Testing the structural validity of the model designed for perceived ease of use, perceived usefulness, trust, and intention to use Bitcoin with process macro

Algılanan kullanım kolaylığı, algılanan fayda, güven ve Bitcoin kullanma niyeti için tasarlanan modelin yapısal geçerliliğini process macro ile test etme

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Abstract

The first cryptocurrency, Bitcoin, has recently received much attention from researchers. There are studies by researchers to contribute more to the Bitcoin literature. However, it is essential to support the Bitcoin literature with different studies. While testing the structural validity of an integrated model that extends the technology acceptance model with a trust structure, this study aims to explain users' intention to use Bitcoin based on their perception of Bitcoin as accessible and valuable and their trust in Bitcoin. Data were collected from 206 participants using an online survey for this aim. The structural validity of the model, which was tested with the macro process technique, was confirmed by statistical analysis. According to the statistical analysis results, the perceived ease of use of Bitcoin, perceived usefulness of Bitcoin, and trust in Bitcoin and the existing relationships between these factors are practical on the intention to use Bitcoin. However, it should be noted that users' intentions to use Bitcoin do not differ significantly in terms of gender, age-range/generation, education status, and monthly income. This study provides implications for both theory and practice and recommendations for future research.

Keywords: Bitcoin, Ease of Use, Usefulness, Trust, Intention to Use, Process Macro

Jel Codes: M10, M30

Öz

İlk kripto para birimi olan Bitcoin, son zamanlarda araştırmacılardan büyük ilgi görmektedir. Bitcoin literatürüne daha fazla katkı sağlamak için araştırmacılar tarafından yapılan çalışmalar bulunmaktadır. Bununla birlikte, Bitcoin literatürünü farklı çalışmalarla desteklemek önemlidir. Bu çalışma, teknoloji kabul modelini güven yapısı ile genişleten entegre bir modelin yapısal geçerliliğini test ederken, kullanıcıların Bitcoin'i kolay ve faydalı olarak algılamalarına ve Bitcoin'e olan güvenlerine dayalı olarak Bitcoin kullanma niyetlerini açıklamayı amaçlamaktadır. Bu amaçla 206 katılımcıdan online anket kullanılarak veri toplanmıştır. Process macro tekniği ile test edilen modelin yapısal geçerliliği istatistiksel analizlerle doğrulanmıştır. İstatistiksel analiz sonuçlarına göre Bitcoin'in algılanan kullanım kolaylığı, Bitcoin'in algılanan faydası ve Bitcoin'e olan güven ile bu faktörler arasındaki mevcut ilişkiler Bitcoin kullanma niyeti üzerinde etkilidir. Bununla birlikte, kullanıcıların Bitcoin kullanma niyetlerinin cinsiyet, yaş aralığı/jenerasyon, eğitim durumu ve aylık gelir açısından önemli ölçüde farklılık göstermediği belirtilmelidir. Bu çalışma hem teori hem de uygulama için çıkarımların yanı sıra gelecekteki araştırmalar için öneriler sunmaktadır.

Anahtar Kelimeler: Bitcoin, Kullanım Kolaylığı, Fayda, Güven, Kullanım Niyeti, Process Macro

JEL Kodları: M10, M30

Introduction

Scientific interest in Bitcoin, the first cryptocurrency, is relatively high (Aysan, Demirtaş and Saraç., 2021). Therefore, studies have been carried out to learn more about the factors that influence users' intentions, attitudes, and level of cryptocurrency usage. For example, ease of use, usefulness (Albayati, Kim and Rho, 2020; Nadeem, Liu, Pitafi, Younis and Xu, 2021; Kabak and Çelik, 2020; Mendoza-Tello, Mora, Pujol-López and Lytras, 2019), value (Gafar, Abenoh and Ahmed, 2021), social influence, design, regulatory support, experience (Albayati et al., 2020), access speed, enjoyment (Kabak and Çelik, 2020), trust (Albayati et al., 2020; Ooi, Ooi, Yeap and Goh, 2021; Kabak and Celik, 2020; Mendoza-Tello et al, 2019), security (Gafar et al., 2021; Nadeem et al., 2021; Ooi et al., 2021), security statements, technical protections (Ooi et al., 2021), transaction procedures (Nadeem et al., 2021; Ooi et al., 2021), risk (Kabak and Celik, 2020; Mendoza-Tello et al., 2019; Yoo, Bae, Park and Yang, 2020), cost (Kabak and Çelik, 2020; Yoo et al., 2020), control (Nadeem et al., 2021), complexity, compatibility, observability, trialability (Yoo et al., 2020), and national cultural values as "masculinity, collectivism, power distance , uncertainty avoidance, and long-term orientation" (Salcedo and Gupta, 2021) are some of the factors recently evaluated in previous studies. According to the relevant literature review, it should be remarkable to explore the reason for users' interest in Bitcoin.

The importance of this present study can be expressed as follows. First, Bitcoin, the most common cryptocurrency globally, is an innovative concept based on "blockchain" technology and an economic concept that serves as an alternative version of financial asset management (Yoo et al., 2020). This study is thought to be necessary to understand the factors that increase users' intention to use the first cryptocurrency Bitcoin (Nadeem et al., 2021).

Bitcoin is the cryptocurrency with the highest market capitalization (Sabry, Labda, Erbad and Malluhi, 2020). Studies are conducted to understand the factors affecting the acceptance of Bitcoin technology (Gunawan and Novendra, 2017). However, as in the case of mainland China, individuals may have similar and different reasons for accepting cryptocurrencies (Shahzad, Xiu, Wang and Shahbaz, 2018). Accordingly, in the context of the new data obtained in this study, answers to the following questions are sought. Why would potential consumers have the intention to use Bitcoin? What factors influence consumers' intentions to use Bitcoin? It is thought that it is possible to explain the answers to these questions based on the integrated framework of the technology acceptance model (TAM) and trust theory (Mendoza-Tello et al., 2019).

This study was carried out to contribute more to the Bitcoin literature. The originality of this present study can be expressed as follows. First, the difference of this study from other previous studies tests a structural model based on an integrated theoretical framework of the TAM and trust theory. In this study, the structural validity of the designed research model is tested. The research model tests whether users' intention to use Bitcoin is affected by perceived ease of use, perceived usefulness and trust and the relationships between these three factors. In addition, whether users' intentions to use Bitcoin differ significantly based on demographic variables is investigated in this study. In the context of the aim of the study, a literature review was conducted, and hypotheses supported by theoretical and empirical evidence were developed.

Literature review

Under this main heading, theoretical explanations regarding the technology acceptance model TAM (intention to use Bitcoin, PEOU of Bitcoin, PU of Bitcoin) and trust theory (trust in Bitcoin) have been made. In addition, the developed hypotheses are listed under the relevant sub-titles under this main heading. Thus, a research model was formulated by considering the developed hypotheses.

Technology Acceptance Model (TAM)

TAM is a model proposed by Davis in a doctoral dissertation completed in the 1980s to explain users' behavioural intentions and information technology use (Davis, 1985). TAM was developed under contract with IBM Canada, Ltd. in the mid-1980s (Davis and Venkatesh, 1996). TAM is an important model used to predict structures/factors associated with users' behavioural intentions to use a technological innovation (Huang, Chang, Yu and Chen, 2019). Previous studies have used the TAM framework to analyse aspects of the adoption process of Bitcoin technology, a blockchain-based cryptocurrency (Folkinshteyn and Lennon, 2016). The TAM framework explained the relationships between PEOU of Bitcoin, PU of Bitcoin, and intention to use Bitcoin (Shrestha and Vassileva, 2019). PEOU of Bitcoin has been defined as the degree to which a person believes that Bitcoin cryptocurrency or technology will be effortless (Nadeem et al., 2021; Shrestha and Vassileva, 2019). PU of Bitcoin is the

degree to which a person believes that using Bitcoin cryptocurrency or technology will improve business performance (Nadeem et al., 2021; Shrestha and Vassileva, 2019).

Intention to use Bitcoin

As a core construct of TAM, intention to use is a factor widely used by researchers to understand the behaviour of information technology users (Davis, Bagozzi and Warshaw, 1989). In this study, intention to use is defined as the willingness and thought of users to buy and sell Bitcoin cryptocurrency. It is possible to state that Satoshi Nakamoto first discussed Bitcoin in the paper "Bitcoin: A Peer-to-Peer Electronic Cash System" in 2008 (Nakamoto, 2008). Therefore, it is possible to classify Bitcoin as a currency, security, emerging asset, or technology-based product (White, Marinakis, Islam and Walsh, 2020). First introduced in 2009, Bitcoin is both the oldest and the most widely used cryptocurrency (Marella, Upreti, Merikivi and Tuunainen, 2020). So much so that the cryptocurrency Bitcoin has fascinated many people, from technologists to investors (White et al., 2020).

Perceived ease of use (PEOU) of Bitcoin

In addition to PU, one of TAM's two fundamental beliefs, PEOU, explains the factors that affect users' intention to use and adopt information technology (Davis et al., 1989). In this study, PEOU is defined as users finding or considering the Bitcoin cryptocurrency easy to use without much. The fact that such electronic currencies can be used easily without much effort increases the use (Rahmiati, Engriani and Putri, 2019). Because the easy perception of the use of blockchain technology-based systems affects users' intention to use these systems (Shrestha and Vassileva, 2019). Nadeem et al. (2021), PEOU is an essential factor that directly affects the intention to use Bitcoin supported by Blockchain technology. It should also be noted that thanks to the mediating role of PU, PEOU is a crucial factor that has an indirect effect on the intention to use Bitcoin (Nadeem et al., 2021). Because there is a causal chain from PEOU to PU and PU to intention to use (Davis, 1989). As a result, while PU and PEOU may have a positive relationship with intention to use (Nadeem et al., 2021; To and Trinh, 2021), PU may also mediate the relationship between PEOU and intention to use (Nadeem et al., 2021). Accordingly, H_1, H_2, and H_3 were developed based on empirical evidence.

H_1: PEOU of Bitcoin will directly positively affect the intention to use Bitcoin.

H_2: PEOU of Bitcoin will directly positively affect the PU of Bitcoin.

H_3: PEOU of Bitcoin will indirectly positively affect the intention to use Bitcoin through the mediating role of the PU of Bitcoin.

Although one study argues that trust in cryptocurrency is an essential factor influencing the PEOU of cryptocurrency (Albayati et al., 2020), according to another study, the PEOU of cryptocurrencies is a crucial factor affecting trust in trust (Mendoza-Tello et al., 2019). In other words, it is known that the PEOU of cryptocurrency is a significant factor affecting trust in cryptocurrency (Mendoza-Tello et al., 2019). Accordingly, this study argues that the PEOU of Bitcoin is an essential factor affecting trust in Bitcoin. In addition, as it is known, while the trust in Bitcoin affects the extent to which users use Bitcoin, at the same time, the trust in Bitcoin has a mediating role in the relationship between some factors (such as security) and the extent of Bitcoin use (Ooi et al., 2021). In addition, as seen in a study evaluating many cryptocurrencies, there is a significant relationship between users' trust in cryptocurrencies and their intention to use cryptocurrencies (Kabak and Çelik, 2020). As a result, PEOU may have a positive relationship with trust. (Wu and Ke, 2015). In addition, PEOU may have a direct and an indirect relationship with the intention to use (Nadeem et al., 2021). On the other hand, a trust may directly relate to intention to use (Gu, Lee and Suh., 2009). Therefore, trust can mediate the relationship between PEOU and intention to use. Accordingly, H_4, H_5, H_6, and H_7 were developed.

H_4: PEOU of Bitcoin will directly positively affect trust in Bitcoin.

H_5: PEOU of Bitcoin will indirectly positively affect the intention to use Bitcoin through the mediating role of trust in Bitcoin.

H_6: PEOU of Bitcoin will indirectly positively affect trust in Bitcoin through its mediating role of PU of Bitcoin.

H_7: PEOU of Bitcoin will indirectly positively affect the intention to use Bitcoin through the combined/serial mediating role of PU and trust in Bitcoin.

Perceived usefulness (PU) of Bitcoin

PU is another of the two central beliefs of the TAM in addition to PEOU (Davis et al., 1989). PU is defined in this study as what people find or consider helpful when using Bitcoin cryptocurrency based on blockchain technology. PU of Bitcoin has a significant positive correlation with the intention to use it

(Kabak and Çelik, 2021; Nadeem et al., 2021). Furthermore, seeing blockchain technology as beneficial influences the intention to use such technology-supported systems (Shrestha and Vassileva, 2019). As a result, there may be a relationship between PU and behavioural intention (Gu et al., 2009; To and Trinh, 2021). Accordingly, H_8 was developed.

H8: *PU of Bitcoin will directly positively affect the intention to use Bitcoin.*

While one study claims that trust in cryptocurrencies is an essential factor influencing the PU (Mendoza-Tello et al., 2019), some studies argue that the technological functionality, reliability, and helpfulness of cryptocurrencies are essential factors influencing trust in Bitcoin (Marella et al., 2020). This study argues that the PU of Bitcoin is an essential factor influencing trust in Bitcoin. On the other hand, it is known from previous research that trust in Bitcoin has a significant effect on the intention to use Bitcoin (Marella et al., 2020; Mendoza-Tello et al., 2019). As a result, PU may have a positive relationship with trust. (Wu and Ke, 2015). While trust can directly relate to behavioural intention (Gu et al., 2009), PU can have a direct and indirect relationship with behavioural intention. Thus, it can be assumed that trust will mediate the relationship between PU and intent to use. Accordingly, H_9 and H_{10} were developed.

H9: *PU of Bitcoin will directly positively affect trust in Bitcoin.*

H10: *PU of Bitcoin will indirectly positively affect the intention to use Bitcoin through the mediating role of trust in Bitcoin.*

Trust theory

The theory of trust may be directed towards a particular system. A theory of trust for a particular system is based on the agents' initial trust in the system's security mechanisms (Ma and Orgun, 2006). In this study, it is accepted that the security properties of blockchain technology provide a basis for trusting Bitcoin as in other cryptocurrencies. In a study describing how trust is formed in cryptocurrencies based on the example of Bitcoin, it is stated that trust is established with technology and three aspects of technology are essential in ensuring trust: functionality, reliability, and helpfulness (Marella et al., 2020). In this context, these three aspects are the focal constructs of blockchain technology in ensuring and maintaining users' trust in Bitcoin. In addition, authentication, confidentiality, irreversibility, and acceptance or non-repudiation of transactions must be guaranteed and verified to establish trust (Elsenpeter and Velte 2001). As a result, the blockchain must support the reliability of cryptocurrencies transactions.

Trust in Bitcoin

This study defines trust as users' trust to use Bitcoin cryptocurrency supported by blockchain technology. It is known that trust is a significant factor in financial transactions and payments (Marella et al., 2020). The factor of trust is a significant indicator of the intensity of use of such electronic currencies supported by blockchain technology (Rahmiati et al., 2019). Depending on the significant relationship between trust and the intention to use cryptocurrencies (Kabak and Çelik, 2020), the trust factor positively affects users' extent of Bitcoin use (Mendoza-Tello et al., 2019; Ooi et al., 2021). As a result, there may be a relationship between trust and behavioural intention (Gu et al., 2009). Accordingly, H_{11} was developed.

H11: *Trust in Bitcoin will directly positively affect the intention to use Bitcoin.*

Methodology

This main heading explains the research model, target population, sample, measurements, survey design, data collection method, and analysis results.

Research model

Based on existing studies in the relevant literature (Albayati et al., 2020; Mendoza-Tello et al., 2019; Rahmiati et al., 2019), the research model of the current study was formulated using the integrated theoretical framework of TAM and trust. In general, the purpose of previous studies is to predict the behavioural intentions of customers towards cryptocurrencies based on blockchain technology. As a result, it is seen that customers intend to use cryptocurrencies due to the perceived ease of use, usefulness, trust, and possible relationships between these three factors (Mendoza-Tello et al., 2019). In particular, trust is a leading factor in blockchain technology adoption (Albayati et al., 2020; Rahmiati et al., 2019). In this context, the research model, which was designed using four variables, one independent (PEOU of Bitcoin), two mediation (PU of Bitcoin and trust in Bitcoin), and one dependent (intention to use Bitcoin), is shown in Figure 1.
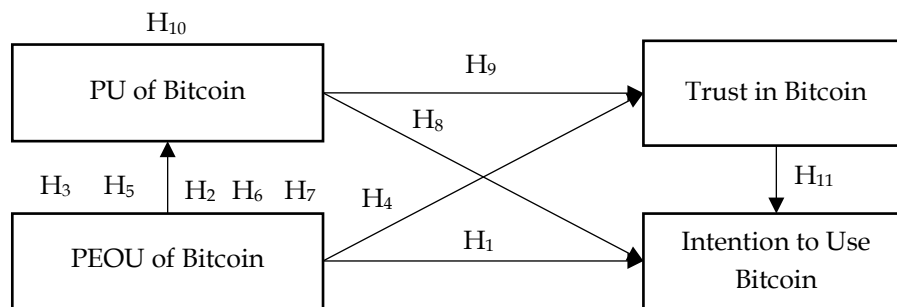
Figure 1: Research Model

Target population and sampling

The target population of the research consists of a group of people who are interested in buying and selling Bitcoin from Turkey. However, it is difficult to know exactly how many Bitcoin users are in Turkey, and it is considered impossible to reach the entire target population.

It is possible to collect data using the convenience sampling method, which provides the most economical, most straightforward and least time-consuming data collection among other sampling techniques (Aaker, Kumar and Day, 2007). Data should be collected at least ten times as much as the scale items of the research (Hair, Black, Babin and Anderson., 2009: p. 329). However, a sample size of 200 is a reasonable sample size to use factor analysis thanks to classical test theory methods (WilsonVon Voorhis and Morgan, 2007). Therefore, data were collected so that the sample size was over 200.

Measurements, survey design and data collection

The scale items were adapted from previous studies to this study. Three items of the PEOU scale and four items of the PU scale were adapted from Lee's (2009) study. Three items of the trust scale were adapted from the study of Chong, Ooi, Lin and Tan (2010). Three items of the intention to use scale were adapted from the study of Teo, Tan, Cheah, Ooi and Yew (2012). An online survey was designed with these scale items and demographic questions such as gender, age range, education status and monthly income. To collect data through the survey, it received the approval document dated 07/01/2022 and numbered 2020/02-10 from the Social and Human Sciences Publications Ethics Committee of Van Yüzüncü Yıl University. Participants whose online survey link was shared via social media tools were asked to participate in the survey. Whether or not to participate in the survey is entirely at the participant's discretion, and data were collected from 206 people who participated in the survey.

Analysis

Frequency, factor, reliability, normality test, correlation, and difference analyses were performed for the collected data, and the structural validity of the research model was tested with the process macro. Process macro is a path analysis modelling tool with a regression plug-in used for mediation, moderation and conditional process analysis. If there is no zero "0" value between the lowest confidence (BootLCCI) and the highest confidence (BootULCI) levels, the path analyses made with the process macro are considered significant (Hayes, 2018). The reason why the research model of this study (or the confirmation of the hypotheses) was tested with the process macro is that the research model has the same structural features as Model 6 (2 mediators) (Hayes, 2018, p. 586). However, hypotheses H_6 and H_{10}, which could not be tested due to the structural feature of Model 6 but were considered necessary by the authors of the study, were tested using the structural feature of Model 4 (Hayes, 2018, p. 585).

Results

Under this main heading, statistical analysis results for frequency, factor, reliability, normality test, correlation, difference and process macro.

Frequency analysis results

Table 1 shows the frequency analysis results for the participants' demographic features.

Table 1: Demographic Characteristics of the Participants

Demographic	Group		f	%
Gender	Male		153	74,3
	Female		53	25,7
		Total	**206**	**100,0**
Age	10-26 years old (1996–2012; Z generation)		126	61,1
	27-41 years old (1981-1995; Y generation)		64	31,1
	42-57 years old (1965-1980; X generation)		15	7,3
	58-76 years old (1946-1964; Baby Boomer generation)		1	0,5
		Total	**206**	**100,0**
Education status (Graduated)	Primary School		1	0,5
	Secondary School		4	2,0
	High School		31	15,0
	University		170	82,5
		Total	**206**	**100,0**
Monthly income	0-2500 TL		62	30,1
	2501-5000 TL		68	33,0
	5001-7500 TL		52	25,2
	Over 7500 TL		24	11,7
		Total	**206**	**100,0**

Among the 206 participants, the number of participants is more male with 74,3%, 10-26 years old/Z generation with 61,1%, university graduates with 82.5%, and whose monthly income varies between 2501-5000 TL with 33,0%.

Exploratory factor and reliability analysis results

In addition to the factor analysis results for determining the factor dimensions and testing their structural validity, the reliability analysis results regarding the reliability of these factor dimensions are shown in Table 2.

Table 2: Validity and Reliability of Factors

Factors	Items	Loadings	Explained Variance %	Reliability
Intention to use Bitcoin	I intend to use Bitcoin continuously in the future.	0,979	54,697	0,920
	I will use Bitcoin frequently in the future.	0,904		
	I advise others to use Bitcoin.	0,826		
Trust in Bitcoin	I trust that payments will be made securely via Bitcoin.	0,942	12,161	0,900
	I think transactions made via Bitcoin are secure and private.	0,888		
	I believe that personal information will be kept confidential when using Bitcoin.	0,813		
PU of Bitcoin	I think that I can finish my transactions faster using Bitcoin.	0,999	9,934	0,887
	I think that I can finish the transactions. After that, I will make using Bitcoin more easily.	0,972		
	I think Bitcoin is valuable.	0,525		
PEOU of Bitcoin	I think using Bitcoin is easy.	0,924	5,416	0,798
	I think that making transactions with Bitcoin does not require much mental effort.	0,843		
	I think using Bitcoin is easy to learn.	0,735		
% Of Total Variance Explained			82,207	
KMO Measure of Sampling Adequacy			0,886	
Bartlett's Test of Sphericity	Approx. Chi-Square=1858,850		df=66	p=0,000

Note: PU item: "Overall, I think it's advantageous to use Bitcoin." was excluded from the analysis because it reduced reliability.

KMO value is 0,886>0,50; and p-value is 0,000<0,05. For this reason, the data set is suitable for factor analysis (Field, 2000). As accepted, the loading of each factor item is greater than 0,50, and at the same time, the total variance explained is over 60% (Hair et al., 2009). According to the reliability analysis, because the reliability value of the four-factor dimensions is larger than 0,70, all four dimensions are reliable (Nunnally, 1978).

Confirmatory factor analysis results

Confirmatory factor analysis was performed using AMOS. Table 3. shows the model fit values and standardized regression weights results obtained by confirmatory factor analysis.

Table 3: Confirmatory factor analysis results and model fit values

Factors	Items	Loadings	AVE	CR
Intention to use Bitcoin	I will use Bitcoin frequently in the future.	0,926		
	I advise others to use Bitcoin.	0,879	0,80	0,92
	I intend to use Bitcoin continuously in the future.	0,871		
Trust in Bitcoin	I trust that payments will be made securely via Bitcoin.	0,905		
	I think transactions made via Bitcoin are secure and private.	0,881	0,76	0,90
	I believe that personal information will be kept confidential when using Bitcoin.	0,820		
PU of Bitcoin	I think Bitcoin is valuable.	0,961		
	I think that I can finish the transactions. After that, I will make using Bitcoin more easily.	0,693	0,62	0,83
	I think that I can finish my transactions faster using Bitcoin.	0,686		
PEOU of Bitcoin	I think using Bitcoin is easy.	0,835		
	I think using Bitcoin is easy to learn.	0,796	0,59	0,81
	I think that making transactions with Bitcoin does not require much mental effort.	0,657		

Model fit values					
NPAR=31	DF=47	CMIN/DF=1,593	AGFI=0,947	RFI= 0,945	RMSEA=0,054
CMIN=74,859	P=0,006	GFI=0,947	NFI=0,961	CFI=0,985	SRMR =0,043

Since CMIN/DF ≤ 3, RMSEA ≤ 0,08, SRMR ≤ 0,05, GFI ≥0,90, AGFI ≥0,85, CFI≥0,95, NFI ≥0,90 and RFI>0,85, model fit values are acceptable (Schermelleh-Engel, Moosbrugger and Müler, 2003). In addition, since AVE values were ≥0,50, CR values were ≥0,70, and CR>AVE, convergent validity was achieved (Fornell and Larcker, 1981).

Normality test

Table 4 shows the results of the normality test.

Table 4: Normality Test Results

	Intention to use Bitcoin	Trust in Bitcoin	PU of Bitcoin	PEOU of Bitcoin
Skewness	0,160	0,014	-0,165	-0,252
Kurtosis	-1,019	-0,983	-0,902	-0,550

Since each variable's kurtosis and skewness coefficients are between -1 and +1, the data show a normal distribution (Hair et al., 2009). Therefore, regression analysis, t-test, and ANOVA difference analyses should be used for normally distributed data and Pearson correlation analysis.

Correlation analysis

Table 5 shows the results of the Pearson correlation analysis.

Table 5: Pearson Correlation Analysis Results

	Intention to use Bitcoin	Trust in Bitcoin	PU of Bitcoin	PEOU of Bitcoin
Intention to use Bitcoin	1	0,739**	0,582**	0,476**
Trust in Bitcoin	0,739**	1	0,641**	0,430**
PU of Bitcoin	0,582**	0,641**	1	0,420**
PEOU of Bitcoin	0,476**	0,430**	0,420**	1

*Note: **Correlation is significant at the 0,01 level (2-tailed).*

There is a significant positive relationship between both variables. In addition, it is possible to determine whether there is a common method/variance bias between the two variables with partial correlation operations (Podsakoff, MacKenzie, Lee and Podsakoff, 2003: 889-894). However, since the correlation coefficient value is less than 0,90 in the relationship between both variables, it should be accepted that there is no common variance bias (Bagozzi, Yi and Phillips, 1991: p. 437).

Difference analysis results

Before testing the research model/hypotheses, difference analyses were conducted to know whether users' intentions to use Bitcoin differ in demographic characteristics such as gender, age, education, and monthly income. Table 6 shows the results of the further analysis.

Table 6: Difference Analysis Results with t-Tests and ANOVA

t-test results for gender	Group	n	$\bar{x}$	SD		df	t	p
	Male	153	2,8475	1,30563		204	0,544	0,659
	Female	53	273,58	1,23233				
t-test results for two education groups	Group	n	$\bar{x}$	SD		df	t	p
	High School	31	3,2366	1,39892		199	2,006	0,336
	University	170	2,7333	1,26325				
ANOVA results for age groups	Source of Variance	Sum of Squares	df	Mean Squares	F	p		
	Between Groups	8,832	2	4,416				
	Within Groups	324,955	202	1,609	2,745	0,067		
	Total	**333,786**	**204**	**6,025**				
ANOVA results for monthly income groups	Source of Variance	Sum of Squares	df	Mean Squares	F	p		
	Between Groups	2,167	3	0,722				
	Within Groups	336,400	202	1,665	0,434	0,729		
	Total	**338,567**	**205**	**2,387**				

There is no significant difference in users' intention to use Bitcoin in terms of demographic characteristics such as gender (t_{204}=0,544; p=0,659), age-ranges (or X, Y, and Z generations) ($F_{(2,202)}$=2,745; p=0,067), education (High School and University graduates) (t_{199}=2,006; p=0,336), and monthly income ($F_{(3,202)}$=0,434; p=0,729). However, the 58-76 age-range/Baby Boomers generation and primary and secondary school graduates were not included in the further analysis because the number of participants was small.

Process macro analysis results

The results of the process macro analysis for testing the structural validity/hypotheses of the research model are shown in Table 7.

Table 7: Process Macro Analysis Results for Testing the Research Model/Hypotheses

Model 6	PEOU of Bitcoin (X)		PU of Bitcoin (M₁)		Trust in Bitcoin (M₂)		Intention to use Bitcoin (Y)
Model Summary	**R** 0,4205	**R-sq** 0,1768	**MSE** 1,1480	**F** 43,8137	**df1** 1,0000	**df2** 204,0000	**p** 0,0000
Outcome Variable PU of Bitcoin	**H**	**coeff**	**se**	**t**	**p**	**LLCI**	**ULCI**
Constant		1,6643	0,2478	6,7172	0,0000	1,1758	2,1528
PEOU of Bitcoin	H_2	0,4676	0,0706	6,6192	0,0000	0,3283	0,6068
Model Summary	**R** 0,6653	**R-sq** 0,4426	**MSE** 0,8561	**F** 80,5987	**df1** 2,0000	**df2** 203,0000	**p** 0,0000
Outcome Variable Trust in Bitcoin	**H**	**coeff**	**se**	**t**	**p**	**LLCI**	**ULCI**
Constant		0,2863	0,2364	1,2110	0,2273	-0,1799	0,7526
PEOU of Bitcoin	H_4	0,2266	0,0672	3,3698	0,0009	0,0940	0,3591
PU of Bitcoin	H_9	0,5858	0,0605	9,6894	0,0000	0,4666	0,7050
Model Summary	**R** 0,7669	**R-sq** 0,5881	**MSE** 0,6904	**F** 96,1219	**df1** 3,0000	**df2** 202,0000	**p** 0,0000
Outcome Variable Intention to use Bitcoin	**H**	**coeff**	**se**	**t**	**p**	**LLCI**	**ULCI**
Constant		-0.1276	0,2131	-0,5986	0,5501	-0,5477	0,2926
PEOU of Bitcoin	H_1	0,2058	0,0620	3,3170	0,0011	0,0835	0,3281
PU of Bitcoin	H_8	0,1549	0,0657	2,3596	0,0192	0,0255	0,2844
Trust in Bitcoin	H_{11}	0,5989	0,0630	9,5015	0,0000	0,4746	0,7232
Model Summary	**R** 0,4764	**R-sq** 0,2270	**MSE** 1,2829	**F** 59,9075	**df1** 1,0000	**df2** 2040,000	**p** 0,0000
Outcome Variable Intention to use Bitcoin		**coeff**	**se**	**t**	**p**	**LLCI**	**ULCI**
Constant		0,8857	0,2619	3,3816	0,0009	0,3693	1,4021
Total effect of the PEOU of Bitcoin		0,5780	0,0747	7,7400	0,0000	0,4307	0,7252

		H	**Effect**	**BootSE**	**BootLLCI**	**BootULCI**
	Total		0,3722	0,0561	0,2653	0,4836
Indirect effect(s) of the PEOU of Bitcoin	Ind1	H_3	0,0724	0,0335	0,0152	0,1456
on intention to use Bitcoin:	Ind2	H_5	0,1357	0,0563	0,0312	0,2517
	Ind3	H_7	0,1640	0,0369	0,0966	0,2435

Indirect effect key:
Ind1: PEOU of Bitcoin -> PU of Bitcoin->Intention to use Bitcoin
Ind2: PEOU of Bitcoin ->Trust in Bitcoin ->Intention to use Bitcoin
Ind3: PEOU of Bitcoin -> PU of Bitcoin ->Trust in Bitcoin->Intention to use Bitcoin

The test results of the two hypotheses that could not be tested above due to the structural feature of Model 6 but were tested using the structural feature of Model 4 are as follows:

Model 4	PEOU of Bitcoin (X)		PU of Bitcoin (Mᵢ)			Trust in Bitcoin (Y)	
Model Summary	**R** 0,4299	**R-sq** 0,1848	**MSE** 1,2459	**F** 46,2538	**df1** 1,0000	**df2** 204,0000	**p** 0,0000
Outcome Variable Trust in Bitcoin		**coeff**	**se**	**t**	**p**	**LLCI**	**ULCI**
Constant		1,2614	0,2581	4,8867	0,0000	0,7524	1,7703
Total effect of the PEOU of Bitcoin		0,5005	0,0736	6,8010	0,0000	0,3554	0,6456

		H	**Effect**	**BootSE**	**BootLLCI**	**BootULCI**
Indirect effect of the PEOU of Bitcoin on trust in Bitcoin	Ind4	H_6	0,2739	0,0591	0,1633	0,3950

Indirect effect key:
Ind4: PEOU of Bitcoin -> PU of Bitcoin -> Trust in Bitcoin

Model 4	PU of Bitcoin (X)		Trust in Bitcoin (Mᵢ)			Intention to use Bitcoin (Y)	
Model Summary	**R** 0,5820	**R-sq** 0,3387	**MSE** 1,0975	**F** 104,4955	**df1** 1,0000	**df2** 204,0000	**p** 0,0000
Outcome Variable Intention to use Bitcoin		**coeff**	**se**	**t**	**p**	**LLCI**	**ULCI**
Constant		0,7692	0,2134	3,6050	0,0004	0,3485	1,1899
Total effect of the PU of Bitcoin		0,6349	0,0621	10,2223	0,0000	0,5124	0,7574

		H	**Effect**	**BootSE**	**BootLLCI**	**BootULCI**
Indirect effect of the PU of Bitcoin on intention to use Bitcoin	Ind5	H_{10}	0,4345	0,0551	0,3294	0,5440

Indirect effect key:
Ind4: PU of Bitcoin ->Trust in Bitcoin ->Intention to use Bitcoin

In this study on Bitcoin, PEOU has a significant positive direct effect on the intention to use (coeff=0,2058; p=0,0011), PU (coeff=0,4676; p=0,0000), and trust (coeff=0,2266; p=0,0009). In addition,

PEOU has a significant positive indirect effect on the intention to use, thanks to the mediating role of PU (Effect=0,0724; BootLLCI=0,0152; BootULCI=0,1456), the mediating role of trust (Effect=0,1357; BootLLCI=0,0312; BootULCI=0,2517), and the combined/serial mediating role of PU and trust (Effect=0,1640; BootLLCI=0,0966; BootULCI=0,2435). In addition, PEOU has a significant positive indirect effect on trust, thanks to the mediating role of PU (Effect=0,2739; BootLLCI=0,1633; BootULCI=0,3950). Lastly, PU has a significant positive direct effect on the intention to use (coeff=0,1549; p=0,0192) and trust (coeff=0,5858; p=0,0000). At the same time, thanks to the mediating role of trust, PU has a significant positive indirect effect on the intention to use (Effect=0,4345; BootLLCI=0,3294; BootULCI=0,5440). Furthermore, trust has a significant positive direct effect on the intention to use (coeff=0,5989; p=0,0000). According to these results, it should be stated that the research model has structural validity since all the hypotheses of the research are supported.

Conclusion and discussion

Based on the importance of the factors perceived ease of use, usefulness, and trust, and the significance of the existing relationships between these factors, this study confirmed the structural validity of a proposed model for assessing users' intention to use Bitcoin. The structural validity of the research model was confirmed. The results mean that some users have found it easy to use Bitcoin as it does not require much effort. Because users see Bitcoin as easy to use, they also find it useful, trust it, and intend to use it. Thanks to both the perceived usefulness of Bitcoin and the mediating role of trust in Bitcoin, the easy perception of Bitcoin to use has a more significant impact on users' intentions to use Bitcoin. Ease of use of Bitcoin has a more significant effect on users' intentions to use Bitcoin, thanks to both their individual and combined/serial mediation roles of the perceived usefulness of Bitcoin and the trust in Bitcoin. In addition, depending on the usefulness of Bitcoin, some users both trust and intend to use Bitcoin. Thanks to the mediating role of trust in Bitcoin, the perceived usefulness of Bitcoin has a more significant effect on users' intention to use Bitcoin. Finally, trust in Bitcoin affects users' intention to use Bitcoin.

It can be said that the results of this study support the results of other related studies. First, similar to the results of this study, it has been observed in previous studies that perceived ease of use affects perceived usefulness (Nadeem et al., 2021), trust (Mendoza-Tello et al., 2019; Wu and Ke, 2015), and intention to use (Nadeem et al., 2021; To ve Trinh, 2021). Accordingly, customers need to think that using the cryptocurrency Bitcoin is easy to learn does not require much mental effort. Therefore, it is easy to use this currency so that they can trust Bitcoin and be willing to use Bitcoin. Second, as seen in previous studies, the perceived usefulness of cryptocurrencies has affected trust in these currencies (Wu and Ke, 2015). It was also concluded that perceived usefulness influences users' behavioural intentions towards such decentralized currencies (Kabak and Steel, 2021; Gu et al., 2009; Mendoza-Tello et al., 2019; Nadeem et al., 2021; To and Trinh, 2021). Therefore, the idea that Bitcoin can be valuable and transactions can be completed more easily and quickly is essential in terms of trust in Bitcoin and the intention to use Bitcoin. Third, similar to the results of this current study, previous studies also concluded that trust in Bitcoin affects the intention to use this currency (Gu et al., 2009; Kabak and Çelik, 2020; Marella et al., 2020; Mendoza-Tello et al., 2019; Ooi et al., 2021; Rahmiati et al., 2019). In this respect, for users to intend to use Bitcoin, users must be convinced that they will make their payments securely with Bitcoin and that their personal information will be kept confidential. Finally, similar to the results of this study, some studies found that intention to use is affected by the existing relationships between perceived ease of use, perceived usefulness, and trust (Nadeem et al., 2021).

However, it was supported by the research results that the participants' intention to use Bitcoin did not differ significantly in terms of gender, age ranges (X, Y, and Z generation), education status (high school and university), and monthly income factors. However, in a study conducted, it has been seen that the value of Bitcoin and its expanding network have a significant relationship with the intent of both the X and Y generation. Still, the security of Bitcoin does not have a significant relationship with the intent of these two generations (Gafar et al., 2021). Accordingly, while it can be stated that the studies conducted may have different results, it is thought that it is possible to explain these different results based on the scope and limitations of the studies.

Implications for theory and practice

This study contributes to the theory by examining users' intentions to use Bitcoin, a cryptocurrency, within the framework of the TAM and trust theory. This study shows that using the integrated framework of these two theoretical approaches, users' intention to use cryptocurrencies should be evaluated. Because considering the results of this study, if this integrated framework is used, information about cryptocurrency usage intentions can be obtained. In this theoretical context, it is

possible to increase users' intention to use such decentralized currencies in advertising campaigns for the ease of use, usefulness, and trust of cryptocurrencies such as Bitcoin. In addition, in this study, while trying to explain the users' intention to use Bitcoin, the users' demographic characteristics were also considered. According to the study results, since there is no significant difference in users' intentions to use Bitcoin in terms of demographic characteristics, it is thought that the advertisement promotions to be made should be aimed at the general user group.

Limitations and recommendations for future research

This study was conducted by adhering to the sample size of 206 participants with specific demographic characteristics. Thus, although this study has proven that PU, PEOU, and trust are essential factors influencing users' intention to use Bitcoin, more research will be needed to generalize this study's conclusion and adequately understand the nature of these factors. On the other hand, it is thought that it would be helpful to evaluate other factors that were not evaluated in this study, such as perceived familiarity, perceived innovativeness, and perceived risk of Bitcoin in further studies.

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