

# Behavioral Intention to Adopt Blockchain Technology: Viewpoint of the Banking Institutions in Malaysia

Hayati Yusof<sup>1</sup>, Mai Farhana Mior Badrul Munir<sup>2</sup>, Zulnurhaini Zolkaply<sup>3</sup>, Chin Li Jing<sup>4</sup>, Chooi Yu Hao<sup>5</sup>, Ding Swee Ying<sup>6</sup>, Lee Seang Zheng<sup>7</sup>, Ling Yuh Seng<sup>8</sup>, Tan Kok Leong<sup>9</sup>

<sup>1,2,3</sup> Research Supervisors, Department of Commerce and Accountancy, University Tunku Abdul Rahman, Kampar, Perak, Malaysia

<sup>4,5,6,7,8,9</sup> Research Scholars, Department of Commerce and Accountancy, University Tunku Abdul Rahman, Kampar, Perak, Malaysia

## Abstract

As the world is catching up with various technological developments, blockchain technology slowly catches the Malaysian attentions. In Malaysia, this technology is still in its infancy stage and is yet to gain popularity. This research is aimed at investigating the factors influencing the behavioral intention to adopt blockchain technology by the Malaysian banking institutions. Unified Theory of Acceptance and Use of Technology (UTAUT) with key determinants such as Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Condition has been adopted in this study. Using questionnaire instruments, 149 data from banking respondents in five states have been collected and analyzed. Of the four key determinants, only Effort Expectancy shows an insignificant relationship with the behavioral intention to adopt blockchain technology. This research is a contribution to scholarly writing while helping administrators' adoption decision making.

**Keywords:** Blockchain Technology, Banking Institutions, UTAUT, Behavioral Intention, Technological Development, Malaysia

## 1. Introduction

Nowadays, most of the currency transactions between persons or companies are centralized and handled by a third party organization such as the banking institutions. For example, the bank will act as a middleman to complete currency transfer transactions between two entities which will also be

charged a fee by the bank. This third party organization will manage all the information and data of the clients in a centralized manner. Blockchain technology has been evolved to resolve this problem. Blockchain is a new revolution that has rarely been seen in the history of technology which will have a large impact on society. Recently, many market sectors are looking into how to integrate the capabilities of blockchain technology into their operations. In addition, it is reported about 10% of global gross domestic products are expected to be stored using blockchain technology by 2025 (World Economic Forum, 2015).

Tapscott (2017) in his report revealed that blockchain technology was first used after the global economic crisis, when a new protocol for "A Peer-to-Peer Electronic Cash System" using a cryptocurrency called bitcoin being released by Satoshi Nakamoto. Bitcoin is the most popular example that has an inherent link with blockchain technology and was the first cryptocurrency rolled out using blockchain technology. In other words, blockchain is a data management technology firstly developed for Bitcoin cryptocurrency where all the transactions are decentralized without any control by a third party organization. Blockchain technology is virtually a public ledger of all transactions or digital events in which all transactions that have been implemented are shared among the participants. Each transaction in the public ledger will then be verified by the participants in the system. All the information can never be changed or deleted after the data has been authorized by all nodes. Besides, the blockchain

contains a certain and verifiable record of every single transaction ever made that make blockchain is well known of its data integrity and security characteristics (Crosby, Pattanayak, Verma & Kalyanaraman, 2016).

Currently, blockchain is successfully being used in financial and non-financial institutions (Crosby *et al.*, 2016). Due to this reason, blockchain technology will not be a threat to the traditional business models in the financial institutions. Conversely, the world's banks are actually looking for opportunities in this area by studying innovative blockchain applications. Figure 1 below shows an example of how the financial transaction is carried out using the blockchain technology.

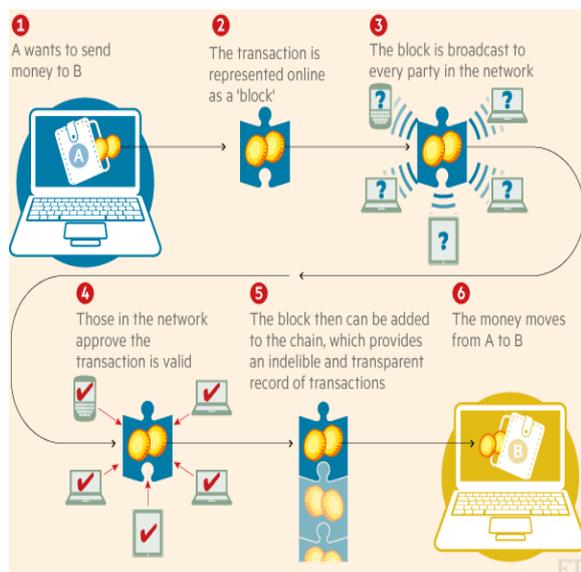


Fig. 1: Financial Transactions using Blockchain Technology (Crosby *et al.* (2016))

According to MIMOS Berhad (2017), the Malaysian Ministry of Science, Technology and Innovation (MOSTI) is profoundly looking at blockchain technology to ensure that the country is not left behind in the blockchain race. Besides, Malaysian Industry-Government Group for High Technology (MIGHT) highlighted that Malaysia would be adopting blockchain by the year 2025. In line with this target, Malaysia's banks have taken positive steps to encourage the development of blockchain technology. From that, the future of financial transactions can be made in seconds or minutes which significantly reduce costs and increase efficiency.

Since the idea of blockchain technology was evoked in 2008, the number of interest in exploring this technology has been increased. However, prior research had focused more on finding and identifying improvements to the challenges and limitations in blockchain (Swan, 2015). Furthermore, many of

current research being conducted in the bitcoin environment, rather than in other blockchain environments where the knowledge is supposed to be expanded to different environments other than cryptocurrencies (Yli-Huumo, Ko, Choi, Park & Smolander, 2016). In Malaysia, blockchain technology is still in its infancy stage due to lack of understanding and awareness for blockchain. This will restrict the speculation and investigation of thoughts because of the broad absence of comprehension of how it functions (Grewal-Carr & Marshall, 2016). In fact, global survey of HSBC (2017) revealed that about 80% of the public do not understand what blockchain is. In line with this issue, this research seeks to investigate the factors influencing the behavioral intention to adopt blockchain technology by the Malaysian banking institutions.

## 2. Literature Review

According to Oliveira and Martins (2011), there are many theories used in research in order to explain the degree of Information Technology acceptance among users. Among the most common used theories are the Theory of Planned Behavior (TPB) (Ajzen 1985; Ajzen 1991), the Technology Acceptance Model (TAM) (Davis 1986; Davis 1989; Davis, Bagozzi & Warshaw, 1989), the Diffusion Of Innovation (DOI) (Rogers, 1995), and UTAUT (Venkatesh, Morris, Davis & Davis, 2003). In Malaysia, some studies have been conducted based on the UTAUT, for example, Ooi, Lee, Tan, Hew and Hew (2018) who applied the theories to understand the cloud computing adoption among manufacturing firms in Malaysia. Besides, Rosli, Yeow and Siew (2012) also state that the UTAUT would best reflect firms' decision makers in deciding on a technology adoption. This research has also adopted the UTAUT in order to understand the adoption intention of blockchain technology among banking institutions in Malaysia.

UTAUT which was developed by Venkatesh *et al.* (2003), consists of four main concepts: (i) Performance Expectancy (PE); (ii) Effort Expectancy (EE); (iii) Social Influence (SI), and Facilitating Conditions (FC). The aim of this model is to explain user's intention to accept an information system and the user's ability to deal with the technology (AlQudah, 2015). This model was developed based on the study of eight models: Theory of Reasoned Action, Technology Acceptance Model (TAM), Motivation Model, Theory of Planned Behavior (TPB), TAM and TPB, Model of PC Utilization, Innovation Diffusion Theory, and Social Cognitive Theory. UTAUT is found to outperform and is able to overcome the limitation of the eight individual models (Lescevic, Ginters & Mazza, 2013); hence, becoming the most used and applied model by many

educational institutions and researchers. In this research, four main variables in UTAUT which are PE, EE, SI and FC are applied in the proposed conceptual framework (Figure 2).

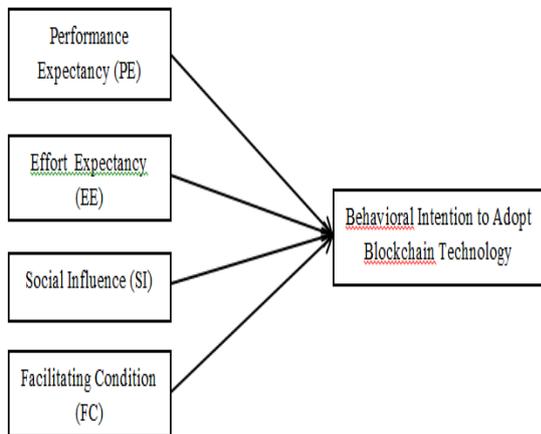


Fig. 2: Proposed Conceptual Framework (Modified from Venkatesh *et al.* (2003) & Abu, Jabar & Yunus (2015))

This framework has been used in identifying the influencing factors on the behavioral intention to adopt blockchain technology by the Malaysian banking institutions.

**Behavioral Intention (BI):** Behavioral intention measures a person’s inclination to engage in a specific behavior (Venkatesh *et al.*, 2003) and has been found as a sign of actual behavior among users in technology. Blockchain adoption behavior in western countries has been empirically tested in some research. However, blockchain is relatively a new technology and the literature regarding this subject is still lacking in Malaysia especially in the context of blockchain adoption.

**Performance Expectancy (PE):** “The degree to which an individual believes that using the system will help him or her to attain gains in job performance” (Venkatesh *et al.*, 2003). In this study, PE is hypothesized to have a positive influence on behavioral intention to adopt blockchain technology (BI).

**H1:** *There is a positive relationship between PE and behavioral intention to adopt blockchain technology by the Malaysian banking institutions.*

**Effort Expectancy (EE):** “The degree of ease associated with the use of the system” (Venkatesh *et al.*, 2003). In this study, EE is hypothesized to have a positive influence on behavioral intention to adopt blockchain technology (BI).

**H2:** *There is a positive relationship between EE and behavioral intention to adopt blockchain technology by the Malaysian banking institutions.*

**Social Influence (SI):** “The degree to which an individual perceives that important others believe he or she should use the new system” (Venkatesh *et al.*, 2003). In this study, SI is hypothesized to have a positive influence on behavioral intention to adopt blockchain technology (BI).

**H3:** *There is a positive relationship between SI and behavioral intention to adopt blockchain technology by the Malaysian banking institutions.*

**Facilitating Condition (FC):** “The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system” (Venkatesh *et al.*, 2003). In this study, FC is hypothesized to have a positive influence on behavioral intention to adopt blockchain technology (BI).

**H4:** *There is a positive relationship between FC and behavioral intention to adopt blockchain technology by the Malaysian banking institutions.*

### 3. Materials and Methods

This research is cross-sectional in nature and its primary data have been collected using survey questionnaires. By applying judgmental sampling, the targeted respondents were the relevant employees of the banks with knowledge of blockchain technology. These participants were selected based on relevant characteristics or information that they had (Etikan, Musa & Alkassim, 2016). The questionnaire which has gone through pilot testing consisted of 27 questions. Thus, based on Hinkin (1995), the ideal sample size falls within the range of 108-270. It turned out that 149 respondents responded to the self-administered and online questionnaires distributed.

According to The Association of Banks in Malaysia (2017), the total number of bank population (commercial banks) is 1918. Five states have been chosen for questionnaire distribution in order to have 50% coverage of the banks. They were Selangor, Kuala Lumpur, Johor, Penang and Perak as majority of the banks were situated in these areas. However, due to the confidentiality nature of banking operations and the voluntary basis of research participation, the actual responses from the banks were quite uneven.

## 4. Results and Findings

### 4.1 Demographic Profile

In total, 149 respondents took part in this research in which 85 (57.05%) were females while 64 (42.95%) were males. The majority of the respondents were Chinese (65,43.62%), followed by Malay (53, 35.57%) and Indian (31, 20.81%). Next, 67 (44.97%) of the respondents were between 36-45 years of age, 44 (29.53%) were between 26-35 years old, 22 (14.77%) were above 46 years and 16 (10.74%) were below 25 years old. In terms of academic background, most of the respondents were graduates (80, 53.69%), 42 (28.19%) were Diploma/Advanced Diploma holders, 14 (9.40%) had a Master degree, five (3.36%) PhD holders and eight (5.37%) had other academic qualifications. Most of the respondents were from Perak (62, 41.61%), Kuala Lumpur (28,18.79%), Johor (22,14.77%), Selangor (19,12.75%) and Penang (18,12.08%). In addition, 42 (28.19%) respondents had less than five years banking experience, 41 (27.52%) spent 11-15 years in the banks, 26 (17.45%) with 6-10 years experience, 21 (14.09%) had 16-20 years experience and 19 (12.75%) worked more than 20 years (Table 1).

Table 1: Demographic Information

Demographic Criteria	Frequency	Percentage
<b>Gender</b>		
Male	64	42.95
Female	85	57.05
<b>Ethnicity</b>		
Chinese	65	43.62
Malay	53	35.57
Indian	31	20.81
<b>Age</b>		
Below 25	16	10.74
26-35 years	44	29.53
36-45 years	67	44.97
Above 46	22	14.77
<b>Academic Background</b>		
Diploma/Advanced Diploma	42	28.19
Bachelor degree	80	53.69
Master degree	14	9.40
PhD	5	3.36
Others	8	5.37
<b>Location of Employment (State)</b>		
Selangor	19	12.75
Kuala Lumpur	28	18.79
Johor	22	14.77
Penang	18	12.08
Perak	62	41.61
<b>Working Experience in Banking (Year)</b>		
Less than 5 years	42	28.19
6-10 years	26	17.45
11-15 years	41	27.52
16-20 years	21	14.09
Above 20 years	19	12.75

### 4.2 Reliability and Normality Test

Based on Table 2 below, all Cronbach's Alpha values exceed 0.70 with the highest value is 0.8834 (BI) and the lowest value is 0.8527 (SI). Hence, the data are normally distributed and reliable for this study.

Table 2: Reliability and Normality Test

Variable	Cronbach's Alpha Value
Performance Expectancy (PE)	0.8654
Effort Expectancy (EE)	0.8748
Social Influence (SI)	0.8527
Facilitating Condition (FC)	0.8739
Behavioral Intention to adopt blockchain technology (BI)	0.8834

### 4.3 Pearson Correlation Analysis

Pearson Correlation Analysis has been applied in order to see the strength of relationship between the independent variables (IV) and dependent variable (DV). Performance Expectancy (PE) and Facilitating Condition (FC) had the strongest relationship with behavioral intention to adopt blockchain technology (BI). On the whole, all IVs are significantly correlated to the DV as their p-value is <.0001 (Table 3).

Table 3: Pearson Correlation Analysis

	PE	EE	SI	FC	BI
PE	1.0000				
EE	0.8294	1.0000			
	<.0001				
SI	0.8664	0.7738	1.0000		
	<.0001	<.0001			
FC	0.8587	0.8262	0.8518	1.0000	
	<.0001	<.0001	<.0001		
BI	0.8083	0.7623	0.7941	0.8059	1.0000
	<.0001	<.0001	<.0001	<.0001	

### 4.4 Model Summary for Multiple Linear Regression Analysis (MLR)

The model summary for MLR in Table 4 pointed out that the R-Square is 71.87%. It means that the behavioral intention to adopt blockchain technology (BI) can be explained by the four IVs by 71.87% while the remaining 28.13% of BI is caused by other variables not captured in this research.

Table 4: Model Summary

Root MSE	Dependent Mean	Coefficient Variation	R-Square	Adjusted R-Square
0.4489	3.2780	13.6936	0.7187	0.7108

#### 4.5 Model Fit

Referring to Table 5, the F-value (91.96) is large and the p-value is < .0001. It shows that at least one of the IVs can be used to explain the DV. Therefore, the model fit is achieved.

Table 5: Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	74.1187	18.5297	91.96	<.0001
Error	144	29.0154	0.2015		
Corrected Total	148	103.1341			

#### 4.6 Multiple Linear Regression Analysis

The tolerance values for every IVs fall between the range of 0.1719 and 0.2623 while the variance inflation factors fall within the range of 3.8118 and 5.8182 (Table 6). It proves that no multicollinearity problem existed since all IVs have tolerance values more than 0.1 and the variance inflation factors are lower than 10. Moreover, for the hypotheses to be supported, its p-value should be less than 0.05. Based on Table 6, three hypotheses were supported (Performance Expectancy, Social Influence and Facilitating Condition) while Effort Expectancy was rejected.

Table 6: Analysis of Variance

Variable	Pr >  t	Tolerance	Variance Inflation	Hypotheses Testing
Intercept	0.0249	-	0	
PE	0.0187	0.1719	5.8182	<b>H1 Supported</b>
EE	0.0689	0.2623	3.8118	<b>H2 Not Supported</b>
SI	0.0213	0.2049	4.8816	<b>H3 Supported</b>
FC	0.0105	0.1889	5.2928	<b>H4 Supported</b>

### 5. Discussion

Results have shed some lights on which factors strongly influenced the behavioral intention to adopt blockchain technology among the banking

institutions in Malaysia, which were not much covered in the previous literature. This study proven that Performance Expectancy, Social Influence and Facilitating Condition are the three important strategic weapons that will influence the behavioral intention in adopting blockchain technology among the bankers.

In terms of Performance Expectancy, the bank employees believed that this technology is helpful in performing their daily activities and enhancing work performance. Moreover, Social Influence indicated that blockchain technology is recommended by the staff's peers, co-workers and those who are close to them. In addition, the staff believed that the banking institutions had sufficient organizational and technical infrastructure to adopt or make use of blockchain technology (Facilitating Condition). Conversely, Effort Expectancy is found irrelevant at this stage of studying the intention to adopt blockchain technology. This might be due to users had no interaction and clear understanding on how to use this technology.

Furthermore, findings of this research are found beneficial and constructive to assist researchers and practitioners who wish to explore the adoption of blockchain technology as this technology is still in its early stage in Malaysia.

### 6. Conclusions

This research explored the behavioral intention to adopt blockchain technology from the viewpoint of the Malaysian banking institutions. Four variables have been adopted (PE, EE, SI and FC). It turned out that all variables except for EE, play the dominant role in affecting the adoption of blockchain technology among the bankers. This research, however, covered limited banking states in Malaysia. Future researchers are recommended to cover a wider population while considering new variables, theories and more effective instruments to make the study more precise and applicable.

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