Migration Letters

Volume: 20, No: 8, pp. 980-996

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

Potential Adoption of Blockchain Technology in Small Industries and the Tourism Industry in Indonesia: An Empirical Study of the Main Drivers Using Extended UTAUT

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Abstract

The Industrial Revolution 4.0 has had a very heavy impact on Small and Medium-sized Enterprises (SMEs). This has a positive impact, but also creates a series of problems, where there are trust issues. The aim of this research is to use the UTAUT model to investigate the intention to use blockchain technology by business actors in SMEs in Indonesia. The method used in this research is a continuous descriptive study of the acceptance of blockchain technology among business actors in SMEs using the UTAUT approach model which has been adapted according to the research objectives. The subjects of this research were SMEs in the Banten Province area who were selected using purposive sampling. The results of this research show that as many as thirteen hypotheses proposed in this research, four of which cannot support the hypothesis, discussion and conclusions will be discussed further.

Keywords: *Blockchain Technology, UTAUT, SMEs, Indonesia.*

1. INTRODUCTION

The Industrial Revolution 4.0 gave rise to blockchain technology (Alladi et al., 2019), which must be connected to the internet (Sony, 2021). Blockchain is a decentralized distributed ledger that can be applied to various sectors, including the tourism industry (Corne et al., 2023; Prados-Castillo et al., 2023; Rana et al., 2022; Sarfraz et al., 2023) and small and medium industries (Ali et al., 2023; Almasarweh et al., 2023; Alshareef & Tunio, 2022b, 2022a; Bracci et al., 2022; Deng et al., 2022; Kumar Bhardwaj et al., 2021; O.N. et al., 2023; Rakshit et al., 2022). The tourism industry and small and medium industries are able to absorb labor as a distribution of the community's economy (Setiawan & Lagarde, 2019). Technological developments are increasingly rapid, so the tourism industry and small and medium industries need to adopt blockchain technology because blockchain is a technology that has a security system that is difficult to hack because each network has layered encryption (George et al., 2019; Hapiffah & Sinaga, 2020).

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The development of big data, artificial intelligence, and financial technology has given birth to a radical revolution in various fields, such as transportation, buying and selling transactions, communications, and government, including small and medium industries and the tourism industry (Nuryanto & Pramudianto, 2021), based on the Internet of Things (IoT) (Alladi et al., 2019; Makhdoom et al., 2019; Wang et al., 2019). This digital transformation has a positive impact, but on the other hand, problems of trust, security, and authenticity arise (Sony, 2021) in adopting blockchain technology. This gap needs an intermediary to strengthen small and medium industries and the tourism industry by implementing blockchain technology into their business domains (George et al., 2019). On the other hand, the problem of trust is currently occurring because business actors, both SMEs and those in tourism, are still less aggressive in using blockchain technology. Because the behavior of consumers and business actors is still limited to using information systems only for payment transactions, there is resistance to the application of blockchain technology in these two industries, such as what happens in the food service industry (Jang et al., 2023), in the logistics industry where errors still occur ((Tijan et al., 2019), and opportunities in the healthcare industry also still need to be developed because there are problems with scalability, smart contract security, and user adoption (Radanović & Likić, 2018).

Nuryyev et al., (2020) recommend that the adoption of blockchain technology in SMEs and the tourism industry is still weak, requiring support from the government to create competitiveness strategy policies. The use of blockchain technology is still practically constrained at the SME business level, so the potential for blockchain technology adoption is still low. Meanwhile, the tourism industry is more aggressive than small industries, but in the context of global tourism. Blockchain technology needs to be adopted by these two industries to make it even more advanced so that the restoration of the people's economy (Nuryyev et al., 2020) and the sharing economy (Pazaitis et al., 2017) can occur in these two industries.

Many studies on the adoption of blockchain technology have been carried out with different industrial backgrounds, such as the supply chain industry (Difrancesco et al., 2022; Sharma et al., 2023), venture and international business (Laplume, 2018), and accounting and financial institutions (Abu Afifa et al., 2023; J. Oh & Shong, 2017; Pakpahan, 2022), libraries and information centers (Jha, 2023), and the energy industry (S.-C. Oh et al., 2017), while Hapiffah & Sinaga, (2020) and Radanović & Likić, (2018) recommend blockchain be applied in the medical industry. Likewise, small and medium industries and the tourism industry must adopt blockchain technology in simpler terms so that business actors are able to apply blockchain technology. This condition is then explored through a study exploring the state of the art regarding the implementation of blockchain-based application adoption as a sustainable business improvement in small industries and tourism.

Blockchain technology needs to be adopted by small industries and the tourism industry in the realm of behavior. When entrepreneurs want to know about it, they will use it; this principle is related to intention (Hidayat et al., 2018). Intention theories and models have been widely studied, such as the Technology Acceptance Model (TAM) (Davis, 1993) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2016). Research on blockchain technology influencing the development of small and medium industries and the tourism industry has been widely carried out (Alshareef & Tunio, 2022b; Kwok & Koh, 2019; Puri et al., 2023). As a justification, why is this research important to carry out considering that there are still differences of opinion among previous researchers regarding how to adopt blockchain-based technology?

So the formulation of this research problem is: What is the potential for applying blockchain technology to small and medium industries and tourism? The aim of this research is to use the expanded Unified Theory of Acceptance and Use of Technology (UTAUT) model to investigate intentions to use blockchain from the perspective of

business actors in small and medium industries and the tourism industry. The proposed model is expected to provide the necessary incentives for businesses to adopt blockchain-based technology.

2. LITERATURE REVIEW

This research requires a rational approach, namely the need to measure the potential of business actors to use blockchain technology. This technology is simplified into more practical language, one example of which is the digitalization of SME finance. So, to measure the readiness of SMEs to use technology, a measurement model is needed. One model that is widely used to analyze the level of acceptance and use of technology is UTAUT (Unified Theory of Acceptance and Use of Technology). UTAUT was developed by Venkatesh et al. (2016) based on eight theories regarding technology acceptance, namely Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (PTB), Model Combining the Technology Acceptance Model and Theory of Planned Behavior, Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT), and Social Cognitive Theory (SCT) (Jogiyanto, 2009). The UTAUT model has four main constructs that influence behavioral intention and use behavior of information technology, namely performance expectancy, effort expectancy, social influence, and conditions. facilitating conditions. The position of this research is different from previous research, as illustrated in the state-of-the art explanation. The repositioning of variables in this research was carried out by considering logical relationships between variables, as evidenced by findings from previous studies. Personal Innovativeness Variables and Technology Adoption This section will focus on finding relationships between variables that will be discussed in depth and breadth in the theoretical review. It is hoped that this offer will enrich the development of the body of knowledge in business and tourism industry studies.

Performance Expectancy

Performance expectancy plays a crucial role in shaping behavioral intention and personal innovativeness. According to Davis (1989), perceived usefulness and perceived ease of use are key factors that influence user acceptance of information technology. The perceived usefulness refers to the individual's belief that using a particular technology will enhance their performance or productivity, while perceived ease of use refers to the individual's perception of how easy it is to use the technology. These factors directly impact the user's behavioral intention to adopt and use the technology.

In the context of mobile commerce, convenience and social influence are important factors that affect users' perception of usefulness and ease of use (Davis, 1989). Convenience, in particular, has a strong mediation effect between social influence and users' perceptions. This suggests that when users perceive a technology as convenient to use, it enhances their perception of its usefulness and ease of use, thereby increasing their behavioral intention to adopt and use it.

Furthermore, personal innovativeness is influenced by factors such as hedonic motivations and social influence (Davis, 1989). Hedonic motivations refer to the pleasure or enjoyment that individuals derive from using a technology, while social influence refers to the impact of others' opinions and recommendations on an individual's decision to adopt and use a technology. These factors not only directly affect personal innovativeness but also indirectly influence users' perception of usefulness and ease of use, thereby shaping their behavioral intention.

The expectation-confirmation model proposed by Bhattacherjee (2001) further supports the relationship between performance expectancy and behavioral intention. According to this model, users' continuance intention is determined by their satisfaction with the information system (IS) use and perceived usefulness of continued IS use. User

satisfaction, in turn, is influenced by their confirmation of expectations from prior IS use and perceived usefulness. This suggests that when users perceive the IS as useful and experience confirmation of their expectations, it enhances their satisfaction and increases their intention to continue using the system.

In summary, performance expectancy, encompassing factors such as perceived usefulness, perceived ease of use, convenience, hedonic motivations, and social influence, significantly influences behavioral intention and personal innovativeness. Understanding these factors is crucial for promoting the adoption and use of innovative technologies and information systems. Thus, we propose the following hypothesis:

H1a: Performance expectancy has a significant influence on the behavioral intention of Small Industries and Tourism Industry to adoption of blockchain technology

H1b: Performance expectancy has a significant influence on the personal innovativeness of Small Industries and Tourism Industry to adoption of blockchain technology

Effort Expectancy

Effort expectancy refers to the perceived ease of use and the perceived usefulness of a technology or system (Davis, 1989). In the context of mobile commerce, convenience is a significant factor that affects users' perceptions of usefulness and ease of use (Davis, 1989). Convenience has a strong mediation effect between social influence and users' perceptions (Davis, 1989). A study conducted by Davis (1989) on the factors that enhance users' perception of mobile commerce in Egypt found that convenience, along with social influence and hedonic motivations, affected users' perceptions and were also found to be mediated by each other (Davis, 1989).

In the field of healthcare, the Technology Acceptance Model (TAM) has been widely used to predict and explain the acceptance and use of health information technology (IT) (Holden & Karsh, 2010). TAM predicts a substantial portion of the use or acceptance of health IT, but the model may benefit from additions and modifications. Holden & Karsh (2010) suggest that TAM should be adapted specifically to the healthcare context, using beliefs elicitation methods (Holden & Karsh, 2010). Several studies have reviewed the application of TAM to healthcare, analyzing data sets from clinicians using health IT for patient care (Holden & Karsh, 2010).

Personal innovativeness is another factor that can influence users' perceptions and behaviors. A study by Devisakti & Muftahu, (2023) on digitalization in higher education found that personal innovativeness has a significant impact on performance expectancy (Devisakti & Muftahu, 2023). This finding is consistent with previous studies (Devisakti & Muftahu, 2023). Personal innovativeness refers to an individual's willingness to try new technologies and adopt innovative practices (Devisakti & Muftahu, 2023).

In summary, effort expectancy, influenced by factors such as convenience and personal innovativeness, plays a crucial role in users' perceptions and intentions towards adopting and using technology. Convenience is particularly important in the context of mobile commerce, while personal innovativeness has been found to impact performance expectancy in digital learning and higher education. These factors should be considered when designing and implementing technology systems to ensure user acceptance and adoption. Thus, we propose the following hypothesis:

H2a: Effort expectancy has a significant influence on the behavioral intention of Small Industries and Tourism Industry to adoption of blockchain technology

H2b: Effort expectancy has a significant influence on the personal innovativeness of Small Industries and Tourism Industry to adoption of blockchain technology

Social Influence

Social influence plays a significant role in shaping individuals' behavioral intentions and personal innovativeness in the context of technology adoption. In the study conducted by Zhang et al. (2019), it was found that social influence had a strong total effect on behavioral intention, along with performance expectancy. The direct effects of social influence on behavioral intention were also significant, indicating that individuals' perceptions of others' opinions and recommendations influenced their intention to use technology. This finding is consistent with previous studies on health information technologies (Zhang et al., 2019).

Furthermore, the study by Zhang et al. (2019) revealed that social influence had an indirect effect on behavioral intention, which was mediated by performance expectancy. This suggests that individuals' perceptions of others' opinions and recommendations influenced their expectations of the technology's performance, which in turn influenced their intention to use it. This indirect effect highlights the importance of social influence in shaping individuals' perceptions and attitudes towards technology adoption.

In the context of personal innovativeness, social influence has also been found to play a role. Although the direct effect of social influence on personal innovativeness may not be as strong as its effect on behavioral intention, it still has a significant indirect effect. Zhang et al. (2019) found that social influence had an indirect effect on personal innovativeness, which was mediated by performance expectancy. This suggests that individual' perceptions of others' opinions and recommendations can influence their willingness to try new technologies and adopt innovative practices.

Overall, these findings highlight the importance of social influence in shaping individuals' behavioral intentions and personal innovativeness in the context of technology adoption. The opinions and recommendations of important others, such as healthcare providers, peers, and family members, can significantly influence individuals' perceptions and attitudes towards technology. Understanding the role of social influence can help in designing interventions and strategies to promote technology adoption and innovation. Thus, we propose the following hypothesis:

H3a: Social influence has a significant influence on the behavioral intention of Small Industries and Tourism Industry to adoption of blockchain technology

H3b: Social influence has a significant influence on the personal innovativeness of Small Industries and Tourism Industry to adoption of blockchain technology

Facilitating Conditions

Facilitating conditions refer to the external factors that can influence individuals' behavioral intentions and personal innovativeness in the context of technology adoption. In the study conducted by Kanera et al. (2016) on healthy lifestyle behaviors among early cancer survivors, facilitating conditions were found to have a significant impact on behavioral intention. The study emphasized the importance of encouraging all examined lifestyle behaviors, taking into account that each behavior may be influenced by a specific set of mainly social cognitive factors or intention (Kanera et al., 2016). This suggests that the presence of facilitating conditions, such as access to resources and support, can enhance individuals' intention to engage in healthy behaviors.

Furthermore, facilitating conditions have also been found to influence personal innovativeness. In the study by Kanera et al. (2016), the prevalence of adherence to different recommendations for healthy lifestyle behaviors varied. While there was high adherence to recommendations such as physical activity and refraining from smoking, there was low adherence to recommendations for fruit and vegetable consumption (Kanera et al., 2016). These variations in adherence may be influenced by the presence or absence of facilitating conditions. For example, individuals may have easier access to

resources and support for engaging in physical activity or refraining from smoking, compared to accessing and consuming fruits and vegetables. This highlights the role of facilitating conditions in shaping individuals' personal innovativeness and their willingness to adopt and maintain healthy behaviors.

In summary, facilitating conditions play a crucial role in influencing individuals' behavioral intentions and personal innovativeness. The presence of facilitating conditions, such as access to resources and support, can enhance individuals' intention to engage in certain behaviors and adopt innovative practices. However, the level of adherence to different behaviors may vary depending on the availability and accessibility of facilitating conditions. Understanding the impact of facilitating conditions can help in designing interventions and strategies to promote behavior change and innovation in various contexts, including healthcare and technology adoption. Thus, we propose the following hypothesis:

H4a: Facilitating conditions has a significant influence on the behavioral intention of Small Industries and Tourism Industry to adopt blockchain technology

H4b: Facilitating conditions has a significant influence on the personal innovativeness of Small Industries and Tourism Industry to adopt blockchain technology

Behavioral Intention

Behavioral intention refers to an individual's subjective likelihood or willingness to engage in a specific behavior. In the context of technology adoption, behavioral intention plays a crucial role in predicting and understanding users' acceptance and use of technology. The Technology Acceptance Model (TAM) proposed by Davis in 1989 is a widely used theoretical framework that explains the relationship between users' perceptions and their behavioral intentions towards technology.

According to, perceived usefulness and perceived ease of use are two key factors that influence users' behavioral intentions. Perceived usefulness refers to the extent to which individuals believe that using a particular technology will enhance their performance or productivity. Perceived ease of use, on the other hand, refers to the degree to which individuals believe that using the technology will be free from effort. These two factors have been found to have a significant impact on users' behavioral intentions and their adoption of technology.

In the context of mobile commerce, convenience is a factor that strongly influences users' perceptions of usefulness and ease of use. Convenience has been found to have a mediation effect between social influence and users' perceptions of mobile commerce. This suggests that the convenience of using mobile commerce platforms can enhance users' perceptions of its usefulness and ease of use, which in turn influences their behavioral intentions towards adopting and using the technology.

In summary, behavioral intention is a key determinant of users' acceptance and adoption of technology. Factors such as perceived usefulness, perceived ease of use, and convenience play important roles in shaping users' behavioral intentions. Understanding these factors can help in designing and implementing technology systems that are user-friendly, convenient, and meet users' needs and expectations. Thus, we propose the following hypothesis:

H5a: Behavioral intention has a significant influence on the use behavior

H5b: Behavioral intention has a significant influence on the adoption of blockchain technology

Personal Innovativenes

Personal innovativeness refers to an individual's willingness and propensity to adopt and use new technologies or innovative practices (Christensen & Raynor, 2003). It is a key

factor that can influence individuals' behavioral intentions and their adoption of technology. In the context of behavioral intention, personal innovativeness has been found to have a significant impact. A study by Christensen & Raynor (2003) found that individuals with higher levels of personal innovativeness were more likely to have positive behavioral intentions towards adopting new technologies. This suggests that individuals who are more open to trying new things and embracing innovation are more likely to express intention to adopt and use technology.

Furthermore, personal innovativeness also plays a role in the adoption of technology. Christensen & Raynor (2003) argue that personal innovativeness is a critical factor in driving the successful adoption and implementation of new technologies. Individuals with higher levels of personal innovativeness are more likely to be early adopters and champions of new technologies, leading to their widespread adoption and diffusion. It is important to note that personal innovativeness is influenced by various factors, including individual characteristics, attitudes, and experiences. For example, individuals who have a higher need for achievement, a greater tolerance for risk, and a positive attitude towards change are more likely to exhibit higher levels of personal innovativeness (Christensen & Raynor, 2003).

In summary, personal innovativeness has a significant impact on individuals' behavioral intentions and their adoption of technology. Individuals with higher levels of personal innovativeness are more likely to express positive behavioral intentions towards adopting new technologies and are more likely to be early adopters and champions of innovation. Understanding the role of personal innovativeness can help in designing strategies to promote technology adoption and innovation in various domains. Thus, we propose the following hypothesis:

H6a: Personal innovativeness has a significant influence on the behavioral intention

H6b: Personal innovativeness has a significant influence on the adoption of blockchain technology

Use Behavior

The adoption of technology is influenced by various factors, including use behavior. Use behavior refers to individuals' actual usage patterns and behaviors after adopting a technology. Several studies have examined the relationship between use behavior and technology adoption, providing insights into the factors that influence individuals' adoption decisions and behaviors. Straub (2009) discusses the importance of addressing cognitive, emotional, and contextual concerns in facilitating technology adoption. The article emphasizes the complex and social nature of the adoption process, suggesting that individuals construct unique perceptions of technology that influence their adoption decisions (Straub, 2009).

Rogers's theory of diffusion of innovations is widely used to understand how innovations are implemented and adopted in organizations (García-Avilés, 2020). The theory proposes a sequence of stages, including awareness, interest, persuasion, decision, adoption, and confirmation, and categorizes adopters into different groups based on their innovativeness (García-Avilés, 2020). This theory provides a framework for understanding the adoption behavior of individuals and organizations.

In the context of specific technologies, Nejadrezaei et al. (2018) conducted a study on the adoption of pressurized irrigation technology among olive farmers. The study found a significant relationship between performance expectancy, social influence, facilitating conditions, and use behavior. Additionally, the study observed a significant relationship between intention to use and use behavior of the technology (Nejadrezaei et al., 2018). These findings highlight the importance of factors such as perceived performance, social influence, and facilitating conditions in influencing individuals' use behavior and adoption of specific technologies.

Huang et al. (2018) examined the impact of vulnerability to soil and water loss on farmers' adoption behavior of soil and water conservation technology. The study found that exposure and susceptibility to soil and water loss positively influenced farmers' adoption behavior, while natural capital had a positive impact on the adoption of certain measures. Financial capital had a negative impact on the adoption of certain measures (Huang et al., 2018). This study demonstrates the influence of environmental and economic factors on technology adoption behavior.

In summary, use behavior is an important factor in technology adoption. Understanding individuals' actual usage patterns and behaviors can provide insights into the factors that influence adoption decisions. Factors such as perceived performance, social influence, facilitating conditions, and environmental and economic factors can play a significant role in shaping individuals' use behavior and adoption of technology. Thus, we propose the following hypothesis:

H7: Use Behavior has a significant influence on the adoption of blockchain technology

The adoption of blockchain technology

The adoption of blockchain technology is influenced by various factors, as highlighted in the references provided. Clohessy & Acton (2019) conducted a study on the influence of organizational factors on blockchain adoption. They found that top management support and organizational readiness were enablers for blockchain adoption, and large companies were more likely to adopt blockchain than small to medium-sized enterprises (SMEs) (Clohessy & Acton, 2019). The study also emphasized the importance of equipping managers with the necessary knowledge and skills to adopt blockchain technology (Clohessy & Acton, 2019).

Kumar Bhardwaj et al. (2021) conducted a study on the determinants of blockchain technology adoption in supply chains by SMEs in India. They found that technology readiness, top management support, and perceived usefulness were factors that positively influenced the intention of SMEs to adopt blockchain technology in their supply chains (Kumar Bhardwaj et al., 2021). However, complexity of technology and cost concerns were identified as inhibitors to technology adoption by SMEs (Kumar Bhardwaj et al., 2021).

In the context of the food supply chain, Mohammed et al. (2023) conducted a systematic literature review on blockchain adoption. They identified scalability, interoperability, high cost, lack of expertise, and regulations as the most likely barriers to blockchain adoption in the food supply chain (Mohammed et al., 2023). The study also highlighted the enablers and benefits of blockchain adoption, providing evidence-based direction for other industries to build their blockchain strategies (Mohammed et al., 2023).

Mathivathanan et al. (2021) conducted a study on the barriers to the adoption of blockchain technology in business supply chains. They found that the lack of business awareness and familiarity with blockchain technology were the most influential barriers to adoption (Mathivathanan et al., 2021). The study also proposed a total interpretive structural modeling approach to identify the interrelationships between the barriers to blockchain adoption (Mathivathanan et al., 2021).

Overall, the adoption of blockchain technology in various industries and supply chains is influenced by factors such as organizational readiness, top management support, technology readiness, perceived usefulness, complexity of technology, cost concerns, scalability, interoperability, lack of expertise, and regulations. Understanding these factors can help organizations and industries overcome barriers and facilitate the successful adoption of blockchain technology. The Figure 1 displaying the conceptual model of the current examination is shown below.

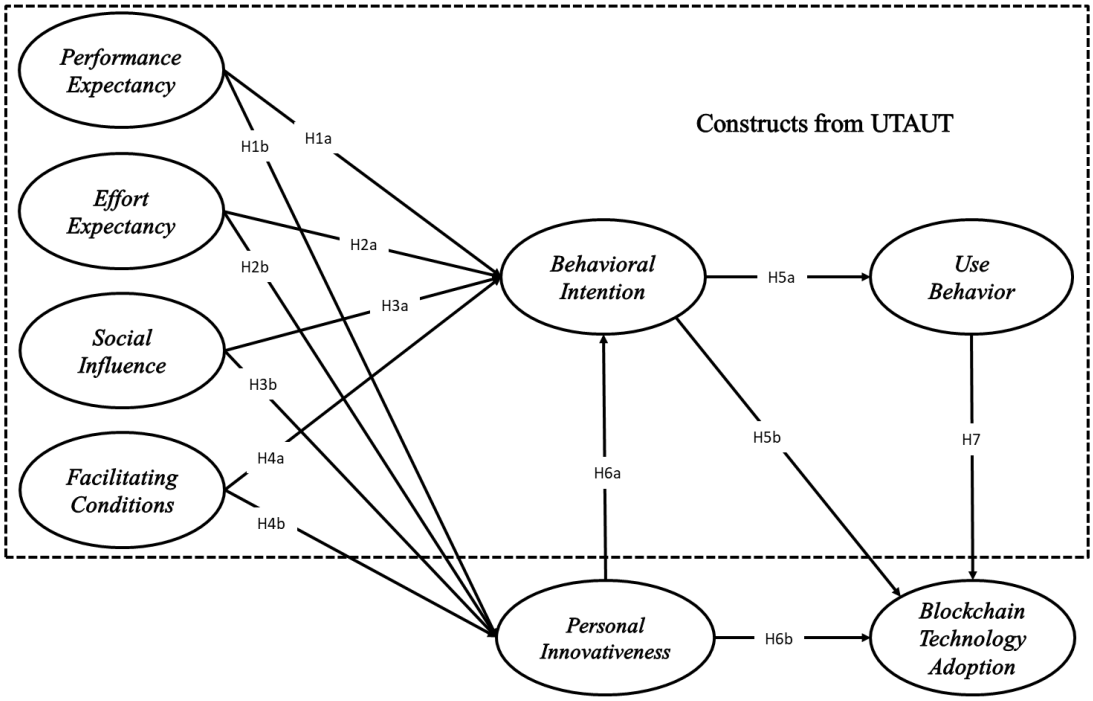

Fig 1. Conceptual model of research

3. RESEARCH METHODOLOGY

The original data were collected through a survey carried out among tourism and hospitality SMEs owners/managers member of PT. PNM Mekaar in Banten, Indonesia. SMEs owners/managers were contacted through the PT. Permodalan Nasional Madani (PNM) Mekaar Banten, which has a database that includes information about more than 2.000 SMEs owners/managers. A total of 387 SMEs owners/managers member from PT. PNM Mekaar Banten met the requirements of our sample. This survey was conducted at a weekly meeting between SMEs owners/managers as members of the PNM group with PNM managers. The questionnaire explored a range of factors related to SMEs' blockchain technology adoption behavior. During data collection, each SME owner/manager was approached face to face and the questionnaires are made using Google Form. Respondents who were unaware of payment system were not invited to take part in this survey. The fundamental properties of the factors are defined by using like the Likert scale strategy from strongly disagree (score = 1) to strongly agree (score = 10). The instrument was developed after a thorough review of studies related to the UTAUT model. The SEM-PLS techniques used to validate structured data, the PLS model analyzes and interprets the reliability and validity of (1) the measurement model and (2) the structural model. In this study, PLS regression was used to perform bootstrapping for our research model and to test and validate the proposed model and the relationships among the hypothesized constructs.

4. RESULT AND DISCUSSION

Descriptive statistics

The findings of the study including testing of hypotheses are presented and discussed in the following paragraphs. Hence the sample size of this study is meaningful for analyzing the constructs and research model. Table 1 shows the demographic profile of respondents and the average age of the SMEs.

Table 1: Descriptive statistics

Valid	Frequency	Percent (%)
Age		
20-30 years	137	35.4%
31-40 years	167	43.2%
41-50 years	68	17.6%
51-60 years	14	3.6%
61 and above	1	0.3%
Total	387	100%
Education		
Elementary School	104	26.9%
Junior High School	103	26.6%
Senior High School	159	41.1%
Undergraduate	19	4.9%
Graduate	2	0.6%
Total	387	100%
Length of SMEs		
1-5 years	263	68.0%
6-10 years	104	26.9%
11-15 years	11	2.8%
16-20 years	4	1.0%
21-25 years	2	0.5%
More than 26 years	3	0.8%
Total	387	100%

Source: Authors estimation

The results of the analysis of respondent data descriptions consist of three categories, namely age, education, and length of business. Table 1 shows that the majority of respondents are in the 31–40 year range (43.2%, then the education level of SMEs owners is in the high school range (41.1%), and the respondents' length of business is dominated by the 1–5 year range (68.0%).

Measurement model analysis

Based on the results of the outer model analysis, the validity and reliability test results were divided into 5 parameters, including convergent validity, average variance extracted (AVE), discriminant validity, composite reliability (CR), and Cronbach's alpha (CA). These results can be seen in the following table:

Table 2. Measurement model results

Variable	Indicators	Factor Loadings	CA	rho_A	CR	AVE
Adoption Technology (AT)	AT1	0,932	0,939	0,939	0,961	0,891
	AT2	0,955				

	AT3	0,943				
Behavioral Intention (BI)	BI1	0,948	0,942	0,943	0,963	0,897
	BI2	0,957				
	BI3	0,936				
Effort Expectancy (EE)	EE1	0,943	0,955	0,955	0,968	0,882
	EE2	0,946				
	EE3	0,946				
	EE4	0,921				
Facilitating Conditions (FC)	FC1	0,909	0,937	0,939	0,955	0,841
	FC2	0,935				
	FC3	0,913				
	FC4	0,913				
Performance Expectancy (PE)	PE1	0,906	0,949	0,951	0,964	0,869
	PE2	0,943				
	PE3	0,925				
	PE4	0,953				
Personal Innovativeness (PI)	PI1	0,956	0,953	0,953	0,970	0,914
	PI2	0,965				
	PI3	0,947				
Social Influence (SI)	SI1	0,933	0,931	0,933	0,956	0,879
	SI2	0,931				
	SI3	0,948				
Use Behaviour (UB)	UB1	0,951	0,967	0,967	0,976	0,910
	UB2	0,956				
	UB3	0,966				
	UB4	0,943				

Source: Authors estimation

A preliminary confirmatory factor analysis was used to test the reliability and validity of the model. There are four important points of analysis to measure an effective model: indicator reliability, internal consistency reliability, and convergent validity (Table 2). First, for the reliability of the indicators, all loadings were between 0.906 and 0.966 higher than the recommended value of 0.708. Similarly, for internal consistency reliability, all values are above 0.70, and based on the reported rho_A, all values are greater than 0.7. Therefore, all values were considered acceptable in reflecting internal consistency. Next, convergent validity is measured based on the average variance extracted (AVE) value. Based on the results in Table 2, all values are higher than 0.5, thus reflecting that the construct explains the item variance.

Structural model analysis

In the last stage, we related a partial least square framework to inquire about the model structure and theory testing which demonstrating path coefficients, t-stats, and probability value. As appeared by Chin (2010) suggestion, a bootstrapping framework using 1000 sub-test was connected with affirming the quantifiable key assessment of the considerable number of values. Table 3 reveals coefficient determination an table 4 reveals beta coefficients, t-stats, and their significant essential value with the comments about the hypothesis testing.

Table 3. Coefficient determination (R^2) of the model.

Variabel	R Square	R Square Adjusted
Adoption Technology	0,898	0,898
Behavioral Intention	0,859	0,857
Personal Innovativeness	0,827	0,825
Use Behaviour	0,831	0,830

Source: Authors estimation

The results of the structural parameters of the analysis model are shown by the R2 value of each exogenous variable and endogenous variable. The R2 value for the adoption technology variable is 0.898, which means that the adoption technology variable is influenced by the behavioral intention, use behavior, and personal innovativeness variables by 89.8%, while the rest is influenced by other variables. The R2 value for the behavioral intention variable was obtained at 0.859, which means that the behavioral intention variable was influenced by 85.9% of the five exogenous variables. The personal innovativeness variable has an R2 value of 0.827, which means that personal innovativeness is influenced by 82.7% of the four exogenous variables. Meanwhile, the use behavior variable has an R2 value of 0.831, which means that use behavior is influenced by 83.1% of behavioral intention.

Based on the results of the measurement model and structural model analysis, it was found that the value of each parameter met the requirements and was included in the high GoF model criteria. so that researchers can continue to draw conclusions regarding hypothesis testing. The results of hypothesis testing using Smart PLS can be seen in Table 3.

Table 4. Result of path coefficients

Hypothesized path		T statistics	P values	Remarks
H1a	PE ➔ BI	0,877	0,381	Not supported
H1b	PE ➔ PI	3,801	0,000	Supported
H2a	EE ➔ BI	3,413	0,001	Supported
H2b	EE ➔ PI	0,618	0,537	Not supported
H3a	SI ➔ BI	3,266	0,001	Supported
H3b	SI ➔ PI	1,098	0,273	Not supported
H4a	FC ➔ BI	1,286	0,199	Not supported
H4b	FC ➔ PI	4,690	0,000	Supported
H5a	BI ➔ UB	59,755	0,000	Supported
H5b	BI ➔ AT	2,925	0,004	Supported

H6a	PI ➔ BI	2,321	0,021	Supported
H6b	PI ➔ AT	7,452	0,000	Supported
H7	UB ➔ AT	2,815	0,005	Supported

Source: Authors estimation. (Level of significance 5%)

Discussion

The results of hypothesis testing in Table 4 show that there are 4 hypotheses proposed that are not supported by the data, namely PE ➔ BI, EE ➔ PI, FC ➔ BI, and SI ➔ PI, because they have a significance value of more than 0.05. The findings from this research are that first, the performance expectation variable does not have a significant effect on behavioral intention. This is not supported by the references provided (Gupta & Arora, 2020), because according to the results of their research, performance expectations should have an influence on behavioral intentions. This study highlights the importance of performance expectations in predicting and influencing behavioral intentions in various contexts, such as mobile payment systems and technology adoption. In reality, business actors have no intention of adopting blockchain-based technology.

The second finding is that effort expectancy does not have a significant effect on personal innovativeness because it has a P value of 0.537. So far, SMEs' efforts to adopt blockchain technology have not produced significant results, so personal innovation is not well formed. Even though the conditions for technology adoption practices continue to be carried out, blockchain technology apparently does not make it comfortable to carry out business activities. This finding is in fact the opposite of Devisakti & Muftahu (2023). Then it was strengthened by Abu Afifa et al. (2023) and Sharma et al. (2023), who found that the expected performance of blockchain technology influences users' perceptions of its usefulness, thereby increasing the intention to adopt blockchain technology. Furthermore, individuals who perceive higher performance expectations tend to show personal innovation in adopting blockchain technology.

The next finding is that social influence does not have a significant effect on personal innovativeness because it has a P value of 0.273, more than 0.05. The findings show the fact that so far the use of social media has only been for socializing online, not for serious selling, so that personal innovation on social media has not been developed in SMEs. This weakness certainly has the impact that social media (such as Instagram, TikTok, Facebook, etc.) has no effect on increasing innovative behavior in business. Even though blockchain technology is very closely related to social media because it has good performance, this is as stated by Zhang et al. (2019). The final finding in this research is that the Facilitating Conditions variable does not have a significant effect on behavioral intention because it has a P value of 0.199 > 0.05. Facilitating conditions in this study suggest that easy access to the use of blockchain technology is not able to increase SMEs' behavioral intentions in using this technology. The main factor is that SMEs' human resources are not yet open to blockchain technology, and there may be a sense of fear of this technology, which is related to the cognition of each individual (Kanera et al., 2016).

5. CONCLUSION

Small and medium enterprises (SMEs) play a significant role in Indonesian business growth. Therefore, the objective of the present study is to investigate the association between antecedents of blockchain technology adoption in Indonesian SMEs. In doing this, this research seeks to identify internal and external factors and combine them using the UTAUT model in adopting blockchain technology and the subsequent impact on the behavior of using this technology for SME performance. The PLS-SEM results confirm that performance expectancy has had a significant and positive impact on personal

innovativeness. Effort expectancy has a positive and significant impact on behavioral intention. Social influence also has a positive and significant impact on behavioral intention. The PLS-SEM results also confirm that behavioral intention has a positive and significant impact on use behavior and adoption of technology. The PLS-SEM results also found that personal innovativeness has an impact on behavioral intention and adoption of technology. Finally, the results of partial least squares modeling confirm that use behavior also has a positive and significant influence on the adoption of technology. Future research can investigate various models of technology acceptance in SMEs other than the UTAUT model or integrate various models to explore the determinants of blockchain technology adoption.

Acknowledgements

The researchers thank all members of PT PNM Mekaar Banten who participated in this research. as well as thanks to the rector of Universitas Bina Bangsa and the head of the Universitas Bina Bangsa research and community service institute.

Funding

This research was supported by the Fundamental Research Grant Scheme, grant number 180/E5/PG.02.00.PL/2023 and contract number 055/SP2H/RT-MONO/LL4/2023 funded by Ministry Education, Culture, Research and Technology (Kemendikbudristek), Republic of Indonesia.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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