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Intention to Adopt Blockchain-Based Technologies: A Systematic Literature Review

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Abstract: Blockchain technologies have garnered significant attention from both industry as well as academia due to their unique features, including data, security, integrity, reliability and decentralization. Despite this, their adoption remains limited, prompting many studies to explore their user satisfaction and adoption rates. Understanding a factors influencing to the intention to adopt blockchain can help address these challenges. Numerous SLRs have reviewed studies for advancing knowledge, identifying research priorities, and informing decision-making in academic and practical contexts. These studies span blockchain technology across diverse fields, including energy management, healthcare, and logistics. Some review delves into its technical aspects, like algorithms and cryptography, while others explore legal frameworks. However, prior research on factors influencing the intention to adopt blockchain-based technologies is limited, and the current research trend remains ambiguous. To bridge the gap, this study aims to comprehensively examine existing research on blockchain-based technology adoption and discuss the challenges and opportunities across deferent sectors, of 225 collected papers, 28 empirical studies that met the criteria and underwent thorough analysis. Findings indicate that the Technology Acceptance Model (TAM) and Technology-Organization-Environment (TOE) are commonly used frameworks for studying blockchain adoption, and in addition to the core variables of these models, perceived cost, trust, facilitating conditions and social influence emerged as the most investigated determinants on various blockchain-based applications. Supply chain management emerges as the primary domain for blockchain adoption. Adoption and continuing to adopt or use are the focus of many studies. Furthermore, existing studies predominantly focus on individual adoption, with little attention given to organizational-level adoption. However, there is limited research on the intention to adopt. This SLR is suppose improve the our understanding by revealer blockchain's full potential, opening the door for the further opportunities of research.

Keywords: *intention to adopt technology; blockchain; verification; systematic literature review*

Introduction

Because of the swift advancement in digital infrastructure and the widespread availability of internet access worldwide, numerous online technologies like blockchain have emerged over the past decade (Sindi, 2019). Blockchain technology revolutionizes data management through its decentralized ledger system, where transactions are recorded as blocks linked together, forming a chain (Mara & Motupalli, 2022). Its key components include decentralization, ensuring transparency and resilience by distributing data across a network of nodes, and cryptographic security, which safeguards transactions through encryption and tamper-evident hashes (Murugesan & Lakshminarasaiah, 2021). Consensus mechanisms like Proof of Work (PoW) or Proof of Stake (PoS) validate ledger states, while immutability ensures transaction integrity (Islam et al., 2021). Smart contracts automate agreements, reducing reliance on intermediaries, and blockchain finds applications in diverse sectors like supply chain management, finance, and healthcare (Khan et al., 2021). Public blockchains, like Bitcoin and Ethereum, offer transparency, while private blockchains prioritize data privacy (Awoke et al., 2021). Challenges such as scalability and energy consumption are being addressed with innovative solutions. Overall, blockchain presents a secure, transparent paradigm for transaction recording and verification, poised to reshape industries and redefine data and value exchange (DuPont, 2017). Scholars have studied that the conditions foster the diffusion and adoption of blockchain technologies (Eric Piscini, 2015; Garriga et al., 2020; Ghonimy Mohamed, 2021; Lin et al., 2021; Subhodeep Mukherjee et al., 2023). Yet, the initial embrace of technology does not necessarily ensure its success of commercial or sustained usage (Paczkowski, 2020; Sáez, 2020). For example, Sáez (2020) highlights the struggles faced by blockchain-enabled platforms, with less than a tenth surviving their first year due to market volatility and skepticism. It argues that challenges include navigating speculative bubbles, demonstrating disruptive potential, and managing growth. To succeed, startups must temper decentralization

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ambitions and focus on controlled market entry, while incumbents must relinquish traditional control. Based on twenty interviews, the study offers recommendations for both parties amidst diverging technological understanding. Hence, understanding of the factors that usually explain the intention to adopt blockchain has acquired will increasing relevance for researchers in Information Systems (IS). Intention to adopt IS as an individual's intention to use an information system (in contrast to continuing to use or accept), that distinguish between continuance behavior and technology adoption, arguing that available studies inappropriately use the same items / constructs to measure acceptance and continued intention, as the reasons explaining technology adoption differ from those explaining continued intention. Since then, the intention to adopt technology has been studied in a many of digital technology settings, including e-tailing (March, metaverse (Almarzouqi et al., 2022), innovative technology (Perri et al., 2020), online banking (Gertze & Petersen, 2024).

While the literature on intention to adopt in the context of blockchain technology has increased in the recent years, a thorough the Systematic Literature Review (SLR) focus on blockchain-based verification technologies is missing. Therefore, (SLR) is helpful to critically assess the extant literature and clarify what we need to know and what we already know about the determinants and consequences of the users' intention to adopt. Through an SLR, the aims of current study is to provide a comprehensive analysis of the current state of the literature regarding the intention to adopt blockchain-based verification, identify research gaps, and offer an agenda for further research.

2. Related studies

The previously published reviews were analyzed to comprehend the current state of research on technologies of blockchain. For example, Yli-Huumo et al. (2016) conducted a review to understand the future directions and challenges regarding the blockchain technology from perspective of technical. The systematic mapping study reveals that over 80% of research centers on Bitcoin, with less than 20% exploring other applications like smart contracts. Predominant concerns are privacy, security, and scalability, yet many proposed solutions lack rigorous evaluation, leaving avenues for further research. Through an SLR, Fahmideh et al. (2022) focused on state-of-the-art blockchain-based software engineering research from the software engineering discipline perspective. The SLR identifies essential Blockchain-Based Software (BBS) engineering aspects, including models theoretical foundations, roles and processes. It offers insights into development, design principles, tasks, resolution techniques and challenges, providing a foundation for further research. Wahab et al. (2023) conducted a review and focused on committer assessment practice in blockchain projects. The review study highlights the critical role of committer assessment decisions in project success, acknowledging associated risks like project forks. Despite existing literature on developer turnover in open-source software, committer assessment practices in blockchain projects have been overlooked. The review identifies gaps and suggests avenues for further research. In the context of conference papers, Cao et al. (2017) review 242 papers on blockchain published from 2014 to 2016 and outlines a classification framework based on literature sources, research subjects, methods, and geographical focus. It highlights progress, limitations, and future trends. The analysis reveals decentralized, non-systematic domestic research lacking depth and quantitative analysis. Future focus areas include digital currency, internet finance, and blockchain technology risk research. Similarly, Conoscenti et al. (2016) present a thorough SLR that explores the potential of blockchain and Peer-to-Peer approaches in decentralized, privacy-focused IoT applications. They identified 18 blockchain use cases, including four for IoT and some for private data management. It highlights challenges such as pseudonymity, integrity relying on Proof-of-Work difficulty, and limitations in adaptability. The research suggests recommendations for addressing these issues. Earlier studies of review were conducted on technology of blockchain. Recently this subject has gained extensive attention and international interest. Alshamsi et al. (2022) focused on blockchain adoption and reviewed 30 empirical studies to understand adoption factors. It was found that the Technology–Organization–Environment (TOE) and Technology Acceptance Model (TAM) are widely used, with trust, cost, and social influence being key factors. Blockchain sees significant adoption in supply chain management, but studies often lack real-world usage analysis, especially at the individual level.

In sum, based on the studies above, blockchain technology has been studied across several disciplines, including healthcare, energy, education, logistics, agriculture, and supply chain management. Examined by some reviews have the

underlying technology of blockchain, like cryptography, distributed storage, peer-to-peer networking, smart contracts and consensus algorithms (Tama et al., 2017; Vacca et al., 2021; Wahab et al., 2023; Yli-Huumo et al., 2016). The interested by other reviews were in highlighting the laws and regulations governing this technology (Balasubramanian et al., 2021). Some reviews focused on the applications of health built using blockchain technologies, their benefits, and the obstacles to implementation (Alshamsi et al., 2022). Another review identified theories of organizational and discussed their application in adopting blockchain technologies in supply chain management and logistics (Tschorsch, 2017). It appears that the existing reviews have overlooked the examination of factors influencing the intention to adopt blockchain-based verification from theoretical perspectives. In addition, there is not enough knowledge about the primary research methods used in adopting blockchain-based applications. Therefore, this study aims to provide a comprehensive review of blockchain-based intention to adopt by examining the main methods of research, domains, technology acceptance theories or models, influential factors, research objectives, and target participants. This SLR study attempts to comprehensively appraise, identify and synthesize all suitable studies that meet pre-specified eligibility criteria according to a predetermined and explicit method to answer a specific question of research. The scientific and transparent process to minimize bias was followed by utilizing the approach recommended by Kitchenham and Charters (2007) for conducting an SLR in the field of IS. The following four research questions were developed to present a comprehensive report on the extant literature.

1. What are the frequent theories and models primarily used in the selected studies?
2. What are the most frequent factors affecting the intention to adopt Blockchain?
3. What frequent adoption concept is mainly investigated in the selected studies?
4. What potential knowledge gaps within the extant literature on intention to adopt blockchain-based technologies?

3.0 Methodology

This study used an SLR method to evaluate prior research on the intention to adopt blockchain, following established SLR principles by Kitchenham and Ebse (2007)The subsequent sections outline the steps taken during the review process, which involved identifying a search string and the databases to search, with Scopus being selected. The keywords used for the search were “intention to adopt,” “information technology,” “continued use,” “continued usage,” “post-adoption,” and “post-adoptive intention.”

Data Collection and Search Methods

The final search was conducted on 22nd December 2023 by following the review protocol, that including formulating preliminary inclusion and exclusion search criteria to identify relevant studies and conducting, analyzing and critically evaluating each paper (Wahab et al., 2023). This process produced a final set of 28 retained and reviewed papers. Figure 1 summarizes the process of selecting suitable papers and identifying. The reporting and dissemination stage details each study’s year blockchain solution-based type, theories, research methods employed, and antecedents and consequences of intention to adopt (Hoehle et al., 2012; Ain et al., 2019). In this SLR, papers were sourced from various online databases such as Emerald, ScienceDirect, IEEE, MDPI, Springer, and Google Scholar. The search was conducted in February 2024 using specific keywords (“Blockchain”) AND (“adoption” OR “intention to adopt” OR “acceptance” OR “use” OR “intention to use” OR “continued use” OR “continuous intention”). Keyword selection is crucial in determining the retrieved papers (Kitchenham & Ebse, 2007). The search yielded 225 articles, filtering results with inclusion criteria; lack theoretical framework, language: English with 188 papers. In addition, 21 duplicate papers were removed, and 167 papers remain. Another inclusion criteria were applied, and 94 papers were removed, with 73 remaining. The criteria were imposed based on the abstract, and 25 papers were excluded. Finally, exclusion based on full reading of the full text was imposed, and 20 papers were removed, resulting in 28 papers meeting the criteria for final of analysis. The search and the refinement stages followed the "Preferred Reporting Items for SLR" guidelines. (Kitchenham & Ebse, 2007). Figure 1 illustrates the PRISMA flow diagram.

Inclusion and exclusion criteria

Table 1 lists the inclusion and exclusion criteria for the papers critically evaluated in this review.

Table 1. Inclusion and Exclusion Criteria

Actions	Criteria
Inclusion Criteria	1. Must have publication dates ranging from 2016 to 2024. 2. Must present a theoretical framework for assessing blockchain. 3. Must evaluate blockchain adoption, acceptance, or ongoing usage. 4. Must be written in English.
Exclusion Criteria	1. Research lacks a theoretical framework despite examining the blockchain. 2. Research presenting a theoretical framework not yet related to blockchain. 3. Research published in languages other than English.

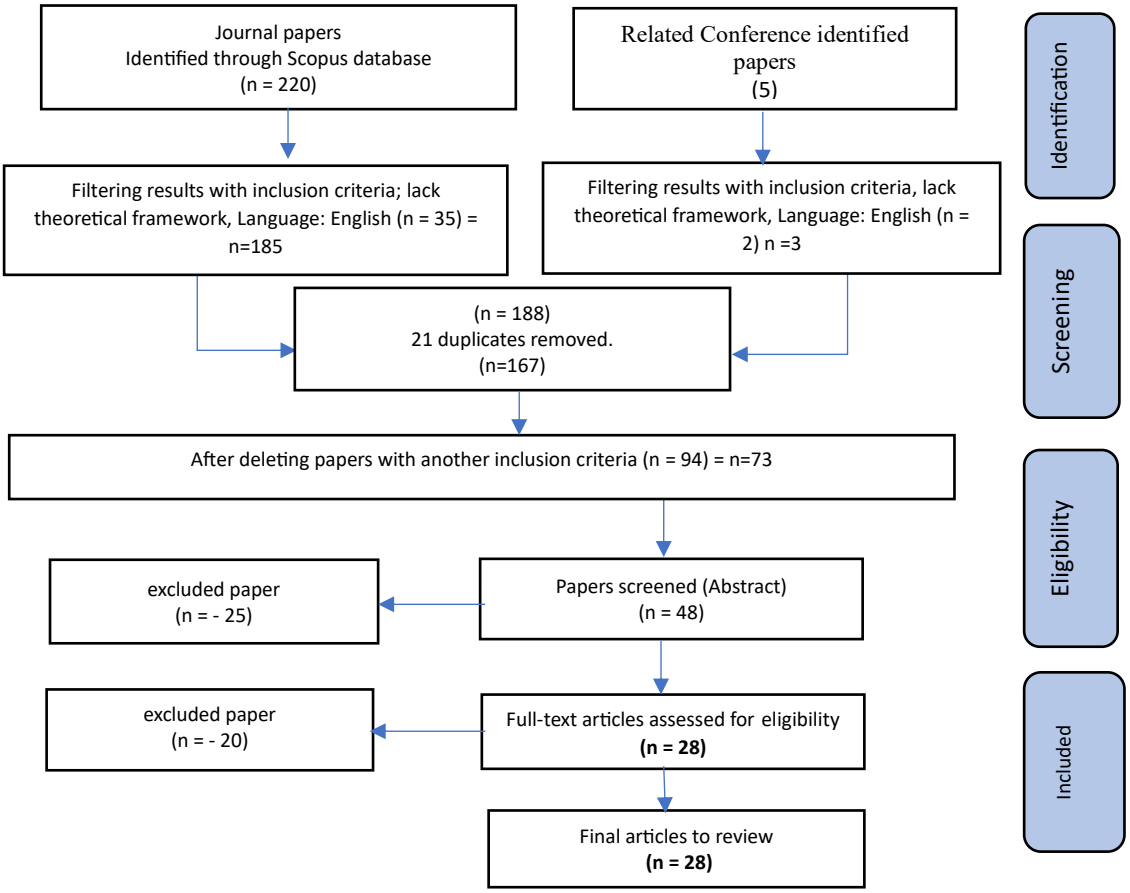

Figure 1: Papers selection and retaining process (PRISMA flow diagram)

Quality Assessment

Quality assessment, alongside inclusion and exclusion criteria, plays a pivotal role in SLR research (Sarkintudu et al., 2019). A set of nine criteria derived from Al-Emran et al. (2018) and Alqudah and Al-emran (2021) was utilized for quality assessment, shaping a method to evaluate the selected research papers (n = 28) for final analysis, as depicted in Table 2.

Table 2. Quality Assessment

Numb	1	2	3	4	5	6	7	8	9
Questions	Are the research objectives clearly stated?	Was the aim of the study successfully accomplished?	Are the variables addressed in the study clearly	Is the study's context clearly articulated?	Are the methods of data collection adequat	Is the instrument reliable and valid?	Is the data analysis technique adequat	Do the findings contribute to existing literatur	Does the study enhance knowl

			outlined?		e?		e?	e?	edge?

This criteria aimed not to critique scholars' work but to gauge research quality, adapted from recommendations by (Kitchenham & Charters, 2007). Each checklist question was rated on a three-point scale: a score of 1 was given if the objectives were clear, 0.5 if the objectives were partly clear, and 0 if the objectives were not clear. This culminated in scores ranging from 0 to 9 for each study. Higher scores indicated a greater alignment with research objectives, determined by scrutinizing nine quality assessment criteria. The first and second authors independently assigned scores to each study, reconciling differences through discussion and reviewing contentious papers. Table 3 outlines the quality assessment outcomes for all 28 papers, revealing that each study met the criteria and was deemed suitable for final analysis.

Table 3. Outlines the quality assessment outcomes

Papers	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Sum**	**%**
P 1	0.5	1	0	1	1	0.5	1	1	1	7	77.7%
P 2	1	1	1	0.5	1	1	0.5	1	1	8	88.8%
P 3	0.5	1	1	1	1	1	1	1	0.5	8	88.8%
P 4	1	1	1	0.5	1	1	1	1	1	8.5	94.4%
P 5	0	1	0.5	1	1	0.5	1	1	1	7	77.7%
P 6	1	1	1	1	1	1	0	0.5	1	7.5	83.3%
P 7	0.5	1	1	0.5	1	1	1	0	1	7	77.7%
P 8	1	1	1	1	1	1	0	0.5	1	7.5	83.3%
P 9	0	0.5	1	1	1	1	1	1	0.5	7	77.7%
P 10	1	1	1	1	1	0.5	1	1	1	8.5	94.4%
P 11	1	1	1	1	1	1	0.5	0	1	7.5	83.3%
P 12	0	0.5	1	1	1	1	1	1	0.5	7	77.7%
P 13	1	0.5	1	1	0.5	1	1	0.5	1	7.5	83.3%
P 14	1	1	1		1	1	1		1	7	77.7%
P 15	1	1	0.5	1	1	1	0.5	0.5	0.5	7	77.7%
P 16	1	0.5	1	1	0.5	1	1	1	1	8	88.8%
P 17	1	1	1	0.5	1	1	1	0.5	0.5	7.5	83.3%
P 18	0.5	1	1	1	0	1	0	0	1	5.5	61.1%
P 19	1	1	1	0	1	1	1	0.5	1	7.5	83.3%
P 20	1	1	1	0.5	1	1	1	1	0.5	8	88.8%
P 21	1	0.5	1	1	0.5	1	1	1	1	8	88.8%
P 22	0.5	1	1	1	1	1	1	1	1	8.5	94.4%
P 23	1	0	1	0	0.5	1	1	1	1	6.5	72.2%
P 24	0.5	1	1	1	1	0.5	1	1	0.5	7.5	83.3%
P 25	1	0.5	1	1	1		0.5	1	1	7	77.7%
P 26	1	0	1	1	1	1	1	1	1	8	88.8%
P 27	0.5	1	1	1	1	0.5	1	1	1	8	88.8%
P 28	1	0.5	1	1	1	1	0	0.5	1	7	77.7%

Data Analysis and Coding

To address the research inquiries in this review, this study categorized the remaining 28 papers by various attributes such as Theories/Frameworks/Models, factors affecting the intention to adopt Blockchain, application area and adoption concept.

Findings

This study presents findings to address the questions of research based on the analysis of 28 selected prior studies.

Dominant Theories and Models

The exploration of blockchain technology adoption led to the analysis of collected articles using theories / models of technology adoption. The 16 papers out of 28 show that the Technology Acceptance Model (TAM) emerges as the most prevalent model. Following closely are the Technology-Organization-Environment (TOE) model with six papers, the Unified Theory of Acceptance and Use of Technology (UTAUT) and Innovation Diffusion Theory (IDT) with one paper each, respectively, as depicted in Figure 2. Similarly, other theories/models, such as TRI and TPB, were each represented once in the examined studies. Quantitative and questionnaire-based surveys are the predominant methods employed in 86% of the blockchain adoption studies analyzed. Conversely, only 14% of these papers utilized interviews for data gathering.

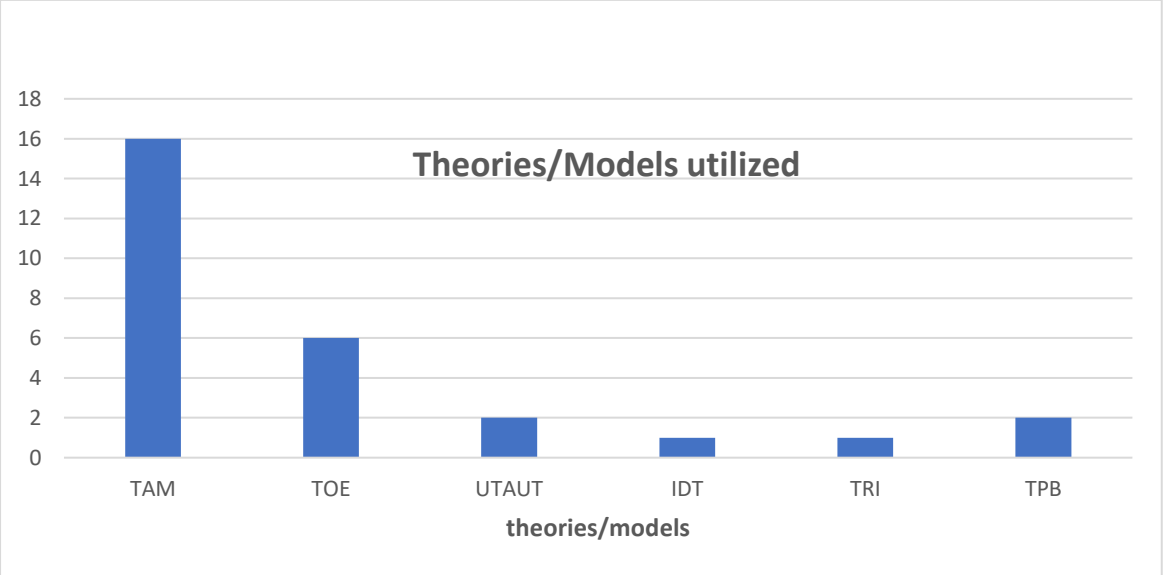

Figure 1: Theories/Models

Factors Affecting the Intention to Adopt Blockchain

The limited acceptance of numerous technologies, including blockchain, is mainly due to an insufficient understanding of the factors influencing their utilization. Consequently, this study has examined previous research to identify the main factors influencing blockchain technology adoption. Figure 2 depicts that among these factors in the literature, perceived trust emerged as the most frequently examined factor in 14 papers. Following closely are perceived ease of use, perceived privacy, perceived usefulness, and perceived institutional trust, which are prominent in 10 papers. Additionally, the analysis of the gathered studies reveals several barriers to its adoption influence the literature on blockchain adoption. Security risk (Frey et al., 2016), privacy risk (Mustafa et al., 2022) among the main risks negatively affecting the adoption of blockchain-based technologies. In addition, high energy costs (Abbasi et al., 2021); Biais et al., 2018) represent the main costs of using the technologies of blockchain. Some of barriers also impose by the organizations to using blockchain technologies, like policies of organizational (Choi et al., 2020) organizational culture (Wahl, 2016) and scalability problems (Dinh et al., 2017).

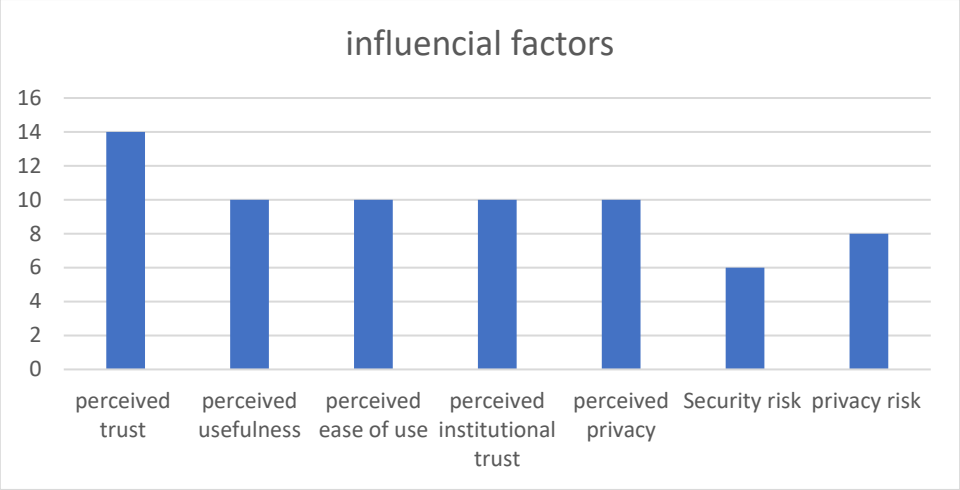

Figure 2. Factors

Blockchain Application Areas

The applications of blockchain have been extensively used across many application areas (Schaupp & Festa, 2018; Yli-Huumo et al., 2016). The collected studies were analyzed based on the adoption of blockchain technology. Figure 4 depicts the main application area in which applications of blockchain were adopted. It can be seen that cryptocurrency leads the list, with ten studies. This is followed by supply chain management, medical and identity management with nine, five and two, respectively. In addition, this analysis underscores the versatility of blockchain technology and its potential to revolutionize numerous sectors beyond finance. By examining the adoption patterns across different application areas, researchers gain insights into the challenges and opportunities blockchain implementation presents in various domains. This comprehensive understanding is crucial for informing future developments and maximizing the benefits of blockchain technology across industries.

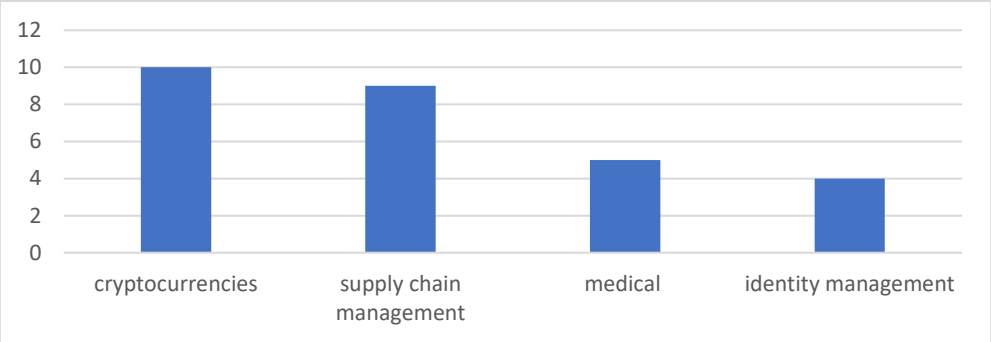

Figure 3. Blockchain Application Areas

Blockchain Research Contexts

There are four contexts within the domain of technology adoption : acceptance, adoption, post-adoption/continuous intention and intention to adopt. Blockchain adoption refers to the initial decision to start using blockchain technology. In contrast, acceptance of blockchain occurs when individuals or groups acknowledge and agree to the presence or reality of blockchain. Post-adoption/continuous intention refers to after-adoption, individuals or organizations may continue to evaluate and engage with the adopted blockchain. Finally, the intention to adopt blockchain is a concept that relates to the predisposition of individuals or organizations to adopt blockchain technology in the future. It reflects the level of readiness or willingness to embrace blockchain. Understanding the aims of the analyzed studies related to the aforementioned contexts is crucial for grasping our position on blockchain adoption. It has been noticed that 21 papers of the analyzed studies focused on measuring blockchain adoption, followed by post-adoption/continuous intention, with five papers. Meanwhile, acceptance studies and intention to adopt one paper each, respectively. They are depicted in figure 4.

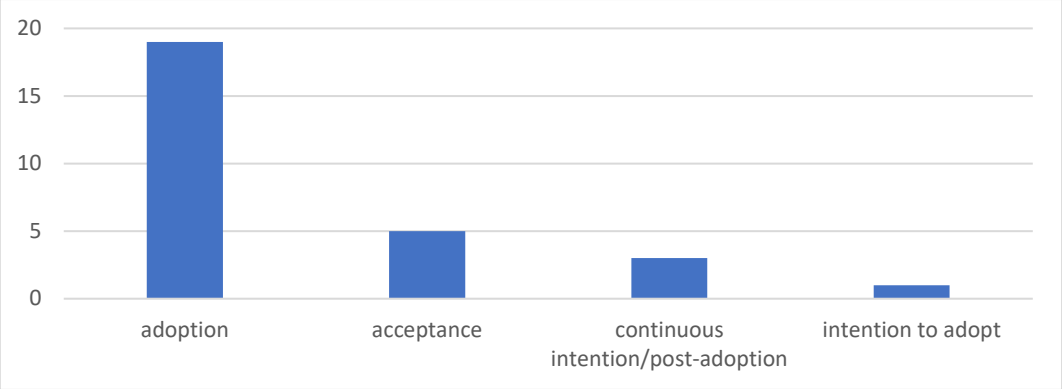

Figure 4. Blockchain Research Contexts

Knowledge Gaps in Blockchain Adoption Literature

The use of blockchain technologies was assessed by categorizing the examined studies into four adoption concepts. Most adoption studies primarily focused on applying transparent and traceable supply chains. For example, papers by (Marshall et al., 2022; Parrondo, 2018; Valenta & Sandner, 2017), enabling real-time tracking of goods from production to delivery (Akram et al., 2020; Helo & Shamsuzzoha, 2020; Kshetri & Loukoianova, 2019; Nasir & Bhutta, 2021)Furthermore, more than half of the 16 papers investigated relied on student evaluations to assess the adoption of blockchain technologies. This was followed by seven papers by experts and four papers by academics. It is obvious that there is a lack of studies on blockchain adoption in higher education, indicating a need for more research in university and college settings.

The many studies presented so far provide us an insight that can be benefit to the IS research practitioners and communities. Literature that examined blockchain adoption largely focused on the concept of adoption. For example, papers by Alzahrani & Daim, 2019 Choi et al., 2020; Effiong, 2020; Wahl, 2016) provide insight into the factors affecting the initial decision to use blockchain-based technologies. The existing research on blockchain technology tends to focus on specific application areas or industries, such as cryptocurrency and supply chain management. This makes it difficult to apply the findings to other sectors, like identity management and verification. Many studies also concentrate on verification in the context of adoption and post-adoption. However, there is still limited understanding of the readiness and willingness of individuals or organizations to adopt blockchain. On the other hand, understanding potential barriers or challenges before adoption can help individuals and organizations develop risk mitigation strategies and contingency plans. There is a need for more research by IS and related scholars to apply existing methods and theories to better understand this promising domain. This study has provided evidence of significant that can be benefit for industry players and academic communities, especially IS scholars, to explore specific intentions to adopt concepts. Also the findings indicate that the both IS and IS-related points of view focused on the technical aspects of blockchain rather than explaining the intention to adopt the concept (Toufaily et al., 2021). Moreover, this study confirmed that very little attention had been paid to consumer engagement and readiness or willingness to embrace blockchain technology, which can guide organizations' preferences and expectations.

Conclusions and Future Work

Blockchain technologies offer vast potential across various domains, yet widespread adoption remains limited. Consequently, studies investigating user satisfaction and adoption play a crucial role in understanding and addressing adoption challenges. This research conducts an SLR of blockchain adoption studies, employing technology adoption theories / models to identify influential factors, application areas and concepts. The review highlights several research gaps. Firstly, predominant models like TAM and TOE are commonly used to comprehend factors influencing blockchain adoption while neglecting the Technology Readiness Index (TRI) and the Diffusion of Innovation theory that traditionally offer additional perspectives. TRI, for example, focuses on individuals' readiness and willingness to embrace new technologies based on their innovativeness, optimism, discomfort, and insecurity. This index can provide insights into how receptive different population segments might be to blockchain technology. Meanwhile, the Diffusion of Innovation (DOI) theory, proposed by Everett

Rogers, emphasizes how innovations spread within a social system. Future work shall consider integrating these frameworks so researchers and practitioners can gain a more holistic understanding of the factors influencing blockchain adoption, considering not only users' attitudes and intentions but also their readiness for technology and the broader societal dynamics at play.

This study is based on surveys of papers from 2016, a year when blockchain applications expanded beyond cryptocurrencies. In the future, researchers are encouraged to use mixed-research approaches, including interviews, to clarify the relationships among adoption factors. Unlike previous reviews that focused on conceptual and industry reports, this SLR concentrates solely on complete blockchain adoption studies, highlighting the need for more empirical research to measure users' readiness levels across different cultures. The cultural implications of blockchain applications are crucial for their social and economic development. The review also reveals a lack of studies on intention perspectives, indicating an insufficient understanding of factors influencing the intention to adopt blockchain technologies, especially in higher education. While organizational perspectives dominate existing studies, individual-level analysis remains limited. However, the review acknowledges limitations in data collection, as it focuses on specific online databases and only analyzes empirical quantitative studies. Future reviews could expand data sources and include qualitative studies for deeper insights. This SLR provides valuable insights into blockchain adoption, highlighting research gaps and emphasizing the need for diversified methodologies and broader cultural considerations in future studies.

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