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*Corresponding author: Ali S. A. Alomari, School of Computer Sciences, Universiti Sains Malaysia, Pulau Pinang 11800, Malaysia E-mail: alialomari@student.usm.my

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Factors influencing the behavioral intention to use Cryptocurrency among Saudi Arabian public university students: Moderating role of financial literacy

Ali S. A. Alomari^{1,2*} and Nasuha L. Abdullah¹

Abstract: This study aims to investigate the factors that can predict the behavioral intention of students at public universities in Saudi Arabia to use Cryptocurrency. The UTAUT model was enhanced with the incorporation of security and awareness to develop the theoretical model for this investigation. The paper investigates the impact of performance expectancy, effort expectancy, facilitating condition, social influence, security, and awareness on the behavioral intention to use Cryptocurrency. The moderating role of financial literacy was also investigated on the associations between the proposed adoption factors and the behavioral intention to use Cryptocurrency. SmartPLS 3.2.8 software was used to analyse 344 responses collected via an online survey. The Findings showed that performance expectancy, effort expectancy, social influence, security, and awareness positively impact on behavioral intention to use Cryptocurrency. Moreover, financial literacy moderates the associations between performance expectancy, security, social influence, and behavioral intention. The findings offer valuable insights to Cryptocurrency users, Cryptocurrency developers, and the government of the KSA.

Subjects: Management of IT; Information & Communication Technology; ICT; Communication Technology; ICT; Management ofTechnology; Behaviour

Keywords: Cryptocurrency; behavioral intention; use; moderating role; financial literacy

1. Introduction

Technology advancements have revolutionized all aspects of human life, including their way of exchanging money (Glebova & Desbordes, 2020; Poongodi et al., 2020). The world is witnessing a shift from a paper-based to an electronic-based system of exchanging money in the form of cryptocurrency (Kavanagh & Ennis, 2020). Cryptocurrency is a digital alternative to traditional currency with a high level of security, high transaction speed, independence from financial institutions, and complete anonymity (Kim, 2021). The technology is acceptable to individuals and businesses as electronic method of exchange that may be traded, saved, and transferred. A cryptocurrency employs cutting-edge encryption techniques to facilitate different kinds of financial transactions. Cryptocurrency users also enjoy lower transaction costs (Omane-Adjepong & Alagidede, 2020). Cryptocurrency is gaining acceptance among businesses and retail outlets, indicating a bright future for the technology (Almajali et al., 2022). Cryptocurrency usage as a payment method is gaining ground worldwide due to an apt recognition of its benefits. It is anticipated that the widespread use of cryptocurrency could enhance the national economy,





especially in developing countries (Patil et al., 2020). However, the maximum benefits of cryptocurrency will not become a reality until the technology is widely accepted among users (De Filippi, 2014).

Massive acceptance of Cryptocurrency by Saudi Arabian users will help the country in its vision 2030 of shifting from an economy based on oil to one based on knowledge before the year 2030 (Nurunnabi, 2017). However, the use of Cryptocurrency is low among users from developing nations like Saudi Arabia (Al-Amri et al., 2019; Mukherjee et al., 2022). However, in spite of the benefits of the technology, users need to be mindful of the fact that cryptocurrency theft or loss due to cyberattacks or human error is irrecoverable (Ermakova et al., 2017). Possible devaluation in cryptocurrency could also affect users' investments negatively (Al-Hatmi et al., 2018).

Existing studies on the use of cryptocurrency primarily concentrate on western nations (Ter Ji-Xi et al., 2021; Walton & Johnston, 2018). Empirical investigations on users' perspectives of cryptocurrency are scarce in developing nations like the KSA (Al-Amri et al., 2019). Consequently, users in emerging economies such as the KSA lag in adopting cryptocurrency (Khwaji et al., 2021). Hence, a comprehensive investigation is needed for a greater understanding of factors that could enhance the adoption of Cryptocurrency among users in Saudi Arabia (Bhimani et al., 2022). Furthermore, other factors that could affect the use of cryptocurrency such as awareness, and technology readiness have not been sufficiently explore (Al-Amri et al., 2019). Prior studies (Hasan et al., 2022; Miraz et al., 2022; Patil et al., 2020; Shaw & Sergueeva, 2019) have revealed inconsistencies in the connections between the UTAUT factors and the behavioral intent to utilize cryptocurrency, However, investigation of the effect of moderator variable seems to be overlooked. The moderating impact of financial literacy on the connections between the proposed cryptocurrency adoption factors and the behavioral intention was investigated to address the inconsistencies in the existing literature as suggested by(Baron & Kenny, 1986). Consequently, the following research questions serve as a guide for this investigation:

- (1) What are the influential factors of behavioral intention to use cryptocurrency among public university students of Saudi Arabia?
- (2) What is the moderating effect of financial literacy on the relationships between determinants of cryptocurrency and behavioral intention to use cryptocurrency among students at public universities in Saudi Arabia?

This study has some contributions, namely: the current study investigates the perspective of KSA users on their behavioral intention to use cryptocurrency using a comprehensive research model with the lens of the UTAUT model extended with awareness and technology readiness. The moderating effect of financial literacy was investigated to address the inconsistencies in the existing literature on cryptocurrency usage in developing countries. This will enhance the understanding of Cryptocurrency and provide useful insights and suggestions for Cryptocurrency developers, the Saudi Arabian government, and Saudi Arabian cryptocurrency users.

The design of the paper was as follows: Literature review was offered, the conceptual framework was explained, followed by hypotheses development. The research methodology was then described, and the results of the study were presented. Then, a discussion was made, and contributions were explained. Finally, study limitations were explained, recommendations for further studies were made, and a conclusion was offered.

2. Literature review

2.1. Unified Theory of Acceptance and Use of Technology (UTAUT)

The current study proposed a conceptual model of the behavioral intention of Saudi Arabian public university students to use cryptocurrency using UTAUT as the theoretical foundation for the study.

UTAUT is a popular technology adoption model that focuses on the factors of successful information systems implementation (Al-Mamary et al., 2015). Whether with additional factors or not, UTAUT model was utilized in several cryptocurrency adoption studies among users (Ter Ji-Xi et al., 2021), the adoption of cryptocurrencies in small and medium businesses (Roos, 2015), and the adoption of bitcoin (Gunawan & Novendra, 2017). The widespread application of UTAUT is due to its great explanatory power. According to Beh et al. (2021), when compared to other acceptance theories, the UTAUT model has high explanatory power for technology adoption. Consequently, UTAUT is selected for this investigation.

3. Conceptual framework

UTAUT constructs of effort expectancy and performance expectancy are regarded as the most common predictors of behavioral intention to use technology (Patil et al., 2020). Moreover, construct such as facilitating conditions, and social influence were only rarely investigated (Patil et al., 2020). UTAUT model was employed as the theoretical basis for the current investigation. Awareness and security were incorporated into the UTAUT model to enhance its predictive power (Patel & Patel, 2018). The constructs were added due to users' concern for security and the lack of empirical research in KSA. The moderating impact of financial literacy was also examined between the proposed predictors and the behavioral intention to use cryptocurrency.

As illustrated in Figure 1, performance expectancy, social influence, effort expectancy, facilitating conditions, awareness, and security were proposed as indicators of behavioral intention to use cryptocurrency among students at public universities in KSA. The moderating effect of financial literacy was also proposed between the proposed determinants and the use of cryptocurrency.

A thorough discussion of hypotheses developments is provided in the next section.

4. Hypothesis development

4.1. Performance Expectancy

Performance expectancy signifies the degree to which people feel that utilizing cryptocurrency will support them perform their jobs better (Miraz et al., 2022; Venkatesh et al., 2012). Existing literature on cryptocurrency reported performance expectancy as a positive driver of the use of







cryptocurrency among individuals. (Gunawan & Novendra, 2017; Hutchison, 2017). Cryptocurrency is based on blockchain technology. The technology has addressed the shortcomings of current payment systems such as credit cards and PayPal and also provides more benefits to users (Baur et al., 2015). The use of cryptocurrency is expected to make financial transactions easier for users. For instance, the efficiency of transactions could be improved (Kim, 2021). Elimination of central financial institutions reduces the cost of transactions and improves the process of fund transfer (Patil et al., 2020).

Many studies have claimed a significant positive impact of performance expectancy on users' behavioral intention to use cryptocurrency (Alalwan et al., 2017; Diep et al., 2016; Shaw & Sergueeva, 2019). From the Malaysian context, Ter Ji-Xi et al. (2021) also identified performance expectancy as a crucial factor of behavioral intention to use cryptocurrency. However, Miraz et al. (2022) argued a negative effect of performance expectancy on behavioral intention to use cryptocurrency. Thus, the outcomes of the above studies are inconsistent. The results are inconclusive. Further research is required on the connection between performance expectancy and behavioral intention to use cryptocurrency. Hence, this study hypothesizes:

H1: Performance expectancy has a positive effect on behavioral intention to use cryptocurrency.

5. Effort Expectancy

Effort expectancy was described as the amount of effort that an individual has to make to learn new technology (Ter Ji-Xi et al., 2021; Venkatesh et al., 2012). According to Al Shehhi et al. (2014), Cryptocurrency is an emerging technology with a lack of stability and some level of education is necessary to use cryptocurrency for financial transactions. Al Shehhi et al. (2014) stated that basic knowledge of the use of cryptocurrency is required to guard users from fraudsters. Several studies claimed that effort expectancy is a crucial factor that influences the behavioral intention to use cryptocurrency (Alalwan et al., 2017; Mensah & Mwakapesa, 2022; TamphakdiphanitT & Laokulrach, 2020). Individuals are mindful of the effort required to apply the technology in their decision to adopt it. However, Yusof et al. (2018a) reported an insignificant effect of effort expectancy on cryptocurrency adoption. Consequently, further investigation is needed on the link between effort expectancy and behavioral intention to use cryptocurrency as easy to use, their behavioral intent to use cryptocurrency could be enhanced (Beh et al., 2021). Thus, we proposed:

H2: Effort expectancy has a positive effect on behavioral intention to use cryptocurrency.

6. Social Influence (SI)

Social influence concerns the level of influence perceived by individuals from their peers and family members to use cryptocurrency (Ter Ji-Xi et al., 2021; Venkatesh et al., 2012). Prior research argued that the behavioral intent of an individual to utilize technology is significantly impacted by the opinions of peer groups, family members, and other existing technology users (Nseke, 2018). Moreover, the influence of word-of-mouth on changing the viewpoint of individuals has been confirmed in the literature (Zhang et al., 2018).

Numerous findings have documented that social influence has a positive impact on behavioral intention to use innovation (Alalwan et al., 2017; Merhi et al., 2019; Patil et al., 2020). A study by (Nseke, 2018) confirmed the stimulating impact of social influence on users' intention to utilize cryptocurrency. However, Hasan et al. (2022) documented an insignificant impact of social influence on cryptocurrency adoption.

It was argued that social influence play a crucial role in the technology usage intention among users when there is little information on the new technology (Adapa et al., 2018). Cryptocurrency is an emerging technology, as such, there is insufficient information about cryptocurrency among students at public universities in the KSA. Therefore, it is expected that the positive influence of friends or loved ones on the benefits of cryptocurrency could positively influence the behavioral intention of students at public universities of KSA to use cryptocurrency. A study by (Nseke, 2018) confirmed the stimulating impact of social influence on users' intention to utilize cryptocurrency. Hence, the researchers formulated:

H3: Social influence has a positive effect on behavioral intention to use cryptocurrency.

7. Facilitating Conditions

The facilitating condition was described as users' perception of the availability of technological infrastructure and support required to use cryptocurrency (Gupta et al., 2020; Venkatesh et al., 2012). Individuals are more probable to embrace technology when required resources and support are available (Alalwan et al., 2017). As an emerging technology, there is a lack of regulatory framework and infrastructure support for the use of cryptocurrency in Saudi Arabia. Moreover, cryptocurrency-related virtual communities like online forums and social media groups for advice and motivation of individuals on the use of cryptocurrency from the KSA context are also in the infancy stage. Existing literature identified facilitating condition as a vital indicator of the use intention of cryptocurrency (Ter Ji-Xi et al., 2021), (Venkatesh et al., 2012), (Beh et al., 2021) and (Gunawan & Novendra, 2017). However, Yeong et al. (2022) found an insignificant effect of facilitating conditions on cryptocurrency adoption. Considering these results, the researchers proposed:

H4: Facilitating condition has a positive effect on behavioral intention to use cryptocurrency.

8. Security

Security was defined as the individual's perception of the degree of protection from online risks from using technology. A feeling of insecurity about technology prevents individuals from using the technology (Hutchison, 2017). Cryptocurrency transactions are conducted virtually. Users might be skeptical about possible financial loss, theft, or failure due to cybercrime (Pandya et al., 2019). The security of cryptocurrency would enhance individuals' confidence in using the technology, enabling cryptocurrency to reach its potential as a substitute for physical currency (Schaupp et al., 2022). Users' behavioral intention to use cryptocurrency is likely to increase when they perceived cryptocurrency as a secure monetary system (Al-Mamary et al., 2020). Extant studies have reported security as a driver of individuals' intention to utilize digital currency (Arias-Oliva et al., 2019; Mukherjee et al., 2021) and (Hasan et al., 2022). In the Malaysian context, a lack of security negatively predicted the behavioral intention of cryptocurrency usage (Pandya et al., 2019). Therefore, the more students of public universities in Saudi Arabia view cryptocurrency as a secure technology, the more likely they would use it. Thus, the researchers formulated:

H5: Security has a positive effect on behavioral intention to use cryptocurrency.

9. Awareness

Awareness was defined as the knowledge level of an individual about innovation and the benefits of its adoption (Shahzad et al., 2018). We conceptualized awareness as the amount of information students of Saudi Arabian public universities have about cryptocurrency and its benefits. The importance of awareness to technology adoption was first proposed in an innovation diffusion theory (Ku-Mahamud et al., 2019). Cryptocurrency is an emerging technology. Hence, users' awareness of the benefits of cryptocurrency is low, especially in developing countries like the KSA. It was documented that level of awareness about the technology and its benefits enhances the perception of the benefits of the technology, and ultimately, the behavioral intention to use the technology (Ku-Mahamud et al., 2019). Some research documented a positive impact of awareness on users' intention to use cryptocurrency (Bohr & Bashir, 2014; Chang et al., 2016; Shahzad et al., 2018). On the other hand, a lack of awareness of cryptocurrency might also hinder its adoption among users (Mendoza-Tello et al., 2018). Thus, the need to study the effect of awareness on the behavioral intention of the public university students in Saudi Arabia to use cryptocurrency. Hence, it is formulated:

H6: Awareness has a positive effect on behavioral intention to use cryptocurrency.

10. Financial literacy as a moderator

Financial literacy refers to the knowledge of an individual that enables the individual to make a financial decision in their best interest (Chan et al., 2022). Financial literacy is considered in this study as the individual's knowledge required to understand the information that cryptocurrency can provide. It was found that financial literacy affects many financial decisions (Saputro & Lestari, 2019). Cryptocurrency is a digital technology for financial transactions. Accordingly, an individual's adoption of cryptocurrency will depend on not only the characteristics of cryptocurrency but also the financial literacy of the individual. Arguably, an individual's financial literacy may influence the level to which the individual comprehends and appreciates the extent to which cryptocurrency might be useful to them (Chan et al., 2022). A moderator variable increases or decreases the impact of one variable on the other. (Baron & Kenny, 1986). It was identified that high financial literacy strengthens individuals' decisions regarding financial alternatives such as cryptocurrency usage (Lusardi, 2019) while low financial literacy weakens individuals' decisions to use cryptocurrency (Grohmann et al., 2018). People with higher financial literacy may be more inclined to use cryptocurrency than those whose financial literacy is lower due to their ability to understand cryptocurrency information faster and take better decisions (Festa & Knotts, 2021; Panos et al., 2020; Saputro & Lestari, 2019; Zhao & Zhang, 2021). Consequently, it is anticipated that financial literacy will moderate the effect of the proposed determinants of this study on the behavioral intention to use cryptocurrency. The following hypotheses were tested:

H7a: Financial literacy moderates the relationship between performance expectancy and behavioral intention to use cryptocurrency.

H7b: Financial literacy moderates the relationship between effort expectancy and behavioral intention to use cryptocurrency.

H7c: Financial literacy moderates the relationship between social influence and behavioral intention to use crypto-.

H7d: Financial literacy moderates the relationship between facilitating conditions and behavioral intention to use cryptocurrency.

H7e: Financial literacy moderates the relationship between security and behavioral intention to use cryptocurrency.

H7f: Financial literacy moderates the relationship between awareness and behavioral intention to use cryptocurrency.

11. Research Methodology

This section presents the population, and sample, variables and measures, data collection methods, data analysis techniques, and response bias.

Population of the study

The population of this study comprises of all students of the five major Saudi Arabian public universities, namely: King Fahd University of Petroleum and Minerals, King Abdulaziz University, King Saud University, University of Hail, and King Khalid University. The universities are situated in the five geographical regions of north, south, east, west, and middle province respectively. Public university students of KSA were chosen as the target respondents because they are considered to be innovators and their use of the technology might motivate other KSA users to also use the technology (Nguyen, 2016). Moreover, the students of KSA are likely to play important role in the achievement of Saudi Arabian vision 2030 when they graduate from the university.

12. Sample and sampling technique

The purposive sampling technique was employed because the researchers have no access to the sampling frame (Sekaran & Bougie, 2016). The use of G*Power revealed 189 as the minimum sample size with 0.95 statistical power. However, 344 valid responses were collected. The 344 responses are therefore considered sufficient for this study.

13. Variables and measures

Measures for the construct were adopted from credible literature, as indicated in Table 1. A fivepoint Likert scale varying from 1) strongly disagree, 2) disagree, 3) neither disagree nor agree, 4) agree, and 5) strongly agree was utilized to measure the study variables.

14. Data collection procedure

This study utilized a quantitative research methodology. Primary data were gathered from public university students of KSA via an online survey. Pretesting and pilot testing were carried out. Results from the pilot test revealed that all constructs' Cronbach α values were above 0.70, indicating satisfactory reliability. The survey link was shared with Deans Students Affairs of the universities, namely King Fahd University of Petroleum and Minerals, King Abdulaziz University, King Saud University, University of Hail, and King Khalid University. The Deans then sent out the survey link to students via the mailing lists of their universities. Data collection was performed for three months, from 22 January 2022 to 26 April 2022.

15. Data Analysis techniques

SPSS version 25 was applied for demographic data analysis while Partial Least Structural Equation Modelling (PLS-SEM) with SmartPLS version 3.28 software was applied for testing the proposed hypotheses. When dealing with a research model that contains several variables and a moderator or mediator variable, or when the sample size is small, it was confirmed that PLS-SEM with SmartPLS is superior to covariance SEM such as AMOS (J. F. Hair et al., 2019). Hence, SmartPLS was preferred over covariance SEM for the analysis of hypothesized relationships in this study.

16. Response bias

Data collection was performed in a single period of time. Hence, the need to test for response bias. Out of the 344 valid responses, 180 were considered early responses, while 164 were considered late responses. As shown in Table 2, response bias test was performed on all the study variables using an independent sample t-test (Armstrong & Overton, 1977).

Except for SI and FL, the early and late responses did not differ significantly. To evaluate the magnitude of the differences between SI and FL for the two groups, Cohen's d was computed based on the mean of the two samples and aggregated variance estimate. Cohen's d values of 0.2, 0.5, and 0.8 are judged small, medium, and large effect sizes (Jacob Cohen, 1988). Except for SI

Table 1. Measureme	ent of variables		
Variable	Code	Measure	Source
Performance	PE1	Using cryptocurrencies will boost my chances to accomplish my important goals.	Arias-Olivaet al. (2019)
expectance	PE2	Using cryptocurrencies will assist me accomplish my goals faster.	
	PE3	Use of cryptocurrency will improve my standard of living.	
Effort	EE1	Learning to use cryptocurrency will be easy for me.	Arias-Oliva et al. (2019)
expectance	EE2	I will have no trouble understanding and using cryptocurrency.	
	EE3	Using cryptocurrency will be easy for me.	
	EE4	It will have no trouble mastering the use of cryptocurrency.	
Social	SI1	People who can affect my decision urge me to use cryptocurrency.	Abbasi et al. (2021)
influence	SI2	People I consider important encourage me to use cryptocurrency.	
	SI3	Leadership provide support for the use of the cryptocurrency.	
	SI4	Generally, organization supports the use of the cryptocurrency.	
Facilitating	FC1	I have the resources needed for Cryptocurrency usage.	Abbasi et al. (2021)
condition	FC2	I am knowledgeable enough to use cryptocurrency.	
	FC3	Other technologies I use are compatible with Cryptocurrency.	
	FC4	I can be assisted if I have difficulty using cryptocurrency.	
Awareness	AW1	I am aware of Cryptocurrency.	Almuraqab, 2019
	AW2	I know Cryptocurrency as an alternative means of exchange.	
	AW3	I understand that cryptocurrency is more attractive than other means of exchange.	
	AW4	I intend to take part in training on the use of cryptocurrency.	

(Continued)

Variable	Code	Measure	Source
Financial	FL1	I have financial expertise.	Arias-Oliva et al. (2019)
literacy	FL2	I have the skill to manage finances.	
Security	SE1	I have no problem using my credit/debit card details for cryptocurrency transaction.	Khalilzadeh et al. (2017)
	SE2	Sensitive information can be safely transmitted through Cryptocurrency transactions.	
	SE3	I would feel totally secured sharing my personal details through Cryptocurrency transactions.	
	SE4	Overall, Cryptocurrency systems are secure for transmitting sensitive information.	
Behavioral	BI1	If given the chance, I would use cryptocurrency.	Khalilzadeh et al. (2017)
intention	BI2	If given the chance, I believe that I should use cryptocurrency	
	BI3	if the opportunity arises, I intend to use cryptocurrency.	

and FL, all variables showed insignificant differences between the two groups (p < 0.5). Although SI and FL are significant, they both have small effects. Therefore, non-response bias poses no problem in this study, and the data from the two groups can be used for further analysis.

17. Common Method Variance

Data was collected using a single source. Using Harman's Single factor test, common method bias was analyzed (Podsakoff, 2003). More than one factor was extracted, and the first

factor accounts for only 22.65% of the variance. Hence, this confirms that common method bias poses no problem in our investigation (Podsakoff, 2003).

18. Descriptive results

Table 3 displays the demographic profile of the respondents. Altogether, 360 responses were gathered from which 344 valid responses were analyzed. SPSS 25 was used to analyze demographic data. Males account for the majority of the respondents (61.3%). Based on age group, most respondents are between 18–24 years old (54.4%). Most of the respondents have a bachelor's degree (63.1%). Additionally, most of the respondents are from King Saud University (33.7%).

19. Results

PLS-SEM with SmartPls 3.2.8 was applied to test hypothesized relationships. The PLS-SEM technique was favoured over covariance-based SEM (CB-SEM), due to its higher reliability in testing complex models (Henseler et al., 2015) and its power in testing moderating effects between variables (Herrero et al., 2017). PLS-SEM analysis was performed in two stages: measurement

Table 2. Respons	se bias test for all	variables						
	Early respon	ıse (n = 180)	Late respon:	se (n = 164)				
Latent variable	Mean	Standard deviation	Mean	Standard deviation	t-value	p-value	Cohen's d	Effect
SE	3.6111	.80857	3.7271	.73519	-1.388	.166	1	I
FC	3.7722	.76145	3.8887	.64486	-1.524	.129	I	I
EE	3.5194	.89788	3.6768	.78227	-1.726	.085	1	I
PE	3.4796	.87319	3.5589	.76915	890	.374	I	I
AW	3.6889	.87917	3.7846	.81210	-1.045	.297	I	I
BI	3.4167	.86081	3.6220	.71837	-1.089	.017	I	I
SI	3.5833	.88849	3.8984	.85194	-3.350	.001	0.1575	Small
FL	3.6861	.93060	3.9695	.76882	-3.062	.002	0.1417	Small

Table 3. Demographic Profiles of respondents					
Demographic Variable	Frequency	Percentage (%)			
Gender					
Female	133	38.7			
Male	211	61.3			
Age Group					
18-24	187	54.4			
25-35	104	30.2			
36-45	53	15.4			
Current Educational Level					
Bachler's	217	63.1			
Master's	92	26.7			
PhD	35	10.2			
University					
King Fahd University of Petroleum and Minerals	21	6.1			
King Saud University	116	33.7			
King Abdulaziz University	109	31.7			
King Khalid University	68	19.8			
University of Hail	30	8.7			

Source: Self-created.

model assessment to test the reliability and validity of the model and structural model to assess the strength of the hypothesized associations (F. Hair Jr et al., 2014).

20. Measurement model assessment

Table 4 showed that factor loadings were all above 0.7, AVE values were all above 05, and Cronbach's α and CR values were all above 0.7 (J. F. Hair et al., 2019).

We examine discriminant validity using HTMT ratios recommended by Henseler et al. (2015). Results in Table 5 revealed that HTMT ratios of all constructs were below the 0.85 threshold value (Mohammad et al., 2019), Hence, testifying to the absence of a discriminant validity problem.

21. Structural model assessment

Assessment of multicollinearity was recommended before testing hypothesized relationships (J. F. Hair et al., 2019). Therefore, this study assessed multicollinearity through the examination of the Variance Inflation Factor (VIF). As specified in Table 6, all inner VIF values were below the 3.3 threshold (Kock, 2015). Thus, no multicollinearity problems.

To test hypothesized relationships, 5000 resamples were used in bootstrapping at a one-tailed t-test (J. F. Hair et al., 2019). Table 6 shows the outcomes of hypotheses testing. The R^2 value of BI was 0.410, indicating a moderate explanatory power of the research model of this study (Ozili, 2022). Moreover, effect size (f^2) was also calculated (J Cohen, 1988), as represented in Table 6. Additionally, a blindfolding procedure was applied to compute the predictive relevance of the research model. Q^2 value BI was 0.220, indicating medium predictive relevance (J. F. Hair et al., 2019).

Table 6 illustrates that the studied constructs, AWR (β = 0.115, t = 1.657),

EE (H2, β = 0.095, t = 1.967), PE (β = 0.110, t = 1.855), SE (β = 0.129, t = 1.723), and SI (β = 0.126, t = 1.885), were found to positively and significantly impact on users' adoption towards

Table 4. Measi	urement model assessment				
		Converge	nt validity	Internal co reliabi	nsistency ility
Variable	Item	Loading	AVE	Cronbach's a	CR
Awareness	AW1	0.863	0.834	0.85	0.749
	AW2	0.899			
	AW3	0.834			
Behavioral Intention	BI1	0.788	0.708	0.708	0.732
	BI2	0.831			
	BI3	0.765			
Effort expectancy	EE1	0.827	0.887	0.894	0.746
	EE2	0.868			
	EE3	0.865			
	EE4	0.893			
Facilitating condition	FC1	0.872	0.762	0.792	0.806
	FC4	0.923			
Financial literacy	FL1	0.861	0.711	0.722	0.775
	FL2	0.899			
Performance expectancy	PE1	0.908	0.799	0.912	0.705
	PE2	0.82			
	PE3	0.786			
Security	SE1	0.912	0.829	0.854	0.745
	SE2	0.864			
	SE3	0.811			
Social Influence	SI1	0.900	0.875	0.879	0.799
	SI2	0.88			
	SI3	0.902			

CR: Composite Reliability; AVE: Average Variance Extracted; AW: Awareness; BI: Behavioral intention; EE: Effort expectancy; FC: Facilitating condition; FL: Financial literacy; PE: Performance expectancy; SE: Security; SI: Social influence.

cryptocurrency. Consequently, H1, H2, H4, H5 and H6 were accepted. However, FC (β = 0.111, t = 1.548) was not significant. Thus, H3 was rejected.

Furthermore, as shown in Table 7 and Figures 2, 3, and 4, financial literacy positively moderates the relationships between performance expectancy, social influence, security, and Behavioral intention.

Facilitating condition revealed a moderating effect on performance expectancy and behavioral intention (β = 0.087, t = 1.700), security and behavioral intention (β = 0.115, t = 1.802), social influence and behavioral intention (β = 0.162, t = 2.553), thus H7d, H7e, and H7f were accepted, however, no moderating effect on the relationships between awareness and behavioral intention (β = 0.092, t = 1.347), effort expectancy and behavioral intention (β = 0.001, t = 0.017, t = 0.390), and facilitating condition and behavioral intention (β = 0.001, t = 0.001) therefore, H7a, H7b, and H7c were rejected. Please see, Table 7 for further details.

Table 5.	Discrimin	ant validi	ity test us	ing HTMT	criteria				
	AW	BI	EE	FC	FL	PE	SE	SI	TR
AW									
BI	0.523								
EE	0.209	0.346							
FC	0.050	0.064	0.180						
FL	0.157	0.310	0.189	0.043					
PE	0.378	0.294	0.077	0.176	0.071				
SE	0.552	0.523	0.063	0.053	0.102	0.324			
SI	0.501	0.507	0.222	0.133	0.152	0.313	0.517		
TR	0.371	0.418	0.197	0.064	0.046	0.370	0.343	0.366	

Dawson (2014) recommended that interaction terms be plotted for significant moderating relationships to comprehend the nature of the moderating effect. Accordingly, the significant moderating effects of financial literacy were plotted as depicted in Figures 2, 3, and 4.

22. Discussion

Our outcomes indicate that awareness, performance expectancy, effort expectancy, security, and social influence are important factors of behavioral intention to use cryptocurrency. Moreover, financial literacy was found to moderate the relationships between performance expectancy, security, social influence, and behavioral intention to use cryptocurrency.

The findings of this investigation disclosed a positive influence of performance expectancy ($\beta = 0.110$, t = 1.855) on behavioral intention. Hence, the respondents' behavioral intention for cryptocurrency usage would be high if they anticipate that using the cryptocurrency will benefit them and help them to complete a task more conveniently and efficiently. This outcome supports previous literature such as Yusof et al. (2018b).

Also, this research discovered that effort expectancy positively and significantly affected behavioral intention to use cryptocurrency. Therefore, (H2, β = 0.095, t = 1.967), was accepted. This result hints that the ease associated with cryptocurrency will motivate students of public universities in the KSA to use the technology. This finding supports previous literature, such as Almuraqab (2020), claiming that when cryptocurrency is difficult, behavioural intent to utilize cryptocurrency would be hampered.

However, facilitating condition was identified as insignificant to the behavioral intention to use cryptocurrency (H3: β = 0.111, t = 1.548). As a result, H3 was rejected. This finding contradicts (Gunawan & Novendra, 2017). The insignificant effect of facilitating conditions in this study suggests that students of public universities in the KSA believe that the technical infrastructure required to use cryptocurrency, such as internet connectivity, and the flexibility of using cryptocurrency on a variety of IT devices already exist.

Social influence positively and significantly influences individual's behavioural intention to utilise cryptocurrency (H4: β = 0.126, t = 1.885). Hence, hypothesis H4 was accepted. The finding was in agreement with Yusof et al. (2018b) and Mahomed (2017). The finding shows that opinions of close and loved ones, such as peers and family members on the benefits of cryptocurrency influence behavioral intent to cryptocurrency usage among students of public universities in the KSA. Hence, spreading knowledge of the advantages of cryptocurrency among friends and family could enhance the behavioral intention of students of public universities in the KSA to use Cryptocurrency.

Table 6. Direc	t Effect Hypothese	S							
Direct relatior	iship hypotheses to	est results							
Hypo-thesis	Relation	β-value	t-value	p-value	Decision	f2	VIF	R ²	Q ²
H1	AW -> BI	0.115	1.657	0.049	Accepted	0.014	1.654	0.410	0.220
H2	EE -> BI	0.095	1.967	0.025	Accepted	0.012	1.272		
H3	FC -> BI	0.111	1.548	0.061	Rejected	0.016	1.292		
H4	PE -> BI	0.110	1.855	0.032	Accepted	0.015	1.362		
H5	SE -> BI	0.129	1.723	0.043	Accepted	0.017	1.630		
H6	SI -> BI	0.126	1.885	0.030	Accepted	0.017	1.623		
Note: *p < 0.05, *	*p < 0.01								

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Table 7. Moderating role of FL					
Hypothesis	Relation	β-value	t-value	p-value	Decision
H7a	FL*AW -> BI	0.092	1.347	0.089	Rejected
H7b	FL*EE -> BI	0.017	0.390	0.348	Rejected
H7c	FL*FC -> BI	0.001	0.018	0.493	Rejected
H7d	FL*PE -> BI	0.087	1.700	0.045	Accepted
H7e	FL*SE -> BI	0.115	1.802	0.036	Accepted
H7f	FL*SI -> BI	0.162	2.553	0.005	Accepted

Note: *p < 0.05, **p < 0.01, (One-tailed).



Low SI

Security was recorgnized as an essential determinant of behavioral intention to use cryptocurrency among the students of public universities in the KSA (H5: β = 0.129, t = 1.723). Hence H5 was accepted. The result was similar to that of Almarashdeh et al. (2018). This outcome signifies the perception of concern for safety of financial transaction associated with cryptocurrency usage among the student of public universities in the KSA

High SI

The findings of this investigation result showed that awareness has positively and significantly impacted behavioral intention to use cryptocurrency (H6: β = 0.115, t = 1.657). Thus, hypothesis H6 was thus accepted. This result aligns with the existing studies, e.g., Shahzad et al. (2018) and Henry et al. (2018). The outcome highlights that knowledge of the benefits of cryptocurrency is critical to its usage among public university students in the KSA. By implication, a lack of awareness might

Figure 4. Moderating effect of FL on the relationship between SE and BI.



result in risk perception and scepticism regarding the use of cryptocurrency among students of public universities in the KSA.

Our results have confirmed the moderating influence of facilitating condition on the relationships between performance expectancy ($\beta = 0.087$, t = 1.700), social influence ($\beta = 0.162$, t = 2.553), security ($\beta = 0.115$, t = 1.802), and behavioral intention to use cryptocurrency.

The results of our study implies that the more individuals become financially literate the better they comprehend the benefits of cryptocurrency, and its security, and become motivated by peer groups and family members regarding cryptocurrency, which ultimately enhances their behavioral intention to use cryptocurrency. This outcome broadens the existing knowledge on the effect of financial literacy and influential factors of behavioral intention to use cryptocurrency.

23. Contribution to the theory

This investigation suggested a research model based on modified UTAUT model to determine the influential factors of Saudi Arabian public university students' behavioral intention to utilize cryptocurrency. The extended UTAUT model provides better insight into the behavioral intention of public university students of KSA to use cryptocurrency.

The outcomes of this study have improved the existing literature on technology adoption, especially the literature on cryptocurrency usage in emerging nations by expanding the understanding of factors that affect intent to utilize cryptocurrency. The current study also extends the UTAUT model by proposing and confirming awareness and security as influential factors of cryptocurrency usage behavioral intent. Moreover, confirmation of the moderating effect of financial literacy has also advanced the existing knowledge on Cryptocurrency usage behavioral intent in Saudi Arabia as a developing country.

24. Practical implications

The finds from this investigation offer insights that Cryptocurrency developers can use to enhance the features of the technology to stimulate the use of cryptocurrency among individuals in developing countries like the KSA by making cryptocurrency more useful, user-friendly, enjoyable, and secure. Developers of cryptocurrency need to make the technology more secure to prevent fraudulent acts such as November 22 FTX collapse that resulted in financial loss to cryptocurrency users.

The government of the KSA needs to provide a supportive and enabling environment for use of cryptocurrency. Saudi Arabian government should also strengthen cybercrime regulations to make them more deterrent to minimize financial loss to cryptocurrency users due to cybercrime. The government of Saudi Arabia needs to develop strategies to raise the awareness of the students of public universities on the benefits of cryptocurrency to improve their financial literacy skills to

enhance the use of cryptocurrency as an alternative means of financial transaction. Social influence was acknowledged to be a key factor of behavioral intention to use cryptocurrency. The promotional campaign can be targeted toward encouraging cryptocurrency enthusiasts in the KSA to spread good comments and recommendations via social media about the benefits of cryptocurrency to motivate their friends and close relations to embrace the technology.

Financial literacy moderated the associations between performance expectancy, social influence, security, and behavioral intention to use cryptocurrency. Thus, financial literacy skills could empower students of public universities to evaluate financial technologies and make informed decisions regarding adopting fintech such as cryptocurrency. Therefore, students of public universities in the KSA should enhance their financial literacy skills to boost their ability to make better decisions regarding cryptocurrency. Online forums, blogs, social media groups, and websites devoted to providing support for the use of cryptocurrency could be developed by cryptocurrency enthusiasts in KSA.

25. Limitations and future suggestions

For this investigation, data were gathered from students of public universities in the KSA. Hence, limiting the generalization of the results of this investigation. Therefore, a similar study needs to be performed in other universities of the KSA to see whether new findings will be reported. Moreover, the current investigation investigated the behavioral intention to use cryptocurrency. Therefore, future researchers may look into the post-adoption behavior of cryptocurrency users to reveal the factors that influence the continuous use of cryptocurrency. Moreover, this study was carried out using a quantitative technique. Future researchers might consider a qualitative approach to find out whether more information would be gained.

The proposed model of this study has only two constructs added to the UTAUT model to predict the individuals' behavioral intention to use cryptocurrency. Additional constructs may be considered in future investigations.

26. Conclusion

This study investigates the factors influencing the behavioral intention of public university students in Saudi Arabia to use cryptocurrency via the lens of the UTAUT model extended with security and awareness. The moderating effect of financial literacy was also investigated between this study's proposed predictors and dependent variables. The outcomes of this study reveal awareness, performance expectancy, effort expectancy, security, and social influence positively affect the behavioral intention to use cryptocurrency among the students of public universities in the KSA. However, facilitating condition was discovered to have an insignificant effect on behavioral intention to use cryptocurrency. Moreover, this study found moderating effects of financial literacy on the relationships between performance expectancy, social influence, security, and behavioral intention to use cryptocurrency.

The outcomes of the current investigation provide numerous theoretical and practical contributions to stakeholders of cryptocurrency, such as individual cryptocurrency users, the government of the KSA, and cryptocurrency service providers. Attention was drawn to enhancing cryptocurrency's features, such as secure designs and user-friendliness, to enhance behavioral intention to use cryptocurrency for financial transactions. The results of this study could be used to stimulate the behavioral intention to use cryptocurrency for financial transactions.

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Author details

Ali S. A. Alomari^{1,2} E-mail: alialomari@student.usm.my ORCID ID: http://orcid.org/0000-0003-3441-5717 Nasuha L. Abdullah¹

- ORCID ID: http://orcid.org/0000-0002-5951-5207
- ¹ School of Computer Sciences, Universiti Sains Malaysia, 11800, Malaysia.
- ² Computer Sciences Department, College of Computing in Al-Qunfudhah, Umm Al-Qura University, Makkah 21955, Saudi Arabia.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Disclosure statement

The authors report there are no competing interests to declare.

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