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BLOCKCHAIN; POSSIBLE APPLICATION IN BANKING SECTOR A SYSTEMATIC REVIEW OF OPPORTUNITIES AND CHALLENGES

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ABSTRACT

Innovative technologies are game-changing in the financial sector. The new-born technology (blockchain) is promising to change the entire banking system, despite various benefits, critical obstacles still stand. In addition, with an overview of major opportunities and challenges, this study aims to conduct a comparison between theoretical literature and practical literature to point out a contradiction if it exists. More than 130 references (paper studies and links) which were conducted by cryptography and technology experts, academics, financial institutions, and other sectors were used to achieve study aims. A systematic approach conducted to accomplish study objectives; we analyzed results and different point of views on blockchain application in banking globally. The study concluded that blockchain itself may hold strengths and weaknesses in a single aspect such as efficiency and security, while no contradictions were observed between the results on the ground and the theoretical literature. The vast majority of references indicate that blockchain will be the next banking system, which may change the legacy of banking. As it stands, the current blockchain-based applications are capable of operating in individual services, specifically in payment systems and cost operations. Financial companies which provide similar services can take advantage of this technology, especially in cross-border transfers, and this will retract a large share of bank profits in case this technology is not adopted. After all, a full adoption needs more improvement in projects and applications based on this technology.

KEYWORDS: Blockchain, Banking system, Innovative technologies, Challenges, Opportunities.

1. INTRODUCTION

Undoubtedly innovative technologies have changed the financial sector fundamentally, particularly in the new millennia. Blockchain is considered to be one of them, it falls under the category of industry 4.0 revolution which includes technologies such as; cloud computing, internet of things. Blockchain-based technologies promise us major changes in various industries such as healthcare, elections, energy, supply chain management, but most importantly, it might be banking's new story. It is the first decentralized anonymous system which is a cryptographically-connected list of blocks to protect data and secure transactions. The day it was invented, it worked well for producing cryptocurrency, however, using it as a new system in the financial sector is still in the early stages due to resistant limitations such as scalability, regulations, implementing costs, and others. Replacing the current banking approach by new technology attracted academics considerably, in particular, evaluating its benefits and limitations. This study aims to review major benefits and challenges and conduct a comparison between what was published in theoretical literature and facts on the ground (projects and case studies) to address any gap if it exists. By relying on the systematic approach, the study reveals that blockchain might be the new banking approach due to more improvements. In addition, contradictions between theoretical publications and practitioners are minor. However, since blockchain itself has some features that could be beneficial and challenging at the same time such as security, different points of views could be presented.

In this study, we briefly reviewed blockchain concept and history with its major feature firstly. Secondly we explore the theoretical basis based on earlier research to quantify the benefits and challenges both theoretical and practically of using blockchain technology in the banking sector. Thirdly a discussion of results presented and followed by the conclusion and future potential studies on the subject.

2. RESEARCH METHODOLOGY

2.1. Statement of the Problem

Blockchain was behind the emergence of the first cryptocurrency (bitcoin) in 2009. Many

academics expect that it will change many different fields, including global finance, banking particularly. According to Tapscott and Tapscott (2016), blockchain might have the biggest revolutionary effect on financial institutions. Beck and Müller-Bloch (2017) anticipated organizational changes as a result of implementing the new business model. Blockchain-based FinTech has the potential to upend numerous industries (De Soto, 2017). According to predictions, the legacy of banking will undergo fundamental changes in the future, which may present opportunities such as; lower transaction costs, less fraud, greater security, faster processing, transparency and others. However, there are various obstacles in the path of application, including scalability, security, data privacy, regulatory compliance, cost and efficiency, and others.

The opportunities and challenges that blockchain technology presents for the banking industry are extensively covered in academic and official literature. However, the study problem lies in the gap between the theoretical literatures due to the lack of actual outcomes on the ground. Determining whether the theoretical and practical investigations are compatible is thus the study's main challenge. This study will attempt to shed light on practical examples of implementing blockchain in the banking sector to narrow down this gap.

2.2. Research Questions:

According to the problem stated and other issues lied out in the study, the research will attempt to answer the following questions:

1. What is blockchain technology?

2. What are the main opportunities and challenges it holds for the banking sector?

3. Is there any gap between what is published in theoretical literature and the real result of using blockchain in the banking sector in terms of benefits and challenges?

4. Can blockchain be the banking next system?

2.3. Research Significance

The research derives its significance from the novelty of the topic that it deals with, which is blockchain as a banking system, and the impact this technology may have on the banking system. Hassani et al., (2018) argue that blockchain could have extraordinarily influence on the banking sector. With the creative use of blockchain, the global banking sector can save up to 20 billion by the year 2022 (Accenture, 2018). Cai et al., (2019); Guo and Liang, (2016) agree that blockchain technology has the potential to bring about a new revolution, particularly in the banking industry. This indicates that immense change is coming in the banking system; therefore, shedding light on it is essential to stay tuned with the latest technology which may change banking fundamentally. To decide whether to apply blockchain in the banking system or not, we need to address actual results from experiments on the ground.

2.4. Research Objectives

This study depends on the previous literature and facts gained by practitioners, as many banks and financial institutions are using and testing blockchain in separate or individual operations. Relying on the problem of the research and the hypothesis below, this study aims to:

1. Explain what blockchain is briefly.
2. Reviewing the main opportunities and challenges blockchain presents and compares it with practitioner literature on implementing it in the banking sector.
3. Explaining to what extent blockchain is applicable in the banking sector.

2.5. Research Hypothesis

To answer the research questions, we depend on the following hypothesis:

1. There is a contradiction between theoretical literature on blockchain and experiment results on the ground in terms of opportunities and challenges.

2. According to last experiments, there is a high possibility that blockchain will be the banking's new system.

2.6. Data Collection and methodology

We used the systematic approach to construct a theoretical framework. This means collecting and analyzing information from earlier literature. In addition to academic references, and to provide an in-depth review, we used secondary data from numerous references, including journals, articles, books, and websites. Additionally, in order to accomplish our research objectives and perform a fair comparison, we add to the body of literature by illuminating the most recent real-world applications of blockchain in the financial industry as a whole and banking in particular.

2.7. Scope of the research

This research deals with the concept of blockchain technology as a potential system for the banking sector by reviewing its most benefits and challenges. Also, this research focuses on the potential impact of blockchain on the banking sector rather than the technology aspect, which means it's not technological research.

3. LITERATURE REVIEW

An innovative wave of disruptive technologies known as "Industry 4.0" has recently emerged globally and extended across various industries (Hou et al., 2020). One of these technologies is blockchain. Nakamoto, (2008) established the first blockchain as the public ledger for bitcoin transactions. FinTech is currently paying a lot of attention to the blockchain concept (Guo and Liang, 2016). Therefore, the banking sector and other industries consider it to be a next-generation business model. Blockchain represents a significant advance in data storage and information transmission. Palihapytia, (2020) concludes that the best invention after the internet is blockchain. It has the potential to fundamentally alter current financial and economic operating models, spurring a new wave of technological advancements and industrial change in the banking sector (Guo and Liang, 2016). This technology functions as a distributed ledger and is accessible to everyone on the network. Blockchain is inherently safe since it is exceedingly difficult to change or convert data once it has been registered (Reyna et al., 2018). Blockchian is attracting international attention. Since a decade, many countries such as the USA, UK, Japan, China, Thailand, and others have been developing and analyzing possible applications in banking and other domains. International organizations like; United Nations and International Monetary Fund are paying more attention to the new technology. The Public Bank of China considers it as an option. Nasdaq announced in 2015 that they had completed security transactions by using blockchain.

(Zhao et al. 2016; Tandon, et al. 2021) have demonstrated that blockchain application can save businesses money and create new opportunities, both of which will soon increase in size.

According to many scholars and organizations, blockchain insure various opportunities for banking sector such as; reducing costs, security, better KYC, speed of cross-border remittances, transparency, and reducing fraud. (Ullah et al., 2022; Ahluwalia et al., 2020; Accenture, 2018; Bank editorial team, 2018; Nelito, 2018; Krause et al., 2016; FinTech Network; Hassani et al., 2018; Meola, 2017) conclude that using blockchain in banking efficiently could reduce costs such as; money transfer costs, operational costs, KYC costs. It also can enhance security (Garcia, 2018; Business Insider Intelligence, 2017; Nelito, 2018; Guo et al., 2016; Weerawarna et al., 2023; Hoffmann, 2021). Current insufficient process of KYC costs financial institutions about 500 millions of USD annually. As such technology, if implemented wisely, can secure customer data more sufficiently and save banks these immense loses, (Sarnitz and Maier, 2017; Business Insider Intelligence, 2017; Martin, 2018; Patki and Sople, 2020; Cucari et al., 2022). Another advantages of blockchain in increasing transactions speed (Tapscott and Tapscott, 2016; Krause et al., 2018; Harigunami, 2017), and fraud risk reduction (Nelito, 2018; Garg et al., 2020). (Sun et al., 2020) concluded in insurance case study, that blockchain could bring trust and transparency. However, in blockchain implement, transparency is two-sided issue; some consider it an opportunity that information will be available and traceable (Patki and Sople, 2020). While others consider it may undermine the privacy (Chang et al., 2020).

As it stands, notwithstanding, blockchain still encounters a plethora of challenges that obstruct its widespread adoption in the banking industry. The scalability, cost and efficiency, security, and regulation could be the fundamental obstacles of blockchain application. It's observed that blockchain has real transactions capacity issues (Caplen, 2018). Literally, restricted scalability is one of the major issues of blockchain technology (Garg et al., 2020; Schou-Zibell and Phair, 2018; Mafike and Mawela, 2022). Cost and efficiency are other critical issues in the blockchain adoption way (Casino et al., 2019). Cost of energy (Galeon, 2017), and storage (Bloomberg, 2018) are other cost concerns. Meanwhile, security is still both a challenge and opportunity at the same time. Digital signatures, hash functions, and other cryptographic primitives and protocols help to maintain and secure the blockchain system. Security of exchanging information on blockchain is still questionable (Mallesha and Hripriya, 2019). (Garg et al., 2020) state, due to the nature of distributed ledger technology, blockchain security is still a concern. (Hughes et al., 2019; Zhang et al., 2020) addressed similar opinions. However, without a regulatory framework blockchain can't be adopted globally. This is another critical restriction that stands ahead. The decentralized approach is a core feature of blockchain technology, which holds obstacles for financial services and keeps law enforcement out of authorities control (Karamchandani et al., 2020). Therefore,

regulation is required to reap the most benefits from it (Bank of Thailand, 2018).

Based on the literature review above, we will discuss each element in more detail. By choosing these main benefits and limitations and comparing them with what has been achieved on the ground, we can demonstrate a more novel view and draw a clearer picture of the applicability of blockchain in the banking sector.

3.1. What is blockchain?

Blockchain is the technology that served as the foundation for Bitcoin. It's a digital ledger. In 2008, Nakamoto presented Bitcoin on the basis of this new technology. It is a distributed and decentralized ledger made up of a number of interconnected data blocks (Hughes et al., 2019). It's a decentralized database of a decentralized P2P network. It enables payment transactions to take place without the involvement of a third party. It has no central authority (Yoga et al., 2019). There won't be a centralized record of transactions on a blockchain; instead, they will be validated by a network of anonymous users and broadcast to all distributed networks (Chen et al., 2021). It enables smart contracts which are self-executing programs.

According to Economist Magazine, (2021), it's a database that keeps track of the history of the data it was created to hold. Basically, blockchain was primarily created for cryptocurrency transactions like Bitcoin and Ethereum, however, due to its extensive feature set, its applications swiftly grew in a number of industries (Uddin et al., 2022) such as healthcare, energy, and financial services.

Therefore, blockchain can be summed up as a network of decentralized, distributed blocks that store information utilizing digital signatures. It is a trustworthy, decentralized database storage technology that is challenging to utilize fraudulently.

Globally, in the financial sector particularly, blockchain technology is being studied and put into use. It has been established that western developed countries, specifically the US, are where most blockchain investment is concentrated. The main European countries are now interested in blockchain technology. While Russia is cautious of the technology, Australia, Canada, UAE and South Korea aim to employ it to strengthen their systems. On the market, there are a number of blockchain platforms. These platforms, however, differ greatly in terms of their capabilities and features; as a result, decisions should be made with the type and performance needs of the system being designed in mind. Corda, Hyperledger Fabric, Quoram, and Ethereum emerge as the favored platforms for developing blockchain-based systems in banking. These platforms differ in terms of functionality and performance metrics. Ethereum, for example, has been discovered to be "more operationally efficient than Corda (Bank of Canada, 2017). Yet, concerning privacy issues, Corda outperforms Ethereum, while Hyperledger provides stronger data protection. To build a robust system with a unified architecture, these applications must be developed and their weaknesses overcome to suit the global banking system.

3.2. Blockchain Evolution

Following the successful implementation of blockchain technology at the heart of the bitcoin payment system, considerable attention is being paid to the idea of leveraging the technology to create a variety of financial instruments. Today, three major areas of technological growth can be distinguished: blockchain 1.0 is used to implement cryptocurrency, while blockchain 2.0 symbolizes smart contracts and blockchain 3.0 is an application outside of the financial sector that can totally replace financial instruments and alter the course of society's life.

First person to introduce blockchain as a protocol was Chaum in 1982 (Cahum, 1979). Then some scholars attempted to improve the technology. Cryptographically, the chain of blocks is explained by Haber and Storneta, (1991). Yet, Nakamoto, (2008) introduced it as bitcoin based on the modern blockchain. Then, for the first time, blockchain introduced a distributed ledger behind cryptocurrency transactions. It was followed by Ethereum in 2013. In 2015 Hyperledger was presented. After a wide use, and to boost the scalability, security, speed, and efficiency, Ethereum 2.0 came out through 2020-2022.

By time, blockchain's area of use widened and its features extended. The 2009 version enabled bitcoin to come out; it was popular for dealing with cryptocurrencies. 2015 witnessed the development of Ethereum's smart contracts and tokenization. By 2020, blockchain had exploded, since then its market size was growing. It's expected that the blockchain market will touch 40 billion dollars by 2025 (Statista, 2020).

Many sectors are exploiting it to build new data systems, including healthcare, energy, insurance, financial services, and others.

Table (1):- Evolution of blockchain

1982	1993	2008	2013	2015	2020-22
Proposed blockchain as protocol	Described a cryptographically secure chain of block	Bitcoin term of blockchain (public)	Ethereum (public)	Hyperledger (private)	Etherum 2.0

Source: Guo and Yu, (2022)

3.3. Blockchain features

Blockchain's critical features attracted many sectors to use it, yet, some refuse it. Enhanced security, decentralization, transparency, reliability, and anonymity are its special features (Aggarwal and Kumar, 2020). However, not all features are desirable; for example, in some cases transparency undermines privacy.

- Security: it's based on cryptography and consensus principles which secure transactions.
- Decentralization: no responsible authorities. Transactions made without intermediaries.
- Transparency: it's both a benefit and limit. Data is open to the network participants.
- Reliability in data storage: every node stores data as a person individually. Immutability of data recorded is trustworthy.
- Anonymity: your identity is hidden.

Currently, there is pressure on the financial sector to either adopt blockchain as a new banking system or stick with the current one. Some banks use it for individual operations such as payments and transferring money. In addition to banks from all around the world studying the potential uses of blockchain, the trial is being led by the American megabank JP Morgan with the ONYX project. To have a greater understanding of blockchain's usefulness in the banking industry, one must first understand it and consider its advantages and limitations.

4. OPPORTUNITIES AND CHALLENGES OF IMPLEMENTING BLOCKCHAIN IN BANKING SECTOR

4.1. Opportunities of implementing blockchain in banking sector

4.1.1. Reducing transaction cost

All throughout the world, banks are looking at blockchain to improve their services. The advantages it provides motivate the banking industry to switch from the established system to blockchain-based applications. Blockchain holds great promise for the financial industry. The key prospects that blockchain brings for the banking industry are listed in Table 2.

Transactions cost plays a major role in the banking sector. Yet, customers bear the most burdens. By removing intermediaries, transferring money would be cheaper than ever, putting blockchain technology to use eliminating the third-party financial institutions' intermediate role will considerably increase service effectiveness and lower banks' transaction costs locally and internationally. Zhang et al (2020) concluded that blockchain has enormous influence on cross-border payment. E-commerce and self-service technology can reduce transaction costs, according to earlier studies (Meuter et al, 2000) and blockchain proved both theoretically and practically. Additionally, banks will be able to meet the demands for quick and convenient payment clearing services for international business transactions. Furthermore, Blockchain can reduce various types of cost such as business operations and compliance. According to Chowdhury et al (2021), 90% of banks around the world are exploring blockchain and they could save almost $12 billion annually in case of adoption.

4.1.2. Enhancing security

Security is one of the most complicated issues in technology; improving security is a key benefit of blockchain. But, compared to the existing banking system, blockchain can improve the security and take it to higher levels (Achanta, 2018). According to Maiya (2018), implementing blockchain is a vital element for banking security, because all data is kept in a single central database, (Park and Park, (2017). It's secure, immutable (Hameed et al., 2022). According to Moorkattil (2022) it's entirely a unique network, he added that it's impossible to break down the blockchain-technology-based systems, (Mafike and Mewala, 2022) says it's not. However, blockchain security has consequently become popular, and as a result, many banks have implemented this technology as an experiment, specifically in permissioned blockchain.

4.1.3. Know your customer better (KYC)

The prevention of illicit use of financial resources and services such as money laundering and terrorism depends in large part on KYC. By requiring banks to confirm and identify their customers, it was intended to aid in the reduction of money laundering and terrorist activities (Kumar et al, (2020). Collecting customer data is highly expensive. Financial institutions spend

more than $500 million USD annually to maintain KYC. Furthermore, according to IBM, the average cost of any sensitive and confidential personal information breach is $148 and for a huge data breach could be $4 million. (Sarnitz and Maier, (2017) argue that blockchain technology can be quite helpful for KYC if properly applied. The Head of Innovation at Bank of New York Mellon has addressed that blockchcain-based technologies can protect data better than the traditional system. This is due to the fact that using blockchain technology can eliminate the requirement for completing many KYC forms when opening a bank account. By preventing needless duplication of information and requests, blockchain can help banks securely exchange customer information across their organization, streamlining the administrative process.

4.1.4. Faster transactions

Vedapradha and Ravi (2021) believes that disruptive technologies and service delivery quality are strongly correlated. The issue with the speed and cost of money transfers and payment transactions is resolved by the security feature in blockchain technology. It has the potential to speed up money transactions while also enabling banks to run constantly, around-the-clock. Compared to companies like Visa and Paybal, blockchain is still modest (Weerawarna and Shao, 2023), yet it is faster in cross-borders settlements. According to Palihapitiya (2020), it speeds up exchanging value dramatically. (Thommandru and Chakka, 2023; Mafike and Mewala, 2022; Satija and Antony, 2018; Barclays Bank case, 2016) concluded the same.

4.1.5. Transparency

Transparency may undermine privacy and jeopardize it, but it increases trust. (Weerawarna et al, 2023). The blockchain offers peer-to-peer data transmission, pseudonymous transparency, irreversible record keeping, and computational logic. Along with an increase in transaction capacity, transparency is becoming a more crucial factor. The traditional banking system is very secretive, but blockchain technology offers ways to make the entire banking process more secure and transparent by locking records and letting users access all historical data with the option of limiting access to shared transaction ledgers to authorized parties (Sazu and Jahan, 2022; Bank of Montreal, Commerzbank, Caixa Bank and Erst Group (Batavia platform based on blockchain).

Banks can avoid privacy concerns by using permissioned blockchain which are restrictive and private, such as the R3 Corda platform, which only prevents unauthorized persons from accessing the database. It’s not publicly accessible, and you have to ask permission to access. It can reduce or even completely eliminate the requirement for trust in transactions and enable transparent (Kumar et al, 2020; Mafike and Mewala, 2022; Krause et al, 2018; Harigunani; 2017; Ullah et al, 2022; Nath and Bhattasali, 2019; Portilla et al, 2022), and real-time audits. In addition, the transparency provided by the blockchain lowers the likelihood of fraud (Bhattacharjee and Bhattacharya, 2022).

4.1.6. Reduction of fraud

The rise in fraud and cyberattacks is "one of the major challenges facing the banking industry today. Yet, in blockchain, due to decentralized access, harmful or fraudulent activities can be detected immediately Patki and Sople, (2020). Blockchain technologies' authenticity is ensured by their immutability. In other words, once data is entered into the system, it cannot be changed. This prevents the fraud's later issues, but it also suggests that information examination up front ought to be done with greater caution (Guo and Liang, 2016). The network is naturally secure from attacks and accepting of any type of fraud because there is no central authority or server (Sarker et al, 2022). Practicaly proven by the National Bank of Cambodia with the Hyperledger Iroha case, the project involved 16 banks.

Table(2):- List of benefits of blockchain application in the banking sector.

Potential benefits of blockchain application	Theoretical literature	Case studies and bank projects
Reducing transaction cost	Weerawarna et al, (2023), Ullah et al (2022) Mallesha and Haripriya (2019), Palihapitiya (2020), Trivedi et al (2021), Moorkattil (2022), Portilla et al (2022), Ahluwalia et al (2019), Oza (2018), Patki and Sople (2022), Muragi (2018), Guo and Liang (2016). Saidat et al (2022), Iansiti and Lakhani (2017). Laarabi and Chegri (2022), Hassani et al (2018).	Uddin et al (2023), Higgins (2016), Al-Kemyani et al (2022), Hoffmann (2021), Cucari et al (2021), Business Insider Intelligence (2017), Sazu and Jahan (2022) Bank of Dubai case, Marr (2017), Wass (2018) Finastra, R3 Platform banks involved (BNP Paribas, BNY Mellon, HSBC, ING, Natixis and State Street, CIH Bank, IFIC Bank).
Enhancing security	Noyes (2016), Moorkattil (2022), New age of banking summit Europe, Patki and Sople (2020), Ammous (2016), Wu and Duan (2019), Ullah et al (2022), Nath and Bhattasali (2019), Palihapitiya (2020), Portilla et al (2022), Ivan and Olexandr (2022), Golubev (2020), Chowdhury et al (2021), Martino (2021), Hassani et al (2018), Sharma (2020), Singh et al (2021).	Vaganova et al (2019), Al-Kemyani et al (2022), GP Morgan experiment case, Uddin et al (2023), Cucari et al (2021), Minoli and Occhiogrosso (2018), Hoffmann (2021), Li et al (2018), the Commonwealth Bank of Australia, Wells Fargo case (2016), Santander.com: Santander bank case.
Know your customer better	Hassani et al (2018), Kumar et al (2020), Patki and Sople (2020), Chowdhury et al (2021), Saidat et al (2022), Thommandru and Chakka (2023), Kawasmi (2020), Malhotra et al (2021).	Gupta (2018): The State Bank of India, Valkanov (2020) project case of Deutsche Bank, HSBC, Mitsubishi UFJ Financial Group (MUFG), Treasuries of Cargill and IBM, FinTech network Goldman Sachs Report: Case Study 7, Cucari et al, (2021),
Faster transactions	Bhattacharjee and Bhattacharya (2022), Hassani et al (2018), Kumar et al (2020), Mafike and Mewala (2022), Krause et al (2018), Harigunani (2017), Ullah et al (2022), Nath and Bhattasali (2019), Portilla et al (2022), Oza (2018), Chowdhury et al (2021), Thommandru and Chakka (2023). Petrov (2019), Malhotra et al (2021), Singh et al (2021).	FinTech network, Garg et al (2020), Ripple Company (https://ripple.com/), Asian banks case (Satija and Antony, 2018), Barclays Bank case (2016).
Transparency	Ivan and Olexandr (2022), Lowry (2017), Hassani et al (2018), Weerawarna and Shao (2023), Nath and Bhattasali (2019), Bhattacharjee and Bhattacharya (2022), He (2021), Wang et al (2019), Patki and Sople (2020), Weerawarna et al (2023),	Hoffmann (2021), Uddin et al (2023), Sun et al (2020), the Commonwealth Bank of Australia, Wells Fargo case (2016), Tucker (2019) Alior bank case, Sazu and Jahan (2022) Bank of Montreal, Commerzbank, Caixa Bank and Erst Group (Batavia platform based on blockchain.
Reducing fraud	Bhattacharjee and Bhattacharya (2022), Kumar et al (2020), Patki and Sople (2019), Economic Times (2019), Weerawarna and Shao (2023), Nath and Bhatassali (2019), Oza (2018), Garg et al (2020), Trivedi et al (2021), Rahmayati (2021), Martino (2021), Feng et al (2018) Suhel (2023).	Al kemyani et al (2022), FinTech network, Sarker et al (2022), The National Bank of Cambodia with Hyperledger Iroha (16 banks involved) (2019), the Commonwealth Bank of Australia, Wells Fargo case (2016),

Source: Prepared by author

4.1. Challenges of implementing blockchain in banking sector

4.1.1. Scalability

Arguably, scalability is a key obstacle when implementing blockchain in real business environments (Xie et al, 2019). All transactions must be stored on blockchain and be available for validation when a new transaction is created. As a result, only a few transactions may be completed every second (Yang et al, 2018), that means the capacity of transactions is very limited, while there are about 28.45 million banking transactions per day according to (SWIFT). Schou-Zibell, and Phair, (2018) states, restricted scalability is one of the major challenges underlying blockchain technology. But to keep in mind, improvements on blockchain have never stopped; Ethereum 2.0 is an upgrade to the Ethereum network that intends to improve the scalability. There may be an enhanced consensus process in the future generation BCn technology, by applying this consensus technique, BCn networks can complete their transactions in less time (Uddin et al, 2023). Currently, a blockchain can only process 7 TPS, compared to Visa's 30,000 TPS. Furthermore, numerous central banks, like De Nederland's Bank, believe that ledger development is not optimal for current financial transaction infrastructures due to scalability limits for large transactions. Concerns about scalability, combined with high energy consumption, suggest that blockchain is better suited for general banking than mass banking (Sazu and Jahan, 2022).

4.1.2. Costs and efficiency

The efficiency of blockchain is critical in banking (Zheng et al, 2017). Blockchain fairly can cut costs in many individual operations; however, it encounters limitations in traditional systems. Implementing a totally new system will be expensive. According to (Deloitte, 2016) institutions must conduct a thorough cost-benefit analysis before implementing it. There are different points of views on the efficiency of the new system such as efficiency of power consumption, scalability, cost of adopting and changing the traditional banking system, awareness and training of banks teams, and others. While (Gupta, 2018; Gou and Yu, 2022; Hughes et al, 2019; Sigh et al, 2021; Sharma, 2020; Raddatz et al, 2021; Rahmayati, 2021; Thommandru and Chakka, 2023; Garg et al, 2020; Andoni et al, 2019; Ivan and Olexandr, 2022; Palihapitiya, 2020; Ullah et al, 2022; Mafike and Mewala, 2022) concluding that implementing improved blockchain will increase the efficiency of bank operations, this is after overcoming current obstacles. Thus, banks must keep watching blockchain improvement and be ready to adopt it.

4.1.3. Security

One of the issues that received the most attention in the chosen papers was security both as a benefit and as a challenge. Guo and Yu (2022) argue that any software that manages assets must include security as a non-negotiable feature. Due to technological, organizational, and environmental difficulties with interoperability, privacy and security, scalability, legislation, and governance, blockchain adoption is still in its early stages (Mafike and Mawela, 2022). Although blockchain technology is intended to be very secure and to protect the integrity of digital data, it is not immune to cyber security breaches. Blockchains are made up of layers, which add to their attractive qualities while also raising security problems. As more organizations, notably banks, employ permissioned networks, it is critical to understand the security risks associated with the technology. Jean-Pierre Flori, a French expert in cryptography concluded in his paper named (The security and insecurity of blockchains and smart contracts): much advancement must be achieved before this technology reaches a level of maturity and confidence that justifies its use in critical applications; there are several security issues with blockchains and their uses. A defect at any point in the chain can have disastrous repercussions (Flori, 2017). Anonymity is another security concern posed by blockchain. Various issues under security have been discovered, including the 51% attack, wallet security, cryptographic security, and other issues.

4.1.4. Regulations and standards

Blockchain regulations are not well established, which is regarded as a key barrier to blockchain use in banking. According to Achanta (2018), the most significant obstacles to the implementation of blockchain are those related to regulation and compliance, due to the contradiction of countries' attitude toward it. Additionally, when it comes to significant commercial innovations, there has historically been a wait between early implementation and regulatory recognition (Vazquez et al, (2019). Blockchain decentralization and self-governance weaken the concept of regulation and have a significant impact on the existing system. However, any good technology comes with drawbacks. As a result, blockchain regulation is required and should be developed as quickly as possible.

Table(3):- List of challenges of blockchain application in the banking sector.

Potential challenges of blockchain application		Theoretical literature	Case studies
Scalability		Chen and Bellavitis (2017), Kumar et al (2020), Buitenhek (2016), Cocco et al (2017), Palihapitiya (2020), Wong and Wong (2020), Vazquez et al (2019), Hughes (2019), Sedlmeir et al (2022).	Monetary Authority of Singapore, (2017), South African Reserve Bank (2018), Uddin et al (2023), Chang et al (2020), Hoffmann (2021).
Efficiency	Decrease	Cao et al (2019), Zheng et al (2017), Lewis et al (2017), Khadka (2020).	Not found
	Increase	Krause et al (2016), Harigunani (2017), Gupta (2018), Gou and Yu (2022), Hughes et al (2019), Sigh et al (2021), Sharma (2020), Raddatz et al (2021), Rahmayati (2021), Thommandru and Chakka (2023), Garg et al (2020), Andoni et al (2019), Ivan and Olexandr (2022), Palihapitiya (2020), Ullah et al (2022), Mafike and Mewala (2022), Guo and Liang (2016),	Cucari et al (2021), Udin et al (2023).
Security		Zou et al (2021), Chang et al (2020), Muralidhara and Usha (2021), Trivedi et al (2021).	Tsenkov et al (2018), Kalra et al (2018), Zhao (2017), Grubb (2013), Vysya and Kumar (2019) case of stealing $59 million valued Ether from Decentralized Autonomous Organization. , .
Regulation and standards		Lacity (2018), Singh et al (2021), Guo and Yu (2022), Kawasmi (2020), Hassani et al (2018), Trivedi (2021), Portilla et al (2022), Palihapitiya (2020), Mafike and Mawela (2022).	Vysya and Kumar (2019) case of $700,000 penalty on Ripple for AML violation. Regulating blockchain technology is still in a late stage due to its connection to Crypto assets and risks related to these types of assets. (Ibrahim, 2023), yet number of regulators and policymakers focusing on it such as (European Commission, International Monetary Fund, US Federal Reserve, and many others).

Source: Prepared by author

5. DISCUSSION AND RESULTS

Blockchain technology is a game-changing breakthrough that underlying cryptocurrencies such as bitcoin, but it never again restricted crypto assets. Practitioners and researchers have paid close attention to the technology; it has been actively used not just for the creation of numerous new cryptocurrencies, but also for financial services such as digital assets and online payments. The breakthrough technology has the potential to drastically transform many domains, including banking. Despite its suitability for banking services, it nevertheless faces a number of challenges. It has undergone a comprehensive both theoretical and practical literature review. According to the majority of published research and practical cases, using blockchain can save banks billions of dollars annually. Enhancing security which reduces cyberattacks and data breaches, prices are reduced, transactions and money transfers are more efficient, transparency, fraud is reduced, and KYC is more efficient.

On the other side there are several challenges in the way of adopting it in the banking sector. Scalability, security, efficiency, absence of regulation is the main challenges according to reviewed literature. Some are acceptable and others will need a time to be solved. Some scholars mentioned that the security in blockchain is still a challenge rather than a positive feature. Notably, the majority of security issues are related to crypto-based blockchain, and more clearly they are investment cases such as wallets. After all, the security level blockchain provides is much higher than the existing banking system provides. Most importantly, no single banking-related security case found in more than 130 resources reviewed. Although the results found in the theoretical literature are consistent with the actual results of experiments, there are aspects in this technology that still carry a positive and negative character at the same time. There is no

consensus on efficiency of the new system such as efficiency of power consumption, scalability, cost of adopting and changing the traditional banking system, awareness and training of banks teams, and others. In terms of costs, efficiency could be improved by the time; in addition costs of implementing are quite high (Al-Keymani, 2022), but it could be compensated in the future or by saved costs (Garg et al, 2020). More resistant obstacles remain scalability and regulations, in terms of conducting a number of transactions. Blockchain is still far away from companies like Visa and Paybal. Improving the speed is vital in banking operations. However in cross-border remittances, blockchain is more efficient and faster than other technologies.

Indeed banks can't operate without clear standards and regulation. Regulating blockchain technology itself is still unclear. Due to its connections to the crypto assets market many countries try to avoid using such systems (Ibrahim, 2023) insert it in references. As a result, we may infer that the benefits provided by this sort of technology outweigh the downsides, and that the conflict in the references, whether theoretical or practical, is due to the relativity of these issues. In both opportunities and challenges no contradictions are observed between theoretical and practical literature. Therefore, a simple difference in opinions does not imply a contradiction, but rather the presence of various and contradictory features of technology itself. In terms of the banking sector's ability to accept this new approach, we can indicate that the existing obstacles can be overcome in the future through extensive research and development of existing applications based on this technology. In the case of regulation and legislation, the global banking system is intertwined, and the legislation must be worldwide in order to support the integrity of global banking activities. Here we must understand that blockchain-based applications are suitable for banking operations away from cryptocurrencies, which is the fundamental cause for some countries' reluctance to adopt this technology. Thus, we can reject the first hypothesis and accept the second one.

5.1. CONCLUSION

According to the literature, there is a genuine desire to implement blockchain in the banking sector. The quantity of experimental projects conducted by the sector demonstrates this. Therefore, related concerns should be taken into consideration at the right time. Currently, applications and projects built on blockchain technology are suitable for individual operations, which benefits remittance and electronic payment. It is worth noting that some obstacles will be resisting to be solved, yet it's still achievable. It could be concluded that there were no contradictions between theoretical and practical experiments in terms of benefits and obstacles of using blockchain in the banking sector. And to be fully adopted, blockchain needs time and cost for more improvements. Additionally, it should be designed to be fail-safe to minimize system downtime. Future research can be conducted on more technological and technical aspects and various based-on-blockchain applications.

5.2. 7.REFERENCES

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پوختە

تەکنەلۆژیا داهێنەرەکان لە کەرتی داراییدا یاری دەگۆڕن. بلۆکچەینی تازە بەڵێنی گۆڕینی تەواوی سیستەمی بانکی دەدات، هەرچەندە لەگەڵ چەندین سووددا، بەڵام هێشتا بەربەستەکان ماونەتەوە. جگە لە پێداچوونەوە بە دەرفەت و بەربەستەکانی سەرەکی، ئەم توێژینەوەیە ئامانجیەتی بەراوردێک لە نێوان ئەدەبیاتی تیۆری و پراکتیکیدا بکات بۆ ئەوەی ئاماژە بە دژایەتییەکە بکات، ئەگەر هەبێت. زیاتر لە ١٣٠ سەرچاوە (توێژینەوە و لینك) لە شارەزایانی کریپتۆ و تەکنەلۆژیا، ئەکادیمی، دامەزراوە داراییەکان، یان کەرتەکانی دیکە پێداچوونەوەیان بۆ کراوە و بەراورد کراون. ڕێبازی سیستماتیکی لەسەر بنەمای بۆچوونی توێژەرانی پێشوو پەیڕەو کرا بۆ گەیشتن بە ئامانجەکانی توێژینەوەکە. ئێمە ئەنجامە جیاوازەکان و دیدگاکانمان شیکردەوە لەسەر بەکارهێنانی بلۆکچەین لە خزمەتگوزارییە بانکییەکان لەسەر ئاستی کارەکانی بانکی لە سەرانسەری جیهاندا. توێژینەوەکە گەیشتە ئەو ئەنجامەی کە ڕەنگە خودی بلۆکچەین خاڵی بەهێز و لاوازی لە هەمان لایەندا هەبێت وەک کارایی و ئاسایش. لە کاتێکدا بە دەگمەن ئاماژە بەوە دەکرا کە دژایەتی لە نێوان ئەنجامەکەی سەر زەوی و ئەدەبیاتی تیۆریدا هەبێت. زۆربەی زۆری ئاماژەکان ئاماژە بەوە دەکەن کە بلۆکچەین دەبێتە سیستەمی بانکی داهاتوو، کە ڕەنگە میراتی سیستەمی بانکی یەک لە دوای یەک بگۆڕێت. وەک خۆی، بەرنامەکانی ئێستا کە لەسەر بنەمای بلۆکچەین دامەزراوە توانای کارکردنیان هەیە لە تاکە خزمەتگوزارییەکان، بە تایبەتی لە سیستەمی پارەدان. کۆمپانیاکانی حەواڵەکردن دەتوانن سوود لەم تەکنەلۆژیایە وەربگرن، بەتایبەتی لە گواستنەوەی سنوور بەزاندن و بانکەکان بەشێکی زۆر لە قازانجەکانیان لەدەست دەدەن ئەگەر ئەم تەکنەلۆژیایە وەرنەگیرێت. لە کۆتاییدا، سەپاندنی تەواو پێویستی بە باشترکردنی زیاترە لە پرۆژەکان و بەرنامەکاندا کە لەسەر بنەمای ئەم تەکنەلۆژیایە دامەزراوە.

وشەی سەرەکی: بلۆکچەین، سیستەمی بانکی، تەکنەلۆژیای داهێنەرانە، دەرفەتەکان، بەربەستەکان.

الخلاصة

تغير التقنيات المبتكرة قواعد اللعبة في القطاع المالي. تعد البلوك جاين حديثة الولادة بتغيير النظام المصرفي بأكمله ، على الرغم من المحاسن الكثيرة ، لا تزال العقبات قائمة. بالإضافة إلى استعراض الفرص والتحديات الرئيسية ، تهدف هذه الدراسة إلى إجراء مقارنة بين الأدبيات النظرية والأدبيات العملية للإشارة إلى التناقض إن وجد. أكثر من 130 مرجعًا (دراسات وروابط) التي تم إنجازها إما بواسطة خبراء التشفير والتكنولوجيا أو الأكاديميين أو المؤسسات المالية أو القطاعات الأخرى تمت مراجعتها ومقارنتها. تم اتباع المنهج المنظم المعتمد على آراء الباحثين السابقين لتحقيق أهداف الدراسة ؛ قمنا بتحليل النتائج ووجهات النظر المختلفة حول تطبيق البلوك جاين في الخدمات المصرفية على مستوى العمليات المصرفية حول العالم. خلصت الدراسة إلى أن البلوك جاين نفسها قد تحتوي على نقاط قوة ونقاط ضعف في ذات الجانب مثل الكفاءة والأمان. بينما نادراً ما لوحظ وجود تناقضات بين النتيجة على أرض الواقع والأدب النظري. تشير الغالبية العظمى من المراجع إلى أن البلوك جاين سيكون النظام المصرفي التالي ، والذي قد يغير إرث الأنظمة المصرفية المتعاقبة. كما هو الحال ، فإن التطبيقات الحالية القائمة على البلوك جاين قادرة على العمل في خدمات منفردة مثل أنظمة الدفع. يمكن لشركات الحوالات الاستفادة من هذه التقنية خاصة في التحويلات عبر الحدود وهذا يخسر البنوك جزء كبير من أرباحها في حالة عدم اعتماد هذه التقنية. في النهاية ، يحتاج التبني الكامل إلى مزيد من التحسين في المشاريع والتطبيقات القائمة على هذه التكنولوجيا.

الكلمات الدالة: البلوك جاين, النظام المصرفي, التكنولوجيا المبتكرة, الفرص, التحديات.