

# Uncertain Supply Chain Management

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## The determinants of customer's intention to use international payment services by applying blockchain

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### ABSTRACT

This study aims to shed light on the way customers determine their utilization of international payment services with blockchain applications. The primary data is collected from the 373 individuals who frequently use the international payment services in Vietnam. We apply the combination of TAM, UTAUT, and ISS models to test the determinants of the Intention to use International payment services at Commercial banks applying Blockchain. These determinants are Quality of System, Quality of Service, Quality of Information, Perceivable usefulness, Convenient usefulness, and Social influence. The research results show that (i) All of the above factors are positively associated with customers' intention to use international payment services in Vietnamese banks which implement blockchain; (ii) The quality of information has the strongest positive impact on the customer's intended use. It refers that the international payment services in banks should be safe, accurate and timely; (iii) Differently from the hypothesis, the social influence indicator is positively related to the customer's intention to use the service, affirming the potential interests of customers on blockchain if applying successfully in banks; (iv) Although current customers have not paid much attention whether banks apply blockchain in international payment or not, they have taken concentration on fundamental risks, costs, and convenience of the services. This signal is consistent with the fact that only 2/46 commercial banks and 49 foreign bank branches in Vietnam provide international payment service with blockchain application nowadays.

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## 1. Introduction

International payments continue to grow, but technological progress poses an extremely urgent challenge for the incumbents, especially in banking industry. This is because these banks were developed in a time when communications were costly, slow, and unreliable. Now, another problem these banks have to face is the increasing demand for a faster and more convenient digital standard of International payment services (Faden, 2019). Regulatory activism, on the other hand, is driving up the complexity and costs of compliance in delivering international payments. This pushes the service industry towards a profound transformation which requires the integration of advanced technology, the enhancement of international payment services. Global banking giants will find themselves in a strong

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position as long as they invent and reinvent themselves. By contrast, small domestic banks will continue to outsource the activities in which they are subscale, including applying technology to international payments. Mid-sized banks will face the toughest strategic options (Barbey et al., 2017).

Blockchain is the general term for distributed ledger technology (DLT) distributed on many systems (tamper-proof). According to Mr. Sanjay Chakrabarty - Deputy General Director of Orient Commercial Bank (OCB) - with blockchain, people find it easier, faster, more convenient, and more secure when they make financial transactions or investment decisions than the traditional way (OCB, 2019). Blockchain is the underlying technology that creates virtual currencies like Bitcoin and Ethereum, and furthermore, involves directly in streamline transaction processes, making them more efficient and economical. Traditionally, banking and payment transactions have relied on a central authority or middleman to make payments, resulting negatively in the transparency, timeliness, and reliability in recognizing and managing these translations. The Blockchain appears to overcome these problems, to allow a distributed computer network to reach consensus without the need for this middleman (Belin, 2008).

Practically blockchain has become more and more and more popular since 2017 when banking services witnessed many collapses in Irish, Spanish and Icelandic. In European countries, IBM has developed a new blockchain technology that will be used by seven of Europe's largest banks, including Deutsche Bank, HSBC, KBC, Natixis, Rabobank, Societe Generale, and Unicredit to promote international trades for small and medium-sized businesses (Kharpal, 2017). In Asia, OCBC Bank is the first bank in the world to use Blockchain technology in domestic and international remittance services, increasing efficiency, transparency, reducing costs and improving customer experience (OCBC, 2016). In Vietnam, in July 2018, NAPAS cooperated with three banks including VietinBank, VIB and TPBank to successfully conduct interbank money transfer transactions using Blockchain. TP Bank is the first bank to apply Blockchain in money transfer while HSBC has successfully implemented Letter of Credit (L/C) transactions on the Blockchain platform between two large enterprises in plastic market (TPBank, 2019). This confirms the popularity of Blockchain platforms in international payment systems of commercial banks. However, it is no doubt to say that scholars do not pay much attention on customers' decision to use international payment services at banks that have applied blockchain, resulting to a relatively shortage in the literature review.

Theoretically, one study about the application of Blockchain in the International Payment system found that the blockchain platform can help banks form a faster, more flexible and secure international payment system (Chen and Hayashikawa, 2018). Therefore, the implementation of general research on applying Blockchain is necessary at this moment for banks and its clients, even with little empirical evidence worldwide. Empirically, TAM, UTAUT, ISS models have been applied to investigate the determinants of customers' decision to use online services such as online shopping, e-banking services and 3G services (Ly, 2018; Dung, 2019). Thus, we will apply these models to analyze the topic: "Determinants of customers' decision to use International Payment Services at Commercial banks Applying Blockchain Platform in Vietnam".

## **2. Literature review**

### *2.1. Three models on determinants of customers' decisions*

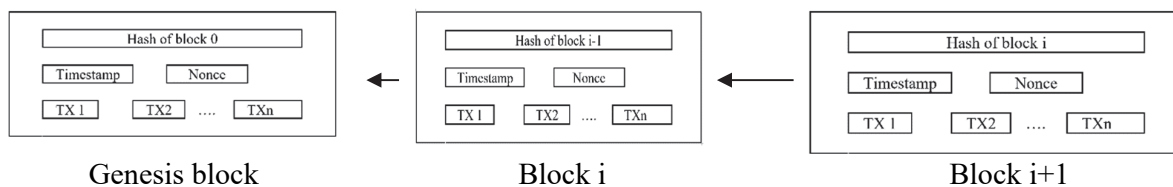
As mentioned above, Technology Acceptance Model (TAM), UTAUT, and ISS are three famous models in analyzing the determinants of customers' intention, especially popular in developing countries. TAM, originally introduced by Davis et al. (1989), illustrates the degree to which a person believes that using a system would enhance his or her job performance. UTAUT is a combination of many factors from other theoretical models with the goal of creating a common perspective for users with new information systems. The combination is among TRA, TPB, TAM, motivation models,

innovation diffusion theory (IDT), social cognitive theory (Social Cognitive Theory) (Venkatesh *et al.*, 2003). Developed by Delone and Mclean (1992), ISS is commonly used to measure the success of information technology systems under users' evaluation (Smith & Kumar, 2003). There should be an overlap between the TAM and UTAUT models in the convenient usefulness, the intended to use, and behavior to use variables. As for the ISS model, which was built to evaluate the satisfaction of the new technology system, it overlaps the TAM and UTAUT models in the independent variable Intended to use.

In the study Adoption of Blockchains - A Cross Cultural Comparison by Franziska (2016), UTAUT and TAM models are applied to assess the impact of performance expectancy, effort expectancy, social influence, facilitating conditions, and some regulatory variables such as habit, culture on behavioral intention. Similarly, Kim and Gim (2017) analyze factors influencing the intention to accept blockchain based on UTAUT. They point out that five factors related to the performance expectancy and effort expectancy are associated with the utilization of blockchain technology. However, there are not many studies on international payment services in banks using TAM, UTAUT, ISS models because these services are new and different among countries due to the different in national regulations. Therefore, we will deep in this theoretical gap by applying these three models to find the determinants of the customers' intention to use international payment services in Vietnamese banks.

## 2.2. Blockchain

About the core concepts of the blockchain, a typical example for a blockchain is illustrated in Fig. 1 (Zheng *et al.*, 2017). A blockchain consists of data sets which has a sequence of data packages (blocks) where each block consists of multiple transactions. In fact, the blockchain is a series of blocks, containing a complete list of transaction records like conventional public ledger (Lee, 2015). This consensus mechanism is a set of rules and procedures that allows maintaining a coherent set of facts between multiple participating nodes (Swanson, 2015). In this process, new transactions are not automatically added to the ledger. Instead, the consensus process ensures that these transactions are stored in a block for a certain period of time before being transferred to the ledger. Afterwards, the information in the blockchain cannot be changed.



**Fig. 1.** Example of a Blockchain

In financial market, the popularity of blockchain might be a strong evidence that it is increasing the firm's performance directly as well as indirectly and that its concepts are truly beneficial (Nakamoto, 2008; Peters *et al.*, 2015). Blockchain technology could be applied for clearing or settling financial assets, maintaining a constant level of costs, and reducing credit risks (Morini, 2016). This is why a lot of big organizations have already implemented blockchain such as Microsoft Azure (Azure Blockchain Service overview - Azure Blockchain, 2020) and IBM (IBM, 2016). In the international market, many practical evidences show that blockchain speeds up international payment processing services, supporting real-time domestic and cross-border payments at a lower cost (Peyton, 2016). In fact, numerous initiatives are focusing on applying blockchain to accelerate and reduce the cost of trading (Commonwealth Bank, 2016; Fortune, 2016). In a recent proof of concept, Commonwealth Bank of Australia, Wells Fargo, and Brighann Cotton undertook what was believed to be the first live global blockchain-based transaction. The transaction involved a collaborative workflow to track and pay for a shipment of cotton between two Brighann units in Texas and China (Commonwealth Bank, 2016).

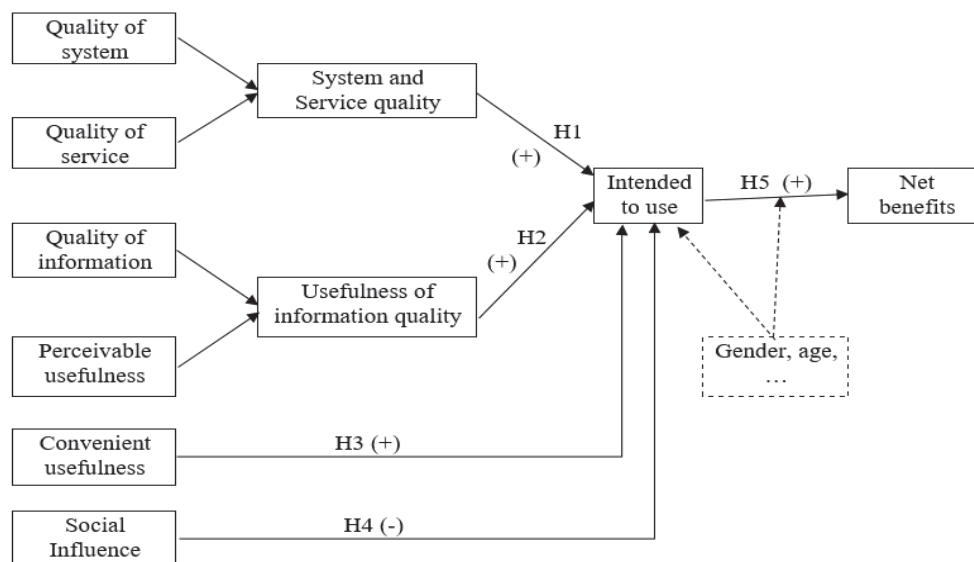
In Vietnam, the development of digital banking creates many new breakthroughs in all aspects, in which international payment services have also been improved to bring more benefits to users. However, a significant disagreement among practitioners has been arisen due to the potential risks that blockchain might result in. First of all, credit market witnesses an ethical risk that occurs in cases when the seller transfers financial assets but does not receive payment, the buyer has paid the goods but has not received. Second, liquidity risk also occurs when a partner does not pay the full value of a payment obligation when it is due. The reason is that the partner lacks solvency, which means that it is unable to convert assets into liquidity capital. Thirdly, legal risks happen when the payment obligation is not completed due to the differences in laws or legal guidelines related to multilateral payment systems (PV, 2017). The reason responsible for this risk is the lack of government guarantee for international payment, leading to the lack of payment security (Oliver, 2018).

In conclusion, with the increasing demand for a better customer service, commercial banks should take advantages of advanced technology to improve their security, their transparency, and the timeliness before enhancing their competitive advantages. Blockchain might be a good solution overcoming these issues, although it does not guarantee a better outcome because of its drawbacks related to credit risk. The number of studies on the issues are negligible, especially in Vietnam where no studies on customers' decision to use international payment services at banks can be found. In addition to the fundamental risks, the limitations of international payment services at Vietnamese banks are complicated and troublesome paperwork. Their customers, as a result, encounter many inconveniences such as waiting for a long time and the inaccuracy of transactions (Chuyen Tien Nhanh, 2020). Therefore, it is no doubt to say that understanding the customers' decision to use international payment services is necessary.

### 3. Research methodology

#### 3.1. Model Design

Based on TAM of Davis et al. (1989), UTAUT of Venkatesh et al. (2003), ISS of Delone and Mclean (1992) and Smith and Kumar (2003), the research team came up with the proposed model including 6 independent variables, 2 dependent variables and 5 moderating variables. The variables are shown as the model below:



**Fig. 2.** Summary of Research model on determinants of customers' decision to use international payment services at commercial banks applying Blockchain in Vietnam

We conducted Cronbach Alpha, EFA tests at SPSS software and CFA tests at AMOS for all variables. After that, we get regression model results with the following independent and dependent variables after SEM test from AMOS software:

$$IU = \beta_0 + \beta_1 \times QIPU + \beta_2 \times QSQV + \beta_3 \times CU + \beta_4 \times SI \quad (1)$$

$$NI = \mu_0 + \mu_1 \times IU \quad (2)$$

where

- QIPU: Usefulness of information quality
- QSQV: System and service quality
- CU: Convenient usefulness
- SI: Social influence
- IU: Intended to use
- NI: Net benefits.

### 3.2. Hypotheses

Based on the theoretical framework stated in Literature review, the team will make 5 hypotheses showing the relationship between variables as follows:

**H<sub>1</sub>:** The quality of the commercial bank system and quality of international payment service are positively correlated with customers' intended to use at commercial banks.

With the tendency of applying science and technology platforms to the system to improve the quality of products, banking services are no exception. Indeed, international payment (IP) with blockchain implementation helps banks be sufficiently sensible to capture dramatic changes in innovation within the business environment alongside the advancement of automation in crediting services in the financial industry. In addition to the operation acceleration, cost reduction, international payments using Blockchain help current procedures with timely verification, thereby, ensuring the authority and the transparency of transactions. For example, derivative market can take advantages of blockchain to reduce frictions and the portfolio selection risks (Morini, 2016). Therefore, the application of blockchain facilitates financial transactions or investment decisions become easier, cheaper, and safer than the traditional way (OCB, 2019).

The application of this technology platform also modernizes banking services, facilitates the improvement of human resources qualifications, thereby satisfying different customer groups in the future. It will promote the confidence of potential customers who have intended to use this international payment service by improving their satisfaction and trust. Therefore, the quality of commercial banking system and the quality of international payment service are positively related to the customers' intended to use at commercial banks.

**H<sub>2</sub>:** The quality of customer transaction information is positively associated with the customers' intended use at commercial banks.

Following of Blockchain, the technology platform has brought many positive trading signals on digital banking services, particularly in international financial transactions (Nakamoto, 2008) and risk management (Eyal & Sirer, 2014). Compared to traditional international payment services, transactions are processed at a faster rate by reducing the complexity of multiple measures. A technological information system combined with blockchain can reduce fundamental risks but achieve higher security levels (Micheler & Heyde, 2016; Morini, 2016). This system combines a reliable recognition process, thereby increasing the usefulness of international payment services. In addition, the application of Blockchain will encourage the coordination among departments, helping the banks with more transparency, alignment, and better performance. This is because the more accurate the quality of

information are, the more useful the system will be. Therefore, it is little doubt to say that meeting the needs of transaction information simultaneously increases customer satisfaction boosting their confidence, thereby, increasing their intention to use international transaction services.

**H<sub>3</sub>:** The convenient usefulness of banking with blockchain implementation is positively associated with the intended use of customers at commercial banks.

It can be said that the convenience and satisfaction play an important role in customer service, especially accelerating customers' intention (Kim & Gim, 2017). In fact, the positive feedbacks on the convenience after applying blockchain are sources of motivations for the success of international payment services in Vietnam (Nguyen, 2010). This means that with a faster transaction speed, lower prices, and higher security level, the banks applying blockchain have increased customers' satisfaction by upgrading the convenience of international transaction services. Although a technology platform is not yet popular, especially in Vietnam market, Blockchain has received positive feedback on its convenient usefulness. Specifically, public blockchains have attracted many users and have received many positive responses from users (Nguyen, 2010). Therefore, the rise in convenient level of international payment service applying Blockchain will help the banks increase customers intention to use this service.

**H<sub>4</sub>:** The social influence negatively affects customers' intended use at commercial banks.

Along with minimizing the limitations of the foreign trade contract process, international payment plays an important role in generating more profits and promoting other banking activities. This is recognized by the society, which has a positive impact when international payment transactions flow smoothly (Mai, 2015). On the other hand, with the current high-speed information processing needs, blockchain faces many obstacles when it is limited in speed. Meanwhile, due to the small size of the blocks, many small transactions are delayed because miners prefer those transactions with high transaction fees. However, large block sizes will slow down the propagation rate and lead to blockchain branches (Zyskind *et al.*, 2015). Therefore, the scalability problem is complicated and difficult to banks in serving a higher quality service. In Vietnam, due to the restricting in accessing to new information, customers tend to use traditional services which are more familiar with them rather than international transactions services applying blockchain. They believe that the complexity of blockchain might result in a misunderstanding and delay in their transactions (Nguyen, 2010). Therefore, the social impacts will negatively affect customers' decisions when using international payment services in Vietnamese commercial banks.

**H<sub>5</sub>:** The increase in the customers' intention help customers with higher benefits in international transaction services.

According to Morini (2016) and Jaag *et al.* (2016), customers who use financial services with Blockchain's implementation can benefit themselves with lower transaction costs, lower credit risks but higher level of security. By contrast, traditional international payment services contain many limitations related to interest rates, the transactions' timeliness, transaction costs, and opportunity costs. Technology innovation created by blockchain helps customers with more timely recognitions, and convenient services, especially for derivative markets which includes a complicated command of transactions among investors, hedgers, speculators, and arbitragers. With up-to-date international transaction services supplied by commercial banks, customers have more choices in investment decisions to optimize their benefits. In Vietnam where the derivative market is new and unsecured, using this type of service ensure the safety of customers in improving their investment decision making process. Therefore, it can be said that the increase in the customers' intention to use international transaction services in commercial banks which use blockchain will further enhance the customers' benefits.

In addition to five different hypotheses above, we also investigate the relationship between moderating variables and customers' intention to use international services applying blockchain. This is because human-related indicators showing the income, education, gender, age, and occupation can influence the dependent variable. According to ManpowerGroup recruitment and HR consultancy report 2019, the average income of Vietnamese people is only about 242 USD per month, resulting in the frequency of using international banking services. The differences between genders and ages also impact on the consumption of banking services (Vu, 2015; Thuy, 2019). We have built the following scales for moderator variables to test their influence on the customers' intention to use international transaction services at commercial banks.

**Table 1**  
The Moderating variables

Moderating variable	The scales				
	Male		Female		
Gender	Male		Female		
Age	From 16 to 22	From 23 to 30	From 31 to 45	From 45 to 55	Over 55
Career	Officers and employees		Student	Other	
Education level	Undergraduate		Graduate	Post-university	
Monthly income	Less than 3 million	From 3 million to 7 million	From 8 million to 10 million	From 11 million to 20 million	Over 20 million

*Source: Authors*

To sum up, 2 dependent variables were chosen for this study basing on literature review, including intended to use (IU) and net benefits (NB) (Morini, 2016; Jaag *et al.*, 2016; Venkatesh *et al.*, 2003). Then, the research team come up with the proposed model include 6 independent variables:

**Table 2**  
The independent variables in model research

Scales of Variable	Full name of Variable	Expected signal	Reference
QI1, QI2, QI3, QI4	Quality of Information	+	Delone and McLean (1992), Nakamoto (2008), Zhang and Wen (2015)
PU1, PU2, PU3, PU4, PU5	Perceivable usefulness		Davis et al. (1993), Eyal and Sirer (2014), Morini (2016)
QS1, QS2, QS3, QS4, QS5, QS6	Quality of System	+	Morini (2016), Hardjono and Smith (2016), Delone and McLean, (1992)
QV1, QV2, QV3, QV4, QV5	Quality of Service		Delone and McLean (1992)
CU1, CU2, CU3, CU4, CU5	Convenient usefulness	+	Zhang and Wen (2015), Hardjono and Smith (2016), Venkatesh and Davis (2010)
SI1, SI2, SI3, SI4	Social Influence	-	Nakamoto (2008), IBM (2016)

*Source: Authors' compilation from primary data*

### 3.3. Sample descriptions

**Firstly**, in terms of gender of the surveyed people, out of 373 surveyed questions, there were 164 people were male, accounting for 44 percent, female survey respondents were 209 people accounting for 56 percent. In general, the gender distribution of the surveyed woman is much larger than the number of men (more than 45 people, equivalent to 12 percent). This is also a proportion consistent with the world trend of society that the research team believes will make the most objective conclusions for this paper.

**Secondly**, based on the social and human nature of Vietnam, the research team had divided the age ranges according to the nature of education, working age and the purpose of users of international payment services. The team divided the age into five groups including "from 16 to 22", "from 23 to 30", "from 31 to 45", "from 45 to 55" and "over 55 ". Based on the results collected and synthesized from the research team, the youngest age "from 16 to 22" accounts for a completely superior rate compared to other customer segments with 263 people (70.5 percent). In addition, the next age groups are fairly evenly distributed in the 3 age ranges "from 23 to 30", "from 31 to 45" and "from 45 to 55" accounting for a total of 28.1 percent, equivalent to more than a quarter of the qualified votes, of which the percentage of each age group was 12.3 percent (46 people), 9.9 percent (37 people) and 5.9 percent (22 people). However, from the age of 55 and up, the number of participants accounted for only 1.3 percent, equivalent to 5 people.

**Thirdly**, regarding the career of the people who had a satisfactory vote, the research group was based on the goal of two main subjects: Vietnamese overseas students and office workers to give 3 main categories of career. Other groups accounted for the least with 23/373 people, equivalent to 6.2 percent. Survey results show that the quantity of Vietnamese overseas students is 264 people, accounting for 70.8 percent and office workers are 86 people (23.1 percent), equivalent to about a quarter of the qualified votes.

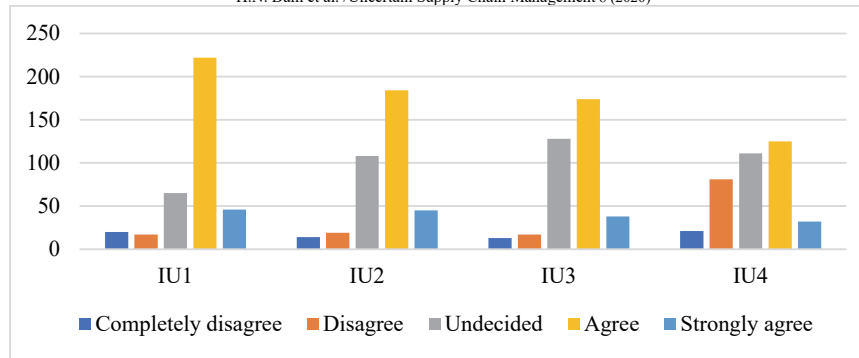
Regarding education level, it is obvious to see that the highest rate is 78.8 percent (more than 3/4 of the qualified votes) - 294 people had graduated. Postgraduate people had 57/373 votes, accounting for 15.3 percent. Finally, with only about nearly one-third of the number of postgraduate, the number of undergraduate accounts for only 5.9 percent with 22 votes. Regarding the income level, based on the results of the survey, it is easy to see that the relatively even number of the three customers with income greater than 8 million per month with 8.8 percent; 9.1 percent and 10.5 percent in each income group "from 8 to 10 million" (33 people), "from 11 to 20 million" (34 people) and "more than 20 million" (39 people). A slightly higher with 16.9 percent, there are 63 votes at an income of "from 3 to 7 million" per month. Finally, corresponding to the age scale, the common income level for students is less than 3 million, there are 204 votes, accounting for 54.7 percent (more than half of the votes considered).

## 4. Results

### 4.1. Descriptive statistical results

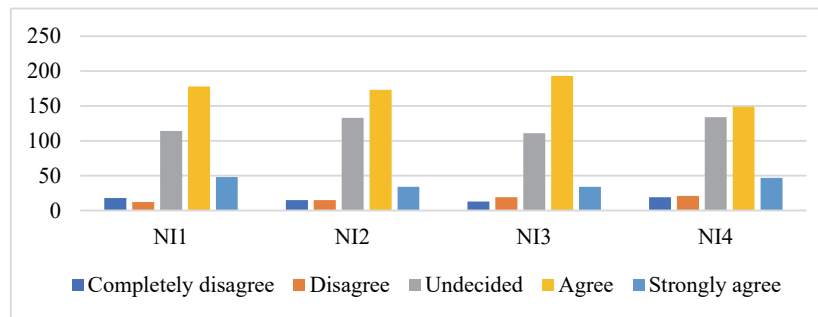
Regarding the factor "Intended to use", the differentiation of the survey results is quite focused on "Agree" or "Undecided" on the first three scales, however, on the last scale IU4, the results of the votes mainly distributed on levels ranging from "Disagree" to "Agree". With the first 3 scales, the level of "Agree" is always the highest with IU1, IU2 and IU3 respectively 226, 190 and 176 votes, accounting for 60.6 percent, 50.9 percent and 47.18 percent. Realizing the first step that customers want to have themselves and their relatives and friends have more opportunities to use the Blockchain technology application in international payment services. Meanwhile on the IU4 scale, the level of "Agree" is still at the highest level but is quite uniform with 2 levels "Undecided" and "Disagree" with respectively 127, 112 and 84 votes. This reinforces the desire to use this technology in international payment services, but customers still need more time to evaluate and become familiar with the application.





**Fig. 3.** Statistical results of the variable “Intended to use”

Regarding the factor “Net benefit”, the differentiation of the survey results is quite focused on “Agree” or “Undecided” on all scales. However, on the NI4 scale, the level of “Agree” with 153 votes is almost equivalent to the level of “Undecided” is 135 votes, the remaining levels make up a minority of less than 50 votes. This shows a good response to the level of excitement customers use when using international payment services at banks that apply Blockchain technology, but the high possibility is still undecided because of the lack of time and knowledge of this issue. Meanwhile on the remaining scales, the level of “Agree” is much higher than the other levels, respectively 182 votes - NI1, 177 votes - NI2 and 200 votes - NI3. From there, we can initially see a good response of satisfaction and confidence in using international payment services at banks that apply Blockchain technology in both the present and the future.



**Fig. 4.** Statistical results of the variable “Net benefits”

#### 4.2. Cronbach Alpha test results

The reliability of the scales is assessed based on the Cronbach Alpha index. The coefficient of variation ranges from 0 to 1, the higher the coefficient, the better the reliability. However, a coefficient of Cronbach Alpha higher than 0.95 will occur duplication in the scale (Nunnally, 1978).

**Table 3**

Results after testing Cronbach’s Alpha

No	Variable	Initial Variables	Remaining Variables	Cronbach's Alpha
1	Independent Variables			
1.1	Quality of information	4	4	0.892
1.2	Quality of system	6	6	0.909
1.3	Quality of service	5	5	0.895
1.4	Social Influence	4	4	0.868
1.5	Perceivable usefulness	5	5	0.912
1.6	Convenient usefulness	5	5	0.875
2	Dependent Variables			
2.1	Intended to use	4	4	0.83
2.2	Net benefit	4	4	0.92

Source: Authors compilation results from primary data

Looking at the results table above, the selected scales have very good measurement capacity (0.8 to 0.92), which is an ideal condition for the results of the research.

#### 4.3. EFA Exploratory Factor Analysis in SPSS

Kaiser-Meyer-Olkin Measure (KMO) of Sampling Adequacy = 0.949 > 0.5: kernel analysis is suitable for the research data. Sig. Bartlett's Test is Sig = 0.000 < 0.05 so observed variables have no correlation with each other in the whole. Although, the Pattern Matrix has some error when having the variables have no meaning, but the research group fixed by removing the variables QV, QV4, QS1, QV5. The results are shown as below:

**Table 4**  
Summary of EFA test results for the model

Testing EFA	1st	2nd	3rd
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)	0.949	0.947	0.946
Sig of KMO and Bartlett's Test	0.000	0.000	0.000
Error of the model when testing	There are 3 variables not classified into any group and no component coefficients	There are 1 variable not classified into any group and no component coefficients	There are no errors
Remove variables of models	QV1, QV4, QS1	QV5	

*Source: Authors compilation results from primary data*

After testing the correlation and EFA rotation matrix, the team found that the model has 33 scales and reallocates them to 6 different groups of factors.

**Table 5**  
New factors reallocated in the model

Usefulness of information quality (QIPU)								
PU1	PU2	PU3	PU4	PU5	QI1	QI2	QI3	QI4
System and service quality (QSQV)								
QS2	QS3	QS4	QS5	QS6	QV2	QV3		
Convenient usefulness (CU)								
CU1	CU2	CU3	CU4	CU5				
Social Influence (SI)								
SI1	SI2	SI3	SI4					
Intended to use (IU)								
IU1	IU2	IU3	IU4					
Net benefit (NI)								
NI1	NI2	NI3	NI4					

*Source: Authors compilation results from primary data*

#### 4.4. CFA Confirmatory Factor Analysis results

Therefore, the all the scale can be viewed as compatible with market data. The factor weights are greater than 0.5, so it can be concluded that the components of their scale reach convergent values. The correlation coefficient the factor in their scale is less than 0.9 so it can be considered that they reach a discriminant value when measuring all factor in model. The results are shown as below:

**Table 6**  
Summary of CFA test results for variables

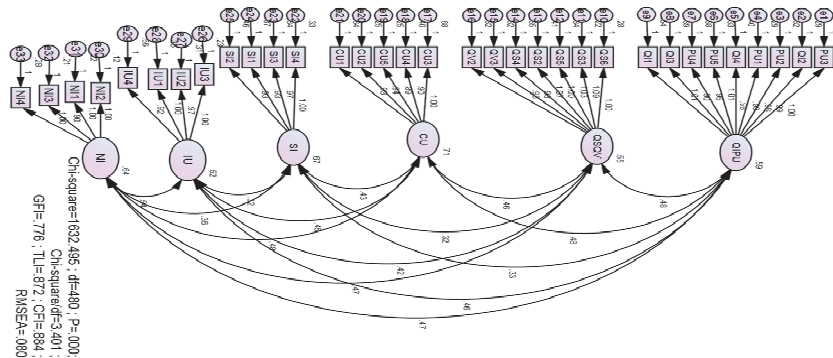
Confirmatory Factor Analysis (CFA) Results	Chi-square/df	CFI	GFI	RMSEA
Usefulness of information quality (QIPU)	4.141	0.967	0.939	0.092
System and service quality (QSQV)	6.557	0.959	0.934	0.12
Convenient usefulness (CU)	6.318	0.972	0.968	0.12
Social influence (SI)	9.648	0.976	0.973	0.15
Intended to use (IU)	5.857	0.984	0.985	0.11
Net benefits (NI)	0.024	1.00	1.00	0.000

Source: Authors compilation results from primary data

The majority of Chi-square / df is greater than 5 but the CFI, GFI> 0.9 and RMSEA most < 0.15 are perfectly suitable. Therefore, the all the scale can be viewed as compatible with market data.

#### 4.5. Analysis results of saturated model

To test the discriminant value, we need to use the saturated model, which is a model of established factors that are freely interrelated. The results of CFA analysis after adjusting possible relationships coefficients show that Chi-square/df = 3.401 greater than 3 but smaller than 5 is good, CFI = 0.81 > 0.8 is good, RMSEA = 0.080 < 0.1 is good. The saturated model testing results shows that the number of free parameters (the scales of variable) is exactly equals the number of variances and unique covariances.



**Fig. 5.** Analysis results of saturated model

#### 4.6. Analysis results using structural equation modeling and testing of research hypotheses

The results of the relationship analysis between the variables in the model show that the independent variables are satisfied and affect the dependent variable in the model as Table 7. The results of estimating the regression coefficients of the relationships in the model are presented in the table, this result shows that all relationships are statistically significant (p\_value < 0.05). Then, the regression equations for relationships can be rewritten as follows:

Relationship between Usefulness of information quality (QIPU), System and service quality (QSQV), Convenient usefulness (CU), Social influence (SI) to Intended to use (IU):

**Table 7**

Structural equation modeling results model

Impact			Estimate	S.E.	C.R.	P
IU	←	QIPU	0.349	0.072	4.866	***
IU	←	QSQV	0.315	0.074	4.244	***
IU	←	CU	0.155	0.055	2.812	0.005
IU	←	SI	0.080	0.041	1.962	0.005
NI	←	IU	1.039	0.051	20.268	***

*Source: Authors compilation results from primary data*

$$IU = 0.349QIPU + 0.315QSQV + 0.155CU + 0.080SI \quad (3)$$

Relationship between Intended to use (IU) to Net benefit (NI):

$$NI = 1.039IU \quad (4)$$

#### 4.7. Discussion of the results

In general, the results show that we may accept hypotheses H<sub>1</sub>, H<sub>2</sub>, H<sub>3</sub>, H<sub>5</sub> and reject hypothesis H<sub>4</sub>.

Firstly, the result of QSQV variable bearing positive sign in the regression model number (1) is perfectly suitable (The hypothesis 1 is totally accepted) since the banks with good system quality and services can satisfy customers better and help customers improve transaction speed, complete procedures faster when using international payment services in Vietnam (Nguyen, 2010). So, it is very suitable for the application of Blockchain to the international payment system in order to improve financial transactions or investment decisions become easy and convenient (OCB, 2019).

Secondly, the result of QIPU variable bearing positive sign in the regression model number (1) are perfectly suitable (The hypothesis 2 is totally accepted) since when the quality of information is improved, payment transactions and customer information when using international payment services will be guaranteed more safe, accurate and timely in Vietnam (Ha, 2014). Vietnam has successfully applied the Blockchain application to the international payment system for L/C services at HSBC between Duy Tan Company with Korean steel company, significantly reducing the previous transaction time of 2-3 trading days in just 24 hours, on the other hand, the cost is also lower and transaction information are secured.

Thirdly, the result of CU variable bearing positive sign in the regression model number (1) is perfectly suitable (The hypothesis 3 is totally accepted) since when the bank offers easy and diversified international payment services, it will meet many customer transaction purposes, while developing new products in addition to traditional products to reduce dependence on a number of customers and contribute to increased income, increased competitiveness (Vu, 2015).

However, the result of SI variable bearing positive sign in the regression model number (1) is contrary to the research group's expectations (The hypothesis 4 is rejected). Additionally, 92 percent of survey participants are preparing to invest in technological innovation and developing sales channels through technology; 96 percent of banks are currently formulating a high-tech development strategy by 2025, typically 3 banks (VPbank; Tpbank; HSBC) have developed an advanced and automated robot development strategy including budget development. Digital banking, big data applications, artificial intelligence applications to serve customers in digital banking, cloud computing applications and research and application of robotic process automation (RPA) (BSI, May 2017). Besides, many banks are still in the first step researching Blockchain platform or have not made any move in improving International payment services. This group is small in scale, limited in technology and has not kept up

with the world's development trend. The context will put great pressure on the rest of the group before having to restructure operations on the technology application platform of Industry 4.0 to survive (Dao, 2019).

In line with expectations, the result of IU variable bearing positive sign in the regression model number (2) is perfectly suitable (The hypothesis 5 is totally accepted) since the number and value of domestic payment transactions of bank cards continue to increase, in the first quarter of 2019 reached 65 million transactions with a total transaction amount of VND 171 trillion. Since the beginning of 2019, Agribank has implemented many customer-centric product and service development programs. In 30/10/2019, the total Agribank number of payment accounts reached 12 million accounts (Thuy, 2019). It can be seen that the application of Blockchain can also be considered a good choice for the development of a payment system, especially in the International Payment Service with a distributed ledger platform and data management by its consensus mechanism. (Lee, 2015). The summary of all testing results is shown as below:

**Table 8**

Conclusion on the determinants of using International Payment service at Commercial Bank applying Blockchain in Vietnam (Dependent Variable: IU)

Independent Variables	Expected Signal	Actual signal	Hypothesis	Accepted/Rejected
QIPU	+	+	H1	Accepted
QSQV	+	+	H2	Accepted
CU	+	+	H3	Accepted
SI	-	+	H4	Rejected
IU	+	+	H5	Accepted

*Source: Authors' compilation from primary data*

## 5. Conclusions, limitations and recommendations

### 5.1. Conclusion

Regarding the factors that affect the attitude and intention to use technology in Literature review, thereby making predictions about the selection of the factors that affect negatively and positively as a basis for factors affecting decided to use international payment services of Blockchain application in Vietnam. We also give the benefits, limitations and applications of Blockchain technology in the 4.0 revolution and current situation of the International payment industry applying new technologies in foreign countries and in Vietnam. The research team has self-developed a research model with 6 independent variables, 2 dependent variables, and test and measure their impact on the use of International Payment services at Commercial banks applying Blockchain. From the opinions and data of the survey, the team found a consensus: The quality of bank's service is assessed depending on the processing speed of payment transactions for customers. Therefore, we have adjusted the QSQV group of factors affecting the intention to use international payment services at commercial banks applying Blockchain. As the quality of the bank's information is better, the timely and complete transfer of customer transaction information will make the bank's international payment service more useful. Since then, the team adjusted the QIPU factor group affecting the intention to use international payment services at commercial banks applying Blockchain. Social influence factors are those that can influence customers' use decisions. Therefore, with a strange technology like Blockchain applied in international payment at Vietnamese banks, it is not widely available now.

### 5.2. Recommendations

The research team proposes a number of recommendations and solutions to develop the application of Blockchain platform for International payment services at Vietnam Commercial Bank as below:

### *5.2.1. Investing more in usefulness of information quality of international payment services*

The usefulness of information quality is a major factor affecting customers' intention to use this service. Therefore, this solution is designed to help international payment services improve the safety, accuracy and timeliness through the improvement of information quality, it makes recommendations at banks and the Blockchain platform of supplier. For banks, the preferred solution is applied at big, prestigious banks such as Vietcombank, BIDV, etc. to take advantage of the large customer base here. In addition, suppliers will work with banks to create new international payment services based on Blockchain to allow customers to transact more easily. At the same time, under the pressure of technological innovation in context 4.0, it is expected that Blockchain platform providers will soon launch many new features of this technology platform.

### *5.2.2. Promoting social influence by making promotion campaigns for increasing awareness of clients on blockchain benefits*

In fact, the number of banks applying Blockchain in international payment services is not popular, small-scale and technological systems face many obstacles. In addition, customers are still wondering about the safety of international payment services at banks applying Blockchain, and banks are forced to change their operating structure on the new technology platform to follow with technology development trends. To do this, banks need to provide information and evidence to customers about international payments using Blockchain technology to create trust from them. Then, because building trust from customers' needs a long process, the effectiveness of the solution takes more time to evaluate. But we believe that if the success of this application will make the transfer of money via Blockchain more popular and bring more benefits.

### *5.2.3. Improving and enhance the application of blockchains for international payment for utilizing its benefits on risks and cost control:*

Currently, customers are mainly focused on the risks, costs and improved utility of international payment services instead of the application of Blockchain. Although banks have used technologies related to artificial intelligence, but with a new technology, it will make many users feel strange and difficult to use. The introduction of this solution makes transactions of international payment services easier; it is proposed for banks and is effective when banks apply Blockchain to upgrade their international payment services via the internet, websites, apps, etc. Therefore, when customers are familiar with the international payment system applying Blockchain, the bank will receive many benefits from this solution.

### *5.2.4. Establishing a system for managing virtual currency transactions with Blockchain technology*

Cryptocurrencies (virtual currencies) are seen as the next step in the evolution of money, as the use of cash diminishes, and new forms of payment become increasingly popular. Currently, transactions related to cryptocurrencies are still taking place in Vietnam, despite a series of risks and consequences. Although, in April 2018, the Prime Minister issued Directive No.10/CT-TTG on strengthening the management of activities related to Bitcoin and other similar virtual currencies. From January 1, 2018, acts of issuing, supplying and using improper payment instruments may be examined for penal liability under Point h, Clause 1, Article 206 of the 2015 Criminal Code (amended and supplemented in 2017). For violations of the regulations on banking activities, other activities related to banking activities, which cause damage to other persons on their property from VND 100,000,000 to under VND 300,000,000, they will be fined from 50,000,000 VND to 300,000,000 VND or imprisonment from 06 months to 03 years for acts of issuing, supplying and using illegal payment instruments. With unregulated operating mechanism, Bitcoin is out of the control of the State Bank when you open a

Bitcoin account, you do not need to declare who you are, where you come from, what you do and how much your monthly income. So, the tacit transactions that we find difficult to control for the activities of money laundering criminals, tax evasion, illegal money transfers, payments, sovereignty grants on currency issuance will affect the efficiency of money laundering. As the result of operating monetary policy, our country has implemented its own management policies.

From there, we propose that Blockchain technology should be used to make it easier for the state bank as well as the government to control the problem and trade cryptocurrencies. Therefore, the State Bank will rely on this basis to cooperate with specialized organizations on Blockchain and Fintech to create management software. The effectiveness of this recommendation is very great, but the research group realized that the current limitations of Vietnamese IT level was not as advanced as other countries such as the US, UK, and so on. Therefore, to implement this option optimally, it needs the cooperation of Fintech organizations, and the Government must support it before this proposal can be implemented soon.

### 5.3. Limitations

Besides scientific and practical contributions, the study still has certain limitations as below:

*Firstly*, the limitations of the survey sampling method are based on the development of sample sizes with related subjects such as international students, office workers and pharmaceutical import-export enterprise does not guarantee representativeness for the entire market. *Secondly*, current research is a new topic in Vietnam, so reference materials and practical applications for international payment at Vietnamese commercial banks are still not much for the research group to refer to, collect and develop research papers. *Thirdly*, the research group conduct a large enterprise survey specializing in import and export, so it was difficult to meet and set up a direct interview with a representative of the company. In addition, the Covid-19 epidemic also affects the interview process when the interview must be conducted over the phone so that the information selection is not as detailed as the direct dialogue. *Finally*, the research is based on practical applications of Blockchain at HSBC and TPbank, so it has not been able to mention all the benefits of Blockchain in international payment services. This can be considered as a limitation of the research group when choosing a topic that is still very new in the Banking and Finance market in Vietnam.

Therefore, further studies need to be improved and supplemented by using more representative investigative methods such as norm sampling, random probability sampling. At the same time, it is possible to expand the research area from Vietnam to the world to have a more comprehensive view of the benefits that Blockchain brings to commercial banks.

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