The critical success factors (CSF) of blockchain technology effecting excel performance of banking sector: Case of UAE Islamic Banks

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C H R O N I C L E	**A B S T R A C T**
	The present study aims to examine the implementation of Blockchain Technology within the financial sector, with a specific emphasis on its acceptance by Islamic banks operating in the United Arab Emirates (UAE). In the context of a technologically advanced period that necessitates expeditious and safe transactions, blockchain emerges as a viable remedy by obviating the need for intermediary entities and augmenting the velocity and security of transactions. This study uses Partial Least Squares Structural Equation Modeling (PLS-SEM) to investigate the important success aspects of technology and its influence on the performance of Islamic banks. The findings of this study are of particular importance, as they demonstrate the considerable impact of Investment Willingness on Financial Resources. Additionally, the study highlights the crucial role played by Organizational Culture and Leadership Support in fostering readiness for adoption. This study serves as an initial step towards the wider use of blockchain technology in the financial industry, with a particular focus on its application within Islamic banking institutions.

1. Introduction

The usage of technology is increasing rapidly. It has an impact on people's lives and modifies the way they learn, think, and communicate. Technological innovations have resulted in significant shifts in society, and among these innovations is Blockchain technology. Blockchain technology has emerged as a significant and noteworthy technological innovation in recent times (Hazgui Samah, 2018). Blockchain is a decentralized and secure database system initially presented in 2008 by Nakamoto. It is made up of transaction blocks that may be checked and certified without the requirement for a centralized authority (Akcora et al., 2022). Blockchain technology has recently reshaped industries by providing a wide range of applications in different fields like business, finance, insurance, government, and education. Many success factors have boosted the uniqueness and appearance of Blockchain Technology above other technologies. This technology has never previously been applied in Islamic banking. As a result, the focus of this research will be on the application of Blockchain technology in Islamic banks and the influence of Critical Success Factors (CSFs) on them, specifically in the UAE, because the UAE is constantly seeking progress and advancement, particularly in the application of the best and latest technologies, and this will facilitate and enhance its application, and the application of this technology will bring great success and benefit not only to Islamic banks but also to the UAE as a country.

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1.1 Research problem

When we want to transfer money or assets, we must go to a bank or have a third party do it for us, and we must wait a long time, possibly hours or even days. Furthermore, transportation will be expensive. All of this is regarded as an obstacle in our day. We live in a fast-paced and evolving era, and as a result, we want technology that will assist us in overcoming all the challenges that we encounter; thus, the concept of blockchain emerged. therefore, we decided to research and focus on this technology because it has many incentives, the most important of which are that it encourages trust and partnership working, improves effectiveness and sustainability, reduces expenses, improves confidentiality and security, provides significant technological advancement, expands speed and productivity, and allows individuals to complete financial transactions without the involvement of a third party, and enables individuals to complete financial transactions without the involvement of a third party; as a result, it saves a significant number of hours, which is our most important component.

1.2 Research Importance

The significance of this study is derived from the following key points:

1) There are no studies on the implementation of Blockchain technology in Islamic banks in the UAE, hence it is regarded as a unique study and a pioneering issue.

2) The blockchain will encourage and accomplish enormous success and a quantum jump in the implementation of this technology in Islamic banks.

3) The implementation of this technology will be critical in our contemporary day since we are experiencing a technological revolution unlike witnessed in past years.

1.3 Research Aim

1) Explain the concept of Blockchain Technology.
2) Investigate the critical success factors (CSF) of Blockchain Technology.
3) Study the impact of using Blockchain Technology by technology.
4) Discuss the performance of Islamic banks in the UAE.
5) Examine the Blockchain Technology performance in Islamic banks in the UAE.
6) Explain the study's results and recommendations.

2. Theoretical framework

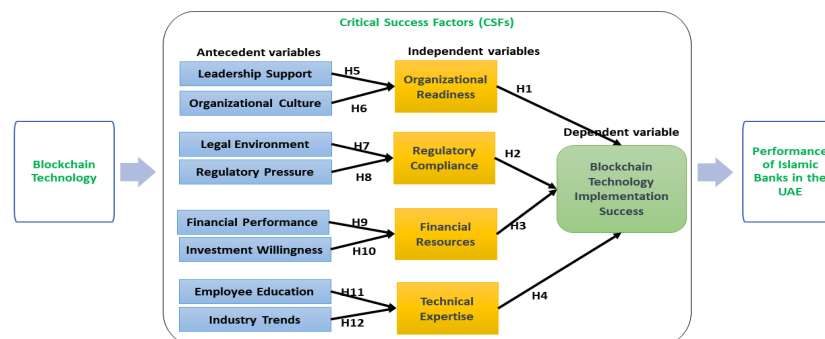Fig. 1 shows the structure of the proposed study of this paper.

Fig. 1. Theoretical research framework

2.1   Blockchain Technology

2.1.1   Brief History and Development of Blockchain Technology

Technology has advanced fast during the last few decades (Ahmed et al., 2019). More than ten years have passed since Satoshi Nakamoto wrote his famous paper titled "Bitcoin: a peer-to-peer electronic cash system," which laid the groundwork for blockchain technology (Wang et al., 2019, p. 370). Since Satoshi Nakamoto's paper initially suggested the notion of blockchain, it has rapidly advanced from a prototype concept to a hot technology in the last decade (Zou et al., 2020). Blockchain is a popular term on the internet. Blockchain provides a decentralized and secure framework for storing data and transferring money. Its applications are emerging in a variety of fields (Zhou et al., 2020; Zou et al., 2020).

2.1.2 The Concept of Blockchain Technology

Blockchain is gaining traction across a variety of industries, including entertainment, retail, philanthropy, automotive, and healthcare (Cole et al., 2019; Huang et al., 2022; Liu et al., 2020). In 2008, Nakamoto released a fundamental paper on Blockchain technology. Following that, Blockchain research and applications began to develop in a variety of fields (Clohessy et al., 2019; Huang et al., 2022; Pazaitis et al., 2017; Saberi et al., 2019; Zhou et al., 2020). One of the most common definitions of the Blockchain, which was created by Golosova and Romanovs (2018) and Tapscott and Tapscott (2017) is that it is "the Blockchain is an incorruptible digital ledger of economic transactions but virtually everything of value" decentralized, irre-producible digital ledger of economic activity that may be used to record nearly any exchange of value, not just money. A block on a blockchain is a group or collection of information. The information is added to a blockchain block by linking it with other blocks in chronological sequence, resulting in a chain of blocks linked together. In general, blockchain refers to a safe, exchanged, distributed ledger containing a list of transactions that cannot be modified without getting permission (Zhang et al., 2022). Blockchain technology development and application depend on technological readiness (Hastig & Sodhi, 2020; Huang et al., 2022; Treiblmaier & Beck, 2019).

2.1.3 Components of Blockchain Technology

1-Asymmetric Key Cryptography

For the blockchain to operate securely, the blockchain network makes use of public key cryptography. Users must have a digital wallet, which functions like a bank account and is secured with the user's private key and be able to access it in order to conduct any exchanges other than those that take place on the same platform. using the private key that was used to create the proper signatures (Navadkar et al., 2018; Puthal et al., 2018).

2-Transactions

Peer-to-peer information sharing, and trade are made possible by Blockchain. Files carrying transfer data from one node to the other, created by a source node and broadcast to the entire network for verification, are used for this exchange (Navadkar et al., 2018; Puthal et al., 2018).

3-Consensus Mechanism

When nodes start sharing and exchanging data via a blockchain platform, they lack a central authority to control and settle disputes, protect against security breaches, and provide a means to monitor the movement of cash and assure an impenetrable exchange to prevent fraud (Puthal et al., 2018).
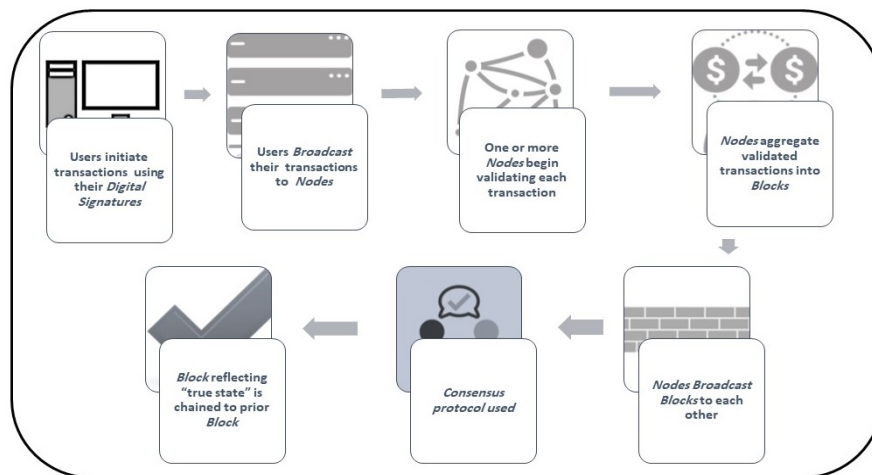
Fig. 2. Working of Blockchain Technology (Navadkar et al., 2018; Puthal et al., 2018)

2.1.4 The Benefits of Blockchain Technology

It is often said that blockchain is a "trustless" network, not because business partners need not trust each other, but because they don't need to. Increasing security, transparency, and traceability are the reasons behind this trust. Furthermore, blockchain provides many business benefits, including speed, effectiveness, and automation, which can lead to significant cost savings. By reducing errors and paperwork, blockchain decreases overhead and transaction costs significantly. It also minimizes or

eliminates the need for third parties or intermediaries in order to verify transactions (Al-Jaroodi & Mohamed, 2019; Atlam et al., 2018; Clohessy et al., 2019; Mohammed et al., 2023; Puthal et al., 2018).

2.1.5   *Blockchain Technology Functions*

Blockchain is an innovation of technology that enables users to transfer, maintain, and confirm the information contained in a transaction ledger that is transferred among different users. To put it another way, blockchain is a decentralized transaction and data management system that doesn't need participant trust or data control by a third party (Abou Jaoude & George Saade, 2019). The blockchain offers a secure way to exchange any good, service, or transaction. The security, durability, and efficiency of systems are being regarded from an entirely new perspective because of the most recent blockchain development (Ahram et al., 2017).

2.1.6   *Who can benefit from Blockchain Technology?*

Habib et al. (2022) examine the sectors that will benefit from blockchain technology: banking, finance, healthcare, cyber security, supply chain management, non-profits, and government. For instance, using Blockchain Technology can help governments operate smarter and develop more quickly. In addition, Secure data exchange between individuals and authorities may boost confidence while providing an immutable audit trail for regulatory compliance, contract management, identity management, and citizen services (ALaroud et al., 2023, Navadkar et al., 2018). Also, Alaeddin et al. (2021) found that blockchain was being used innovatively in Islamic financial institutions such as Waqf, Zakat, and Sukuk.

2.1.7   *Potential Applications of Blockchain Technology*

Recently, there has been a sharp increase in interest in Blockchain applications for organizational and commercial goals in both academics and businesses (Kummer et al., 2020). The key benefits of blockchain include no intermediary involvement, an efficient and transparent procedure, minimal cost, and great data security. Based on the features listed above, blockchain has a wide range of applications.

2.1.8   *Financial Industry*

Using blockchain technology, financial transactions can be securely recorded. No entity participating in the chain can modify this registry after it has been added to the chain. Moreover, it can perform collective checks and verifications to validate transactions. Digital currencies, shares trading, financial settlements, and other financial applications benefit from these two characteristics (Al-Jaroodi & Mohamed, 2019). Blockchain Technology is being used in a wide range of financial industries, including business services, financial asset settlement, prediction markets, economic transactions, and other financial applications that benefit from these two characteristics. (Nawari & Ravindran, 2019).

In Business, instead of the time-consuming sequential verification method, using Blockchain Technology can speed up company transactions by receiving many approvals at once with the least amount of monitoring needed. In addition, Insurance companies can use Blockchain Technology to automate insurance claims, eligibility checks, and privilege execution. Greatly reducing the burden of insurance agents who are responsible for manually reviewing and cross-referencing insurance claims with real data, this would be advantageous in terms of cost savings. Fraud and phony claims would also be eliminated (Nawari & Ravindran, 2019). while in Public Sectors, Blockchain Technology has many potential uses in the public sector, including facilitating openness with non-profit organizations and managing medical data, voting and identity, land registration and property monitoring, transportation, disaster management, and real estate monitoring (Navadkar et al., 2018; Nawari & Ravindran, 2019).

Although Academia addressing the issues of vulnerability, security, and privacy in any learning context (Mbaidin, 2023), the Blockchain Technology program may provide a safe system for storing educational data records about students and teachers (Navadkar et al., 2018; Nawari & Ravindran, 2019). Now, Blockchain Technology is being used for implementing IOT, intelligent manufacturing, supply chain administration, digital asset agreement, and other sectors in many domains (Navadkar et al., 2018). As a result, many businesses have already begun to apply this technology or plan to implement it in order to improve their company's quality (Zhang et al., 2022).

2.2   *Performance of Banks and Islamic Banks in the UAE*

Banks, like other financial intermediaries, play an important role in the economy, according to (Hornuf et al., 2021). by channeling cash from surplus units to deficit units. They coordinate the various requirements of borrowers and lenders who are unfamiliar with and distrustful of each other. The banking industry is diverse and includes areas such as central banking, investment, corporate, commercial, retail banking, and so on, each with its own business strategy and performance goals (Dashkevich et al., 2020). An Islamic Bank seeks to fulfill four goals: Islamic, economic, social, and ethical (Kaakeh et al.,

2019; Taufik et al., 2023). In Islam, Islamic banking or Islamic finance refers to the process of conducting financial transactions according to Shariah (Islamic law). Its two most important concepts are sharing profit and loss and restricting lenders and investors from collecting and paying interest (Rahmayati, 2021). In addition, Tabash & Anagreh, 2017 note that Islamic banks have had a major impact on the growth of Middle Eastern economies and investments. For instance, Dubai Islamic Bank (DIB) is one of the oldest banks in the UAE. DIB was established on 15 September 1975, and with the establishment of Dubai Islamic Bank, the first-ever private Islamic bank, Islamic banking began to develop in the United Arab Emirates among privately held institutions (Kaakeh et al., 2019). Until today the DIB is one of the leading Islamic banks in Dubai. Dubai Islamic Bank (DIB), the largest Islamic bank in the UAE and the second-largest Islamic bank in the world had announced that it had become an official member bank of UAE Trade Connect (UTC). UTC is the first commercialized blockchain platform of its kind in the UAE built on advanced technologies; launched commercially on 19 April 2021, the platform was co-created by Etisalat Digital, seven leading UAE banks, and Avanza Innovations (Dubai Islamic Bank, 2021). This further development demonstrates that Islamic banking has played and will continue to play an essential role in the economy of this country.

2.3 Critical Success Factors of Blockchain Technology

Critical Success Factors (CSFs) are characteristics, factors, conditions, or variables that have a major influence on a business's performance, and they must go right to achieve successful outcomes (Çaldağ & Gökalp, 2020). Government and institutional support are essential for blockchain implementation (Navadkar et al., 2018). Without such outside assistance, enterprises are left to shoulder the risks on their own and are more likely to sluggishly adopt modern technology. Another key aspect of the deployment of blockchain is its guaranteed dependability (Heston, 2017). A system that incorporates new technologies frequently experiences issues with security and trust. To provide security and confidence to the parties involved, blockchain security technology is created to execute transaction procedures that are hindered by encryption methods. Another aspect of blockchain implementation success that has been observed is accessibility (Yadav & Singh, 2021). This implies that there should be enough number of blockchain solution providers to address the issues that arise in the client companies. Additionally, the development of a blockchain ecosystem within the sector is a success factor. It is acknowledged that one of the key factors in the adoption of new technology is the managers' and owners' engagement. As blockchain is a relatively new technology, senior management must support its deployment through a variety of strategies, including showing commitment, assisting the team in overcoming challenges and encouraging the team (Zhou et al., 2020).

2.4 Blockchain Technology with Performance of Banks and Islamic Banks in the UAE and the Critical Success Factors for the Implementation of this technology

Blockchain is a revolutionary technology that has attracted the interest of central banks, as well as a technology with enormous innovative potential (Dashkevich et al., 2020). According to Ben Dhaou and Rohman (2018) there is a critical view that this technology is being pursued considering economic crisis and as an alternative to monetary tools which are proving inadequate, as well as showing signs of obsolescence. The UAE is one of the countries that has taken the lead in using blockchain technology, with a goal of shifting 50% of government transactions to blockchain platforms by 2025 (Angelis & Da Ribeiro Silva, 2019; Salim et al., 2022).

2.5 Critical Success Factors for Implementing Blockchain Technology in Islamic Banks in the UAE

2.5.4 Organizational Readiness

According to Weiner, 2020 readiness may be defined as an organization's or a person's intention to have an active role in organizational growth. Measuring the level of readiness of stakeholders to deal with new technology is an essential component that contributes greatly to the effective adoption of this technology (Alami et al., 2020; Balasubramanian et al., 2021; Miake-Lye et al., 2020). As a result, organizational readiness is regarded as one of the determinants of the success of blockchain technology implementation in banks. The more rapidly banks in the UAE have the capability to adopt new technologies, the greater the chance of successful implementation of this technology. Wang et al. (2020) and Weiner (2020) explain that the psychological and behavioral preparedness of organizational members to execute change is characterized as organizational readiness for change. To implement change, an organization must be psychologically and behaviorally prepared. It has been proven that organizational readiness assessments are important tools for achieving successful implementation (Miake-Lye et al., 2020). A study done by Clohessy et al., 2018 indicated that the presence of appropriate organizational readiness in terms of the availability of financial and staff resources, as well as access to information technology (IT) infrastructure, has a beneficial impact on a company's choice to use blockchain. Therefore, the excellent regulatory readiness that banks in the UAE contain is an important success factor motivating the implementation of the blockchain.

2.5.5 Leadership Support

T. Wang et al., 2020 said that leaders play a strategic role in the process of organizational development and that numerous studies have been undertaken to demonstrate the function of leaders in a successful transition. The support of the organization's leaders has a significant impact on the success of organizational transformation (Wulandari et al., 2023). The leader's job in

organizational transformation is to promote change (Muafi & Azim, 2019). As noted by Wulandari et al., 2023, leadership style influences group dynamics and member interaction, which influences organizational readiness to change. The better leaders manage strategy, culture, and several other elements in the business, the more smoothly change management will function and employees' readiness to change will rise. whether banks or Islamic banks in the UAE organizational members are more likely to commence change implementation, continue in the face of challenges or failures, and participate in cooperative or even championing behavior in support of the change effort when organizational readiness is strong in terms of leadership support (Weiner, 2020).

2.5.6   Organizational Culture

Every company has a unique character defined by its community and technology has become a critical component of organizational operations and a key driver of innovation and competitiveness (Silas Nzuva, 2019). Organizational culture encompasses shared values, beliefs, norms, and behaviors that influence interactions and decision-making among members (Ertosun & Adiguzel, 2018; Rasak, 2022; Williams et al., 2022). Shamnad Shamsudin & VP Velmurugan, 2023 said in their research that it is essential for companies to foster a positive organizational culture to achieve their strategic goals and maintain competitiveness in today's corporate world. Financial institutions must create a digital culture by adapting their organizational culture to keep up with the advancement of technology if they want to succeed (Çetin Gürkan & Çiftci, 2020). The UAE's conventional and Islamic banks face similar challenges and opportunities when it comes to incorporating blockchain technology. However, their unique organizational cultures and values will play a critical role in shaping their approach to adoption (Alam et al., 2019). Alam et al., 2019; LACASSE et al., 2018 said that given the distinctive characteristics and principles of Islamic finance, the impact of organizational culture on the successful implementation of blockchain technology in UAE Islamic banks can be particularly significant.

2.5.7   Regulatory Compliance

The use of blockchain for regulatory compliance has been widely discussed in peer-reviewed literature. Researchers propose that financial regulation should be enhanced by automating required regulatory reporting or by establishing an algorithmic rule-following monetary authority on the blockchain. This would make embedded oversight easier, lowering legal concerns and discouraging regulatory arbitrage (Dashkevich et al., 2020). According to Salim et al., 2022, the system requirements for innovative products change often during the implementation phase due to a lack of prior experiences and historical data, this necessitates an effort on regulatory compliance from banks to significantly boost the success and perfection of this technology. The banking industry is heavily regulated, because it is such an important part of modern economies (Chinyanya, 2023). Alisherovich & Buron Ugli, 2023 said that a banking's internal control system plays an important role in safeguarding assets, ensuring compliance with laws and regulations, and enhancing the accuracy and reliability of financial reporting. Achieving compliance with rules for settling disputes, identifying regulators, maintaining records, paying taxes, and reporting are important considerations (Charles et al., 2019). Blockchain technology in Islamic banks will have a greater chance of success if laws, regulations, and rules of Islamic banks are developed and organized very well.

2.5.8   Legal Environment

According to Dubey (2023) and Zulfikri et al. (2023) regulation compliance is becoming increasingly important for commercial and financial institutions, which is imperative for their compliance with various laws, rules, and regulations. The adoption of Blockchain technology by banks, including Islamic banks, is possible with the support and confidence of a favorable legal environment (Minaz et al., 2022). Ali et al., 2019 clarified in their research that it is crucial to have clear and adaptive regulations, data privacy protections, and compliance measures to ensure that Blockchain is used in a secure and compliant manner in the financial sector while supporting financial inclusion and innovation. Ali et al., 2019; Jamaruddin & Markom, 2020; LACASSE et al., 2018 explain in their research that specifically the implementation of any technology such as Blockchain technology in Islamic banks needs strong regulatory work to ensure compliance with Shariah law.

2.5.9   Regulatory Pressure

One of the key drivers behind the formulation of policies that minimize fintech risks and enhance the quality of services provided by these technological systems is regulatory pressure (Ali et al., 2019; Khayer & Alam, 2022). Ali et al., 2019 also explained in their research that in the finance industry regulatory pressure is important because the volatile regulatory environment continues to introduce new regulations in Financial Technoology (FinTech). Therefore, it is necessary to keep up with regulations continuously by banks and Islamic banks in the UAE, as this will enhance the implementation of Blockchain Technology in a highly effective manner. In a young industry, financial assets will grow at a rapid rate, and to achieve this growth, governments must have a clear vision, a strong regulatory framework, and an immense human resource base (Rusydiana, 2018). According to (Albayati et al., 2020; Ali et al., 2019; Dubey, 2023) , regulatory frameworks are established by the government to monitor and ensure that technology service providers and consumers fulfill their commitments and prevent any violations.

2.5.10   Technical Expertise

Technology readiness refers to the capability of the organization to adopt new technology, and its ability to benefit from it (Alharbi & Sohaib, 2021). As technology advances, Blockchain Technology operators benefit from lower costs, economies of scale in collecting and manipulating large amounts of data, and more secure transmission of information (Vives, 2017). The goal of the technical readiness level is to recognize the technical maturity measurements of performance, reliability, durability, and operational experience in the anticipated environment (Salazar & Russi-Vigoya, 2021). It is critical to have a comprehensive understanding of the technological readiness that might inspire and promote the successful adoption of Blockchain Technology. Technical advancements need to be encouraged, even only temporarily, since they will benefit from them and boost profitability (Sgroi, 2022). Key aspects influencing the adoption of IT innovation include required expertise with a perceived comparative value that fits and integrates with existing technology (Chinyanya, 2023). The organization's view looks at the elements that affect a company's adoption of innovative technologies, such as its leadership, size, concentration of expertise, readiness, and resource allocation policies (Clohessy et al., 2019).

2.5.11   Employee Education

Evalina et al., 2023 emphasizes that knowledge is a vital source for individuals and organizations in the face of the time frame of globalization, which is defined by competition, human resources are necessary to have comprehensive knowledge. Knowledge becomes a possible source for achieving the desired results. The knowledge that supports work and a willingness to enhance work are indicators that impact knowledge (Altarawneh et al., 2023). Employees in the banks and Islamic banks in the UAE must have skills, according to (Atlam et al., 2018; Chang et al., 2020; Evalina et al., 2023), and the indications that impact skills include having technical expertise in the subject of work to be handled, having the capacity to detect difficulties, and having the ability to discover solutions to problems. Also Evalina et al., 2023 said that technical skill refers to someone's proficiency in the creation of procedures such as rapid calculation, computer operation, and so on. All these factors affect employee education positively the technical expertise and thus this enhances the implementation of Blockchain Technology in banks and Islamic banks in the UAE.

2.5.12   Industry Trends

As the banking and finance industry becomes more competitive, digital transformation is rapidly expanding in scope (Aysan et al., 2022). Cole et al., 2019; Noor, 2022 clarified in their research that staying up to date with the latest advancements in blockchain technology is crucial for banks to maintain their competitive edge and ensure successful implementation in their operations. The use of blockchain technology by banks in the UAE is significantly influenced by current industry trends, regardless of whether they are conventional or Islamic banks. Investing in Blockchain Technology would make an organization's processes more efficient and give them a competitive advantage over non-adopters (Noor, 2022). In order to be successful, banks need to stay up to date with these trends and customize their blockchain strategies to meet the changing needs of the market, regulatory policies, and technological advancements (Khalil et al., 2022). By embracing these trends, there is a better chance of executing a successful blockchain implementation that benefits both the institutions and their customers (TRAUTMAN, 2019).

2.5.13   Financial Resources

The cost of technology implementation is regarded as one of the most important elements influencing the feasibility of technology adoption and the desire to use it (Salim et al., 2022; Scherer et al., 2019; Setiawan et al., 2021). These expenses include both direct expenditures like hardware, software, and installation as well as indirect costs like staff training, technological development, and the cost of transitioning from the present system to one that employs the new technology (Salim et al., 2022; Upadhyay et al., 2021). The cost of implementing blockchain in banks is high, but the benefit of implementing this technology is greater than the cost of its creation (Chen et al., 2021). Therefore, financial resources are an important success factor that enhances the implementation of blockchain technology.

Platforms that use blockchain technology offer banks attractive features, such as higher barriers to data corruption and building trust with heterogeneous business partners (Osmani et al., 2021). Although it is crucial for Islamic Banks to yield substantial and sustainable revenue (Mbaidin et al., 2023), due to the large investment they make in developing blockchain-based applications (Chen et al., 2021; Vives, 2017). Another crucial aspect of implementing Blockchain Technology in Islamic Banks is that saving a lot money expenses (Osmani et al., 2021). To reducing, the number of employees because this technology will replace the old process and the paperwork, and all these transactions will become through this technology which is also a good point that stimulates the application of the Blockchain Technology in the Islamic Banks in the UAE. Blockchain Technology requires a large capital investment, but the benefits will extend not only to Islamic banks but also to bank users and the country's development (Chen et al., 2021).

2.5.14 *Financial Performance*

The impact of technology on the financial sector is highly notable, as highlighted by (Aysan et al., 2022). The banking industry is more likely to adopt innovative technologies like blockchain when it has strong financial performance. Numerous studies, including those conducted by (Dai & Vasarhelyi, 2017; Gazali et al., 2017; Ølnes et al., 2017), have demonstrated that blockchain technology substantially improves various aspects of financial services, including loan management, governance, general services, and auditing. These studies have also highlighted multiple advantages of the use of this technology, such as the enhancement of financial infrastructure and the optimization of systems. In particular, its influence is significant in the banking sector, leading to enhanced economic growth, as shown by (Garg et al., 2021; Lu et al., 2019). A strong financial performance provides the necessary foundation and resources for banks and Islamic banks to successfully implement and sustain blockchain technology (Khalil et al., 2022).

2.5.15 *Investment Willingness*

Investment willingness is absolutely essential to ensure that there are enough financial resources available for the development of blockchain technology in both Islamic and traditional banks (Ayedh et al., 2021). Investment readiness refers to the preparedness and willingness of an organization to allocate the necessary resources, both financial and non-financial, to successfully implement and sustain blockchain initiatives (Fuller & Markelevich, 2020; Patsavellas et al., 2021). The robust investment abilities of both traditional and Islamic banks can strongly encourage the adoption and implementation of blockchain technology in the financial industry, resulting in increased efficiency, transparency, and innovation while maintaining compliance with regulatory and ethical standards (Sternberg, Hofmann, & Roeck, 2021). In another way According to Chang et al., 2020 Blockchain is a highly attractive option for both traditional and Islamic banks due to its ability to attract increased attention and investment opportunities from shareholders. So the willingness of traditional banks as well as Islamic banks to invest in blockchain technology can create a positive impact on its deployment (Ali et al., 2019; Panjwani & Shili, 2020).

3. Research Method

The study employs a quantitative methodology, specifically adopting a cross-sectional survey design to gather primary data from workers working at three Islamic banks located in the United Arab Emirates. The primary objective of this study is to comprehensively examine the various aspects that influence the effective adoption and integration of blockchain technology within organizational contexts.

3.1 *Objective*

- To analyze the role of leadership, organizational culture, and other antecedents in facilitating blockchain technology adoption.
- To examine the impact of organizational readiness, regulatory compliance, financial resources, and technical expertise on blockchain implementation.
- To evaluate how perceived usability mediates the relationship between independent variables and the successful implementation of blockchain technology.

3.2 *Sampling Technique*

This study first gathered a total of 332 survey responses to evaluate the parameters that influence the effective adoption of blockchain technology in Islamic banks within the United Arab Emirates (UAE). Out of the total replies received, a total of 265 responses were validated and deemed suitable for further analysis. This rigorous selection process ensured that the sample size was sufficiently robust to effectively evaluate the research issues at hand. The research utilized a convenience sample method, primarily focusing on individuals engaged within the banking sector who possess a certain degree of knowledge and experience with blockchain technology. The utilization of this particular sampling methodology facilitated expedited data acquisition, while concurrently providing valuable insights into the perspectives and attitudes of personnel who are more prone to engage with or be influenced by the technology in question.

3.3 *Data Collection*

In order to gather data, a structured questionnaire was utilized, consisting of various parts intended to elicit responses on a Likert scale spanning from 1 to 5. The questionnaire underwent a thorough review procedure, overseen by a domain expert, in order to ascertain its validity and reliability. Following completion, the poll was distributed across several online platforms, including professional networking sites like LinkedIn, as well as internal communication channels inside the Islamic banks specifically focused on in the United Arab Emirates (UAE). The purpose of employing a multi-channel approach was to optimize response rates and get a diverse range of viewpoints from employees with varied degrees of experience with blockchain technology.

The demographic composition of the 265 participants offers significant insights into the contextual framework of the study. Table 1 shows the sample exhibited a largely masculine composition, accounting for 70.2% of the participants, while females constituted a lower proportion of 29.8%. In terms of age distribution, the most prominent cohorts were individuals between the ages of 25 and 34, constituting 41.5% of the population, followed closely by those aged 35 to 44, accounting for 42.3% of the total. This implies a concentration on a relatively younger audience that may possess greater proficiency in technology. Regarding the participants' educational background, it is noteworthy that a significant proportion of respondents possessed either a Bachelor's Degree (40.4%) or a Master's Degree (41.9%). This finding highlights the high level of education among the sample. The sample had a diversified distribution in terms of position, with 35.5% representing mid-level employees, 38.5% representing senior-level employees, and 23.4% representing executive-level employees. This composition allowed for a comprehensive understanding of the banking sector across various hierarchical levels. In relation to the participants' level of experience, most of the respondents (54.7%) reported having accumulated 1-5 years of experience in the sector. This perspective holds particular significance for individuals who are relatively new to the industry. The inclusion of a wide range of demographic data in this study enhances its richness by ensuring that the findings accurately represent a diverse array of experiences and perspectives within the Islamic banking sector of the United Arab Emirates.

3.4 Study Model and Hypothesis

- **Antecedent Variables**: Leadership Support (ORLS), Organizational Culture (OROC), Legal Environment (RCLE), Regulatory Pressure (RCPP), Financial Performance (FRFP), Investment Willingness (FRIW), Employee Education (TEEE), Industry Trends (TEIT).
- **Independent Variables**: Organizational Readiness (OR), Regulatory Compliance (RC), Financial Resources (FR), Technical Expertise (TE).
- **Dependent Variables**: Blockchain Technology Implementation Success (BIS).

Responses were checked for completeness and consistency before being subjected to statistical analysis for Data Validation where Fig. 3 mentions to study model.

Fig. 3. The Critical Success Factors (CSFs) of Blockchain Implementation in Banks and Islamic Banks

H_1: *The level of organizational readiness (OR) is positively correlated with the success of implementing blockchain technology (BIS).*

H_2: *The adherence to regulatory compliance (RC) exerts a substantial favorable influence on the success of implementing blockchain technology (BIS).*

H_3: *The presence of ample financial resources (FR) is strongly correlated with the successful implementation of blockchain technology (BIS).*

H_4: *The presence of Technical Expertise (TE) is positively correlated with the level of success in implementing Blockchain (BIS).*

H_5: *The presence of Leadership Support (ORLS) has a notable and favorable influence on the level of Organizational Readiness (OR).*

H_6: *The influence of Organizational Culture (OROC) on Organizational Readiness (OR) is found to be significantly beneficial.*

H_7: *The Legal Environment (RCLE) has a substantial and favorable influence on Regulatory Compliance (RC).*

H_8: *The presence of Regulatory Pressure (RCPP) exerts a notable and favorable influence on the level of Regulatory Compliance (RC).*

H_9: *The financial performance (FRFP) exhibits a notable and favorable influence on the financial resources (FR).*

H_{10}: *The willingness to invest (FRIW) exerts a statistically significant positive influence on financial resources (FR).*

H₁₁: *The level of education attained by employees (TEEE) is positively correlated with their technical expertise (TE).*
H₁₂: *The influence of Industry Trends (TEIT) on Technical Expertise (TE) is notably beneficial.*

4. Data Analysis

In this section, the data analysis is presented, utilizing Partial Least Squares Structural Equation Modeling (PLS-SEM) as the principal analytical tool. The SmartPLS 4.5.9 program was employed to conduct a range of studies, such as outer loadings, f-square calculations, Cronbach's alpha, and composite reliability, among other statistical procedures. The utilization of comprehensive analytical methodology offers a strong basis supported by empirical evidence to investigate the connections between different antecedent, independent, and dependent variables. This process allows for the validation or questioning of our initial hypothesis and provides valuable insights to shape our conclusions and recommendations.

Table 1
Demographic composition

Variable	Item	Frequency	Percent
Gender	Male	186	70.2
	Female	79	29.8
Age Range	Under 25	7	2.6
	25-34	110	41.5
	35-44	112	42.3
	45-54	32	12.1
	55 and above	4	1.5
Education	College	3	1.1
	Bachelor's Degree	107	40.4
	Master's Degree	111	41.9
	Doctorate Degree	44	16.6
Position	Entry Level	7	2.6
	Mid Level	94	35.5
	Senior Level	102	38.5
	Executive Level	62	23.4
Experience	Less than 1 year	5	1.9
	1-5 years	145	54.7
	6-10 years	54	20.4
	11-20 years	61	23.0

4.1 Measurement Model: Outer Loadings

The evaluation of the measurement model involved examining the outer loadings to determine the strength and statistical significance of the association between observable indicators and their associated latent variables. In general, a value exceeding 0.7 for the outer loading is commonly regarded as an indication of a robust association between the indicator and its underlying latent variable.

Table 2
The results of outer loading

Relationship	Value	Relationship	Value	Relationship	Value
BIS1 ← BIS	0.971	RC1 ← RC	0.98	ORLS1 → ORLS	0.976
BIS2 ← BIS	0.973	RC2 ← RC	0.984	ORLS2 → ORLS	0.838
BIS3 ← BIS	0.975	RC3 ← RC	0.984	ORLS3 → ORLS	0.863
FR1 ← FR	0.985	RCLE1 → RCLE	0.948	OROC1 → OROC	0.866
FR2 ← FR	0.984	RCLE2 → RCLE	0.928	OROC2 → OROC	0.954
FR3 ← FR	0.985	RCLE3 → RCLE	0.831	OROC3 → OROC	0.912
FRFP1 → FRFP	0.95	RCPP1 → RCPP	0.837	TEIT1 → TEIT	0.85
FRFP2 → FRFP	0.905	RCPP2 → RCPP	0.911	TEIT2 → TEIT	0.958
FRFP3 → FRFP	0.871	RCPP3 → RCPP	0.936	TEIT3 → TEIT	0.921
FRIW1 → FRIW	0.932	TE1 ← TE	0.927	TEEE1 → TEEE	0.924
FRIW2 → FRIW	0.926	TE2 ← TE	0.936	TEEE2 → TEEE	0.929
FRIW3 → FRIW	0.891	TE3 ← TE	0.929	TEEE3 → TEEE	0.922
OR1 ← OR	0.977	OR2 ← OR	0.973	OR3 ← OR	0.982

As shown in Table 2, the external loadings for BIS1, BIS2, and BIS3 were 0.971, 0.973, and 0.975, correspondingly. The remarkably elevated results serve as evidence that these indicators possess a high degree of reliability and effectively capture the underlying construct of the BIS. In a similar vein, the indicators FR1, FR2, and FR3 exhibited outside loadings of 0.985, 0.984, and 0.985, correspondingly. The substantial loadings observed indicate that these variables possess a robust representation of the Financial Resources construct. The constructs of Financial Performance (FRFP), Investment Willingness (FRIW), Organizational Readiness (OR), and others exhibited robust outer loadings, indicating their high reliability and validity. The outer loadings for all observed indicators in these constructs surpassed the commonly acknowledged criterion of 0.7 (AlLouzi & Alomari, 2023), therefore affirming their relevance and dependability.

4.2 Structural Model: The model's robustness and reliability

The model exhibited robust explanatory capacity for all endogenous constructs. The study, as shown in Table 3, found that Blockchain Technology Implementation Success (BIS) was responsible for approximately 80.5% of the observed variance, Financial Resources (FR) accounted for 89.8%, Organizational Readiness (OR) accounted for 90.6%, Regulatory Compliance (RC) accounted for 87.3%, and Technical Expertise (TE) accounted for 79.3%. These findings are supported by the R-Square values of 0.805, 0.898, 0.906, 0.873, and 0.793, respectively. The corrected R-Square values exhibited a high degree of alignment, hence enhancing the robustness of these findings. In general, the high values of R-Square and adjusted R-Square suggest a robust fit and predictive capacity of the model, providing evidence for the dependability and validity of its ability to explain the crucial elements that influence the performance of blockchain technology in the Islamic banking industry of the UAE.

Table 3
R-Square and Adjusted R-Square

	R-square	R-square adjusted
BIS	0.805	0.802
FR	0.898	0.897
OR	0.906	0.905
RC	0.873	0.872
TE	0.793	0.792

4.3 Structural Model: underscoring the relative importance of the various variables in the model

The F-square values, which represent the effect sizes of the predictor variables on their corresponding dependent variables, provide additional evidence of the significance of each factor inside the model. Table 4 indicates that it is worth noting the variable known as Investment Willingness (FRIW) has a significant impact on Financial Resources (FR), as seen by its high F-square value of 7.517. Additional robust predictors include the influence of Organizational Culture (OROC) on Organizational Readiness (OR), exhibiting a notable F-square value of 5.287. Furthermore, the impact of Leadership Support (ORLS) on Organizational Readiness (OR) is also significant, as indicated by an F-square value of 3.837. The impact of Regulatory Pressure (RCPP) and Legal Environment (RCLE) on Regulatory Compliance (RC) is significant, as seen by F-square values of 4.037 and 2.277, respectively. The substantial effects of Financial Performance (FRFP) on Financial Resources (FR), Technical Expertise on Employee Education (TEEE), and Industry Trends (TEIT) on Technical Expertise (TE) are worth mentioning, as indicated by F-square values that surpass 1.5. The factors of Organizational Readiness (OR) and Regulatory Compliance (RC) have a notable impact on the success of implementing Blockchain Technology (BIS), as well as Technical Expertise (TE) on BIS. However, their contributions are relatively smaller, as indicated by F-square values ranging from 0.485 to 0.953.

Table 4
F-square

FR → BIS	1.439	RC → BIS	0.953
FRFP → FR	1.525	RCLE → RC	2.277
FRIW → FR	7.517	RCPP → RC	4.037
OR → BIS	0.937	TE → BIS	0.485
ORLS → OR	3.837	TEEE → TE	2.095
OROC → OR	5.287	TEIT → TE	1.532

4.4 Measurement Model Evaluation: Discriminant Validity

The Heterotrait-Monotrait (HTMT) ratios were evaluated in the performed Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis to determine the discriminant validity among the constructs. Table 5 shows that the findings of the analysis demonstrate strong discriminant validity among all variables, as seen by the HTMT values which were significantly lower than the conservative threshold of 0.85 (AlHamad et al., 2022). As an illustration, the HTMT coefficient denoting the relationship between Financial Resources (FR) and Blockchain Technology Implementation Success (BIS) was found to be 0.594, whilst the HTMT coefficient between Organizational Readiness (OR) and BIS was determined to be 0.521. In a similar vein, it can be observed that Regulatory Compliance (RC) and Technical Expertise (TE) both displayed robust discriminant validity with BIS, as evidenced by HTMT values of 0.455 and 0.287 respectively. When considering the associations among several constructs such as FR, OR, RC, and TE, the HTMT values observed ranged from 0.024 to 0.057. This finding provides evidence that these constructs are indeed separate and distinguishable from one another. The aforementioned findings enhance the credibility of the model and provide evidence for the uniqueness of the constructs examined in the research.

Table 5
HTMT

	BIS	FR	OR	RC	TE
BIS					
FR	0.594				
OR	0.521	0.122			
RC	0.455	0.024	0.03		
TE	0.287	0.043	0.025	0.057	

4.5 Measurement Model Evaluation: Reliability and Validity Metrics

The measuring model exhibits high levels of validity and reliability across all constructs, thus establishing a solid basis for subsequent analysis. Table 6 shows that all of the Cronbach's alpha values surpass the threshold of 0.7, therefore providing confirmation of a strong level of internal consistency. Similarly, the composite reliability ratings, denoted as rho_a and rho_c, exceed the threshold of 0.7, providing additional confirmation of the constructs' reliability. Finally, it can be observed that all of the Average Variance Extracted (AVE) values exceed the commonly accepted threshold of 0.5, which suggests a robust level of convergent validity (Alomari, 2023). The combination of these metrics provides strong evidence for the reliability and validity of the measurement model, indicating that the constructs accurately capture the intended variables.

Table 6
Reliability and Validity Metrics

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
BIS	0.972	0.972	0.981	0.946
FR	0.985	0.985	0.99	0.97
OR	0.977	0.977	0.985	0.956
RC	0.982	0.982	0.988	0.965
TE	0.922	0.923	0.951	0.866

4.6 Hypothesis Testing and Path Coefficients in Structural Model

The structural model presented in Table 7 exhibits numerous statistically significant associations, with p-values consistently equal to zero, thus affirming the significance of each pathway within the model.

Table 7
Path Coefficients

Hypothesis	Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
H1	OR → BIS	0.431	0.431	0.034	12.834	0.00
H2	RC → BIS	0.431	0.432	0.03	14.351	0.00
H3	FR → BIS	0.534	0.535	0.032	16.447	0.00
H4	TE → BIS	0.308	0.309	0.03	10.253	0.00
H5	ORLS → OR	0.602	0.596	0.024	24.947	0.00
H6	OROC → OR	0.707	0.701	0.024	28.947	0.00
H7	RCLE → RC	0.539	0.535	0.024	22.042	0.00
H8	RCPP → RC	0.718	0.714	0.026	27.346	0.00
H9	FRFP → FR	0.395	0.384	0.029	13.663	0.00
H10	FRIW → FR	0.878	0.87	0.022	40.385	0.00
H11	TEEE → TE	0.659	0.655	0.031	21.369	0.00
H12	TEIT → TE	0.564	0.558	0.032	17.471	0.00

The variable "Investment Willingness" (FRIW) demonstrated a significant impact on "Financial Resources" (FR) in terms of direct impacts. The original sample coefficient (O) for this relationship was 0.878, and the corresponding t-statistic was 40.385. This implies that the willingness to invest plays a crucial role in determining the availability of financial resources. The variable "Organizational Culture" (OROC) exhibited a significant influence on "Organizational Readiness" (OR), as indicated by the original sample coefficient (O) of 0.707 and a t-statistic of 28.947. This link underscores the crucial significance of organizational culture in equipping an organization for change or adaptation.

The third most significant direct influence is denoted as "Regulatory Pressure" (RCPP) on "Regulatory Compliance" (RC), with a coefficient of 0.718 and a t-statistic of 27.346. This suggests that businesses under greater regulatory pressure tend to exhibit elevated levels of compliance.

Table 8 shows the specific effects of path coefficients between variables, of particular significance among the mediating effects is the pathway denoted as "Investment Willingness" (FRIW), which exerts an influence on "Financial Resources" (FR), subsequently affecting the level of "Blockchain Implementation Success" (BIS). The observed t-statistic for this pathway was 15.918, indicating a significant mediating effect of Financial Resources on the relationship between Investment Willingness and Blockchain Implementation Success.

Another noteworthy mediating pathway is the "Legal Environment" (RCLE), which influences "Regulatory Compliance" (RC), ultimately impacting "Blockchain Implementation Success" (BIS) with a t-statistic of 13.766. This implies that the regulatory framework has the potential to influence the effectiveness of blockchain integration indirectly and substantially through influencing regulatory compliance.

The statistical analysis revealed a significant mediating effect of "Leadership Support" (ORLS) on the relationship between "Organizational Readiness" (OR) and "Blockchain Implementation Success" (BIS). The t-statistic of 12.39 indicates that supportive leadership plays a crucial role in enhancing organizational readiness, thereby promoting successful implementation of blockchain technology. The dataset offers a comprehensive structure for comprehending the primary and secondary factors that contribute to the effective adoption of blockchain technology. These findings are supported by statistically significant t-values and non-existent p-values, indicating a high degree of trust in the results. Fig. 4 shows all the results of the structure model.

Table 8
Specific Indirect Effects

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
TEIT → TE → BIS	0.174	0.172	0.019	8.949	0.00
RCLE → RC → BIS	0.233	0.231	0.017	13.766	0.00
FRIW → FR → BIS	0.469	0.465	0.029	15.918	0.00
ORLS → OR → BIS	0.259	0.257	0.021	12.39	0.00
TEEE → TE → BIS	0.203	0.202	0.022	9.265	0.00
FRFP → FR → BIS	0.211	0.205	0.019	10.877	0.00
RCPP → RC → BIS	0.31	0.309	0.023	13.196	0.00
OROC → OR → BIS	0.304	0.302	0.023	13.192	0.00

Fig. 4. Structure model bootstrapping

5. Discussions

The aim of our study was to examine the possible benefits and obstacles associated with the adoption of Blockchain Technology within financial institutions, with a specific focus on Banks and Islamic banks in the United Arab Emirates (UAE). Previous research conducted by Çaldağ & Gökalp, 2020; Charles et al., 2019; Chen et al., 2021 have underscored the significance of blockchain technology as a decentralized ledger that ensures secure and transparent transactions, which is of utmost importance in the financial industry.

The present study expands upon prior knowledge by conducting an empirical analysis of data using Partial Least Squares Structural Equation Modeling (PLS-SEM) methodology, facilitated by the utilization of SmartPLS 4.5.9 software. Numerous discoveries have surfaced that enhance the comprehension of blockchain's possible ramifications on the banking industry.
It is worth noting that our observations indicate a considerable impact of Investment Willingness (FRIW) on Financial Resources (FR), as evidenced by an F-square value of 7.517. This implies that the allocation of resources for the implementation of new technologies, such as blockchain, within an organization can be significantly influenced by its desire to spend in such activities. The aforementioned findings are consistent with prior scholarly works that examine the significant impact of investment readiness on the adoption of technology in financial institutions (Alharbi & Sohaib, 2021; Chang et al., 2020; Miake-Lye et al., 2020; Noor, 2022; Patsavellas et al., 2021; Salazar & Russi-Vigoya, 2021).

In a similar vein, our findings indicate that Organizational Culture (OROC) and Leadership Support (ORLS) are significant characteristics that have an impact on Organizational Readiness (OR). The F-square values for OROC and ORLS are 5.287 and 3.837, respectively. The findings presented in this study align with the research conducted by Wulandari et al., 2023 as well as Shamnad Shamsudin & VP Velmurugan, 2023, which emphasized the significance of organizational culture and leadership in promoting technical advancements inside financial establishments.

The reliability and validity of the construct were assessed using measuring techniques such as Cronbach's alpha, composite reliability, and average variance extracted (AVE). These values were found to surpass preset thresholds, indicating the construct's reliability and validity. Moreover, the R-square and adjusted R-square coefficients demonstrate a substantial degree of explanatory power of our model with respect to key variables such as Financial Resources (FR) and Organizational Readiness (OR). The present findings not only validate but also expand upon the conclusions drawn from other studies, indicating that a comprehensive strategy that encompasses investment willingness, organizational culture, and leadership support can enhance the readiness of financial institutions for the implementation of blockchain technology (Abou Jaoude & George Saade, 2019; Miake-Lye et al., 2020; Noor, 2022; Wulandari et al., 2023).

6. Conclusions

In an era of accelerating digitalization, it is undeniable that technology possesses the capacity to revolutionize society structures. Blockchain technology is widely recognized as one of the most revolutionary advancements in this particular domain. The implementation of this technology, as emphasized by Navadkar et al., 2018, extends across several domains such as property deals and financial transactions, with a particularly notable impact observed within the banking industry. Based on our empirical research, the achievement of effective Blockchain deployment within financial institutions is contingent upon four Critical Success Factors (CSFs): Organizational Readiness, Regulatory Compliance, Technical Expertise, and Financial Resources. The Critical Success Factors (CSFs) not only function as independent factors that contribute to the success of Blockchain deployment, but they also interact with each other in a complicated manner, forming a web of influence that collectively determines the outcome.

Our research indicates that directing attention towards these critical success factors (CSFs) has the potential to assist banks and Islamic institutions in the United Arab Emirates (UAE) in maximizing the advantages offered by Blockchain Technology. Institutions can attain a decrease in transaction friction, an increase in security, and an improvement in operational efficiency by investment in these fields. In summary, Blockchain Technology presents a strategic advantage for financial organizations, with the potential to redefine the integrity and efficiency of transactions.

This study aims to offer a complete guide for financial institutions in the UAE and beyond by highlighting the interplay of Critical Success Factors and their substantial influence on the success of Blockchain deployment. The outlined plan is evident: with strategic concentration on these critical success factors (CSFs), financial institutions have the potential to access the complete range of advantages provided by Blockchain Technology.

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