

## Research Article

# Adoption of Blockchain Technology: Exploring the Factors Affecting Organizational Decision

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Blockchain (BCT) is an emerging technology that promises many benefits for organizations, for instance, disintermediation, data security, data transparency, a single version of the truth, and trust among trading partners. Despite its multiple benefits, the adoption rate of BCT among organizations has not reached a significantly high level worldwide, thus requiring further research in this space. The present study addresses this issue in the Australian context. There is a knowledge gap in what specific factors, among the plethora of factors reported in the extant literature, affect the organizational adoption of BCT in Australia. To fill this gap, the study uses the qualitative interpretative research approach along with the technology-organization-environment (TOE) framework as a theoretical lens. The data was mainly drawn from the literature review and semi-structured interviews of the decision-makers and senior IT people from the BCT adopter and potential adopter organizations in Australia. According to the findings, perceived information transparency, perceived risks, organization innovativeness, organization learning capability, standards uncertainty, and competition intensity influence organizational adoption of BCT in Australia. These factors are exclusively identified in this study. The study also validates the influence of perceived benefits and perceived compatibility on BCT adoption that are reported in the past studies. Practically, these findings are helpful for the Australian government and public and private organizations to develop better policies and make informed decisions for the organizational adoption of BCT. The findings would guide decision-makers to think about the adoption of BCT strategically. The study also has theoretical implications explained in the discussion section.

## 1. Introduction

Blockchain (BCT) is a novel distributed and decentralized database technology organized as a list of ordered blocks, where each block is connected to its previous block. The technology has attracted a broad audience of practitioners, policymakers, researchers, and national authorities after a few years of its inception in 2008. Initially, it was developed to solve the double-spending problem through a proposal of a cryptocurrency known as Bitcoin [1]. Afterward, researchers proposed many different applications of BCT, e.g., e-voting, network security, healthcare, human resource management, governments, supply chain, and industry 4.0 [2–7]. Moreover, BCT has been reported as a significant contributor to the global economy. For example, in the reports published by Gartner and PwC, the BCT market is

expected to reach more than US\$176 billion by 2025 and US\$3.1 trillion by 2030 [8, 9]. In another report by Wintergreen [10], the BCT market value is estimated to be reached US\$60.7 billion by 2024. Similarly, Statista [11] and International Data Corporation [12] estimated that the BCT could drive the worldwide market size to US\$15.9–\$39.7 billion by 2023–2025. It is expected that the BCT will revolutionize the world in the future through its operational and strategic advantages for organizations [13, 14]. BCT is expected to underpin the majority of the current digital services in the future [15]. Tapscott and Tapscott [16] and Mohammed et al. [17] stated that BCT has promising benefits such as data security, information transparency, a single version of the truth, and trust among organizations. However, despite the benefits and proposed applications, surprisingly, the worldwide adoption of BCT among organizations is slow

[18, 19]. Consequently, this calls for research to investigate the factors causing this low uptake among organizations [17, 20]. In responding to this call, this study aims to identify the factors affecting the organizational adoption of BCT.

*1.1. Research Context.* The study has specifically been conducted in the Australian context. Australia has been chosen due to a number of reasons. The Australian government started working with BCT in 2016 when Standards Australia submitted a proposal to the International Organization for Standardization (ISO) to develop standards for BCT [21]. Since then, the Australian government has put significant efforts into promoting BCT adoption within the country. The most recent BCT initiatives of the Australian government include blockchain roadmap [22], national blockchain, water trading [23], Australian security exchange project [24], pilot grants [25, 26], and private partnership [27]. There is also significant support for BCT at the private level in Australia. Blockchain Australia has actively promoted BCT adoption among Australian organizations [28]. According to a report from Deloitte [29, 30], Australia has the potential to become a global BCT leader. The Economist Intelligence Unit (EIU), a world reliable organization, ranked Australia first in its technology readiness index [31], indicating that Australia has all the required infrastructures to embrace innovation like BCT. However, despite having support from the government and private sector, BCT has not been adopted by Australian organizations heavily [22, 29, 32]. Therefore, it seems important to know the specific factors influencing Australian organizations to decide the adoption of BCT.

*1.2. Key Limitations of the past Research.* Although some of the past studies reported factors that influence the organizational adoption of BCT, they were conducted in the context of non-oceanic countries like Ireland, Malaysia, Germany, Kosovo, UAE, and Brazil [15, 33–36]. Their findings vary from country to country. According to Troshani and Doolin [37], the factors influencing the adoption of a technological innovation differ as the context wherein the research is conducted differs. Since the properties of the countries wherein the prior research on BCT adoption has been conducted differ in terms of population, economy, literacy, uncertainty avoidance index, and technology readiness index from Australia [38, 39], therefore, the findings of similar studies on BCT adoption conducted in the context of other countries cannot be generalized to the Australian context.

Furthermore, the past studies report inconsistent results for the same factors influencing BCT adoption. For example, Clohessy and Acton [15] and Orji et al. [40] found top management support as a critical factor for the organizational BCT. In contrast, Wong et al. [34] reported an insignificant effect of upper management support on BCT adoption. Similarly, De Castro et al. [41] found a positive role of government regulations in the organizational adoption of BCT, whereas Albrecht, et al. [42] mentioned that government regulations hinder BCT adoption. This inconsistency in the findings of past studies makes it unclear what specific factors influence BCT adoption among Australian organizations.

According to the best of our knowledge, there exists a knowledge gap in the literature in terms of an in-depth exploratory study to address this issue. Therefore, this study aims to fill this knowledge gap by identifying the factors influencing Australian organization when deciding BCT adoption.

*1.3. Research Question.* The study aims to find the answer of the following research question:

*What specific factors influence the organizational decision to adopt blockchain technology in Australia?*

The rest of the paper provides a literature review on the adoption of BCT, its theoretical foundation, research methodology, and empirical results, followed by a discussion of the findings and their theoretical and practical contributions. In the end, the paper concludes the key findings, presents the limitations of the research, and suggests directions for future research.

## 2. Literature Review

BCT adoption brings a significant change in the internal and external operations of an organization. Therefore, a careful evaluation is necessary before making any decision regarding the adoption of BCT [43]. Researchers have made tremendous efforts to understand the adoption of BCT among organizations in the context of different countries and industries. Most of the past research on BCT adoption is factorial in nature, where researchers examined the effect of different factors on BCT adoption. For example, De Castro et al. [41] explored BCT adoption in the asset and wealth management industry in South Africa. They found that the relative advantages, computability, complexity, supportive technological environment, characteristics of the industry, and regulations influence BCT adoption; Orji et al. [40], Dobrovnik et al. [44], Barnes III and Xiao [45], and Kühn et al. [46] evaluated the factors that influence BCT adoption in the logistics industry. They identified that the availability of specific BCT tools, infrastructural facilities, and government policy and support are the main significant factors on BCT adoption; Wong et al. [47], Wong et al. [34], Bai and Sarkis [48], Kouhizadeh et al. [49], Ghode et al. [50], Kalaitzi et al. [51], Queiroz et al. [36], and Agi and Jha [52] investigated BCT adoption for the supply chain industry. They found relative advantages, complexity, upper management support, cost, market dynamics, competitive pressure, and regulatory support as the influencing factors; Clohessy and Acton [15] found that BCT awareness, top management support, and organization size influence BCT adoption in Ireland. Loklindt et al. [53], Mohammed et al. [17], Post et al. [54], Hoxha and Sadiku [35], Holotiuk and Moormann [33], and Sharma and Joshi [55] investigated BCT adoption in different industries including shipping, land record management, and fashion industry. They showed that easy verification of transactions, data accuracy and reliability, and cost reduction influence organizations to adopt BCT; Kulkarni and Patil [56] and Koster and Borgman [57] claimed that the firm scope, learning culture, top management, customer readiness, competitive pressure,

and government policies influence BCT adoption in banking and public sector. Moreover, Albrecht et al. [42] studied the post-decision stage of the BCT adoption. They found that market power, regulation, transaction speed, transparency, and costs, confidentiality, and interoperability were the prominent factors that influence BCT implementation in the energy sector.

The review of the literature reveals that there are a plethora of factors that affect the adoption of BCT among organizations. However, the factors that are highly relevant to the organizational adoption of BCT in Australia are still unclear. Further, the literature review shows that there is a lack of in-depth qualitative research that demonstrates the effect of the factors identified from the data directly drawn from the opinion or experiences of people working in Australian organizations. The following Table 1 presents the limitations of past studies on BCT adoption.

Authors' from the summary of the past research, it is clear that the prior studies on BCT adoption are either conceptual, technical, or at the individual level. Further, past studies have been conducted in the context of non-oceanic countries like Indonesia and Ireland. According to the best of the authors' knowledge, there is a lack of research that investigates BCT adoption in the Australian context. Thus, there exists a knowledge gap to investigate the organizational adoption of BCT in Australia. The present study accomplished the identified knowledge gap by using a qualitative interpretative research approach based on the technology-organization-environment (TOE) framework [76] as a theoretical lens.

### 3. Theoretical Foundation

The present study finds the TOE framework as the most appropriate theory to examine the adoption of BCT at the organizational level in Australia. The framework provides multiple perspectives that are not presented in other theories to investigate technology adoption. The TOE framework states that an organization's decision to adopt technology is affected by three different types of contextual factors, namely, technology, organization, and environment. The technology factors comprise the factors related to the technology under investigation; organizational factors are associated with the effect of organization's characteristics such as size, culture, top management on its decisions, and environmental factors that describe the effect of the environment wherein an organization operates its business.

Although there are other organizational level theories, e.g., diffusion of innovation (DoI) [77] and institutional theory of [78], they either have shortcomings or are partially covered in the TOE framework as explained below:

- (i) The TOE framework comprises the environmental context, which is missing in the DoI theory
- (ii) The institutional theory lacks the impact of technological factors, which are included in the TOE framework

- (iii) The DoI theory addresses the impact of technology characteristics on an IT adoption process. This aspect is covered in the technology context of the TOE framework
- (iv) The institutional theory explains the impact of environmental factors on an IT adoption, which is already covered in the TOE framework

Therefore, the TOE framework has more explanatory power over the other technology adoption theories reported in the literature. Due to its strong explanatory power, many researchers have used the TOE framework to examine the adoption of different technological innovations at the organization level, e.g., EDI and ERP systems, e-commerce, and RFID [79–81]. Therefore, we found the TOE framework an appropriate theoretical foundation for our study.

### 4. Research Methodology

The study aims to identify the factors influencing the organizational adoption of BCT in Australia. A qualitative interpretative research approach was opted for this study to achieve the aim of the study. This approach is considered appropriate when inadequate or little research is available on an issue. In such a case, it becomes essential to understand the phenomenon within the given social context and the meanings people assign to it [82]. Since the existing literature on the organizational adoption of BCT in Australia is limited, the qualitative interpretative approach was found appropriate. This study followed the principles' set by Klein and Myers [83] for interpretative qualitative research. An explanation of these principles and how they were incorporated into this study is given in Table 2.

*4.1. Data Collection.* The primary data was collected with in-depth semi-structured interviews of the key persons from the Australian organizations that had either adopted or were in the process of adopting BCT (potential adopters). To collect accurate and valid data, the respondents from every participating organization were chosen carefully. The selection criteria are given below:

- (i) They should be able to demonstrate extensive knowledge/expertise in both IT and BCT
- (ii) They should hold a decision-making position, such as chief executive officer (CEO), chief technology officer (CTO), project manager, and director in an organization. These individuals were chosen because of their presumed level of knowledge about the organizational adoption of BCT in Australia

The target organizations and their relevant information, such as contact details, which industry they are working in, and their adoption status with BCT, were collected through (i) search engines and social media websites, e.g., Google and LinkedIn; (ii) use of our professional network, and snowball sampling technique; (iii) examination of BCT

TABLE 1: Key characteristics of prior work to highlight their differences and limitations.

No.	Author(s)	Description and limitation(s)
1	Al Harthy et al. [58]	The study describes possible use cases of BCT in higher education such as the library, human resources, and securing student records, and presents a literature review in this regard. However, the research is narrative rather than providing empirical evidence for the adoption of BCT at the organizational level
2	Koens and Poll [59]	The study explains and evaluates the appropriateness of BCT in three different scenarios, namely, cryptocurrency-Bitcoin, identity management solution-uPort, and supply chain solution-IBM Hyperledger Fabric, by using an existing decision model. The study analyses the suitability of BCT in the context of different parameters
3	Taufiq et al. [60]	The study provides a literature review on the factors affecting the adoption of BCT in the Indonesian banking payment system. The study is conceptual and does not provide any clarity on whether the reported factors are effective at the individual or organizational level
4	Supranee and Rotchanakitumnuai [61]	The study describes the impact of different factors on the acceptance of different applications of BCT in the supply chain process of the Thai automotive industry. The study addresses BCT adoption at the individual level
5	Sander et al. [62]	The study examines the acceptance of BCT as a traceability and transparency system by meat consumers. The unit of analysis of this study is individual
6	Grover et al. [63]	This study explores the drivers for BCT acceptance by mining the collective intelligence users on Twitter. The study is conceptual and focuses the BCT adoption at the individual level
7	Wang et al. [64]	This is one of the conceptual studies that provides guidelines for the adoption of BCT. The study does not provide any empirical evidence to support their suggestions
8	Li [65]	This “work in progress” study proposed an integrated model, based on DoI and TAM, to explore the adoption of BCT from business managers’ perspective. The unit of analysis of this study is individual managers rather than any organizational level
9	Helebrandt et al. [66]	This is a technical study that proposes the use of BCT for monitoring and management of enterprise networks
10	Schuetz and Venkatesh [67]	This is a conceptual study that provides research agenda to investigate the inclusion of BCT in financial matters of rural Indian households
11	Angelis and da Silva [68]	This is a conceptual study that proposes a framework to help managers to decide the appropriateness of BCT for their organizations. The study has identified some value drivers of BCT from the literature that managers might find helpful when deciding the adoption of BCT. The study lacks empirical evidence
12	Wanitcharakkukul and Rotchanakitumnuai [69]	The study examines the factors affecting the acceptance of BCT-based electronic medical record systems by patients and medical personnel. The study uses the technology acceptance model, which is an individual-level theory to investigate technology acceptance
13	Kshetri and Loukoianova [70]	The study provides a summary of BCT adoption among different Asian companies, e.g., Toyota, JD.Com, Alibaba, and Provenance, running their business in the supply chain. The study just describes the advantages of BCT in supply chains
14	Hien et al. [71]	This conceptual study provides a survey on real-world use cases of BCT in the field of finance and banking services, education, e-commerce, healthcare, transportation, and supply chains, although the study reports few challenges for BCT adoption but lacks empirical evidence
15	Bogucharskov et al. [72]	This technical study proposes a conceptual model for the use of BCT in trade finance. The study explains how BCT can be used in trade finance and reports its advantages in this regard
16	Queiroz and Wamba [73]	The study provides empirical evidence of BCT adoption among supply chain professionals in India and the USA. The study examines BCT adoption at the individual level
17	Holotiuk and Moormann [33]	The study investigates the impact of different factors on the organizational adoption of BCT in Germany
18	Tumasjan and Beutel [74]	This study is an attempt to understand the adoption of BCT-based shared economy business models from a customer perspective. The study is conceptual and explains BCT adoption at the individual level
19	Clohessy et al. [75]	The study provides a literature review on the factors that affect the adoption of BCT at the organizational level. The study has been conducted in the context of Ireland

scholarly and commercial literature, various industry reports, and press releases; and (iv) scanning of the BCT related workshops and conferences.

An invitation email along with the description of the research project and consent form was sent to the target organizations. They were requested to nominate a person

TABLE 2: Principles for the interpretative qualitative research used in this study [83].

Principle	Description	How used in this study
Principle of the hermeneutic circle	This fundamental principle explains how human meanings are socially constructed. It describes the nature of the interdependent meaning of the parts and the whole that they form	This study investigates the interpretations of the experts (the parts) having experience/knowledge about the organizational adoption of BCT in the Australian context (the whole)
Principle of contextualization	This principle explains the social and historical context to understand the views of potential audiences about the emergence of the phenomenon under investigation	This study uses the Australian context to explain the factors affecting the adoption of BCT among organizations
Principle of interaction between the researchers and the subjects	This principle asserts that social facts are better understood when a researcher socially interacts with the participants involved in the phenomenon	The data for this research was collected through semi-structured interviews. The interviews were conducted both face-to-face and online
Principle of abstraction and generalization	This principle explains the importance of using a particular theoretical lens to derive insights from the interpretations of the participants	In this study, the TOE framework has been used as a starting point to understand the organizational adoption of BCT
Principle of dialogical reasoning	This principle requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings (the story which the data tell) with subsequent cycles of revision	This study introduces country-related issues found in the interviews, which cannot be explained through the original TOE framework
Principle of multiple interpretations	This principle explains the possibility of variations among participants' interpretations. Therefore, the researcher should use multiple interpretations to reach a final analysis	In this study, multiple viewpoints from interviewees are used to form the analysis. The key findings are supported by more than one interview
Principle of suspicion	This principle explains the bias in interpretations due to preconceptions, which leads to the misinterpretation of the viewpoints	To avoid this, the viewpoints from the respondents of the same industry were cross-examined

that had either extensive knowledge/expertise in BCT or was involved with the actions/decisions related to BCT adoption. The organizations indicated their willingness by returning the signed consent form and by nominating a person chiefly responsible for their BCT project(s). Finally, a mutually agreed time was set for the interview, and a tentative questionnaire was provided to the nominated person. By following the recommendations of Hill et al. [84], the questionnaire was emailed one week before the interview date giving the respondent ample time to get familiar with the research and prepare the answers.

Before the start of the actual data collection, an interview guide and protocol were prepared to ask relevant and specific questions. Senior academics and researchers were consulted while preparing the interview guide and protocol. The guide was kept updated, considering the findings of every interview. Table 3 shows the profile of the participating organizations and their respondents.

We employed a purposive theoretical sampling method for the data collection. The organizations were chosen that fit the purpose of our study. We carried out the interview process until the data saturation was reached, as advised by Glaser and Strauss [85]. A total of 23 interviews were conducted within the seven months of the period. Twenty interviews were conducted over Skype, and the remaining three were face-to-face. The duration of every interview was between 30 and 60 minutes. Every interview was transcribed and analyzed after it was finished. An ethical code of conduct was followed for the whole data collection process.

**4.2. Reliability and Validity.** Qualitative methods such as in-depth interviews come with some biases like intrinsic and methodological that should be carefully assessed to maintain the reliability and validity of the research. We followed the guidelines outlined by Yin [82] to achieve the reliability and validity of our research.

**4.2.1. Construct Validity.** Triangulating the interview questions helps to maintain the construct validity. We asked a question with alternative wordings to understand the same issue from multiple perspectives. This method is considered effective that permits a refined approach for construct validity. In addition to this, the interviewee was requested to confirm the major findings when the interview had finished. Later, we provided them a complete transcribed copy of the interview and asked if they wanted to add or remove anything from the interview.

**4.2.2. Internal Validity.** Internal validity refers to the degree to which extraneous factors that could affect results are controlled or eliminated. We draw the internal validity by following several measures including substantiating the interview questions, piloting the interview schedule, removing extraneous data from the analysis, and keeping an ethical procedure for the study. Moreover, the interviewees were selected carefully. We conducted in-depth interviews of the people that were either decision-makers or senior IT people that were experts in the area of BCT. This helped us to capture the information that was purely relevant to the study.

TABLE 3: Profile of the participating organizations and their respondents.

Industry	Designation	Identifier	BCT adoption status
Information technology (IT)	Founder	A1	Adopted
	Software engineer	A2	Potential adopter
	System analyst	A3	Adopted
	CTO	A4	Adopted
	Project manager	A5	Adopted
	CEO	A6	Adopted
	CEO	A7	Adopted
	CEO	A8	Adopted
	Co-founder	A9	Adopted
Finance	CEO	A10	Adopted
	CTO	A11	Potential adopter
Travel	CEO	A12	Adopted
	Technical analyst	A13	Adopted
Education	Founder	A14	Adopted
Government	Senior computer forensics officer	A15	Potential adopter
	CEO	A16	Adopted
Services	CEO	A17	Adopted
	Project manager	A18	Potential adopter
	Solution architect	A19	Adopted
	Advisor	A20	Potential adopter
Legal	Director	A21	Adopted
	Director	A22	Potential adopter
	Advisor	A23	Potential adopter

We also examined the secondary data, e.g., existing literature on BCT, white papers, Australian government reports, and organizations' websites, to corroborate the findings. Furthermore, the data analysis was done by the authors of this paper, who have extensive experience in analyzing and doing qualitative research.

**4.2.3. External Validity.** External validity refers to the degree to which findings of a study can be generalized and transferred into other settings, e.g., industry, country, and population. To attain the external validity for this study, participants were selected from a diverse range of industries and roles and had extensive BCT knowledge, expertise, and leadership, as reflected in Table 3. Because of their profile, the participants had a strong influence on many people and industries in Australia. Therefore, the findings derived from their in-depth interviews would be convincing for the organizations and people working in similar industries and roles. However, the study still has limited external validity.

**4.2.4. Reliability.** Reliability refers to consistency in the findings if the analysis of the interview data is repeated or reproduced. To obtain research reliability and avoid researcher bias, every activity of the data collection was properly documented. We selected interviewees from a diverse range of industries and roles. Although we used the TOE framework to formulate the initial questions, however, we encouraged interviewees to freely mention the factors that actually influence them, or they consider them important while deciding

on BCT adoption. The interviewees were asked if they had any questions or concerns about the research. We answered every question that the interviewees asked to remove their doubts and enhance their confidence and trust in the research. We recorded every interview with the written or verbal consent of the interviewee. Every interview was conducted with a team of two persons, authors of this paper, having extensive knowledge of BCT. One team member asked the interview questions, while the other took notes and recorded the interview. These records can be accessed, and the data can be easily retrieved for rechecking or reanalysis. In addition to this, we discussed the research process with senior peers and colleagues in terms of the research design, methods, interpretation, themes, and findings of the research.

## 5. Data Analysis and Findings

The interview data were analyzed by using the thematic analysis technique offered by Braun and Clarke [86] and Strauss and Corbin [87]. We used QSR NVivo software for the qualitative data analysis. The steps performed for this analysis are enlisted in Table 4. How the steps were incorporated for this study is also explained in the table. Since we used the TOE framework as a theoretical lens, the analysis is a theoretical thematic analysis rather than an inductive one. Given this, we coded that segment of data that was relevant and interesting to our research question. To improve

TABLE 4: Steps that were undertaken for the thematic analysis.

Steps	How are the steps used in this study?
Step 1: Familiarizing with the data	Interview data were transcribed and read line-by-line multiple times. After each read, we made notes and wrote down the early impression of the data to develop some ideas about the codes
Step 2: Generating initial codes/ open coding	All the transcribed data was organized in a meaningful and systematic way and reduced into small chunks of concepts related to our research question. When we finished the initial coding, we compared the codes, discussed them, and modified them before moving to the next step
Step 3: Search for themes/axial coding	A theme can be defined as a pattern that exhibits something significant or interesting about the data. Inter-related codes form a theme. At this step, we put initial codes together based on their similarities and differences. For example, the codes related to BCT were collated into a theme called “technology”
Step 4: Review the themes	During this step, the themes discovered in Step 3 were further analyzed to check their coherence and distinction from each other. We examined if the interview data supported the themes, and they make sense. In NVivo software, it is easier to move codes from one theme to another if they do not fit
Step 5: Defining and naming themes/mapping	During this step, a refinement of the themes is done to identify the essence of what each theme is about. We mapped the interrelated themes with the relevant contexts of the TOE framework
Step 6: Data display	During this step, we created a schematic diagram, Figure 1, to visualize the conceptual relationship between the factors and the adoption of BCT

the reliability of the findings, the data analysis was conducted by a team of two persons (authors of this paper).

To get further insights from the interview data, we performed a frequency analysis of every theme as shown in Table 5. The frequency shows how many times a theme was supported by the respondents and what the reason was.

The following subsections explain how the identified factors influence BCT adoption among Australian organizations.

**5.1. Technological Context.** The findings derived from the analysis of the responses of the participants show that the technological factors, namely, perceived benefits, perceived compatibility, and perceived information transparency, have a positive impact on the organization’s intention to adopt BCT. However, the factor “perceived risks” has a negative impact. Excerpts from the interview data related to every factor are given below.

**5.1.1. Perceived Benefits.** Most of the interviewees agreed that the perceived benefits play an important role in BCT adoption. They stated that the benefits such as a reduction in expenses, time savings, peer-peer transactions, security, and disintermediation motivated them to adopt BCT.

An interview with a technical analyst (A13) working at a traveling agency mentioned: “blockchain has certain benefits for our business. We have customers all over the world. It takes a couple of days to receive payment in our bank account in Australia. It was not only time-consuming but also expensive to our customers and us due to the several service charges imposed by the banks. Now we receive payments in cryptocurrency, which is fast and cost savings.”

**5.1.2. Perceived Compatibility.** For the adoption of BCT, its smooth integration with the organization’s existing businesses is very important [41]. One of the CEO (A8) providing enterprise BCT solutions supported this by saying, “if blockchain is compatible, for example, if an organization is providing IT solutions such as AI or database and it has all

the technical staff, then it would surely adopt BCT because it aligns with its business aims and objectives.” He further added that “now suppose if an organization requires to install a completely new technological infrastructure, it will think twice to adopt blockchain because of its incompatibility.”

The CTO (A4) expressed similar thoughts about the compatibility of BCT for their business. He stated, “we already had a team of IT professionals. So, it is normal for us to start working with any new technology like blockchain.”

**5.1.3. Perceived Information Transparency.** Information transparency is one of the major features of BCT that attracts organizations toward its adoption [88, 89]. This increases the overall performance of an organization. A solution architect (A19) emphasized this by stating, “our clients wish to adopt blockchain because of the transparency of information it provides. The clients want a solution to facilitate their consumers to track the products they are buying is authentic”. He further stated, “we recommend blockchain solutions to our clients who demand openness and visibility within and outside of their organization.”

Some of the interviewees (A2, A18, and A22) mentioned information transparency as a barrier to BCT adoption. They stated that the availability of information to everyone breaches privacy laws.

**5.1.4. Perceived Risks.** New technologies like BCT come with certain risks that hinder organizations from their adoption. During the interviews, respondents mentioned different risks of BCT, for instance, scalability, privacy, slow transaction processing speed, and the need for miners to run the network. One of the interviewees (A20) stated, “usually, the big organizations control the industry, and they dictate how the processes should work, and how the vendors and suppliers and other small peer organizations should deal with them. These big players perceive fear of losing control after adopting blockchain.” Another risk highlighted by

TABLE 5: Frequency analysis of the factors.

TOE context	Factor	Impact	Frequency	Impact reason
Technology	Perceived benefits	Positive	22	Positive impact because of timesaving, reduction in cost and expense, fast transactions
		Negative	0	—
		Not sure	1	Not sure about the impact of perceived benefits on the organization’s intention to adopt BCT
	Perceived compatibility	Positive	20	Positive impact of compatibility with business processes, technical infrastructure, and skills
		Negative	0	—
		Not sure	3	Not sure about the impact of compatibility on the organization’s intention to adopt BCT
	Perceived information transparency	Positive	19	Positive impact due to easy access and visibility of the information
		Negative	3	Negative impact due to lack of privacy
		Not sure	1	Not sure about the impact of information transparency on the organization’s intention to adopt BCT
	Perceived risks	Positive	0	—
		Negative	21	Negative impact of due to security and privacy breaches, benefits uncertainty
		Not sure	2	Not sure about the impact of perceived risks on the organization’s intention to adopt BCT
Organization	Organization innovativeness	Positive	20	Positive impact if an organization is open to new ideas and accepts the risks associated with them
		Negative	0	—
		Not sure	3	Not sure about the impact of organization innovativeness on the organization’s intention to adopt BCT
	Organizational learning capability	Positive	21	Positive impact if the organization keeps their employees up to date about contemporary technologies and it has a mechanism to store, share new knowledge
		Negative	0	—
		Not sure	2	Not sure about the impact of organizational learning capability on the organization’s intention to adopt BCT
Environment	Standards uncertainty	Positive	0	—
		Negative	18	Negative impact of due to the immaturity of BCT and lack of industry standards
		Not sure	5	Not sure about the impact of standards uncertainty on the organization’s intention to adopt BCT
	Competition intensity	Positive	20	Positive impact because organizations feel motivated and pressurized to adopt BCT before their competitors and gain competitive advantages over them
		Negative	0	—
		Not sure	3	Not sure about the impact of competition intensity on the organization’s intention to adopt BCT

A18 was “blockchain is a relatively new technology, and there is a lack of well-established blockchain systems in the market. Organizations cannot observe the real benefits of blockchain that cause worried about the value proposition, the return on their investment in blockchain.”

5.2. *Organizational Context.* This research suggests that the organizational factors, such as organization innovativeness and organizational learning capability, have a positive impact on the organizational adoption of BCT. Further explanation of these factors is given below.

5.2.1. *Organization Innovativeness.* New technologies like BCT come with novel idea that has very limited trials and

successful evidence. Therefore, the risk-taking and openness of an organization have a substantial relationship with the adoption of an innovation [90]. This was also reflected during our interview with a project manager (A5) of a leading IT organization. He said, “we are the pioneer in Australia working with blockchain technology. When we started, there were no success stories about blockchain in Australia. However, we decided to take the risk and invested in developing blockchain solutions for our clients.” A similar thought was shared by A17, “since the blockchain is totally a novel idea, it requires organizations to change their legacy systems that is a massive process for many organizations. Therefore, only those organizations will adopt blockchain that are creative and contemporary in doing business.”



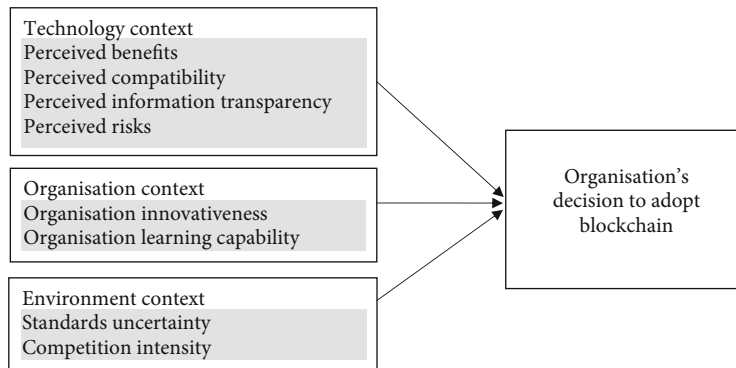


FIGURE 1: Factors mapping with the TOE contexts.

**5.2.2. Organization Learning Capability.** The adoption process of technology starts when an organization acquires knowledge about that technology via a learning system [77, 91]. A learning system could be a formal knowledge management system, an R&D department, organizing informational seminars and workshops within the organization, or sending employees to attend external conferences to gain new knowledge. Most of the interviewees endorsed the role of an organization's capability to learn about new technology emerging in the industry. They mentioned that the first step to adopting BCT is organizations must get the knowledge to understand BCT (A14 & A17). "We have a dedicated R&D department that floated the idea of blockchain to work with. We shared this idea with our employees through a newsletter and asked them to provide their feedback. Then, we analyzed the opportunities and risks associated with blockchain for our business, and finally decided to develop blockchain solutions for our clients," said A12.

**5.3. Environmental Context.** The analysis of the responses of the interviewed participants suggests that the environmental factors, namely, competition intensity, have a positive impact, whereas the standards uncertainty has a negative impact on the organizational adoption of BCT. The detail is presented below.

**5.3.1. Standards Uncertainty.** Uncertainty about the BCT standards is one of the main reasons that stymies its organizational adoption as stated by one of the legal experts (A21), "organizations aren't likely to invest if they're not sure what the standards are going to be set for blockchain. They have been waiting until the formal standards are developed." Most of the respondents agreed that Australian organizations are reluctant to adopt BCT because of the unavailability of the standards. The uncertainties cause organizations to distrust BCT, which ultimately impedes its adoption. "Organisations are slow to adopt blockchain-based solutions because they have been waiting for the potential blockchain standards. They fear if the blockchain standards change over time, it might require them to make expensive investments in the future," stated A20, a legal advisor.

**5.3.2. Competition Intensity.** Organizations feel the fear of losing their competitiveness if their competitors have

adopted new technology. This was endorsed by A21, "we adopted blockchain solution because our competitors started to accept payments in digital currencies. We felt the pressure of losing our customers if we do not offer them that service." According to Zhu et al. [92], if similar organizations do things in a certain way in the industry, others feel a competition intensity. According to A9, "whenever there is new technology coming out, everyone starts doing the same thing to become the first to develop a product and defeat others in the industry. For example, Facebook has started working with blockchain. I certainly think that the other IT giants like Google, Microsoft, and Amazon are not going to be far behind and will be doing something similar."

## 6. Discussion and Contributions

The study applies the TOE framework as a theoretical lens to identify the factors that affect the organizational adoption of BCT in Australia. The findings reveal eight factors, of which five have exclusively been identified in this study. The newly identified factors include perceived information transparency, organization innovativeness, organizational learning capability, standards uncertainty, and competition intensity. The findings in the context of the TOE framework are further explained below.

**6.1. Technology Factors.** In terms of the technology factors, the findings reveal that the perceived benefits, perceived risks, perceived compatibility, and information transparency are enablers, whereas the perceived risks work as an inhibitor to BCT adoption. Australian organizations adopt BCT when they perceive it beneficial for their business. Cost reduction, time-saving, and disintermediation are the main benefits of BCT for Australian organizations. This finding is consistent with the earlier studies of Orji et al. [40] and Saheb and Mamaghani [38, 89]. The study found that the compatibility of BCT with an organization's technological and financial needs significantly affects its adoption. This finding is similar to the work of Kim [93] but inconsistent with De Castro et al. [41]. Therefore, we recommend that organizations should carefully evaluate and understand the compatibility of BCT with their business goals before deciding its adoption. Perceived transparency of information obtained through BCT has been found positive, which is

consistent with Al-Jabri and Roztocki [94]. The information transparency enhances the trust among the organizations involved in the BCT network. Consequently, organizations coordinate and share information with full of confidence [95]. However, due to privacy concerns, information transparency also works as a barrier to BCT adoption. We suggest that organizations should evaluate privacy laws before moving to BCT. The impact of perceived risks on BCT adoption was found negative. This finding is aligned with the earlier study of Yoo et al. [96] that reported risks such as privacy disclosure, misuse of information, and un-scalability hinder organizations from adopting BCT. We suggest that organizations should carefully analyze the risks before deciding the adoption of BCT.

**6.2. Organizational Factors.** Organizational innovativeness and organizational learning capability were found to be positive to the adoption of BCT. These findings are similar to the suggestions of Kulkarni and Patil [56] and Newby et al. [97]. The findings are also consistent with Marikyan et al. [98] that found that organizations that are capable of acquiring new knowledge, storing, and applying that new knowledge and learn from it; open to new ideas, and are ready to take risks are more likely to adopt BCT. This led to the conclusion that organizations should have a formal learning system to remain updated about the contemporary technologies beneficial for their business as mentioned by Elhidaoui et al. [99].

**6.3. Environmental Factors.** We found that the competition intensity has a positive impact on BCT adoption, whereas the standards uncertainty has a negative influence. The positive impact of the competition intensity on BCT adoption implies that organizations want to remain competitive at the forefront of their rivals. Competition intensity encourages organizations to find ways to grow and sustain their competitive advantage. Prior studies have also established that the adoption of BCT is important for organizations to retain their competitiveness [34, 47, 48]. The impact of standards uncertainty was identified as unfavorable on the adoption of BCT, which implies that organizations are still seeking BCT-related industry standards. This finding is consistent with Guo and Liang [100] and Balasubramanian et al. [5], who reported that BCT adoption would be unsolved until the industry standards related to BCT are established. To accelerate the adoption of BCT, it is urgently needed to develop industry standards for BCT [46, 101, 102]. This finding may help the relevant government and private industrial agencies to pay attention to develop BCT standards.

**6.4. Research Contributions.** Theoretically, this study contributes to the existing IT adoption literature in several ways. Firstly, the study uses the TOE framework to provide empirical evidence about the factors influencing the organizational adoption of BCT in Australia. Thus, the study bridges the knowledge gap on the factors relevant to BCT adoption among Australian organizations. The identification of such factors is important, particularly for the Australian organiza-

tions interested in the value creation of BCT. Second, the study introduces new factors, namely, perceived information transparency, organization innovativeness, organization learning capability, standards uncertainty, and competition intensity on BCT adoption that are exclusively identified in this research. Third, this study confirms the findings of the earlier studies that the factors perceived benefits and perceived compatibility have an impact on the organizational adoption of BCT. Fourth, according to the best of our knowledge, this is the first study that has used the qualitative interpretive research approach offered by Klein and Myers [83]. Therefore, the study confirms the suitability of this approach for BCT. Lastly, most of the researchers have used the TOE framework in quantitative research. This study proves its validity in qualitative research as well.

Practically, the study contributes as follows: First, the decision-makers working with the Australian government and private organizations can use our findings to develop better national policies for the adoption of BCT in Australia. Second, the findings can help consulting and marketing companies while developing business strategies for their potential BCT customers. Third, standards uncertainty is found to be an inhibitor to the adoption of BCT. This requires the Australian government and other relevant organizations to develop BCT standards needed to remove the uncertainties of potential adopters. Last, the findings can be used by multinational organizations willing to expand their business in Australia.

## 7. Conclusion

This study identifies the factors influencing the organizational adoption of BCT in Australia. The TOE framework is used as a theoretical foundation. Following the qualitative interpretative research approach, interviews of the decision-makers and senior IT people from the BCT adopter and potential adopter organizations were conducted. After analyzing the interview data, certain technological, organizational, and environmental factors have been identified that influence the adoption of BCT among Australian organizations. These factors include perceived benefits, perceived compatibility, perceived information transparency, perceived risks, organization innovativeness, organizational learning capability, standards uncertainty, and competition intensity. The study constitutes important theoretical and practical implications for the Australian government and private organizations working with BCT.

The study has some limitations that provide a pathway for future research. The study has been conducted in the Australian context, which limits its external validity. Further, the study uses a small sample size that restricts the generalization of its findings. To overcome these limitations, we hope to conduct a future survey study with a larger sample size to enhance the generalizability of the findings.

## Data Availability

The data used to support the findings of this study are included within the article.

## Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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