

## READINESS OF ACADEMIC LIBRARIES FOR BLOCKCHAIN TECHNOLOGY: A CONCEPTUAL EXPLORATION

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### ABSTRACT

*The acceptance of blockchain technology have begun to benefit developed nations, and developing countries have shown interest in implementing the technology. However, it still has relatively few applications. Blockchain technology is still in its early stages of development, with a lack of studies on its acceptance, especially in the context of libraries. Emerging as a disruptive force across various industries, blockchain promises increased transparency, security, and efficiency in data management. In the realm of academic libraries, where information integrity and accessibility are paramount, the adoption of blockchain holds immense potential. This conceptual paper explores the theoretical foundations and practical implications of integrating blockchain technology within Malaysian academic libraries. By examining the benefits, challenges, and potential applications, this paper aims to provide insights into how this innovative technology can revolutionize information management practices in the Malaysian educational landscape. Factors consist of technological, organizational, and environmental contexts. Based on a literature review, the technological context includes relative advantage and compatibility, while the organizational context includes organizational readiness and top management support. Meanwhile, the environmental context includes government support and library user readiness. The analysis also reveals the relationship between technological, organizational, and environmental factors (independent variables) and the intention to adopt blockchain (dependent variable).*

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## 1. Introduction

Organizations play a pivotal role in today's commercial landscape, particularly amidst the fourth industrial revolution (4IR) which has ushered in a wave of transformative technologies such as cloud computing, robotics, artificial intelligence, and the Internet of Things. These modern technologies are instrumental in driving growth and innovation. One notable example

is blockchain, which stands out as the most renowned application of distributed ledger technology. Recognized as one of the top ten emerging technologies of 2016 by the World Economic Forum, blockchain comprises data transaction records known as blocks. Each block is characterized by a block header, a hash, a transaction counter, and its corresponding transactions.

Unlike for-profit organizations that rely on profit and loss statements to assess, motivate, and implement changes, libraries operate with different metrics. They serve as a reliable repository of knowledge, excelling in this aspect according to Cabello, JanBen, and Mühle (2017). The emergence of the Blockchain Network, a decentralized chain network, has significantly influenced the development of online systems for storing, managing, and retrieving transactions and information. Individuals in industrialized nations are beginning to reap the benefits of emerging technologies, with a notable focus on blockchain. However, Tella, Amuda, and Ajani (2022) report that libraries in developing countries are also expressing interest in leveraging technologies like blockchain, though the adoption and implementation seem to progress at a slower pace.

Prior research underscores that blockchain technology (BT) is opening up new avenues for libraries. The blockchain-based approach holds promise for various library-related domains, including digital preservation, tracking, and interlibrary lending services. Notably, blockchain technology bolsters security by utilizing a network of numerous computer nodes for transaction processing (Ahram et al., 2017).

Despite the potential of BT to enhance library operations, instances of its practical application are relatively scarce. A paucity of research on the implementation of BT in libraries persists, primarily due to the technology's nascent developmental stage. Many studies indicate that initiatives are in the planning stages, and the current technological infrastructure may not fully support advanced applications. Paulavičius, et al (2019) aim to ensure that practical applications meet the essential criteria of compatibility, scalability, and long-term viability. This study thus delves into examining the factors influencing the adoption of blockchain technology in libraries. While early blockchain research primarily focused on technological facets, there is a growing emphasis on understanding its uptake and utilization, as noted by Janssen et al. (2020).

### **1.1 Problem Statements**

According to Van Hoek and Saberi (2019), highlighted that reliance on both intra- and inter-organizational connections presents a substantial challenge to the successful implementation of permissioned blockchains. This challenge encompasses financial constraints, a lack of managerial commitment, and opaque information disclosure policies. Unlike profit-driven organizations, libraries base their operational decisions not solely on financial metrics but on the need to provide reliable and accessible information. The advent of blockchain presents libraries with new possibilities, such as enhancing digital preservation, tracking, and interlibrary loan systems. However, the adoption of BT in libraries is still in its nascent stages globally, with limited implementations and a lack of comprehensive studies on its adoption

factors. Thus, the key contribution of this research will identify the factors of readiness of blockchain technology application among academic libraries.

In a comprehensive analysis of existing research, Mohanta et al. (2019) identified privacy and security as the primary hurdles in the implementation of blockchain technology. Moreover, the consideration of interoperability is crucial when introducing any new technology. Interventionary studies involving animals or humans, and other studies that require ethical approval, must list the authority that provided approval and the corresponding ethical approval code.

In this study, the researchers will use TOE framework and combine with other models' variables that relate to the topic in order to examine the inter-organizational innovation adoption and organizational level, and the role of the external environment. This study aims to investigate the factors influencing the adoption of blockchain technology among academic libraries in Malaysia. The primary objectives are to:

- i. To identify the level of awareness among librarians regarding blockchain technology;
- ii. To examine the factors in technological context that influence the adoption of blockchain in libraries;  
To examine the factors in organizational context that influence the adoption of blockchain in libraries.
- iii. To examine the factors in environmental context that influence the adoption of blockchain in libraries.

## 2. Literature Review

In this study, technological, organizational, and environmental context are the independent variables and intention to adopt blockchain is the dependent variable. That means, in order to identify the factors that influence the adoption of blockchain technology in Malaysian's libraries technological, organizational, and environmental context play their respective roles. The technological context includes relative advantage and compatibility while for organizational context include organizational readiness and top management support. For environmental context, the factors that include are government support and user readiness. However, Du, Pan, Leidner, & Ying (2019) explained that the adoption of blockchain is usually a specific case phenomenon that often necessitates a thorough experimentation phase to determine whether the technology is suitable for its intended purpose.

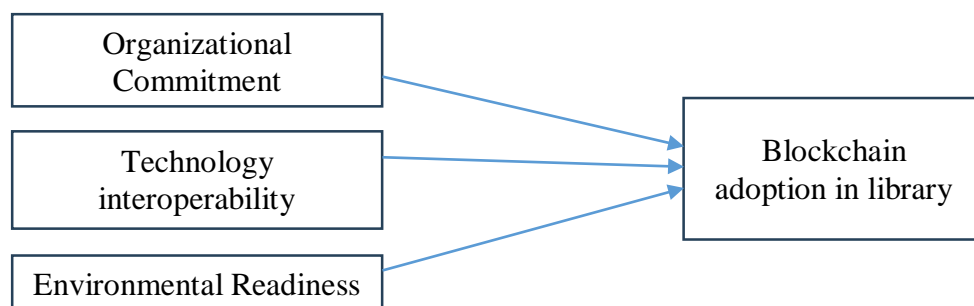


Figure 1: Conceptual framework of intention factors to adopt blockchain

This research framework draws upon a synthesis of models from the study by Asare, Brashear Aleja, and Kang (2016), particularly the TOE framework. In the present investigation, the independent variables include elements related to technology (such as relative advantage and compatibility), organization (specifically, IT readiness and organizational preparedness for change, as well as top management support), and environment (including government support and library user readiness). These independent variables are examined in relation to the dependent variable, which is the intention to adopt blockchain technology. To tailor the framework to the current study's focus, adjustments have been made to the independent variables, with IT readiness now encompassing organizational readiness for change, industry support being modified to government support, and Library user readiness reflecting the influence of customer pressure.

## 2.1 Organizational Commitment

The features and resources that an organisation has that may be limiting or facilitating elements for the aim to adopt innovation are referred to as the organisational context. In this study, organisational context is described by two factors which are organizational readiness and top management support.

Clohessy and Acton (2019) stated that three categories of organisational resources, including the availability of workers with the necessary IT knowledge and skills, financial resources for adopting IT innovations (such as an IT budget), and infrastructure on which blockchain applications can be built, were examined in terms of organisational readiness with regard to adopting new IT innovations. According to Toufaily, Zalan, Dhaou, (2021) the capacity of an organization to adopt new technologies and leverage existing knowledge is often referred to as organizational readiness. It can also be described as the organization's absorptive capacity. It is doubtful that businesses without the necessary technical, human, and financial resources will be willing to adopt new technologies. In the study of big data and business analytic, researchers and practitioners agree that organizational readiness is required for BD adoption (Wahab et al., 2021). As a result, this study contends that organisation readiness is one of the top crucial drivers of BT adoption in libraries.

## 2.2 Technological Interoperability

The term “technological context” refers to all important internal and external technologies to the organization, even if they have not yet been adopted by the organization. To determine the intention to adopt blockchain technology among libraries, researcher examined two factors that are frequently utilize in the new innovation adoption.

### 2.2.1 Relative advantage

Studies by Nezamdoust et al. (2022) revealed that relative advantage is a significant affects the adoption of mobile applications in health application in healthcare by nurse. Blockchain has several benefits to the library services or application as was demonstrated above and thought to have a positive effect on the intentions to use the technology, which will eventually affects adoption. According to Adeyinka Tella, Halimah Odunayo Amuda and Yusuf Ayodeji Ajani (2022), blockchain technology is more appropriate for maintaining unalterable records and is most effective for

straightforward transactional records. It has the capability to reconcile the library community's principles of individual confidentiality and accessibility, as well as transparency and responsibility. Studies of Hashimy et al. (2022) discovered that relative advantages has the greatest impact on adoption intention adoption of blockchain in Spanish firms. They also examine the importance of the indirect effects of relative advantage towards intention to adopt to adoptions, is the product of the path coefficient from relative advantage to intention to adopt and from intention to adopt relative advantage. As demonstrated before in chapter two, blockchain has numerous advantages. These benefits are thought to have a positive impact on the intention to adopt the technology, which will eventually impact adoption.

### **2.2.2 Compatibility**

According to Thong (1999), technological compatibility refers to the degree to which an innovation is perceived as agreeable with existing business processes, experiences and needs of a given organization. Rogers, (2003) stated in general, the acceptance of technology is heavily influenced by how well it aligns with the existing values, experiences, and requirements of potential users. This factor is critical in determining the compatibility of an innovation. According to Mishra and Swain (2018), in the context of mobile payment system should compatible with the lifestyle of a merchant. Mobile payment compatibility is defined as the similarity of the mobile payment process to existing transaction procedures. This also will likely influence the adoption of BT in libraries when libraries perceive that BT is compatible with their existing library system and management also, lifestyle among library patrons, they are more likely to adopt the technology, which benefits their organization's performance even more.

## **2.3 Environment Context**

According to Saleem, et al. (2022), the environmental context refers to the impact of the external and inter-organizational surroundings in which an organization conducts its operations. There are two dimensions in order to measure factors in adopting Blockchain:

### **2.3.1 Government Support**

Government support includes assistance from industry organisations and the availability of existing industry standards that are intended to manage and promote emerging technology. Workshops are typically held by associations to educate personnel and give members access to digital infrastructure. These programs give businesses the confidence they need to employ cutting-edge technologies. They identified that the availability of specific BCT tools, infrastructural facility, and government policy and support are the main significant factors for BCT adoption; Wong, et al. (2019). According to De Castro, Tanner, and Johnston (2020), the government must offer adequate support, such as the creation of regulations, in order for BT to be widely adopted by organizations. According to Wong et al. (2019) and

Kulkarni and Patil (2020), government assistance is a key element in the deployment of BT.

### **2.3.2 Library's User Readiness**

According to Kulkarni and Patil (2020) research, in context of banking industry, consumer readiness is a strong predictor of BT adoption. According to Balasubramanian et al. (2021), the most popular and eagerly anticipated blockchain elements in the healthcare sector were accurate electronic health records (EHRs), data exchange, and interoperability. More than 85% of poll participants indicated that they had heard of or had some familiarity with blockchain technology and were willing to implement it in a network. This support that in adopting blockchain in libraries, user readiness also play an important role. It has been discovered that satisfying customer needs electronically for improved communications drives the adoption of innovations. In the framework of the study, libraries will be concern to adopt blockchain technology because they think it will enable them to better serve their patrons as stated by Lengoatha and Seymour (2020).

## **3. Methodology**

### **3.1 Instrument**

In this section, the research will be conducted using quantitative research methods for its research design. The questionnaire included indicators or items derived from previous literature (Masrek et al., 2017) to assure the reliability of data collection for perceptual measurement. Every construct consisted of five indicators or items, and participants are asked to indicate their level of agreement using a 5-point Likert scale, which ranged from "1<sup>2</sup>Strongly Disagree" to "5<sup>2</sup>Strongly Agree."

The collected data will be analyzed to examine the objectives of the research. The data obtained from the questionnaire responses will be analyzed using the Statistical Package for the Social Sciences (SPSS). SPSS is a widely used software for statistical analysis, particularly in social science research. By employing SPSS, researchers can conduct various statistical tests to find data source based on objective which suits the study within the data.

The methodology indicates the consideration of three main categories of factors:

- Technological aspects
- Organizational aspects
- Environmental aspects

These are the independent variables that are presumed to influence the dependent variable, which is the adoption of blockchain technology in libraries. Through the questionnaire responses and subsequent SPSS analysis is aim to identify and measure the relationships between these independent variables and the adoption of BT.

### **3.2 Population, sampling and sample size**

According to Saunders, etc. (2000), the selection of a sampling technique relies on the

feasibility and practicality of gathering data to address the research questions and objectives from the entire population. This research focuses on understanding the readiness factors affecting the adoption of blockchain technology in Malaysian libraries. A questionnaire will be distributed via email to eight academic libraries in Malaysia, targeting a total of 202 librarians and staff members. This approach allows for a broad sampling of individuals involved in library operations, potentially providing a comprehensive view of their perceptions and readiness regarding BT adoption.

The target population of this study is academic libraries in public universities because this study will be evaluated under the same entities on the readiness of academic libraries. The choice of a descriptive research design aligns with the objectives of this study. In this case, it involves describing the factors that contribute to or hinder the adoption of blockchain technology in academic libraries. This design allows researchers to summarize, organize, and present the data obtained from the questionnaire responses in a meaningful and insightful manner.

#### 4. Conclusion

This study offers valuable insights for academic libraries, shedding light on the factors that influence the adoption of blockchain technology and its impact on libraries' intentions to adopt. The conceptual framework developed in this study holds potential not only for immediate application but also for guiding future research endeavors aimed at implementing blockchain technologies in academic libraries across Malaysia.

In conclusion, the adoption of blockchain technology presents significant opportunities for Malaysian academic libraries aiming to modernize their information management systems. By harnessing the principles of decentralization, immutability, and transparency, libraries can bolster data security, streamline operations, and cultivate a culture of innovation within the educational sphere. Despite existing challenges, the substantial benefits of blockchain outweigh these obstacles, rendering it a compelling pathway for advancing scholarly pursuits in Malaysia.

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