

# Framework Model to Enhance the Effectiveness of Blockchain Technology through the Knowledge Management Processes

Hamad AlBadri

**Abstract:** This study topic is essential since it highlights the challenges facing the effective integration of blockchain technology and the necessary measures to improve their performance through knowledge management processes. The primary aim of this study was to develop a framework model for advancing the effectiveness of blockchain technology in the Middle East and the Gulf region. For this study, the researchers collected secondary data by conducting a deep systematic review of all the information found online on the topic. The researchers selected essential studies by integrating an inclusion and exclusion criteria. This research exclusively included articles released post-2019 to guarantee that they contained relevant information. In addition, studies had to be in English to ensure clarity for all the researchers involved. The authors collected the secondary data through the GovInfo.gov database as well as the Google Scholar search engine. After the comprehensive reviewing of all the relevant articles that fit the inclusion and exclusion criteria, fifteen articles were included in the research. Out of the fifteen, eight focused on the Middle East and the rest on the Gulf. **Conclusion:** The development of blockchain technology in the Middle East and the Gulf region has witnessed tremendous improvements over the years. Many sectors like healthcare and banking industries have dedicated efforts to applying the technology in their processes. However, the technology has faced numerous challenges that need immediate address to ensure the ultimate success of this technology. The concerned policymakers should research on the topic and develop appropriate policies that guarantee the effectiveness of the technology.

**Keywords:** blockchain technology; framework model; knowledge management processes; the Gulf region; the Middle East

## 1 INTRODUCTION

### 1.1 Operational Definition

Blockchain technology reflects a shared and indisputable ledger that spearheads the transaction recording procedures and asset tracking within a business system. In such a network, assets can be either tangible or intangible. The primary features of blockchain technologies consist of distributed ledger machinery, immutable records, and smart contracts. This technology is essential in a business environment as most companies work best if they receive accurate information quickly. Weking et al. (2019) [25] insist that blockchain technology guarantees that enterprises incorporate new methods of shaping financial activities, thereby minimizing costs, and enhancing trust in the business ecosystem. On the other hand, knowledge management is the acquisition, conversion, storage, and application of a firm's intellectual knowledge [7]. The processes involved in knowledge management comprise the obtaining, creation, collection, and dissemination of knowledge in companies. These procedures often aim to save staff knowledge and experiences in an enterprise, after which they distribute and utilize it effectively and efficiently. The main goal of this study is to establish a framework model that can improve the effectiveness of blockchain technology by using the knowledge management process. The focus of the research is the Middle East and the Gulf region.

### 1.2 Research Problem and Questions

The main problem that has triggered this study is the presence of various inefficiencies with blockchain technology. For instance, the technology encounters the shortcoming of having updating challenges and preventing the ultimate elimination of errors. Attaran's (2020) [8] study highlights the primary disadvantage of blockchain technology as its infancy since the concept is still new and

may face numerous obstacles before its ultimate successful implementation. This challenge makes it necessary to establish a method of enhancing the effectiveness of blockchain technology. It is essential to develop the most sustainable approach that companies can use in the long run with many ways available. Thus, creating a framework model for understanding how the knowledge management processes can enhance the effectiveness of blockchain technology remains critical.

At that juncture, the main aim of the study is to establish a framework model for ensuring the efficiency of blockchain technology via knowledge management processes in the Middle East and the Gulf by conducting a deep systematic literature review. The following research questions will help in fulfilling this aim:

- What is the current state of blockchain technology in business in the Middle East and the Gulf?
- How effective is blockchain technology in business in the Middle East and the Gulf?
- Which framework model will ensure that knowledge management processes enhance the effectiveness of blockchain technology in the Middle East and the Gulf?

### 1.3 Significance of the Study

This study is essential, as it will facilitate the public learning about blockchain technology, its performance, and ways of enhancing its effectiveness. The answers to this study will benefit the public by translating the knowledge to their work environment to improve the associated blockchain technology. The study will also contribute to existing research by presenting a framework-based model for improving blockchain technology. Currently, not many research papers address this issue. The central institutions that will benefit from this study are the Middle East and the Gulf companies that integrate blockchain technology. The information provided via this research will enable them to

deal with any inefficiency challenges they encounter appropriately. In addition, the manufacturers of blockchain technology will benefit from this research since it will equip them with the necessary knowledge to improve the technology and make it more efficient. Moreover, this study will help future researchers by providing them with the relevant information on the topic, whereby they can use it to inform their independent studies. In addition, this research offers an avenue for future researchers to support or criticize the study.

#### 1.4 Previous Studies

Previous studies on this topic focused on the Middle East have highlighted the limitations of blockchain technologies in the region. For instance, Papadaki and Karamitsos (2021) insist that since the technology is still in its infant stages, it has led to various disadvantages like few use cases, lack of collaborative governance, and limited employee skills. Other challenges include difficulties in cross-country collaboration and the lack of a regulatory model [20]. These factors could ultimately contribute to the inefficiency of this technology. In a similar perspective, Alsubaei (2019) [6] argues that the majority of the blockchain technology available in the Gulf region is still at its establishment phase, but efforts to test and implement the technology. For example, in 2018, the UAE launched a strategy titled Emirates Blockchain, whose goal was to transfer fifty percent of the country's government transactions to the blockchain by 2021. The application of blockchain technology in institutions in the Gulf is likely to increase in the future.

#### 1.5 Limitation of the Study

The main limitation of this study is that it exclusively relies on secondary data to form conclusions. As a result, it lacks the originality researchers attain through conducting primary research. Another shortcoming is the absence of sufficient literature concentrating on the study topic, revealing a literature gap that is necessary to fill through more research. The study adopted a cross-sectional design, implying that the data collected only reflects the current situation in January 2022. This information may not be relevant in future studies, especially if there are significant changes in blockchain technology, such as developing more efficient methods of improving the technology. The final limitation of this research is that the researcher exclusively included journal articles in English. This situation is disadvantageous as the researcher could have missed out on other arguments in non-English journals.

## 2 RESEARCH METHOD AND PROCEDURES

### 2.1 Methodology of the Study

The authors decided to use a secondary data collection method during this research. This approach involves using information collected by someone else other than the primary user. Secondary data can also be defined as data collected for other research purposes but relevant to the current research. The information used in secondary data collection might

come from internet journals, books, information collected by the government, libraries, and many other sources [13]. The benefit of the approach is that it saves the researcher a lot of time that would be spent gathering information on the ground. The secondary data collection method is easy to conduct since accessing secondary information is easy as the internet provides vast information. Furthermore, the secondary data collection technique usually is cost-effective [2] since most of the sources of information are free, which allows the researcher to gain knowledge without having to put any money on the table. On the other hand, the shortcoming of the approach is that it might not be specific to the researcher's requirements since the information was collected in the past for another reason making it unreliable for the researcher's current needs. In addition, the information might be outdated since it was acquired in a different error [26].

The collection of secondary information involved integrating a deep systematic literature review approach. The approach produces scientific evidence to answer particular research questions in a precise and reproducible manner while looking forward to incorporating all issued proof on the research topic and promoting the quality of the evidence. A systematic literature review follows clearly defined procedures that outline the criteria before the analysis [23]. Furthermore, a comprehensive, clear search conducted on various databases and grey literature that can be photocopied and reproduced by other researchers, which requires organizing a research strategy that is well thought out and mainly answers a defined question. The advantage of using systematic reviews in research is that it is comprehensive when appropriately conducted [18] since all relevant research is acknowledged and assessed. The other benefit of systematic literature reviews allows individuals who want to know the overall answer to a question to get a quick solution, thus saving the readers a lot of time [24]. However, the disadvantage of using a systematic literature review is that it might take time to conduct it thoroughly and publish it.

The researcher used the inclusion and exclusion criteria, which included the features that prospective research subjects should have to participate in the research. On the other hand, the exclusion criteria are the characteristics that disqualify future subjects from participating in the study. Thus, the inclusion and exclusion criteria might incorporate age, gender, and ethnicity (Martinic et al., 2019). Using the inclusion and exclusion criteria assists the researcher in developing eligibility criteria that rule in and out the participants in a study. The inclusion and exclusion criteria follow the scientific objectives of the research and contain vital implications for the scientific rigor of a research and the assurance of ethical principles. The exclusion criteria are essential as it is used to eliminate the subjects that do not comply with follow-up visits, those who cannot provide biological specimens or information, and those whose safety and ethical protection cannot be assured [21].

The criteria are only included in papers published from 2019 onwards since most of the information found in those articles is recent. Furthermore, the researcher considered the papers published in 2019 and beyond since most of the data

is accurate compared to the current situation in the Middle East. Additionally, the researcher dealt with documents written in English since English is linear and contains one central point, with each part contributing to the main point of argument without digressions or repetitions. In addition, English is the standard written form of the language used in many countries. Furthermore, most individuals find articles written in English easy to read and understand. Papers relevant to the study were vital since they offered information that matched what the investigation entailed, making it possible for the researcher to gather relevant information. Nonetheless, papers addressing the Gulf region or those that refer to the Gulf region and represent the area were helpful to the researcher since they offered specific information that focused mainly on the Middle East.

The researchers used the best match 5-years filters in the GovInfo.gov catalogue to collect appropriate data. On the contrary, when looking for sources in the Google Scholar search engine, the authors used the 2019-2022 filters to ensure that the data collected was the hottest in the field. Readings met the inclusion criteria if they focused on either region of the Gulf and involved information on how to upgrade the effectiveness of blockchain technology through implementing a knowledge management process. The researchers were responsible for developing the search strategy, and they analyzed the method through the press checklist. This technique allowed the researchers to investigate whether the design implemented by prospective studies matched the study topic. Further, the list permitted the researcher to generally evaluate the sources of the cases and ensure the correct spelling and filters suitability. Nonetheless, when a conflict arose during this process, the researchers controlled it via agreement.

## 2.2 Procedure for Drawing Conclusions

For this research, all the people involved reviewed all the data acquired from the articles concerning the effectiveness of blockchain technology in the Middle East and the Gulf. The next step entailed critically evaluating the arguments presented to establish what they meant and their implication for the study. Finally, the researchers derived conclusions based on their understanding of the information reviewed.

## 3 RESULTS AND DISCUSSION

### 3.1 Results

Two of the researchers involved in the drafting of this manuscript worked side by side to review all the potential publications for inclusion in the study. They surveyed whether they were available as abstracts or full texts and exclusively integrated only the full-text articles to conceptualize the study methodology and outcomes. Out of all the studies reviewed, only fifteen qualified for incorporation into the study. Out of the fifteen articles, eight of them (53.3 %) contained information concentrating on the Middle East, while seven (46.7 %) focused on the Gulf region. The pie chart below highlights this information (Fig. 1).

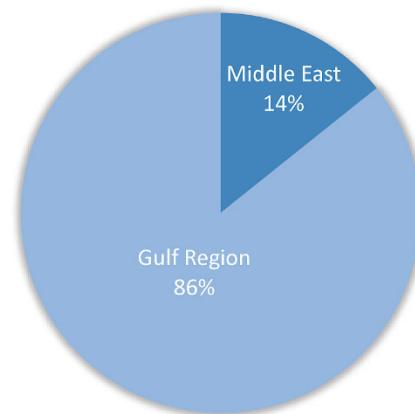


Figure 1 Primary focus of the included publications

## 3.2 Discussion

### 3.2.1 Blockchain Technology in the Middle East

The integration of blockchain technology in the Middle East has witnessed significant improvement over the years. For instance, numerous opportunities in Egypt can ensure the successful adoption of blockchain technology in the food sector, such as improving trust, advancing food traceability, and minimizing counterfeiting [12]. Nonetheless, many people in Egypt lack awareness about the technology, its success is uncertain, and there is insufficient collaboration. In Israel, there is a high potential for blockchain technology [27], given the success in Fintech and cybersecurity. The country also has a blockchain ecosystem with eleven start-up enterprises.

In another study focusing on the Middle East, Ozturan, Atasu, and Soydan (2019) [19] highlighted that Turkish banks' readiness to adopt the blockchain technology was at a mean of 3.30. In a similar perspective, Bulut, Kantarcı, Keskin, and Bahtiyar (2019) [10] examined the efficiency of blockchain technology by testing the time it takes to conduct an election. The results revealed that the technology significantly minimized waiting time for results. However, this experiment depends on theory, and more practical evidence is necessary. In Afghanistan, the integration of blockchain technology is most evident in the land administration sector. For instance, a study by Konashevych (2021) [17] showcased that adopting this technology in the industry has failed to yield positive outcomes due to the bureaucracy and failure to prove that it guarantees the system's security. A synonymous study by Hedayati, Baktash, and Mohmand (2019) [15] claims that incorporating blockchain technology in Afghanistan's voting system encounters numerous challenges, such as low literacy levels, cybersecurity risks, and website accessibility requirements.

Another study concerning Syria reveals that the blockchain system integrated into the education sector faces multiple shortcomings. Since Syria is a low-income country, the cost of setting up blockchain technology is significantly lower. Nevertheless, the system encounters trust and credibility issues that make its success uncertain in the region [4]. More importantly, Barbino (2021) [9] evaluates the potential of blockchain technology to solve the refugee

identification crisis prevalent in Syria. These arguments imply that there is a high potential for integrating blockchain technology. However, the successful incorporation of the concept requires handling all the limitations of the technology. Establishing a framework for reducing inefficiencies is vital if the technology should survive in the Middle East.

### 3.2.2 Blockchain Technology in the Gulf

In the Gulf, the adoption of blockchain technology has been significant, particularly in the United Arab Emirates. A study by Alabbasi and Sandhu (2021) [1] points out that the integration of blockchain technology in the region presents a chance to maximize these countries' growth by eradicating the monetary threats in the banking sector. Moreover, in Saudi Arabia, integrating blockchain technology in the country's healthcare sector in managing diabetes patients has yielded significant corroborative [16]. Nevertheless, the technology is in its nascent stage and more research in the topic is necessary to solve the current problem the technology faces. In Iran, the application of the blockchain technology in the healthcare domain has faced numerous shortcomings inclusive of expertise absence, cost, and security issues, in addition to uncertain state policies [14]. In a similar viewpoint, studies such as that by Sahebi, Mosayebi,

Masoomi, and Marandi (2022) [22] showcase that Iran policymakers must establish policies that ensure the development of blockchain technology-driven renewable energy supply chains.

Most importantly, in Kuwait, the application of blockchain technology remains evident via the Ripples blockchain technology applied at Kuwait Finanche House [5]. In Oman, studies concerning the application of the technology in various sectors are limited [3] and more research is appropriate. In a synonymous viewpoint, Dora and Srinivasan (2019) [11] identify the primary challenges impeding the successful integration of blockchain technology in Oman banking sector include insufficient tools, high training costs, privacy leaks, and the sensitivity of data sharing. Based on these arguments, it remains evident that despite the adoption of blockchain technology by various countries in the Gulf, its successful implementation encounters many shortcomings that may negatively affect its ultimate success. Therefore, it remains essential for all the relevant policymakers to invest in the development of knowledge management processes that can ultimately improve the efficiency of blockchain technology and guarantee ultimate success.

At that juncture, after a deep systematic review of literature, the researchers developed the following framework model (Fig. 2) for advancing the effectiveness of blockchain technology in the Middle East and the Gulf.

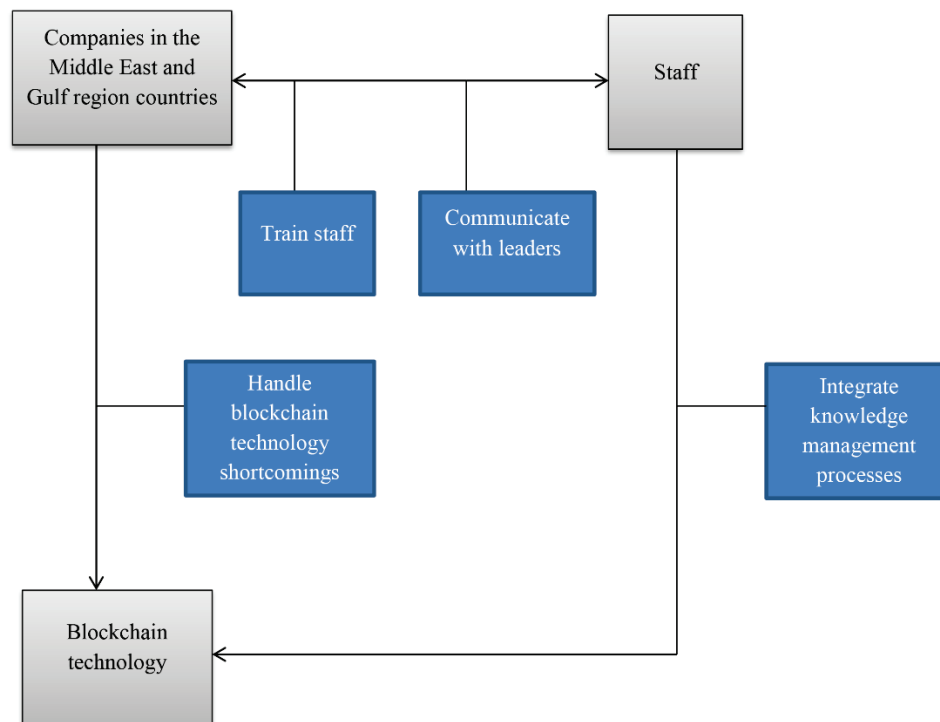


Figure 2 Suggested Framework

## 4 CONCLUSIONS

The main objective of this research was to establish a framework model for improving the efficiency of blockchain technology in the Middle East and the Gulf region. The researchers conducted a deep systematic review of all the

information found online on the topic. The review led to the identification of fifteen essential articles focusing on the target region. Eight concentrated on the Middle East and seven on the Gulf region. The information presented in the documents reveals that in the two regions, the integration of blockchain technology is in its infancy phases. Nonetheless,

some sectors like healthcare and banking have integrated the technology in their practice. Based on the analysis, it remains evident that Gulf region countries have achieved more success from incorporating the technology. However, the challenges experienced when integrating the technology are numerous. The technology encounters security, implementation, and employee training challenges. The solution of these problems is vital to ensure the success of blockchain technology in both regions. Thus, all the concerned people should establish collaborations to develop frameworks for dealing with the shortcomings brought about by the technology to guarantee that they reap maximum benefits once they incorporate it into their different sectors.

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**Author's contacts:**

**Hamad AlBadri**  
College of Business, MIS, University of Jeddah,  
21551 Jeddah, Kingdom of Saudi Arabia  
[halbadri@uj.edu.sa](mailto:halbadri@uj.edu.sa)