

Factors Affecting Employees' Acceptance of Blockchain in the Higher Education Institutions

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Abstract: Blockchain technology is a distributed digital ledger that boosts decentralised applications. This technology has many potential applications in the Higher Education Institutions (HEIs) industry. Yet, blockchain technology adoption is still low in HEIs. Within the adoption process, neglecting employees' acceptance of blockchain technology might cause a failure in adopting blockchain. To address the blockchain acceptance problem, this study aims to determine the factors that impact employees' acceptance of blockchain technology within HEIs. To accomplish this aim, this paper proposes a framework that extends the unified theory of acceptance and use of technology (UTAUT) with blockchain characteristics to determine the factors that affect blockchain acceptance among HEIs' employees. Specifically, the proposed model includes UTAUT constructs: effort expectancy, performed expectancy, social influence, facilitating conditions, behavioural intention and technology use, and blockchain characteristics, including security and trust. Also, this study investigates HEIs employees' awareness as a moderator of UTAUT factors. This paper contributes to academia as it proposes a new theoretical framework that contains factors that might facilitate or hinder the implementation of blockchain technology applications among employees. The present paper also contributes to practitioners in HEIs as it informs decision-makers about potential factors concerning employees' acceptance of the blockchain technology.

1 INTRODUCTION

Blockchain technology can disrupt individuals' daily activities and organisations' operations. Indeed, it can potentially disrupt different sectors, including Higher Education Institutions (HEIs) (Tapscott & Tapscott, 2017). Blockchain can be described as 'a distributed digital ledger used to support the applications such as Bitcoin' (Beynon-Davies, 2020, p.175). Blockchain represents a list that is recorded in a distributed database, which could be confirmed by network participants, called nodes (Yli-Huumo et al., 2016). The nodes can employ blockchain to provide a new method to store and share data (Grech & Camilleri, 2017).

The HEIs industry has issues in developing the learning system as it has not evolved for a long time, particularly in developing states (Sharma & Batth, 2020). Trust, security and privacy are significant issues HEIs encounter within their cyber systems (Raimundo & Rosário, 2021), which could be significantly decreased by adopting a well-developed

blockchain-based application(s) (Alammary et al., 2019; Awaji et al., 2020). Blockchain could improve various sections and activities, including, but not limited to, finance, human resources and libraries (Al Harthy et al., 2019; Loukil et al., 2021). For instance, Sony Global Education team (2017) proposed their blockchain-based system for authenticating, storing and managing educational records. Relatedly, some HEIs have applied blockchain, such as the University of Nicosia, King's College and Open University. They use blockchain to issue and store certificates, receive tuition fees and administrate educational procedures (Fedorova P. & Skobleva I., 2020). Hence, HEIs could benefit from adopting blockchain within their systems and across different sections.

Previous studies show that HEIs attempt to adopt emerging technology (Kaushik & Verma, 2020). In this context, employees play a significant role in the adoption process. For example, a modest level of productivity and failure of adoption might occur if employees reject the adoption of a technology (Brandon-Jones & Kauppi, 2018; Brown et al., 2014;

Venkatesh et al., 2003). Also, most employees resist general organisational changes, which might lead to turnover intention (Laumer et al., 2016; Srivastava & Agrawal, 2020). Therefore, blockchain acceptance by employees in HEIs is critical to achieve successful adoption.

This study aims to explore the factors that determine blockchain acceptance in HEIs among employees. The objectives of this paper are: 1) identifying the drivers and barriers to using blockchain among HEIs' employees; and 2) developing a conceptual model that supports HEIs' decision-makers to adopt the blockchain. Further, these objectives contribute to academia in different aspects. It explores blockchain acceptance from a new individual perspective. Secondly, it proposes a new developed conceptual framework. Further, it provides HEIs' decision-makers with individual and technological factors that might cause accepting or rejecting blockchain applications by employees.

2 LITERATURE BASIS

Literature studies have explored the technical and financial aspects of blockchain and tend to disregard the talk about adopting this technology (Chod et al., 2018; Cole et al., 2019; Janssen et al., 2020; Nofer et al., 2017; Saberi et al., 2019). To explore, in their systematic literature review (SLR), Alshamsi et al. (2022) found that blockchain adoption is concentrated around organisational facets (not individual). In HEIs, the authors of the current study align with Taherdoost's (2022) findings, have found that only three studies examined blockchain adoption in HEIs (i.e., Iftikhar et al., 2021; Kumar et al., 2022; Ullah et al., 2021). However, these studies differ from the current study.

For instance, one of the closest studies to this paper is from Ullah et al. (2021). However, it differs from the current study in the context and theoretical framework. Ullah et al. (2021) integrated the Technology Acceptance Model (TAM) and Diffusion of Innovation theory, while the current study is based on the Unified Theory of Acceptance and Use of Technology (UTAUT). Secondly, their investigation concerned e-learning only and not other HEIs' activities.

Kumar et al. (2022) presented a recent study about blockchain adoption in HEIs. However, it varies from the current paper in the underpinning framework and targeted sample. Kumar and others mainly extended TAM, not UTAUT. Moreover, they did not include

administrative employees in their study. Further, this study does not include students, which was part of Kumar's investigation.

Likewise, Iftikhar et al. (2021) recently discussed blockchain technology adoption in HEIs. The framework of Iftikhar and others is based on the integration of TAM and technology-organization-environment (TOE) frameworks. Unlike Iftikhar et al. (2021), the present study employs UTAUT as the underlined theory, not TAM and TOE.

Therefore, there is no published paper that aims to provide a conceptual framework based on UTAUT to determine the factors that predict blockchain acceptance among employees in the HEIs industry. This paper endeavours to close this gap by exploring factors that predict employees' acceptance of blockchain technology in HEIs.

3 TECHNOLOGY ACCEPTANCE MODEL

Venkatesh et al. (2003) proposed the UTAUT to unify the view of technology user acceptance. UTAUT is employed in the current study for three factors. Firstly, it is among the most utilised theoretical acceptance model in studies that regard blockchain technology adoption in different sectors, excluding the HEIs sector (Taherdoost, 2022). Secondly, UTAUT could investigate the actual use of different technologies, individuals segments, industries, and nations (Venkatesh et al., 2016). Finally, UTAUT is preferred in studies investigating workplaces (Sneesh et al., 2022). Hence, UTAUT is selected as the main theory of the current study.

However, UTAUT constructs do not include blockchain characteristics. In UTAUT's initial proposal, Venkatesh et al. (2003) identified "performance expectancy, effort expectancy, social influence and facilitating conditions" (p.447) as the determinants of users' acceptance and use behaviour of an emerging technology. However, the UTAUT constructs do not include blockchain's characteristics, namely, security, privacy and trust. Indeed, blockchain attributes are deemed substantial in investigating individuals' acceptance of use (Albayati et al., 2020). Hence, the framework of the current paper adds the blockchain characteristics to the UTAUT constructs. Moreover, it investigates the moderating role of awareness because blockchain remains an infant technology (Toufaily et al., 2021).

Following Venkatesh et al. (2016) suggestion, this study extends the UTAUT constructs by employing the New Endogenous Mechanisms and New Moderation Mechanisms to build determinants consistent with the blockchain characteristics. These mechanisms are employed to extend UTAUT with the blockchain technology characteristics. Additionally, awareness moderates the correlation between UTAUT antecedents and intention to use blockchain. Furthermore, the proposed framework of this study does not employ the UTAUT initial moderators (i.e., gender, age, experience and voluntariness of use) because they do not exhibit flexibility in acceptance and usage (Alazab et al., 2021). Hence, the selected factors for the present study include UTAUT constructs, blockchain main characteristics and awareness as a moderating variable.

3.1 Hypotheses Development

Based on the discussion above, the following hypotheses will be employed.

3.1.1 Performance Expectancy

In the present study, performance expectancy refers to the degree to which employees believe that using blockchain will enhance their performance (Alazab et al., 2021). Following the blockchain use cases in higher education (e.g., Bhaskar et al., 2020 and Eaganathan et al., 2019), this study assumes potential advancements in job performance among the HEIs' employees when applying blockchain.

Furthermore, previous studies have found that performance expectancy positively and significantly affects the intention to adopt blockchain (Abu Afifa et al., 2022; Alazab et al., 2021; Queiroz et al., 2021). Therefore, this study formulates the following hypothesis:

H1. Performance expectancy has a significant and positive impact on the behavioural intention to adopt blockchain among HEIs employees.

3.1.2 Effort Expectancy

Venkatesh et al. (2003) referred to effort expectancy as the extent of easiness correlated to using a technology (e.g. blockchain).

The acceptance of using an emerging technology is more likely to decrease among employees if they believe it is complex and not easy to use (Alazab et al., 2021). Thus, this study proposes that if HEIs' employees find the utilisation of blockchain diminishes their effort to implement their tasks and is not complex; they will accept the use of blockchain

applications (Wamba & Queiroz, 2019). Further, blockchain's autonomy feature might reduce employees' effort to fulfil tasks.

Previous studies have found that effort expectancy positively and significantly affects the intention to adopt blockchain (Abu Afifa et al., 2022; Alazab et al., 2021). Therefore, this study proposes the following hypothesis:

H2. Effort expectancy has a significant and positive impact on the behavioural intention to adopt blockchain among HEIs employees.

3.1.3 Social Influence

In this study, social influence refers to the extent to which employees comprehend the reasons their colleagues, friends and/or family members believe in using blockchain technology (Alazab et al., 2021; Queiroz & Fosso Wamba, 2019). Additionally, blockchain is a new technology, which might increase the importance of social influence on employees' intention to accept or reject utilising blockchain applications (Abu Afifa et al., 2022).

Previous studies concerning blockchain adoption have found a positive and significant correlation between social influence and the intention to use blockchain applications (Abu Afifa et al., 2022; Khazaei, 2020). Hence, this study proposes the following hypothesis:

H3. Social influence has a significant and positive impact on the behavioural intention to adopt blockchain among HEIs employees.

3.1.4 Facilitating Conditions

Facilitating conditions factor refers to employees' feelings toward the availability of the organisational and technological infrastructure to support the use of blockchain applications (Venkatesh et al., 2003).

This study postulates that if employees perceive that the organisational and technological infrastructure (e.g., human support) is accommodating to utilise blockchain applications, they are more likely to attain a better experience of utilising blockchain application which will increase their intention to accept using blockchain technology (Alazab et al., 2021; Queiroz & Fosso Wamba, 2019).

Prior literature investigating blockchain has found that facilitating conditions significantly and positively impact the behavioural intention to utilise blockchain technology applications (Alazab et al., 2021). Thus, this study formulates the following hypothesis:

H4. Facilitating conditions has a significant and positive impact on the behavioural intention to adopt blockchain among HEIs employees.

3.1.5 Trust

Grech and Camilleri (2017) define trust as the judgement between two or more parties, such as individuals and technologies.

The significance of trust in various technologies has been discussed widely in previous literature that concerns blockchain adoption (e.g., Alazab et al., 2021; Queiroz & Fosso Wamba, 2019). Trust between users and a particular technology affects users' intention to utilise the technology (Zakaria, 2020). Further, trust is significantly pertinent to blockchain and higher education shareholders, such as employees (Ramos & Queiroz, 2022). Hence, it could be argued that a lack of trust can cause the rejection of using blockchain technology applications among HEIs' employees (Alazab et al., 2021; Almaiah et al., 2019). In other words, the less an individual trusts a technology, the less he or she accepts the use of the technology.

This study argues that trust significantly impacts users' behaviour toward a particular technology (Zakaria, 2020). Previous studies found that trust significantly correlates with the intention to use blockchain technology (Khazaei, 2020; Queiroz et al., 2021; Ramos & Queiroz, 2022; Wamba & Queiroz, 2020; Zakaria, 2020). Additionally, trust has been found to have a significantly positive impact on the effort expectancy and performance expectancy (Chang et al., 2022). Hence, this study hypothesises:

H5A. Trust has a significant impact on the behavioural intention to adopt blockchain among HEIs employees.

H5B. Trust has a positive significant impact on the effort expectancy to adopt blockchain among HEIs employees.

H5C. Trust has a positive significant impact on the performance expectancy to adopt blockchain among HEIs employees.

3.1.6 Perceived Security

Perceived security is the employees' perception of safeguarding against security breaches, threats and data control within the blockchain technology application (Salisbury et al., 2001).

Privacy aspects could be integrated as part of perceived security. The overlapping characteristics of security and privacy, might lead to integrate the privacy factor into the security factor in order to test individuals' intention to accept an emerging

technology (Treiblmaier & Sillaber, 2021). Hence, this study adds privacy as an additional aspect of the perceived security construct. Hence, Perceived privacy and security as one construct can demonstrate users' perceptions which concern whether accessing, utilising and disclosing personal information will remain confidential (Kumar et al., 2022; Treiblmaier & Sillaber, 2021).

Perceived security is a significant factor for HEIs stakeholders (Alammary et al., 2019; Loukil et al., 2021). Typically, HEIs store a massive amount of data within their system, including employees' data. Employees' perception or feeling of acquiring higher security protection while utilising blockchain technology make them feel safer against cybersecurity attacks and breaches (Khazaei, 2020). Hence, employees need to be confident that utilising blockchain applications increases their perceived security while conducting their tasks.

It has been found in previous studies that perceived security affects individuals' intention to utilise emerging technologies significantly and positively (Khazaei, 2020; Kumar et al., 2022; Lim et al., 2019). Also, it has been found in previous studies that perceived security positively and significantly affects users' trust (Almaiah et al., 2019; Kumar et al., 2022). Based on the discussion above, this study proposes the following hypothesis:

H6A. Perceived security of blockchain has a significant positive impact on the behavioural intention to adopt blockchain among HEIs employees.

H6B. Perceived security of blockchain has a significant positive impact on trust to adopt blockchain among HEIs employees.

3.1.7 Awareness

Awareness refers to employees' knowledge about blockchain's existence, characteristics, advantages, ease of use, and usefulness to their institution (Abubakar et al., 2013).

Awareness is critical in determining the acceptance or rejection of blockchain technology among HEIs' employees. Inadequate awareness of blockchain would cause employees to encounter difficulties in shifting from the current system toward a blockchain application (Khazaei, 2020). Indeed, employees' modest awareness of blockchain technology is considered the most significant barrier to adopting blockchain (Sadhya & Sadhya, 2018). Hence, this study argues that the less employees are aware of blockchain, the more they resist its adoption in the HEIs systems (Abubakar et al., 2013).

Recent studies have found that awareness has a significant impact as a moderation role between behavioural intention and UTAUT's constructs (Daniali et al., 2022; Omar & Ala'a, 2011). In the present study, awareness does not moderate the blockchain characteristics because, to the authors' best knowledge, no studies have employed awareness as a moderating variable between security and trust and behavioural intention to use blockchain. Consequently, the following is hypothesised:

H7A. Awareness of blockchain significantly moderates the correlation between performance expectations and the intention to adopt blockchain.

H7B. Awareness of blockchain significantly moderates the correlation between effort expectations and the intention to adopt blockchain.

H7C. Awareness of blockchain significantly moderates the correlation between social influence and the intention to adopt blockchain.

H7D. Awareness of blockchain significantly moderates the correlation between facilitating conditions and the intention to adopt blockchain.

3.1.8 Behavioural Intention

Intention to use is a central antecedent in previous theories concerning technology acceptance, such as TAM and TPB. According to Fishbein and Ajzen (1975), behavioural intention is the users' goal or purpose in carrying out the behaviour. In the context of the present study, behavioural intention indicates employees' goal or purpose to utilise blockchain applications in HEIs.

Previous studies have seen the intention to use a technology as the main factor that affects the actual use of the technology (Venkatesh et al., 2003). Intention to use a particular technology can predict the utilisation of an individual's (e.g., employee) actual technology use (Cody-Allen & Kishore, 2006). Based on the significant correlation between behavioural intention and actual use in previous models, including UTAUT, this study hypothesises:

H8. Behavioural intention has a significantly positive impact on the actual use to adopt blockchain among HEIs employees.

3.2 The Proposed Framework

Following the previous discussion, figure 1 demonstrates this study's proposed conceptual model.

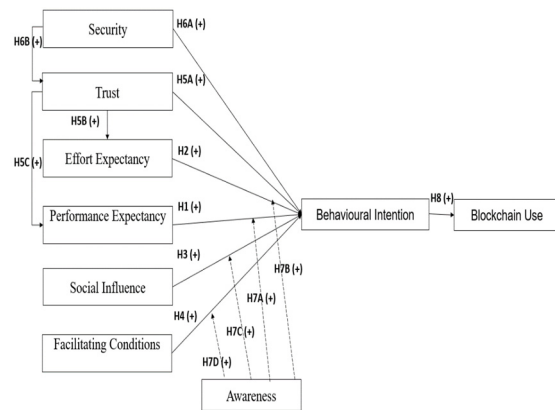


Figure 1: Proposed conceptual framework.

4 CONCLUSION

This paper presents a conceptual framework that can contribute to explaining the factors that affect employees' acceptance of blockchain technology within HEIs. The proposed framework was built based on the UTAUT due to its efficiency in explaining the acceptance of an emerging technology by different stakeholders, different time frames, and different contexts (Venkatesh et al., 2016). The UTAUT model was expanded in this study by the inclusion of new factors related to blockchain characteristics, namely, security, trust and awareness (as a moderator of UTAUT variables). The proposed model will be empirically tested in a future study.

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