CRYPTOCURRENCY ADOPTION: EVIDENCE FROM GHANA, NIGERIA AND VIETNAM

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A B S T R A C T

This study examines the factors affecting cryptocurrency adoption in Ghana, Nigeria and Vietnam. Based on the Unified Theory of Acceptance and Use of Technology (UTAUT) and its extension, UTAUT2, we test a model that explains 62.3% of the intention to use cryptocurrencies quantitatively with SmartPLS. A structured questionnaire was designed and administered via Google Form to 756 participants around 20 years old and beyond. The results of the general models suggest that performance expectancy, effort expectancy, facilitating conditions, perceived risk, and financial literacy are determinants of intention to use cryptocurrency. Social influence and digital literacy are not determinants of intention to use cryptocurrency. A multigroup analysis result for Ghana, Nigeria and Vietnam shows that the relationship between performance expectancy and intention to use cryptocurrencies was significant across the three countries. Further, the finding reveals that effort expectancy and the intention to use were significant in Nigeria and insignificant in Ghana and Vietnam. Social influence, digital literacy, perceived risk, and intention to use were insignificant across the three countries. Facilitating conditions and intention to use were only significant in Ghana, and likewise, financial literacy and intention to use while they were not significant in Nigeria and Vietnam. This study is one of the initial attempts that examine the determinants of cryptocurrency adoption in three countries in a single study. This study underscores the need to consider the key variables influencing cryptocurrency adoption in emerging economies.

1. INTRODUCTION

Cryptocurrency is a new digital asset that is receiving attention from investors, regulators, and scholars (Shahzad et al., 2021). Cryptocurrency, as a form of financial technology innovation, is a virtual currency that is built on blockchain technology (Dwyer, 2015) which performs financial transactions using cryptographic technology (Mazambani and Mutambara, 2020). The advent of the internet revolution brought about digital currency, which has had tremendous effects on the future of the financial market (Joshi et al., 2018). People are interested in flexible payment methods that are secured and convenient (Gupta and Arora, 2019). Hence, people rely on cryptographic-proof payment method as it embraces disintermediation, thus reducing both transaction costs and time (Dwyer, 2015). Approximately over a decade back, the world witnessed the launching the first type of cryptocurrency known as Bitcoin. Since then, both developed and developing countries have embraced the adoption of cryptocurrencies. Specifically, cryptocurrencies are likely to play a pivotal role in

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several contexts, such as Africa (Ndemo, 2022), the United States of America (Arli et al., 2020), Asia (Liu et al., 2020), and Europe (Jonker, 2019).

The adoption of information technology (IT) has changed financial transactions such that paper money has been significantly replaced with digital financial instruments (Kien and Binh, 2021). However, adopting technology instruments such as cryptocurrencies has posed a security risk to human rights protection (Aleksina, 2020). In Vietnam, cryptocurrencies such as bitcoin were prohibited means of payment in 2018, as it was seen as a means of tax evasion and financial crimes such as money laundering (Tetkin, 2018). However, the restriction policy was relaxed a bit in 2019, allowing local firms to operate cryptocurrency (Antipov, 2020). Vietnamese are among the top cryptocurrency users, albeit they lack a legal framework for owning, trading and using them (Nguyen, 2022). It is essential to determine the factors responsible for cryptocurrency adoption in Vietnam. The evolution of digital financial services (DFS) has addressed banking and electronic payment problems in Africa. Despite the benefits attributed to the adoption of these digital technologies, many African countries are still not fully aware of the benefits of these technologies, thus discouraging their adoption. For instance, financial regulatory bodies in Ghana view payment via cryptocurrencies as illegal. Cryptographic-proof payment method is still relatively new, and there is still relatively low digital literacy in Ghana. However, its adoption would positively impact the job market as the number of firms in the cryptocurrency industry is expected to increase. The adoption of cryptocurrency is also expected to regulate the fluctuation in domestic currency in Ghana. In Nigeria, the 2016 financial crisis led to the adoption of Cryptocurrencies such as Bitcoin. As of Q1 in 2020, Nigeria became one of the fastest-growing markets for cryptocurrency adoption. Like other African countries, Nigeria has adopted cryptocurrencies as a means of cross-border transactions to avoid exorbitant fees charged by commercial banks. Nigerians also cultivate savings habits through cryptocurrencies, and the country has Bitcoin automated teller machines (ATMs). Albeit the ban on cryptocurrencies by the Central Bank of Nigeria (CBN), people still find ways trading them. Despite the importance of fintech, Nigeria still experiences financial exclusion as not all Nigerians have formal access to digital financial services.

The literature on cryptocurrencies is nascent despite the growing interest of scholars in Bitcoin as the most widely used cryptocurrency (e.g., Baig et al., 2019; Dastgir et al., 2019; Nadeem et al., 2021). However, studies on cryptocurrencies, in general, are scanty. Additionally, studies on human-centred approaches are scarce and require the attention of scholars (Alshamsi & Andras, 2019). The perception of the potential cryptocurrency users is vital to explaining their intention to use cryptocurrency. Hence it is crucial to adopt human-centred approaches to study cryptocurrency. Therefore, our paper focuses on the determinants of cryptocurrency use in Ghana, Nigeria and Vietnam. Authors employ the

Unified Theory of Acceptance and Use of Technology (UTAUT) (and its extension UTAUT2 framework to predict the impact of performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, financial literacy and digital literacy on the intention to use cryptocurrencies. The results from this study offer valuable insights into the critical factors for customer acceptance of cryptocurrencies in Ghana, Nigeria and Vietnam. This study is among the first to examine cryptocurrency use in three countries using human-centred approaches (with the exception of Arias-Oliva et al., 2019). Further, this study extends the literature (Arias-Oliva et al., 2019) by examining the influence of digital literacy on the intention to use cryptocurrency.

2. LITERATURE REVIEW

2.1 Theoretical Framework

The Unified Theory of Acceptance and Use of Technology (UTAUT) (Vanketesh et al., 2003) and its extension UTAUT2 (Venkatesh et al., 2012) serve as the underpinning theory for understanding the intention to use cryptocurrency in Nigeria, Ghana, and Vietnam. The UTAUT theory suggests that acceptance of technology is a function of performance expectancy, effort expectancy, social influence and facilitating conditions (Abu et al., 2015; Arias-Oliva et al., 2019). Therefore, acceptance of cryptocurrencies is based on the users' anticipation that cryptographic-proof transaction is based on technology which will be secured and on time (Gupta and Arora, 2019). Furthermore, one's decision to accept a technology could be attributed to the ease at which an individual transacts on the cryptocurrency technology interface (Shahzad et al., 2018). The theory admits that social forces such as peer pressure, socialization, and society also facilitate the acceptance of cryptocurrency by an individual or organizations (Moon and Hwang, 2018). The availability of necessary resources and access to necessary training on investing in cryptocurrency could also be the basis for its acceptance (Hussain et al., 2018). This study also adopts the extended UTAUT2 model by including the influence of perceived risk and financial and digital literacy (Arias-Oliva et al., 2019; Slade et al., 2013). This study aims to demonstrate that perceived risks negatively impact the intention to use cryptocurrencies using this model. Furthermore, this study also adopts this model to establish the positive impacts of financial and digital literacy on the intention to use cryptocurrencies.

Performance expectancy and intention to use cryptocurrency

Performance expectancy refers to the users' expectation that technology usage would improve their standard of living and quickly facilitate the achievement of life goals (Arias-Oliva, 2019). The acceptance of technology is likely influenced by the expectation that the technology will enhance users' performance (Gupta, 2017). Several studies have found an empirical association between

performance expectancy and intention to use in electronic commerce and marketing (e.g., Arias-Oliva et al., 2019; Chow et al., 2019; Patil et al., 2020). According to Gunawan and Novendra (2017), for a user to accept cryptocurrency usage, they must be convinced that it will improve their performance. Kim et al. (2018) submit that performance expectancy influences the intention to use a biometrics payment authentication system. Mendoza-Tello et al. (2018) demonstrate that performance expectancy is the main predictor of the intention to use cryptocurrencies. Contrarily, Mirza et al. (2022) found a negative and insignificant impact of performance expectancy on intention to use cryptocurrency. Based on the literature, we argue that performance expectancy will affect the use of cryptocurrencies in Ghana, Nigeria and Vietnam.

H1. Performance expectancy concerning using cryptocurrencies positively impacts the intention to use them.

Effort expectancy and intention to use cryptocurrency

Effort expectancy is the degree of ease linked with using a specific technology (Venkatesh et al., 2012). Several studies have examined the impact of effort expectancy on intention to use a specific technology. In Vietnam, Nguyen and Nguyen (2021) found that effort expectancy influences companies' adoption of blockchain technology in supply chain management. Arias-Oliva et al. (2019) examined the drivers of cryptocurrency usage in Spain. The result suggests that effort expectancy is necessary for the intention to use cryptocurrency. Almarashdeh et al. (2021) examined the variables affecting adopting bitcoin technology using SEM. The findings revealed that effort expectancy is the most significant determinant of behavioural intention to use bitcoins technology. Tamphakdiphanit and Laokulrach (2020) examined Thailand's determinants of cryptocurrency usage. The multiple regression analysis results reveal that the expectation that the cryptocurrency platforms will be user-friendly, understandable, and easy to use significantly influence behavioural intention to use them. However, the study by Wong et al. (2020) in Malaysia affirmed that effort expectancy has an insignificant effect on behavioural intention. Tarhini et al. (2016) found an insignificant impact of effort expectancy on users' acceptance of internet banking technology in Lebanon. We hypothesized that

H2. Effort expectancy concerning using cryptocurrencies positively affects the intention to use them.

Social influence and intention to use cryptocurrency

Social influence is the extent to which an individual perceives that others would prefer him/her to adopt cryptographic-proof transactions. It is the extent to which an individual feels that people who exert influence on him/her would think he/she should use cryptocurrencies (Gupta & Arora, 2019). Often, people are motivated to behave in a certain way to meet the expectation and behaviour of other socially influential people (Kishore & Sequeira, 2016). A user's realization that celebrities, friends, experts, and neighbourhoods expect him/her to

adopt bitcoin technology is more likely to result in social pressure and intention to use bitcoin (Kim et al., 2018). In India, Queiroz and Wamba (2019) observe that social influence has a significant positive impact on the intention to adopt blockchain technology. Schaupp and Festa (2018) found that the relationship between social influence and intention to adopt cryptocurrencies is significant. Arguably, it is inferred that social influence strongly influences people to use cryptocurrency. Almarashdeh et al. (2021) also found a negative but significant influence on the intention to use Bitcoin. Makanyeza and Mutambayashata (2018) reported an insignificant effect of social influence on the intention to use plastic money. Mendoza-Tello et al. (2018) observe that social influence is unrelated to the intention to use cryptocurrency. Arias-Oliva et al. (2019) show that social influence does not have significant predictive power on the intention to adopt cryptocurrencies.

Similarly, previous studies also found no significant impact of social influence on financial technology adoption (Khan et al., 2018; Makanyeza and Mutambayashata, 2018). Customers who are early adopters feel no need to wait for people's opinions before accepting financial technology (Abbasi et al., 2021). Based on the proposition from the literature, this study hypothesized that:

H3. Social influence concerning the use of cryptocurrencies positively impacts the intention to use them.

Facilitating conditions and intention to use cryptocurrency

Facilitating conditions suggest the extent to which a user believes he/she has the technological resources to support the use of new technology (Venkatesh et al., 2003). The presence of necessary resources and knowledge about cryptocurrencies technology promotes facilitating conditions which attract users to invest in cryptocurrencies technology (Chow et al., 2019; Gunawan & Novendra, 2017). Khan et al. (2017) show that facilitating conditions foster intention to use online banking. Other studies highlight the influence of facilitating conditions on the adoption of financial technologies (e.g., Khan et al., 2017; Nisha, 2016). Other studies found an insignificant influence of facilitating conditions (Abbasi et al., 2021; Farah et al., 2018; Makanyeza & Mutambayashata, 2018; Moon & Hwang, 2018). We argue that if a person believes that he or she has the necessary organizational and technical infrastructure to use cryptocurrency, he/she will use them.

H4. Facilitating conditions for the use of cryptocurrencies has a positive impact on the intention to use them.

Perceived risk and intention to use cryptocurrency

Perceived risk is the degree of unfavourable conditions attributed to using cryptocurrency technology and other financial technologies (Arias-Oliva et al., 2019; Faqih, 2016). Cryptocurrency technology can expose users to cybercrimes as cryptocurrency accounts can be hacked using malware. Also, since transactions with

cryptocurrencies are largely unregulated, they could be attacked by fraudsters and used as an avenue for money laundering. When users perceive that the acceptance of technology poses a higher risk, they tend to take proper measures to reduce risks (Featherman & Pavlou, 2003). Developing knowledge and skills on how to use the technology can be a coping strategy. Contrarily, customers interested in investing in high-risk businesses are more prone to be attracted to cryptocurrencies (Lammer et al., 2019). Since cryptography-proof investments are riskier (Abramova & Boeme, 2016) than non-crypto currency investments, customers with a high-risk tolerance tend to invest more in cryptocurrencies than those who are risk-averse (Zhao & Zhang, 2021). In related studies, for instance, Farah et al. (2018) observed that perceived risk is not a determinant of the intention to use m-banking. Mendoza-Tello et al. (2018) demonstrated that perceived risk does not predict the intention to adopt cryptocurrencies for electronic payments. Given that cryptocurrency is an emerging fintech with potential risk, authors hypothesize that:

H5. The perceived risk of using cryptocurrencies negatively impacts the intention to use them.

Financial literacy and intention to use cryptocurrency
Financial literacy is the ability of an individual to apply financial resource management skills and proficiency in making finance-related decisions effectively (Jariyapan et al., 2022). Financial literacy is integral to financial investment decisions (Lusardi & Mitchell, 2014; Stolper & Walter, 2017). Specific to cryptocurrency technology, Jariyapan et al. (2022) stated that the low rate of financial literacy in emerging economies could inhibit the behavioural intention to use the technology. The advent of financial technologies necessitated financial education to take advantage of it (Yoshino et al., 2020). Surprisingly, Yoshino et al. (2020) found that a higher level of financial literacy reduces the intention to invest in cryptocurrencies. They argue that financial literacy does not determine the intention to use cryptocurrency technology. Arias-Oliva et al. (2019) contend that an individual with financial management proficiency would be reluctant to hold cryptocurrency assets since their price is volatile. Arguably, financial literacy can promote the use of cryptocurrencies in emerging countries. Hence the following hypothesis is proposed.

H6. Financial literacy positively impacts the intention to use cryptocurrencies.

Digital literacy and intention to use cryptocurrency
Digital literacy is proficiency in using digital tools (Van Laar et al., 2017). Digital literacy encompasses proficiency in handling ethical, legal and moral issues associated with online transactions (Ananiadou & Claro, 2009). It also encompasses proficiency in handling cyber safety and security and using digital technologies for daily activities (Ng, 2012). Technological innovations have improved the dimensions of literacy such that digital literacy is required to have confidence in using technologies to perform tasks (Song & Ling, 2011). Arguably, proficiency in using digital tools can encourage people to use cryptocurrencies. One of the

contributions of this study is the introduction of digital literacy as one of the factors affecting the intention to use cryptocurrencies.
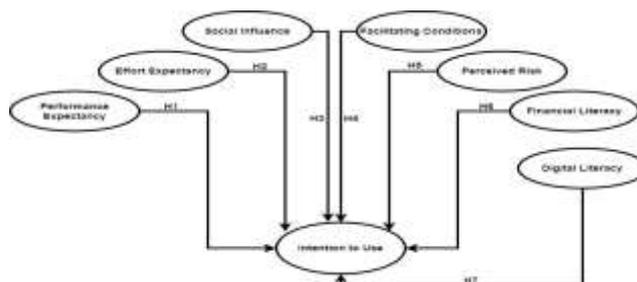
H7. Digital literacy positively influences the intention to use cryptocurrencies.

3. METHODOLOGY

The methodology is one of the core elements of research. Dependable research involves data collection and interpretation (Saunders et al., 2009). This study employed quantitative methodology to explain the relationship, differences, and trends between carefully selected dependent and independent variables using SmartPLS version 3.3.9 for Structural Equation Modelling based on established theory in the literature. The study worked on the measurement model and conducted Principal Component Exploratory Factor Analysis with Varimax rotation to ascertain the dimensions in the scales. The study also conducted the reliability, convergent and discriminant validity analyses, and the defect items were removed at this stage (Table 4). Also, the study worked on the structural model and calculated the R^2 and Q^2 based on the path coefficients of the independent and dependent variables with Partial Least Square Consistent-Structural Equation Modelling (PLSc-SEM). At this stage, the study ascertains the degree of significance of the variables. According to Dijksra and Henseler (2015), the PLS-SEM technique is preferable to PLS-SEM due to Type I and Type II errors. PLS-SEM is appropriate for reflective constructs.

Data Collection
This study targets two countries in Africa (Ghana and Nigeria) and one in Asia (Vietnam) for comparative analysis (Figure 1).

Figure 1. Proposed Theoretical Framework for intention to use Cryptocurrency

A structured questionnaire was designed and administered via Google Form to participants around 20 years old and beyond. The earlier study emphasised the importance of financial knowledge and behaviour (Robb and Woodyard, 2011) and this study targets participants who are aware of cryptocurrency and have financial knowledge. The survey also considers the participants with Internet competence. In total, 756 responses have been collected and 352 (Ghana= 32.08%; Nigeria= 35.26%; Vietnam= 32.66%) qualified for the analysis. Those eliminated were because of incomplete answers to

any of the questions. The questionnaire was used to glean their opinion on the intention of using cryptocurrency for diver's purposes (Table 1) The questionnaire consists of demographics and Likert Scale questions.

Table 1. Adapted variables, items, and their theoretical precedents

Variables and Items	Theoretical Precedents
Intention to use (ITU) I intend to use cryptocurrencies I predict that I will use cryptocurrencies	Chen et al. (2016) Venkatesh et al. (2003) Arias-Oliva et al. (2019)
Performance expectancy (PE) Using cryptocurrencies will increase opportunities to achieve important goals for me Using cryptocurrencies will help me achieve my goals more quickly Using cryptocurrencies will increase my standard of living	Venkatesh et al. (2003) Kim et al. (2018)
Effort expectancy (EE) It will be easy for me to learn how to use cryptocurrencies Using cryptocurrencies will be clear and understandable for me It will be easy for me to use cryptocurrencies It will be easy for me to become an expert in the use of cryptocurrencies	Venkatesh et al., 2012
Social influence (SI) The people who are important to me will think that I should use cryptocurrencies The people who influence me will think that I should use cryptocurrencies People whose opinions I value would like me to use cryptocurrencies	Schaupp and Festa, 2018
Facilitating conditions FC I have the necessary resources to use cryptocurrencies I have the necessary knowledge to use cryptocurrencies Cryptocurrencies are compatible with other technologies that I use I can get help if I have difficulty using cryptocurrencies	Venkatesh et al., 2012)
Perceived risk (PR) Using cryptocurrencies is risky There is too much uncertainty associated with the use of cryptocurrencies Compared with other currencies/investments, cryptocurrencies are riskier	Faqih (2016)) based on Shim and Lee (2011)
Financial literacy (FL) I have a good level of financial knowledge I have a high capacity to deal with financial matters	Hastings et al. (2013) Skagerlund et al. (2018)
Digital literacy (DL) I have a good level of digital knowledge I have a high capacity to deal with digital tools	Chen (2015) Bawden (2008)

4. RESEARCH RESULTS

4.1 Measurement Model

The exploratory factor analysis was performed with IBM SPSS App to check the dimension included in the scales used for the study. The scales were found to have one dimension each. Bartlett's test indicates that the Kaiser-Olkin (KMO) statistics measure the sampling adequacy and show how the data is suited for factor analysis. The KMO values are not close to zero, as the KMO value indicates 0.82. This result conforms to the threshold of 0.8 to 1. Also, the variance explained by the factors accounts for 74.56%, and this result confirms that the statistic applied is appropriate. This study dwells on the proposition of Hair et al., (2011), Ringle and Sarstedt (2013) and evaluates the measurement model. According to Hair et al. (2013) the standardized loadings of the

variables of reflective measurement models should be higher than 0.7 with a significant value of $t > 1.96$ (Table 2). All the items met the criteria except the third item of Facilitating Conditions, but its t-values were more significant than the 1.96 threshold. The third item was retained because of Chin's (1998) proposition that emphasized the flexibility of a standardized loading boundary of 0.7. Further, all the construct's composite reliability was more significant than the 0.7 thresholds. This result confirmed the reliability of the utilized constructs (Tables 2, 3 and 4). The scales' average variance extracted (AVE) was more significant than 0.5. This result also established the convergent validity of the constructs. On the other hand, the discriminant validity was established as the AVE's square root surpasses the constructs' correlations (Roldán and Sánchez-Franco, 2012). The variance inflation factor values were

acceptable (Table 3), and Harman's single factor test accounts for 30.94, which is <50% threshold. According to Jakobsen and Jensen (2015), common method bias occurs when the relationship between the measured variables is affected by common method variance. Based on the result, it can be concluded that the common method variance is not present.

Structural Model

The study conducted PLSc bootstrapping with 5000 resamples to evaluate the quality and the relevance of the construct's path coefficients. The results in Figure 6 show the R^2 value for the intention to use cryptocurrency and the path coefficients of the explanatory variables. The R^2 value of 62.2% indicates that the model's goodness of fit is substantial (Chin, 1998). The Q-square values also above zero (0.58) indicate that endogenous constructs have predictive relevance, and the values are well reconstructed. This result firmly established the strong intention to use cryptocurrency. The results show that performance expectancy, effort expectancy, facilitating conditions, perceived risk, and financial literacy (H1, H2, H4, H5, and H6) were supported, and performance expectancy is the highest predictor of intention to use cryptocurrency with the most significant effect size (Cohen, 1988).

On the other hand, social influence and digital literacy (H3 and H7) were not supported. After examining the results of the general model, the study also conducted a multigroup analysis for three countries based on the path coefficient used for the general model (see table 5 and 6). The study employed bootstrapping to accomplish this goal. The results show differences in the path coefficients of all the seven variables utilized. Further, the relationship between performance expectancy and intention to use cryptocurrencies was significant across Nigeria, Ghana, and Vietnam, but Nigeria is the highest predictor of intention while Vietnam is the lowest.

Regarding the path coefficient of effort expectancy and the intention to use, it was only found significant in Nigeria and insignificant in Ghana and Vietnam. The path coefficient of social influence, digital literacy, perceived risk, and intention to use was insignificant across the three countries. Facilitating conditions and intention to use were only significant in Ghana, and likewise, the financial literacy and intention to use while they were not significant in Nigeria and Vietnam (Table 6).
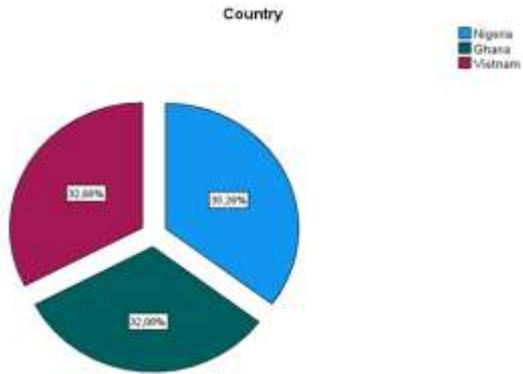
Table 2. Variables, items, standard loadings, and their t-value

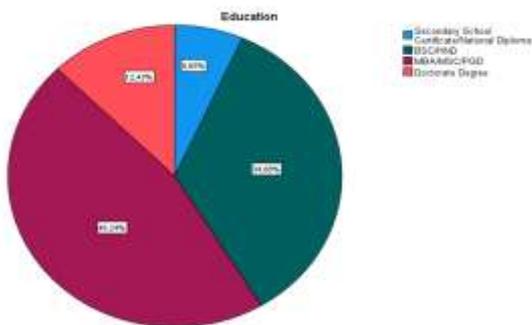| Variables and Items	Items Loading and (t-value)
Intention to use (ITU)	
I intend to use cryptocurrencies	0.97 (207.10)
I predict that I will use cryptocurrencies	0.97 (188.93)
Performance expectancy (PE)	
Using cryptocurrencies will increase opportunities to achieve important goals for me	0.92 (118.50)
Using cryptocurrencies will help me achieve my goals more quickly	0.89 (51.48)
Using cryptocurrencies will increase my standard of living	0.85 (32.85)
Effort expectancy (EE)	
It will be easy for me to learn how to use cryptocurrencies	0.83 (36.89)
Using cryptocurrencies will be clear and understandable for me	0.91 (83.48)
It will be easy for me to use cryptocurrencies	0.89 (59.55)
It will be easy for me to become an expert in the use of cryptocurrencies	0.82 (34.00)
Social influence (SI)	
The people who are important to me will think that I should use cryptocurrencies	0.88 (36.15)
The people who influence me will think that I should use cryptocurrencies	0.91 (63.70)
People whose opinions I value would like me to use cryptocurrencies	0.86 (34.08)
Facilitating conditions FC	
I have the necessary resources to use cryptocurrencies	0.80 (31.01)
I have the necessary knowledge to use cryptocurrencies	0.76 (24.38)
Cryptocurrencies are compatible with other technologies that I use	0.66 (13.93)
I can get help if I have difficulty using cryptocurrencies	0.74 (18.26)
Perceived risk (PR)	
Using cryptocurrencies is risky	0.90 (5.48)
There is too much uncertainty associated with the use of cryptocurrencies	0.89 (5.12)
Compared with other currencies/investments, cryptocurrencies are riskier	
Financial literacy (FL)	
I have a good level of financial knowledge	0.97 (4.84)
I have a high capacity to deal with financial matters	0.93 (4.93)
Digital literacy (DL)	
I have a good level of digital knowledge	0.83 (14.22)
I have a high capacity to deal with digital tools	0.90 (14.31)

Note. Third item of perceived risk was removed due to small factor loading
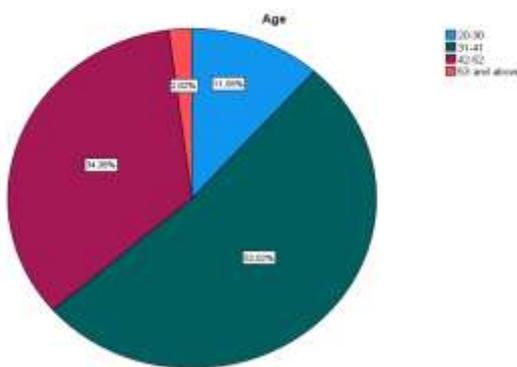
4.2 Descriptive Statistics

The dataset consists of Ghana, Nigeria and Vietnam, and Figure 2 shows Ghana has 32.08%, Nigeria 35.26% and Vietnam 32.66%. Nigeria has the highest dataset, while Ghana and Vietnam were almost in the same range. Education-wise, Figure 3 shows that MBA/MSC/PGD has the highest participation with 46.24%, followed by BSC/HND with 34.68%. Doctorate holders also have 12.43%. Since cryptocurrency requires a high level of literacy, the participant of this study meets this requirement.

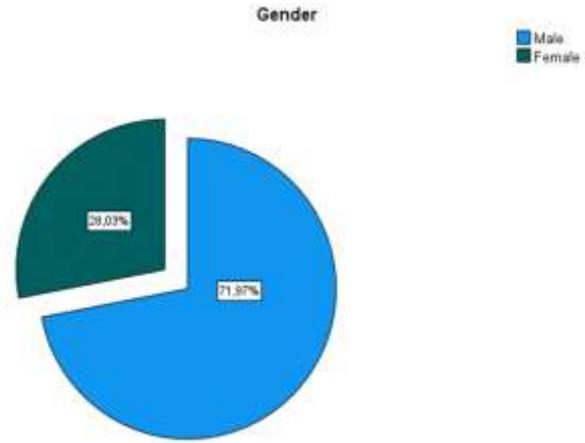**Figure 2.** Country's datasets (Ghana, Nigeria and Vietnam)

Figure 3. Education level of the participants

Figure 4. Age brackets of the participants

Two major age brackets emerged as the participants of this study with the highest percentage. Age 31-41 typify 52.02% while age 42-52 reflect 34.39%. Age 20-30 are less with 11.56% and 53 and above with 2.02%. Millennials and Gen X dominate this study (Figure 4). In the study sample, 71.97% male and 28.03% female participated (Figure 5).
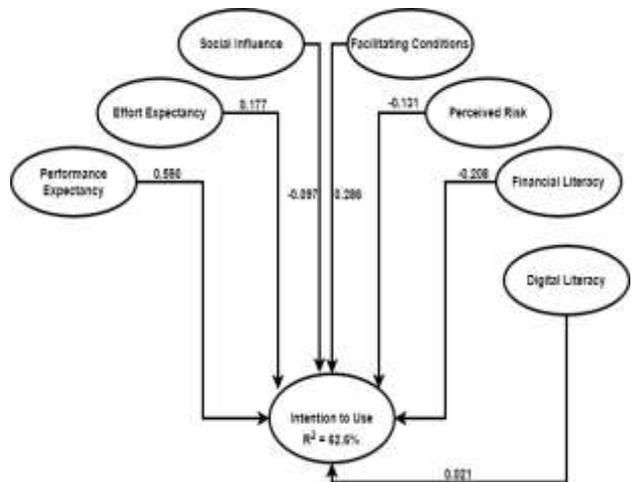

Figure 5. Gender of the participants

Table 3. Quality Criteria of the Variables (Composite Reliability, Average Variance Extracted and Variance Inflation Factor

Variables	Composite Reliability	AVE	Inner VIF Values
Intention to use	0.967	0.937	
Performance expectancy	0.919	0.791	1.557
Effort expectancy	0.920	0.742	2.382
Social influence	0.912	0.775	1.762
Facilitating conditions	0.829	0.550	2.114
Perceived risk	0.890	0.801	1.066
Financial literacy	0.950	0.905	1.460
Digital literacy	0.858	0.751	1.914

Note. Statistically, convergent validity is established when the Average Variance Extracted (AVE) is >0.50.

Figure 6. Theoretical Framework Path Coefficient Results

Table 4. Discriminant Validity (Fornell-Larcker Criterion)

	DL	EE	FC	FL	INT	PE	PR	SI
DL	**0.867**							
EE	0.625	**0.862**						
FC	0.364	0.595	**0.742**					
FL	0.488	0.357	0.368	**0.951**				
INT	0.183	0.397	0.553	0.014	**0.968**			
PE	0.151	0.313	0.513	0.104	0.722	**0.889**		
PR	0.098	0.189	0.160	0.085	-0.077	0.014	**0.895**	
SI	0.279	0.500	0.517	0.071	0.404	0.505	0.180	**0.880**

Note. It is possible to prove discriminant validity if the square root of Average Variance Extracted (AVE) for a particular construct is higher than the construct's correlation with all other constructs.

Table 5. Model 1 Direct Effect Path Coefficient tested hypotheses, R-Square, Q-Square and T-value results

Hypotheses	Variable	R^2	Q^2	ƒ Square	Direct Effect	t-value	p-value	Confirmation
	Intention to use	0.626	0.580					
H1	PE -> Intention to use			0.597	0.590	11.625	0.001	Yes
H2	EE -> Intention to use			0.035	0.177	3.115	0.002	Yes
H3	SI -> Intention to use			0.014	-0.097	1.719	0.086	No
H4	FC -> Intention to use			0.103	0.286	3.988	0.001	Yes
H5	PR -> Intention to use			0.043	-0.131	2.951	0.003	Yes
H6	FL -> Intention to use			0.079	-0.208	3.503	0.001	Yes
H7	DL -> Intention to use			0.001	0.021	0.403	0.687	No

Table 6. Multi-group analysis bootstrapping results

Hypotheses	Variable Relationship	Nigeria	Ghana	Vietnam	Different	Assessment
H1a	PE -> Intention to use	10.688	8.760	4.568	Yes	A
H2b	EE -> Intention to use	2.965	0.690	1.890	Yes	A/NS/NS
H3c	SI -> Intention to use	1.539	0.548	1.473	Yes	NS/NS/NS
H4d	FC -> Intention to use	1.860	2.044	1.855	Yes	NS/A/NS
H5e	PR -> Intention to use	0.752	0.645	1.650	Yes	NS/NS/NS
H6f	FL -> Intention to use	0.475	2.172	1.299	Yes	NS/A/NS
H7g	DL -> Intention to use	0.056	1.346	1.898	Yes	NS/NS/NS

5. DISCUSSION

This study discovered a continental gap in the intention to use cryptocurrency in three emerging markets. This study employed the theories of the Unified Theory of Acceptance and Use of Technology (UTAUT), perceived risk, financial literacy, and digital literacy, which aligns with financial acceptance studies to fill the gap in financial literature. The focus of this study is to propose and test an explanatory model of the intention of students and workers to use cryptocurrencies in Ghana, Nigeria, and Vietnam. The experience of severe financial hardship due to the disruption caused by COVID-19 has increased the quest for financial knowledge and liberation. This quest propelled both the rich and the poor to dabble in cryptocurrency investment, especially in developing countries. The study by (Jalilian & Kirkpatrick 2002; Bolarinwa & Akinlo 2021) emphasised the development of the financial sector as a panacea for poverty reduction. This study aims to identify the crucial determinants of the intention of students and workers to use cryptocurrency in developing countries. This study presents two models in the results section, and the general model results reveal the explanatory power of performance expectancy above other utilised variables. It indicates the strong intercontinental perception of the students and workers

that intend to use a cryptocurrency that they will gain if they engage in cryptocurrency business or trading. *Performance Expectancy* is a construct common in the adoption and use of technology research and has been justified as the predictor of behavioural intention in earlier studies (Venkatesh et al., 2003; Venkatesh et al., 2012). A recent study on cryptocurrency use focused on a single developed country in the Southwest of Europe (Arias-Oliva et al., 2019), while another study on behavioural intention to use cryptocurrency focused on a single developing country in Southern Asia (Jariyapan et al., 2022). This study fills the gap created in the earlier study and contributes to the financial literature by understanding the factors that directly impact the intention to use cryptocurrency in emerging markets. This study contributes to the financial literature in two ways. One, this study spotlighted the five most important factors that directly relate to the intention to use cryptocurrency: technology, risk, and literacy at the general level. The significance of technology factors (performance expectancy, effort expectancy, and facilitating conditions) was consistent with the study of (Arias-Oliva et al., 2019). Similarly, in the earlier study and this study, performance expectancy and intention to use cryptocurrency path coefficient had the highest direct effect. Contrary to previous studies (Arias-Oliva et al.,

2019; Jariyapan et al., 2022), this study's perceived risk and financial literacy predicted the intention to use cryptocurrency (Table 5). The study of Ogawa and Luo (2024) compared different risks and concluded that financial markets prompt global financial risk more than global policy risk. Financial risk has been the major concern of many investors and their investments. The significant relationship between financial literacy and intention to use cryptocurrency aligns with the study of Jariyapan et al. (2022). This study reveals the impact of technology, risk, and literacy at the country levels. The study shows that the technology factor of performance expectancy is more predominant in Nigeria than in Ghana and Vietnam. Another technology factor of effort expectancy was only relevant in Nigeria and not in Ghana and Vietnam in this study. Also, the financial literacy factor was only important in Ghana and not important in Nigeria and Vietnam based on the results of this study. A recent study mentioned that financial literacy and investment experience positively aid cryptocurrency investment (Zhao and Zhang, 2021). This result reflects the true-life situation in these countries. Cryptocurrency investment or business is a growing trend in Africa, as the study by Ndemo (2022) shows that 2 per cent of the global value of cryptocurrencies dwells in Africa. However, this financial trend shows rapid growth as Africans harvest $105.6 billion in cryptocurrency in 2021, which accounts for a 1200 per cent increase from 2021. The study of Ndemo also confirmed that Nigeria and Ghana are among the top ten countries of cryptocurrency use. Similarly, Vietnam is among the leading countries in Central and Southern Asia and Oceania (CSAO). This study is timely and a gateway to the intention to use cryptocurrency in West Africa and Southeast Asia. This study is unique as it differentiates itself from the earlier studies that focused on a single country. This study combined three potential countries for cryptocurrency and discovered the crucial factors that necessitate the intention to use cryptocurrency. This study seems to be the first initiative of behavioural intention to use cryptocurrency in Western Africa and Southeastern Asia with a combination of technological, risk and literacy factors.

6. CONCLUSION

Cryptocurrency has received attention from students, workers, investors, media coverage, and hype. Cryptocurrencies offer many potential benefits and significantly impact future economic systems. Nonetheless, cross-country studies about Cryptocurrencies are scarce, especially in emerging economies. Based on UTAUT and UTAUT2, this paper examines the individual intention to use cryptocurrencies using data from Nigeria, Ghana and Vietnam. The findings showed a strong intention to use cryptocurrency. Based on the results of the general models, performance expectancy, effort expectancy, facilitating conditions, perceived risk, and financial literacy are determinants of intention to use cryptocurrency. On the other hand, social influence and digital literacy are not determinants of intention to use cryptocurrency. A multigroup analysis for three countries reveals that the relationship between performance expectancy and intention to use cryptocurrencies was significant across Nigeria, Ghana, and Vietnam. The result shows that effort expectancy and the intention to use were significant in Nigeria and insignificant in Ghana and Vietnam. Further, social influence, digital literacy, perceived risk, and intention to use were insignificant across the three countries. Facilitating conditions and intention to use were only significant in Ghana, and likewise, the financial literacy and intention to use while they were not significant in Nigeria and Vietnam.

6.1 Theoretical Implications
This study looked at the Nigerians, Ghanaians, and Vietnamese intention to use cryptocurrencies, and the findings identify the factors that influence the adoption of cryptocurrencies. In a single study, understanding of factors that influence the use of cryptocurrencies in different countries is limited. The present study addresses this gap by employing the UTAUT and UTAUT2, and the results add value to the nascent but growing literature on cryptocurrency. This study is one of the initial attempts to extend the UTAUT and UTAUT2 by focussing on three emerging economies in a single study and deepening our insights into cryptocurrency adoption. Additionally, our study extends UTAUT and UTAUT2 by considering the effects of digital literacy on the intention to use cryptocurrency and the findings are insignificant. The findings offer a theoretical base for scholars to extend our study and the debate on cryptocurrency.

6.2 Practical Implications
This study has several practical implications. Besides informing individuals (students/ workers), investors, and companies, our study also informs governments and financial institutions on the need to formulate and implement policies that will assist in reducing the risks associated with the use of cryptocurrency. Understanding how cryptocurrency works and the knowledge and skills of cryptocurrency users could shape users' adoption. Therefore, we recommend that potential users be exposed to the knowledge and skills needed to use cryptocurrency effectively. Countries such as the United States, Japan, India, Indonesia, and European Union have implemented policies regulating cryptocurrencies. Ghana, Nigeria and Vietnam governments should pay attention to the position of cryptocurrency in the financial system and allow it to interact with other market assets. Therefore, authors recommend that governments regulate cryptocurrencies by learning from countries where cryptocurrencies have been used.

6.3 Limitations and Future Research Directions
This study is subject to shortcomings, which offer an avenue for more research. First, data were collected from three countries in West Africa and Southeast Asia, showing individuals' intentions in these countries. For generalization, future studies should obtain data from more countries (emerging) to test the research model. Second, our study revealed insignificant effects of social influence and digital literacy, so future research should examine this relationship. Third, the absence of regulations concerning cryptocurrencies could lead to using them for illegal activities such as money laundering, tax evasion, and financing of terrorism (Yelowitz and Wilson, 2015). Scholars should explore the dark sides of cryptocurrency use. Fourth, the qualitative research approach can provide an in-depth insight into the subject. Future research should consider using a qualitative research approach to examine the phenomenon. Finally, scholars should explore the risks (financial and operational) linked with the use of cryptocurrencies in the countries examined and beyond. Nonetheless, we contribute to the debate on cryptocurrency and financial technology.

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