Influencing Factors on the Acceptance of Blockchain Technology in Capturing and Sharing Project Knowledge: A Grounded Theory Study

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Abstract
In the past two decades, there has been an increasing interest in project knowledge management, as knowledge is a crucial resource for project management success. Knowledge capture and sharing are two effective project management practices. Capturing and sharing project knowledge has become more efficient due to technological advances. Nevertheless, present technologies face several technical, functional, and usage obstacles and constraints. Thus, Blockchain technology might provide promising answers, yet, there is still a dearth of understanding regarding the technology's proper and practical application. Consequently, the goal of this study was to fill the gap in the literature about the adoption of Blockchain technology and to investigate the project stakeholders' acceptance and willingness to utilize the technology for capturing and sharing project knowledge. Due to this inquiry's exploratory and inductive characteristics, qualitative research methodology was used, namely the Grounded Theory research approach. Accordingly, eighteen in-depth, semi-structured interviews were conducted to collect the data. Concurrent data collection and analysis were undertaken, with findings emerging after three coding steps. Four influencing factors and one moderating factor were identified as affecting users' acceptance of Blockchain technology for capturing and sharing project knowledge. Consequently, the results of the study aimed to fill a gap in the existing literature by undertaking a comprehensive analysis of the unrealized potential of Blockchain technology to improve knowledge capture and sharing in the project management environment.

Keywords:
Blockchain Technology; Adoption; Project Knowledge Capture; Project Knowledge Sharing; Grounded Theory.

1. Introduction

In a post-industrial era, knowledge is a significant economic and strategic resource that is the foundation for contemporary organizations [1]–[6]. According to [3], there are four fundamental processes in knowledge management: knowledge discovery, knowledge capture, knowledge sharing, and knowledge application; these processes are further divided into sub-processes. Project management processes usually generate knowledge that requires capture and sharing within and across projects [7]. The knowledge captured throughout the project lifecycle is saved in Knowledge Management Systems (KMS) or knowledge bases, allowing project stakeholders to access and share knowledge from previous and current projects [8]. As a result, all project knowledge is captured and shared between projects, preventing knowledge loss. However, project teams do not generally use this technique [9]. According to [10], technological capabilities used for knowledge management are inadequate in capturing and sharing knowledge. Therefore, successful project knowledge activities need a proper and efficient technology that allows all project stakeholders to capture and share project knowledge.

Blockchain technology is one of the emergent technologies widely believed to have the potential to disrupt currently established practices [11]. Furthermore, t decentralization, security, and consensus authentication characteristics of Blockchain technology might be capable of addressing knowledge capture and sharing difficulties and improving project knowledge management [12]. However, prior blockchain studies have concentrated mainly on technological design and functionality while neglecting the adoption and usage topic in a multidisciplinary context [13]. As a result, the potential of relying on Blockchain technology to capture and share project knowledge is still insufficiently understood, despite the technology's rapid adoption and growing popularity. Therefore, this research attempts to bridge the Blockchain adoption body of knowledge gap by investigating the influencing factors on the acceptance of Blockchain technology to capture and share project knowledge. Accordingly, the study pursued to answer the following research questions:

What factors influence Blockchain technology acceptance in capturing and sharing project knowledge?

2. Literature Review

This literature review systematically surveys the body of knowledge related to the topics of the study. The reporting was performed based on several studies, a structure for understanding, knowledge capture, knowledge sharing, project knowledge capture and sharing, Blockchain technology, and the interrelated topics between these fields.

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2.1 Knowledge Capture

Knowledge management processes are well-known and widely utilized in the business sector. Several components of knowledge management processes are unappreciated; knowledge capture is one of them [14]. Knowledge capture is a constant process in which knowledge is extracted from multiple sources, evaluated, and applied under the organization's strategy; using appropriate methods and technology; the captured knowledge is processed, stored, shared, and updated [15]. Culture is one of the issues associated with knowledge capture; [5] argued that employees' shared views and knowledge may shape a business's culture. They have established that interaction between the organization's employees and its environment can lead to shared goals and learning. Culture is, therefore, essential to the establishment of organizational knowledge. Furthermore, the application of technology is another significant issue regarding knowledge capture. Emerging technologies play a growing role in knowledge codification, contributing to knowledge capture and enhancing the possibilities for these processes [6]. [14] elaborated on the technology and culture issues as he explained that knowledge capture is influenced by knowledge technology and organizational culture. Hence, a collaborative effort is needed to develop a solution that addresses organizational culture and technology issues. [16] summed up the importance of knowledge capture; they state that knowledge capture is critical for facilitating innovation, enhancing agility, and improving teamwork, operation, and project integration and performance.

2.2 Knowledge Sharing

Knowledge sharing is a vital technique for employees to exchange explicit and implicit knowledge to enhance the organization's knowledge application, innovation, and competitive advantage [17]. [3] described knowledge sharing as a mechanism in which explicit or tacit knowledge is transmitted to different parties. Knowledge sharing differs from knowledge transfer; The phrase *knowledge transfer* is frequently used to refer to the transmission of knowledge between departments or organizations rather than between individuals [17]. Furthermore, technology is one of the vital knowledge-sharing enablers; [18] claimed that any knowledge management program or strategy must have a robust technology infrastructure. However, information technology cannot function independently; successfully aligning knowledge management technologies and processes depends on the corporate culture's support or opposition.

Moreover, like the knowledge capture process, culture is crucial to knowledge sharing; Several research pieces and literature have attempted to highlight the culture's role in knowledge sharing. For instance, [19] argued that culture has positively influenced tacit knowledge-sharing actions; therefore, even a relatively significant common culture presence in the organization will lead to a meaningful shift in the implicit knowledge-sharing behavior. One of the most important elements related to the culture is trust; Previous research shows the importance of building individuals' trust in sharing valuable knowledge with others. According to [20], trust is the predominant mediator between organizational standards and knowledge sharing. However, expressing personal knowledge is risky, as most people are compensated for their knowledge rather than their sharing. Therefore, making people share their knowledge enthusiastically requires adjusting the organizations' incentives and rewards mechanisms, rewarding people willing to share knowledge [21].

2.3 Project Knowledge Capture and Sharing

Project management has been an established field for at least six decades, with well-respected practitioner organizations and generally acknowledged methodology and standards [22]. As a result, a systematic range of tools, principles, and procedures for managing single projects and project portfolios and programs has been developed in project management practice [23]. Knowledge is inherently a vital resource in project management [24]. Project knowledge management is an emerging topic of interest for researchers and organizations; several studies have been undertaken to determine how project knowledge management might be enhanced to facilitate knowledge sharing between projects [25]. According to [7], organizations that fail to capture and share knowledge will eventually be lost and unavailable for use in future projects. As a result, future projects will be costly as time, human and financial resources are exhausted in regenerating knowledge that was once available, and the quality of a project's deliverables might be unpleasant. [26] argued that discovering and sharing best practices in an area entails duplicating accomplishments that enable individuals to learn from one another and reuse well-established techniques. An effective interchange of best practices may be established by fostering an environment where consumers, experts, and communities can interact and work together. Therefore, organizations must implement efficient and structured knowledge management procedures to minimize knowledge disintegration and the failure of organizational learning from projects [8]. Many organizations depend on communities of practice to preserve project teams' professional experiences. Since communities of practice promote knowledge sharing, they are essential to addressing the challenges of developing, exchanging, disseminating, and using knowledge [25]. Furthermore, organizations utilize knowledge management systems to efficiently capture and share project knowledge. For instance, [27] demonstrated how an organization with a track record of successful project implementation has leveraged knowledge management to improve project

success rates. The research described the NASA environment, emphasizing the critical role of project management in achieving NASA objectives. Similarly, [28] stressed the role of knowledge management systems in capturing, sharing, and storing project information efficiently.

2.4 Blockchain Technology

The concept of Bitcoin was first presented in a 2008 posting claimed by the author [29]. Satoshi Nakamoto published a paper discussing the possibility of conducting immutable digital monetary transactions without the involvement or control of a centralized authority. Blockchain was the technology that powered the Bitcoin cryptocurrency, and it was used for the first time in that capacity [30]. Blockchain technology is a digital distributed ledger that uses a program containing an algorithm to exchange the content of sequenced and linked blocks of data in collaboration with cryptography and security technologies to accomplish and preserve information integrity [11]. Blockchain technology is a scheme that allows the interchange of digital material, such as the transaction of financial operations, information, knowledge, and ownership of intellectual and property rights, in a secure setting that utilizes asymmetric cryptography [31]. Furthermore, it enables the sharing of digital content under the provision that all participants in the network agree to change or duplicate the block's content [32]. Therefore, these characteristics make Blockchain technology appealing to many business sectors today. As a result, blockchain technology ensures network dependability, proof of identity, and the privilege to use and control any digital content.

Moreover, cryptography guarantees that users may only edit blocks if they possess the appropriate private keys for writing and updating the block; it also maintains that every version of the distributed ledger is synchronized. However, there is an absence of awareness of where and how blockchain technology can be efficiently applied and its notable practical benefits [13], [33].

Therefore, Blockchain technology has become one of the most prevalent research areas in the past few years, both in academic and practical fields [34]. For example, [35] investigated the potential of blockchain technology as a solution for trustworthy electronic records preservation through Blockchain technology for record-keeping. According to the researcher's results, blockchain technology can address information security and integrity concerns in the short and medium term, providing a suitable security structure. However, it does not guarantee data reliability and has severe limits as a long-term solution for keeping trustworthy electronic records. Additionally, in their systematic literature review, [32] identified a set of qualities of Blockchain technology that enable confidence and trust in a collaborative setting.

Similarly, [36] asserted that Blockchain technology guarantees a *Single Source of Truth*, which indicates the creation of a single data source on which all network participants can accept that the current version of this database is the only valid version. Based on the accumulated results of the studies that have come before. Therefore, it is reasonable to conclude that the transactions completed by blockchain technology and the records of data, information, and even knowledge kept using the blockchain technology model enjoy higher levels of trust due to the system's distinctive properties.

3. Methodology

Since this study endeavors to discover individuals' intentions to accept Blockchain technology in capturing and sharing project knowledge. Thus, this research is considered an exploratory qualitative study. The Grounded Theory research strategy offers a sensitive and rigorous method for investigation; it is a constructivist research strategy and relates to the inductive approach [37]–[40]. Therefore, Grounded Theory allowed the researcher to collect qualitative data and analyze them qualitatively through Grounded Theory's core principles. The researcher has adopted and applied a range of data collection and analysis methods and tools commonly associated with Grounded Theory. Purposive and theoretical sampling strategies have been adopted in the study; additionally, in-depth semi-structured interviews with 18 participants ($n = 18$) were conducted to collect data.

Furthermore, analytical principles and processes of Grounded Theory were applied. The study maintained the three pillars of Grounded Theory established by [37]: constant comparison, theoretical sampling, and theoretical saturation. Furthermore, the practical process of Grounded Theory applied in this research performed the three phases of coding provided by [38], [39], [41]: open coding, axial coding, and theoretical coding. Furthermore, simultaneous data collection and analysis, which involves interaction between data collection and analysis in addition to memo-writing, continued throughout the analysis phases. Finally, the researcher continued the theoretical sampling and concurrent data collection and analysis until theoretical saturation was achieved; Figure 3.1 visually exhibits the research design and processes applied in this study.

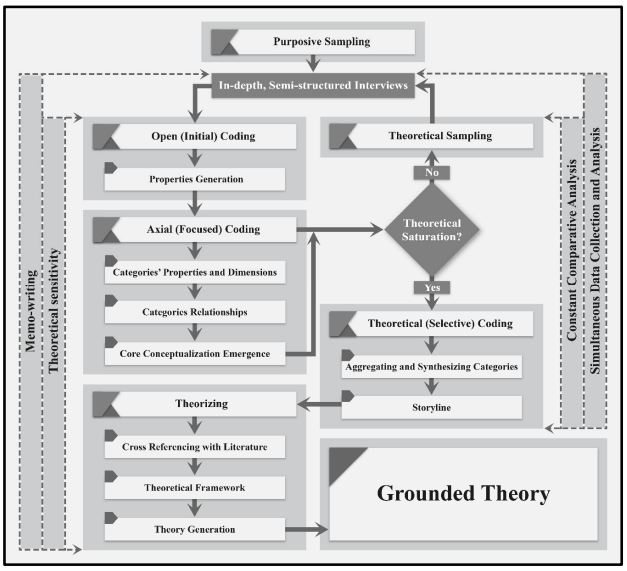

Figure 3.1 Grounded Theory Research Design and Processes.

4. Results and Discussion

This section demonstrates the analysis results and then discusses the research findings. The outcome of the open coding phase is a list of coded properties and dimensions of the issues perceived by research participants. At the end of the open coding phase, eighteen interview transcripts were coded, which resulted in a total of 514 coded properties and 81 dimensions. The outcomes of a more systematic data analysis in the axial coding phase pointed toward an interdependency in the relations between the coded properties and dimensions generated in the open coding step, which led to the emergence of 34 sub-categories, then refined and interrelated into five categories.

Table 4.1 Categories emerged from the axial coding phase.

Categories	SC	D	CP
Attitude toward project knowledge capture and sharing	5	13	76
Awareness of Blockchain technology	8	16	91
Perceived usefulness	11	31	195
Perceived ease of use	4	7	64
Organizational Leadership and Governance	5	14	88

SC: Sub-categories | D: Dimensions | CP: Coded Properties

Furthermore, this research aimed to investigate the factors influencing individuals' acceptance of Blockchain technology in capturing and sharing project knowledge. Therefore, theoretical coding is done to understand the rationale for this research problem, relating emerged categories and a more in-depth explanation of these categories and sub-categories. The following section discusses the categories and sub-categories which emerged in the axial coding.

First, the attitude toward the project knowledge capture and sharing category emerged through the analysis of responses made by interviewees discussing perceptions, motivations, concerns, and objectives regarding project knowledge capture and sharing. Accordingly, five sub-categories have been generated: risks in capturing and sharing project knowledge, personal motivating factors, mutual interest, time-intensive process, and a valuable resource for project management.

Second, the results revealed the awareness of the Blockchain technology category by analyzing the respondents' feedback regarding their understanding and perception of Blockchain technology. Several responses were made, and eight sub-categories surfaced: Blockchain technology awareness, decentralization, distributed ledger, consensus, irreversibility, auditability and traceability, automation, and transactions of value. This research has demonstrated the significance and importance of raising knowledge of Blockchain technology, which positively influences the attitude and intention to use it. Those who accurately comprehend the technology and its possible uses must endeavor to explain and simplify Blockchain technology by discrediting its negative reputation and limited relevance to financial transactions, which has spread among non-specialists. A further practical strategy to positively influence the acceptance of Blockchain technology in capturing and sharing project knowledge by project management team members would be devoting more and earlier attention to the dearth of understanding regarding Blockchain technology. It is encouraging to compare these results with that of [42] who referred to the awareness issue of Blockchain technology as a Lack of clarity; the author acknowledged this issue as one of the challenges facing Blockchain technology. He stated, "The perceived immaturity of the Blockchain technology creates a barrier to its adoption. […] The lack of sufficient knowledge, awareness, and potential of blockchain technology restrict its widespread adoption" [42]. Furthermore, a research article titled Characteristics of a Blockchain Ecosystem for Secure and Sharable Electronic Medical Records by [43] emphasized the need for Blockchain technology awareness. They suggested that understanding is scarce in the healthcare industry since the Chief Information Officers of the Healthcare Organizations they interviewed knew little about Blockchain technology and its implications for exchanging healthcare information.

Third, the perceived usefulness category included the highest number of sub-categories, dimensions, and coded properties with 11 sub-categories, 31 dimensions, and 195 coded properties; in addition, it was also the highest

observed category among the research participants. The perceived usefulness category and its sub-categories emerged from the interviewees' responses to the questions about the factors influencing their acceptance and intention to use Blockchain technology in capturing and sharing project knowledge. Several responses were made; accordingly, eleven sub-categories emerged: security, trust and transparency, knowledge preservation, knowledge quality, real-time knowledge capture, accessibility, performance, coordination, relevancy and compatibility, and added value. Interestingly, this category accords with Technology Acceptance Model (TAM) developed by [44]. The results produced from this investigation indicate that perceived usefulness has been established as a conclusive category that directly influences the acceptance of Blockchain technology in capturing and sharing project knowledge.

Furthermore, the perceived ease of use category explored the analysis of respondents' answers about the factors influencing their acceptance and intention to use Blockchain technology in capturing and sharing project knowledge. Four sub-categories have been obtained: user experience, anticipated effort, retrieval capabilities, and operating timeframe. Several usability concerns and constraints of Blockchain technology have been noted as potentially hindering the technology's adoption. First, the difficulty of utilizing Blockchain technology and the absence of end-user support are two obstacles that impede the broad implementation of Blockchain technology. In accordance with these observations, [45] research revealed that many distributed applications are inaccessible to the typical user and have unattractive interfaces. Consistently, the phrase user-friendly has appeared in the study's findings, along with several explanations of the concept and its influence on the potential users' acceptance, ranging from being visually attractive and readable to have specific functionality.

Moreover, the organizational leadership and governance construct has emerged as a moderating category. The responses made by the research participants throughout the interviews resulted in the development of several concepts and themes. These themes constructed moderating associations with other categories. The technologies utilized to capture and share project knowledge have become fundamental. However, the technological infrastructure cannot operate independently from other relevant elements that facilitate systematic project knowledge capture and sharing. The organization's overall strategy is considered a crucial factor that influences the effectiveness of a project's knowledge management technology solutions and the acceptance of project stakeholders. In addition, the corporate culture may foster an atmosphere that stimulates and encourages project knowledge collection and sharing and the use of Blockchain technology. In addition, the assistance of top management may encourage the use of Blockchain technology at the individual level by demonstrating commitment, providing proper training and support, and employing various motivating techniques. These findings are aligned with several previous studies (e.g., [2], [14], [15], [17], [18], [42], [46]–[48]).

4.1 Addressing the Research Question

The current study aimed to explore the factors influencing individuals' acceptance of Blockchain technology in capturing and sharing project knowledge. This research identified a gap in the literature as the absence of studies investigating individuals' intention to adopt Blockchain technology to capture and share project knowledge. This study has attempted to bridge this gap by discovering factors impacting potential users' acceptance of Blockchain technology. Therefore, the study pursued to answer the following research question:

What factors influence Blockchain technology acceptance in capturing and sharing project knowledge?

Blockchain technology promises to improve the capture and sharing of project knowledge. Nevertheless, the learning curve is significant, and there is no coherent understanding of adopting emerging technology in the face of existing systems for project knowledge management. Consequently, there is still a great deal to explore about the possible advantages of Blockchain technology and how the project management community will embrace it. The elements impacting the research sample's adoption of Blockchain technology for capturing and sharing project knowledge have been investigated. According to the findings, determining the factors that influence the adoption of Blockchain technology is a complex subject. Individual, social, technical, and organizational aspects can construct various connections between these aspects and their settings. This study revealed that four fundamental factors influence the acceptability of Blockchain technology. These are the attitude toward project knowledge capture and sharing, awareness of Blockchain technology, perceived usefulness, and perceived ease of use. The general opinions were not universally positive, negative, or neutral; instead, they differed based on the various categories and sub-categories that emerged during the inquiry.

First, the attitude toward project knowledge capture and sharing significantly impacts the adoption of Blockchain technology for knowledge capture and sharing. According to this study, individuals with a positive attitude toward project knowledge capture and sharing are more encouraged to participate in these two processes utilizing Blockchain technology.

Second, the acceptance of Blockchain technology is determined by the level of Blockchain technology

awareness. Based on the research findings, individuals with a background in information technology had a more robust knowledge and grasp of Blockchain technology and a more positive attitude toward the technology than participants with expertise in other fields. The lack of understanding of Blockchain technology, its properties, and its prospective advantages can be attributed to its novelty. In addition, the lack of well-established applications and use cases in management-related domains, namely project knowledge management. Additionally, the negative reputation of Blockchain technology or its sophistication might hinder people's comprehension of the technology. In addition to the direct impact of Blockchain technology awareness on the attitude toward its use, this construct affects the perceived usefulness. The study revealed that participants in this study with sufficient comprehension of Blockchain technology characteristics consistently correlated these features with many sub-categories of the perceived usefulness category.

Third, following the research findings, perceived usefulness is the most influential construct with the highest sub-categories. The individuals' perceptions of Blockchain technology's perceived usefulness in project knowledge capture and sharing have been identified as positive regarding the technology's increased security, trust and transparency, knowledge preservation, knowledge quality, and real-time knowledge capture. In contrast, the lack of integration capabilities of the technology has been evaluated unfavorably. On the other hand, accessibility, performance, coordination, relevancy and compatibility, and the added value of Blockchain technology on project knowledge capture and sharing were seen as neutral issues that did not have a significant positive or negative influence on the adoption decision. Fourth, the current study could not discern an apparent positive or negative effect of the perceived ease of use on the acceptance of Blockchain technology for gathering and sharing project information. Nonetheless, four sub-categories of ease of use have emerged: User experience, anticipated effort, retrieval capabilities, and operating timeframe are essential factors to consider. Individuals believe that enhancing the user experience and retrieval capabilities and lowering the time and effort necessary to use Blockchain technology can positively affect their adoption of the technology.

In addition, the research has found organizational leadership and governance as moderating the other four dimensions. Existing functional systems that partly or cohesively manage project knowledge can impede the organizational adoption of Blockchain technology. In addition, the organization's reduced emphasis on implementing Blockchain technology prevents understanding the presence and benefits of the new technology, resulting in a low priority placed on the technology at the individual level. In addition, the lack of knowledge will force individuals to reject Blockchain technology due to their lack of understanding. In addition, the organizational perspective significantly affects the individuals' willingness to adopt the technology. Individuals' desire to capture and share project knowledge using a Blockchain-based solution is severely impacted by the organization's failure to provide enough motivational strategies, as they worry about their knowledge's economic or social value. This results in low participation in the adoption and possible deployment of Blockchain technology. Lastly, the lack of standards and regulations of project knowledge management suited for digital innovation might be a formidable obstacle to using Blockchain technology. Therefore, the investigation demonstrated a variety of crucial aspects that are required for individuals to accept and intend to use Blockchain technology: a well-developed organization adoption strategy, a proper management culture, appropriate processes and indicators for governing project knowledge, efficient incentivizing approaches, and active senior management that provides training and support at all levels. Figure 4.1 presents the links between the four influencing factors and the moderating category on the acceptance of Blockchain technology in capturing and sharing project knowledge.

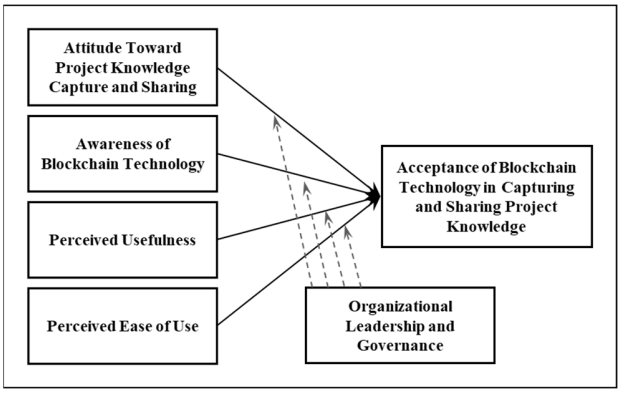

Figure 4.1 The influencing factors on the acceptance of Blockchain technology in capturing and sharing project knowledge.

5. Limitations

The limitations of this research must be highlighted. First, due to the theoretical nature of this investigation, no experimental validation has been performed. It was established from the outset that this study would employ an inductive methodology. However, the quality and credibility of this research were governed by a solid constructivist orientation and the criteria outlined in the methodology section, which should be adequate. Nonetheless, pragmatic validation of this research would strengthen its validity and generalization. Second, data were obtained through in-depth, semi-structured interviews with

multiple levels of Saudi Arabian public and private sector project management stakeholders. Due to the difficulties in locating suitable interviewee candidates within this study, no additional interviews with people from other countries were conducted. Therefore, the researcher cannot be sure of this variable's impact on the results. Insights into highly social and cultural issues may have affected the outcomes further.

6. Future Research

In addition, the study's goal was to explore the adoption of Blockchain technology, leaving future quantitative research more suited for generalizability. Therefore, future research might use a quantitative method to validate the results of this study. Consequently, the researched influencing factors may serve as a useful beginning point. Evaluating this framework in different settings or industries is a promising avenue for further study. Additionally, a more significant number of participants may create additional research possibilities. Since most of this study's research sample was drawn from Saudi Arabia, a study of participants from other countries would also be helpful. Such research findings might be contrasted with this study's to highlight variations in perceptions and attitudes.

7. Conclusion

Blockchain technology, one of the rising technologies, is generally believed to disrupt several existing processes. However, previous Blockchain technology research has mainly concentrated on the design and functionalities of the system, ignoring its acceptability and application in a multidisciplinary situation. Consequently, despite the big promises, there is now a dearth of understanding of the suitable and practical application of Blockchain technology. Therefore, it is essential to understand the ramifications of depending on this technology to capture and share project knowledge. Consequently, this study aimed to investigate if Blockchain technology can attain this objective. In addition, this study explored the intention of project stakeholders to use Blockchain technology to capture and share project knowledge to close the knowledge gap regarding the usage of Blockchain technology.

In addition, the Grounded Theory research approach was utilized in this investigation. First, the practical research procedure was illustrated; the Grounded Theory analysis yielded thirty-four sub-categories, and five categories emerged from the empirical data. The data were then evaluated and analyzed to understand the elements influencing individuals' adoption of Blockchain technology for knowledge capture and sharing.

Therefore, this research enriched the existing conversation and expanded the limited literature on Blockchain technology in business management. Furthermore, the results of this study aimed to fill a gap in the current research by conducting a thorough analysis of the unrealized potential of Blockchain technology to assist and enhance knowledge capture and sharing in the context of project management.

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