EAI Endorsed Transactions
on Pervasive Health and Technology
Research Article EAI.EU

# A Systematic Review on the Adoption of Blockchain Technology in the Healthcare Industry

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## Abstract

INTRODUCTION: Blockchain technology is a distributed ledger, decentralized, and cryptographically secure technology which has garnered considerable interest in different sectors including healthcare. It can enable better trust, security, management, and transparency of healthcare data, processes, and transactions resulting improving quality of care. Despite the fact of the increasing number of research investigating the applications/potentials of blockchain in healthcare, there is a scarcity of comprehensive reviews that focuses on the factors that influence its adoption in the healthcare industry.

OBJECTIVES: This review aims to summarise existing studies regarding the adoption of blockchain technology in the healthcare industry. This review presents a detailed review of existing empirical studies investigating the factors influencing blockchain adoption in healthcare by highlighting the research methodologies, targeted stakeholders, adoption theories/models used, and the influential factors explored in each of these studies. Careful syntheses of these studies would enable researchers and partitioners to acquire a wide knowledge and understand various opportunities and challenges of blockchain implementation in healthcare.

METHODS: Inspired on "Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)" guidelines, the study's scope and research questions are established, Scopus database is selected as an information resource, search strategy, and inclusion and exclusion criteria for document selection is developed. This review was conducted in August 2022. From 223 articles found in the search, 12 met the eligibility criteria and were selected to be extensively analyzed in this review.

RESULTS: This review reveals that very few empirical studies exist that sought to explore the significant factors influencing blockchain adoption in healthcare. The qualitative method was the most method employed, healthcare providers were the most targeted stakeholders, and most of the studies were not based on adoption theories/models. Privacy, government regulation, and trust were the most influential factors investigated in the studies.

CONCLUSION: The utilization of blockchain can help handle many issues in healthcare systems and bring improved healthcare delivery. Little attention has been paid to highlight internal and external factors that would impact successful blockchain adoption in healthcare. Additionally, the evaluated research placed little attention on understanding how underlying factors interact, social structures and institutional mechanisms affect the adoption of blockchain in healthcare. The reasons why healthcare organizations are hesitant to implement blockchain are still not clear. There is a need to conduct more research to examine the factors influencing the decision of healthcare stakeholders to adopt blockchain by using adoption theories/models. The proposed framework of the factors in this study may contribute as a starting point for future blockchain adoption studies in the healthcare industry.

**Keywords:** Blockchain technology, Adoption, Healthcare, Systematic review.

Received on 6 November 2022, accepted on 20 March 2023, published on 20 April 2023

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doi: 10.4108/eetpht.v9i.2844

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## 1. Introduction

Blockchain technology (BCT) first emerged in 2008 as a peer-to-peer (P2P) transaction platform comprised of cryptographically chained immutable blocks in the bitcoin market [1]. Since Bitcoin introduced BCT to the world, it has developed with a broad application of it in a range of sectors, including financial services, manufacturing, telecommunication, energy, and healthcare [2], [3]. BCT is seen to have a crucial role in the industrial revolution 4.0, which has enabled changes to the global economy's structure and increased prospects for innovation, progress, and a better quality of life [4]. Despite the fact an increasing number of industrial sectors have begun to use BCT in their workflows, adoption of blockchain-based applications in the healthcare sector remains slow [5]–[11].

Current healthcare systems confront numerous issues, including security, interoperability, privacy, lengthy processes, delays in diagnosis and treatment, difficulties in sharing information, high operational expenses, data control, and data ownership [7], [8]. Thus, the healthcare sector is recognized as one of the sectors that is a possible beneficiary of BCT adoption [9]–[11]. Several features lend themselves to the application of BCT in healthcare, including immutability, decentralization, transparency, and traceability [2], [12]. Hence, if developed appropriately, BCT can lead to a revolution in healthcare and reshape it to make a stable, trustworthy, protected, and sustainable digital ecosystem for better-quality health data management [11], [13]–[17]. BCT is considered one of the top technology trends for health IT notwithstanding the widespread notion that it is still in its infancy [5]. BCT in the healthcare sector was valued at USD 1.95 billion in 2018 and is expected to be worth USD 3.21 billion by 2024, growing 8.7 percent of a compound annual growth rate (CAGR) [6].

Healthcare organizations and professionals are hesitant to accept BCT as a core innovation [13]. BCT is a cutting-edge technology that has a lot of potentials and can be used in many different healthcare settings. The unique characteristics of this technology make it crucial for healthcare organizations. Despite this, only a few BCT initiatives have been successfully announced in the healthcare ecosystem, and many proposals are still in the research and evaluation phase [3], [10], [11], [17]. This could be related to a lack of clarity and knowledge regarding the factors influencing their adoption [8].

Although there have been various reviews of BCT-based healthcare [10], [11], [18]–[26], we argue that little attention has been paid to BCT-based healthcare adoption studies. As seen in Table 1, the primary focus of existing reviews has been on the outline and synthesizing the BCT application trends and areas in healthcare. It is evident that the factors influencing the adoption of BCT-based healthcare have not been examined in the existing reviews and there is insufficient knowledge in this field. BCT Knowledge advancement in healthcare, in general, must be built on the previous effort. To push the knowledge boundary, we must first understand where is it by assessing the breadth and intensity of the current body of knowledge by analyzing relevant publications to highlight the gaps and identify future research avenues [27].

**Table 1.** Previous review studies on BCT in healthcare

| Study | Context |
|---|---|
| [19] | Highlighted many examples of BCT use in healthcare, as well as the problems encountered and potential solutions |
| [20] | Described the numerous BCT platforms that have been created to be used in healthcare. |
| [21] | Offered summary statistics on popular BCT platforms in the healthcare area |
| [22] | Used bibliometric methodologies to provide an overview of BCT aspects and research directions in healthcare applications. |
| [11] | Presented the scope of BCT applications in the healthcare domain |
| [23] | Reviewed the role of BCT in the healthcare domain |
| [24] | Investigated the possibilities for using BCT solutions in healthcare. |
| [25] | Conducted a review to analyze the current and future use of BCT in healthcare applications |
| [10] | Presented the obstacles and chances of using BCT in healthcare |
| [26] | Presented the benefits and challenges of BCT-based applications in healthcare |
| [18] | To evaluate the studies on the use of BCT in patient care, as well as the related obstacles. |

There is a lack of reviews that focus on BCT-based healthcare adoption studies, which was the major motivator for doing this study. Therefore, this systematic review aims to fill the current gaps by providing a complete view and offers a detailed summary of BCT adoption studies related to the healthcare industry. This review presents a detailed review of characteristics of existing empirical studies investigating the factors influencing blockchain adoption in healthcare by highlighting the research methodologies, targeted stakeholders, adoption theories/models used, and the influential factors explored in each of these studies.

The focused discussion on the adoption of BCT in healthcare is beneficial. The research on the adoption of different healthcare stakeholders is essential to identify the key factors impacting BCT deployment in healthcare and to solve the problems that might cause acceptance barriers [28]–[30]. The review studies can help by summarizing prior research and outlining the main aspects that require extensive attention from scholars [31]. Systematic Literature Review studies (SLRs) can offer a useful summary of what is known now in a field of study [32] and can help identify gaps in knowledge that need to be filled in the future [33]. According to our knowledge, this is one of the first reviews that seeks to

examine the status of research on BCT adoption in healthcare and propose advice for possible future research aspects.

This paper is organized as follows: Section 2 examines the methods used in this study. Section 3 presents the results from the primary studies. Section 4 carries out a discussion as highlighted in the research questions. Lastly, section 5 presents the conclusion and suggestions for further research.

## 2. Methodology

The main aim of this study is to present a detailed review of existing empirical studies investigating the factors influencing blockchain adoption in healthcare. The review process used in this study was inspired on "Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)" [34] guidelines. We followed the PRISMA guidelines without considering meta-analysis approaches. PRISMA is a comprehensive approach for generating data and contributing to identifying research structures and routes, as well as a potential future study [35]. The review process in this study employs a two-stage planning and conducting as shown below.

### 2.1 Planning stage

This stage begins with establishing the study's scope and research questions. The main aim of this study is to provide a systematic review of BCT adoption studies in healthcare. So, the study's scope is collecting BCT adoption papers related to the healthcare context to make a detailed analysis and extract valuable information. The main question of this study is:

To what extent the BCT adoption in healthcare studied in literature? This main question is followed by some sub-questions:

1. What are the research methods used in these studies?
2. Who are the healthcare stakeholders that were target participants in these studies?
3. What are the technology adoption theories/models used in these studies?
4. What are the influential factors of blockchain-based healthcare adoption?

### 2.2 Conducting stage

This stage involved choosing databases, developing a search strategy, and implementing inclusion and exclusion criteria for document selection. To find the studies that focused on BCT adoption in healthcare, an electronic search was undertaken on the Scopus database. Scopus is the most extensive citation and abstract database of peer-reviewed papers worldwide, summarizing the highly qualified research output worldwide in all subjects [36], [37]. Compared to other literature databases (e.g., "Web of Science"), Scopus has a greater number of journals and scientific articles [36]. The search has conducted on 30 August 2022 with no time constraints. The search for relevant publications was performed by using the query strings ((blockchain) AND (adopt* OR accept* OR intent*) AND (health* OR *health OR medic* OR *care). The search was limited to journal articles, conference papers, and book chapters that were written in the English language and the full text are accessible. The initial search identified 223 studies. After that, the primary screening based on the title and abstract was done and the 33 papers moved to the next step. Then, a set of inclusion and exclusion criteria guided the selection of papers for evaluation in this study as presented in table 2.

**Table 2.** Inclusion and Exclusion Criteria

| Inclusion Criteria | Exclusion Criteria |
|---|---|
| The study had empirical investigations of BCT adoption in healthcare | Studies focus on BCT adoption in healthcare but without empirical investigation |
| The methodology of the study was quantitative, qualitative, or mixed methods. | General studies related to BCT-based healthcare, or technical articles, such as those on BCT architecture and algorithms |

Following an assessment of document eligibility and the rejection of irrelevant articles based on inclusion and exclusion criteria, 12 articles were eventually determined eligible and appropriate for detailed review. Figure 1 summarizes the systematic review process followed.

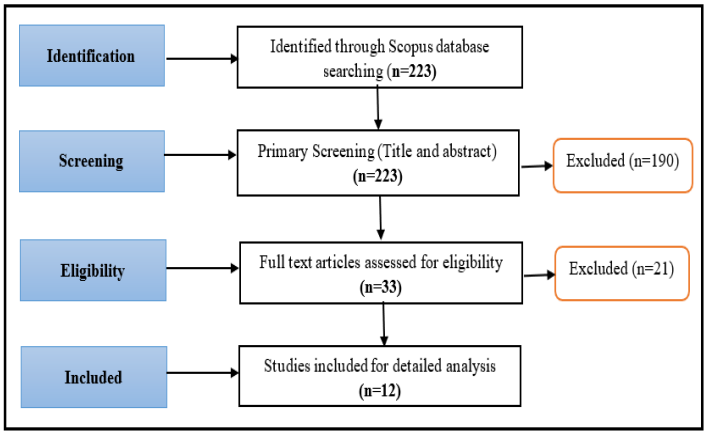



**Figure 1.** The flowchart of the selecting papers process

## 3. Results

This study reviewed the current extent of BCT adoption studies in healthcare that are indexed in the Scopus database Table 3 briefly describes each of the examined studies by presenting the author, country, objective, methodology used, theory/model used, and the factors investigated in each study. As shown in figure 2, in 2017 only one (n=1) publication was found and in 2019 and 2020 increased 2 times to two (n=2) each, in 2021 found (n=5) papers, and until August 2022 there are two (n=2) publications were found. This indicator shows that the adoption of BCT in the healthcare industry has recently grown. Seven countries were found based on the target population in the analyzed studies. As presented in figure 3, four countries (India, Canada, South Korea, and

USA) have two papers each. The other three countries (UAE, Saudi Arabia, and China) have one paper each. We have provided the outcomes of the 12 studies examined in this review to answer the specified research questions.

**Table 3**. Description of studies included in this review

| Study | Country | Objective of study | Methodology | Theory/ Model | Factors investigated |
|---|---|---|---|---|---|
| [38] | India | Identify critical factors of BCT adoption in healthcare | Qualitative method (Workshop) n=15 healthcare expert | NA | Privacy, security, interoperability, cost, integration encouragement, regulatory clarity and governance, BCT developers, data unavailability, compatibility, trust, scalability, accessibility, data standardization, and immature technology. |
| [14] | India | Determine barriers to BCT adoption in healthcare | Qualitative method (Semi-structured interviews) n = 15 hospital staff and administration | NA | Legal framework, data storage capability, trust, cost, scalability, BCT awareness, data standardization, technical expertise, top management support, complexity, data privacy, and security, infrastructure |
| [39] | Canada | Explore the intention to adopt BCT for PHR and Data Sharing | Qualitative method (Focus groups) n= 26 patients | NA | BCT knowledge/Awareness, privacy, decentralization, trust, data access, and data sharing. |
| [40] | South Korea | Assessment of the awareness to use BCT-based patient-centered HIE | Qualitative method (Semi-structured interview) n=21 (7 patients, 7 physicians, and 7 developers) | Grounded Theory . | Cooperation among various institutions, awareness, data standardization, privacy issues, and government policy. |
| [41] | South Korea | Examine attitude toward using BCT for medical information management | Quantitative method (survey) n= 180 (90 Medical doctors and 90 patients) | NA | Privacy and awareness |
| [42] | NA | Determine the factors impacting BCT adoption of EHR. | Quantitative method (survey) n=149 (patients and medical personnel) | NA | Perceived usefulness, relative advantage, performance expectancy, ability, Integrity, security, privacy, and trust. |
| [43] | China | Identify the factors impacting BCT adoption in elderly care | Quantitative method (survey) n =181 elderly care top managers | TOE/DOI | Privacy, security, trust, relative advantage, corporate social responsibility, top management support, organizational readiness, competitive pressure, government support, and complexity. |
| [44] | USA | Explore the attitude of patients toward BCT-enabled HIE | Quantitative method (Web-based experiments) n= 2013 Patients | NA | Privacy, trust, patients' willingness to disclose personal information, and perceived benefits |
| [45] | USA | Explore the factors of BCT adoption for HIE | Qualitative method (In-depth interview) n=38 physicians | Grounded Theory | Innovative technological features, Collaborative ecosystem, System performance, BCT knowledge, trust, complexity, BCT model types, feasibility, readiness, Network effects, lack of collaboration among various stakeholders, regulatory issues |
| [46] | Canda | Identify barriers to BCT adoption for public health (PH) data sharing | Qualitative method (semi-structured interviews) n=10 PH professionals | NA | Compatibility, data sharing, Privacy, Data Integrity, identity management, Legislation, and Government Policies |
| [47] | Saudi Arabia | Identify factors affecting healthcare organizations to use BCT for data sharing | Mixed Method expert review (n=16); and a questionnaire survey (n=45) healthcare IT specialist and BCT experts. | NA | decentralization, data integrity, cost, ease of use, confidentiality, policy, anonymity, privacy, Availability/robustness, Accuracy, efficiency, Tamper-proofing, Interoperability, Access control, transparency, |

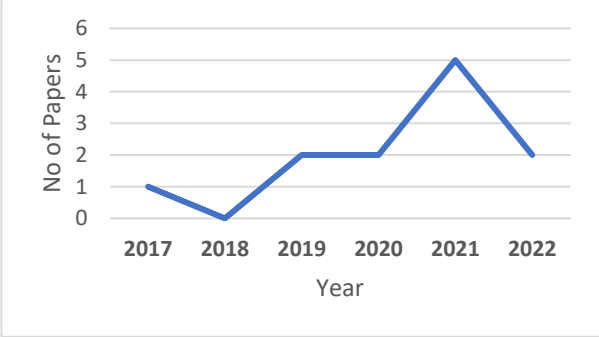



**Figure 2.** Distribution of papers by year of publication

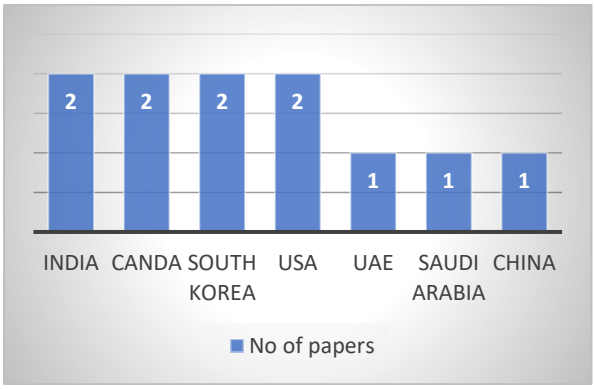



**Figure 3.** Distribution of papers by countries

## 3.1 Research Method used

The results showed the qualitative method was the most research method of the examined studies which represented 50% (n=6) of studies and relied on interviews [14], [40], [45] [46], workshops [38], and focus groups [39] to collect the data. However, 33% (n=4) of studies used the quantitative method and relied on questionnaire-based survey instruments [41]–[43] to collect the data except for one that used web-based experiments [44]. For the remainder of the studies, 17% (n=2) used the mixed method (qualitative and quantitative) for collecting the data [9], [47].

## 3.2 Stakeholders as target participants

Governments, healthcare providers (including professionals, diagnostics, medical personnel, and so on), insurance, and consumers/patients are the primary stakeholders in the healthcare system. Healthcare research experts and BCT providers and experts are two more stakeholders regarded as crucial, although they may not have a direct relationship with the healthcare ecosystem. We analyzed the papers selected within this review regarding stakeholders as targeted participants to better understand who evaluated BCT adoption. The results showed that 42% (n=5) of the examined studies depended on healthcare providers, 25% (n=3) on patients, and no study relied on the government or insurance as primary stakeholders. In 33% (n=4) of the studies examined, the intended participants were healthcare research experts and BCT experts.

## 3.3 Adoption Theories/Models used

According to theories/models on how people or organizations adopt new technologies, it can be seen that most analyzed studies (n=9) do not use adoption theory or model to investigate the factors affecting the adoption of BCT in healthcare. Only one study [43] used the "technology-organization-environment (TOE)" and "diffusion of innovation (DOI)" theories to examine the factors that impact BCT adoption decisions in elderly care organizations. The rest of the examined studies (n=2) applied a ground theory.

## 3.4 The influential factors of BCT adoption in healthcare

A total of thirty-three factors that can influence BCT adoption in healthcare are found in the publications examined in this study. As shown in Table 4, the most frequent factors mentioned influencing the BCT adoption in healthcare are privacy with ten papers (83.33%), government support/regulatory regulations (n= 8) 66.67%, trust (n=7) 58.33%, and security (n=6) 50%. Two factors cost and knowledge/awareness of BCT appeared in 5 studies (41.67%), and perceived benefits/relative advantage appeared four times (33.33%). Seven factors are robustness/efficiency/quality of BCT systems, access control/accessibility, interoperability/compatibility, complexity, organizational readiness, cooperation among various institutions, and immature technology appeared in 3 studies each (25%), Data integrity, data standardization, top management support, decentralization, scalability, data access, and infrastructure were the factors appeared in 2 studies each (16.67%). Other factors were performance expectancy, technical expertise, BCT developers, organization size, ease of use, competitive pressure, corporate social responsibility, perceived usefulness, ability, anonymity, transparency, and data storage capability s appeared once (8.33%).

**Table 4.** Influential factors of BCT adoption in healthcare

| Factors | No of studies | % | Source |
|---|---|---|---|
| Privacy | 10 | 83.33% | [9], [14], [38]–[43], [46], [47] |
| Government Regulation & Policies | 8 | 66.67% | [9], [14], [38], [40], [43], [45]–[47] |
| Trust | 7 | 58.33% | [9], [38], [39], [42]–[45] |
| Security | 6 | 50.00% | [9], [14], [38], [42]–[44] |
| Cost | 5 | 41.67% | [14], [38], [44], [45], [47] |
| BCT Knowledge/ Awareness | 5 | 41.67% | [14], [39]–[41], [45] |
| Perceived Benefits / Relative Advantage | 4 | 33.33% | [42]–[45] |
| Robustness/ Efficiency/Quality of BCT Systems | 3 | 25.00% | [41], [46], [47] |
| Access Control/ Accessibility | 3 | 25.00% | [38], [46], [47] |
| Interoperability /Compatibility | 3 | 25.00% | [38], [46], [47] |
| Complexity | 3 | 25.00% | [14], [43], [45] |
| Organizational Readiness | 3 | 25.00% | [9], [43], [45] |
| Cooperation Among Various Institutions | 3 | 25.00% | [9], [42], [45] |
| Immature Technology | 3 | 25.00% | [38], [40] |
| Data Integrity | 2 | 16.67% | [42], [46] |
| Data Standardization | 2 | 16.67% | [38], [40] |
| Top Management Support | 2 | 16.67% | [14], [43] |
| Decentralization | 2 | 16.67% | [39], [47] |
| Scalability | 2 | 16.67% | [14], [38] |
| Data Access | 2 | 16.67% | [38], [39] |
| Infrastructure | 2 | 16.67% | [9], [14] |
| Performance Expectancy | 1 | 8.33% | [42] |
| Technical Expertise | 1 | 8.33% | [14] |
| BCT Developers | 1 | 8.33% | [38] |
| Organization Size | 1 | 8.33% | [9] |
| Ease of Use | 1 | 8.33% | [47] |
| Competitive Pressure | 1 | 8.33% | [43] |
| Corporate Social Responsibility | 1 | 8.33% | [43] |
| Perceived Usefulness | 1 | 8.33% | [42] |
| Ability | 1 | 8.33% | [42] |
| Anonymity | 1 | 8.33% | [47] |
| Transparency | 1 | 8.33% | [47] |
| Data Storage Capability | 1 | 8.33% | [14] |

## 4. Discussion

The use of BCT has gradually emerged as an important topic in the healthcare industry. BCT can lead to a new dimension in healthcare and reshape it to make a trustworthy and sustainable digital ecosystem for better-quality health data management [48]. The healthcare BCT industry is predicted to reach USD 3.21 billion by 2024 [6]. Even though BCT has a lot of promise in the healthcare setting, BCT adoption has been limited and it is still in its early stages. Stakeholders and decision-makers in healthcare organizations are not highly motivated about adopting and implementing BCT into their healthcare system. It is essential to discover the factors that impact the adoption of BCT as an emerging technology. Technology adoption is dependent on the factors impacting its use. Thus, it is critical to get additional insights into what influences the adoption of BCT throughout healthcare to increase its utilization. Consequently, this systematic review aimed to present a detailed overview of BCT adoption studies in healthcare by analyzing the main methods of research, targeted stakeholders, technological adoption theories/models, and crucial factors investigated in each study.

According to the findings of this study, qualitative techniques were utilized as the major method used in the

analyzed studies with 50%. These findings contradict previous systematic evaluations of the technology adoption, which determined that quantitative methods were the most commonly used. Regarding BCT adoption in other sectors, a previous systematic review [49] found that quantitative approaches were the most typically utilized, and study [50] found that qualitative investigations were the predominant technique utilized in the majority of the studied papers on BCT adoption. Thus, based on these results, it is proposed that future studies adopt the mixed-research strategy, which includes questionnaire surveys in addition to interviews. This is because quantitative techniques give a deeper explanation of correlations between the factors influencing BCT adoption which would be useful for decision-makers.

Regarding theories/models on how people/organizations adopt new technologies, our findings revealed that 11 studies did not use any theories/models in examining Blockchain adoption. Only one research [43] investigated the factors by combining TOE and DOI to investigate the factors affecting BCT adoption in elderly care. Upcoming research should consider adoption theories/models at both the individual (e.g., Technology Acceptance Model (TAM)) and organizational levels (e.g., TOE). There are numerous advantages to conducting research utilizing theories. Theories give the underlying logic for natural or social events by elucidating the subject phenomenon's primary causes and effects. and also the fundamental mechanisms that drive that event. In addition, it helps us make sense of earlier empirical findings by integrating them into a theoretical framework and clarifying inconsistent findings by determining the contingent factors that influence the link between different constructs in distinct investigations. Furthermore, theories provide a framework for future research by identifying significant constructs and relationships that might be studied [51].

Regarding the influential factors of BCT adoption in healthcare, the most frequent factor affecting BCT adoption in healthcare was privacy (n= 10). This is followed by government support/regulatory regulations (n= 8), trust (n= 7), and security (n= 6). However, there is plenty of potentials for other factors to be examined in terms of various technological adoption theories/models and BCT-specific features. In addition, understanding key challenges and taking them into account while deploying BCT will increase their adoption rate. The key technological hurdles of adopting and implementing BCT in healthcare include scalability, interoperability, complexity, and data storage capability. Security and privacy concerns are significant barriers to BCT adoption and deployment. Inadequate access to IT infrastructure by stakeholders impedes successful and sustained BCT adoption [38] [14] [39]. Adoption of BCT is a costly affair that necessitates technological infrastructure upgrades; hence, hospital administration is hesitant to apply it, which is the real concern. Additional problems, such as the quantity of necessary infrastructure, technical competence, and the number of new personnel, pose hurdles to top management commitment, and hence management is less concerned about BC [14]. There is a lack of experts with BC experience, thus they are unable to comprehend the benefits of BC adoption in the healthcare industry. Top-level management must be addressed in terms of data integrity, verification, validation, and the generating of value at a rapid rate as a result of BC implementation. Also, the key challenges include a lack of data integrity and trust, as well as a lack of readiness to use BCT [46] [42] [43].

Because of knowledge limitations, technological adoption may fail. Major knowledge barriers to BCT implementation include a lack of familiarity with BCT, insufficient understanding of stakeholders about BCT, and a shortage of experienced and knowledgeable people [39] [40]. To adapt to this new system, all stakeholders must be educated and trained. However, most firms are unable to provide sufficient training and orientation to their employees, which is a big hurdle to BCT adoption and integration [42]. Another important issue is a lack of support from senior management. It is difficult to connect BCT with existing legacy systems without the full backing and collaboration of top executives [14] [43]. Lack of knowledge breeds distrust among stakeholders, which includes IT specialists, technicians, organization management teams, security professionals, policymakers, and experts [38] [14].

Many nations are still hesitant to use BCT owing to a lack of appropriate legislation [47]. Uncertainty about BCT regulatory issues causes stakeholders to be hesitant, which serves as a barrier to properly implementing this technology [43] [45] [46]. Some of the problems that directly impact BCT adoption and deployment are management scalability, a lack of standardization, insufficient government rules, legal concerns, and a lack of an active regulatory board [47] [9]. In certain circumstances, a government's refusal to adopt has delayed BCT implementation attempts. A lack of clear government incentives and benefits for effective BCT system implementations contributes to demotivate professionals and specialists from embracing this technology [38] [14] [40].

In general, the widespread adoption of any disruptive technology (such as BCT) in healthcare is challenging. Understanding the factors that determine the adoption of new technology projects is critical [30]. Despite its importance, research on BCT adoption in healthcare is still in its infancy and the influential factors of BCT adoption in healthcare have not been well investigated. In addition to technological aspects, technology adoption decisions may be influenced by a variety of inter-organizational and environmental factors. Thus, based on the results of this review, we propose a conceptual framework including the key factors that impact BCT adoption decisions in the

healthcare industry. The proposed framework grouped the factors into technological, organizational, and environmental (TOE) aspects, as illustrated in Figure 4. Other researchers can utilize this framework to further their work.

## 5. Conclusion and Future Research

Despite the tremendous benefits that BCT appears to provide to the health sector, its adoption remains low and in its early stages. This is one of the primary motives for conducting adoption studies. Identifying what influence the adoption of BCT can help to handle their adoption obstacles more effectively. Several concerns and challenges must be addressed for adoption and diffusion to occur. The limited adoption rates of many technologies, including BCT, are due to a lack of information about the factors impacting their use. Therefore, this study presented a detailed overview of the available literature dataset on BCT-based healthcare adoption studies by analyzing the main methods of research, targeted healthcare stakeholders, technological adoption theories/models, and crucial factors in each study. To achieve this goal, SLR was carried out on the Scopus database to find relevant articles for evaluation. The findings summarized the existing knowledge of BCT adoption studies in healthcare. Careful syntheses of these studies would enable researchers and partitioners to understand various opportunities and challenges of BCT implementation in healthcare. To our knowledge, this is the first effort that has conducted a detailed review of BCT adoption in healthcare.

Several research gaps were highlighted in this review. First, few studies in the literature have studied the factors that influence BCT adoption decisions in the healthcare system. Little attention has been paid to highlight internal and external factors that would impact successful BCT adoption in healthcare. Additionally, the evaluated research placed little attention on understanding how underlying factors interact, social structures and institutional mechanisms affect the adoption of BCT in healthcare. The reasons why healthcare organizations are hesitant to implement BCT are still not clear and call for more research. The critical factors influencing the decision to embrace BCT in healthcare have been misunderstood; it is important to understand these factors. The focus on rather technical properties of BCT may have neglected relations on human/social aspects of technology adoption and integration, which should be examined in further studies as well and this is an opportunity for future research.

Although an effort has been made to provide a comprehensive overview of the literature published on BCT adoption in healthcare, this study has a few limitations. First, this study followed the PRISMA guidelines without considering meta-analyses. Future research should be taking into account meta-analyses to support the findings of this study. Second, the gathered publications were also only acquired from the Scopus database, thus it's possible that some relevant studies aren't included. Hence, papers from another database may be used in future investigations. Finally, only English-language publications were included; however, similar papers from other languages may be taken into account in future research to overcome this limitation.

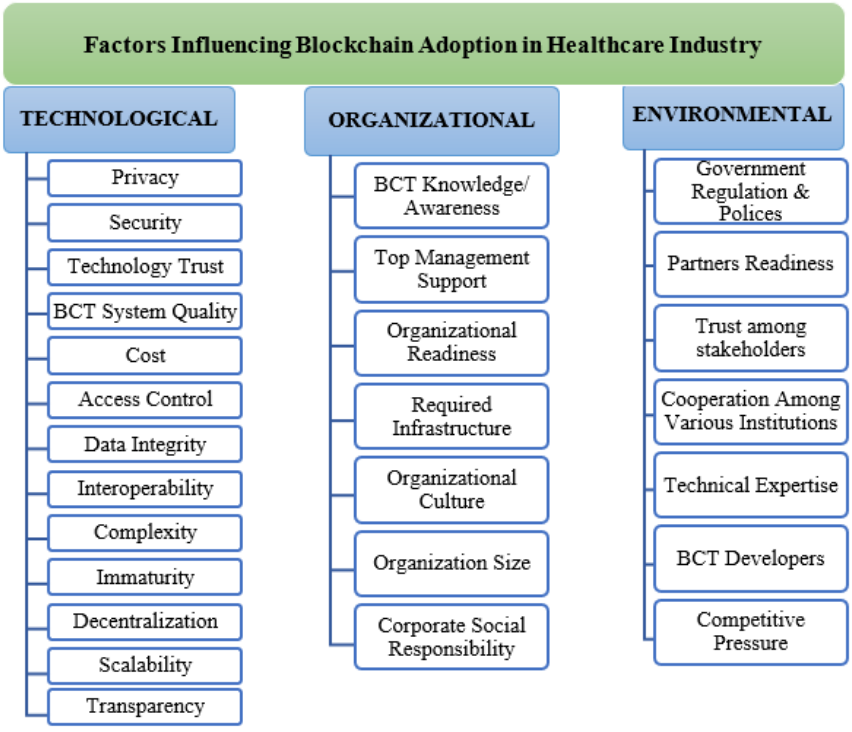



**Figure 4.** A framework of BCT adoption in healthcare

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