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Determinants of Cryptocurrency Exchange Adoption:
A Conceptual Model

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ABSTRACT

Cryptocurrencies have become a global phenomenon, and the number of registered users of cryptocurrency exchange platforms has grown worldwide. However, only a small number of the registered users are active users that engage in actual transactions. In this study, the authors used a multi-theory approach to identify the key factors of the adoption of cryptocurrency exchanges and to develop a conceptual model that would have a potentially high explanatory power. The proposed model emphasizes the role of psychological innovation resistance, functional innovation resistance, technology readiness and trust, perceived risk and risk propensity, subjective norms, and critical mass of users. The authors discuss the model along with the research propositions it implies and the theoretical and practical implications of the study.

KEYWORDS

Cryptocurrency Exchanges, FinTech, Innovation Resistance, Perceived Risk, Technology Readiness

INTRODUCTION

Cryptocurrency exchanges are online platforms that allow buyers and sellers to trade cryptocurrencies for other assets such as fiat and digital currencies (Corporate Finance Institute, 2023). Centralized exchanges (e.g., Coinbase and Gemini) act as intermediaries between the seller and the buyer, whereas decentralized exchanges (e.g., UniSwap and Kyber) allow users to execute peer-to-peer transactions without intermediary. The use of cryptocurrency exchanges is growing worldwide and, for the first time in history, the market capitalization of cryptocurrency topped 2 trillion USD in the first quarter of 2021 (Kharpal, 2021). As of the beginning of 2021, Coinbase (i.e., the leading cryptocurrency exchange in the U.S.) that launched in 2012, has had 56 million registered users, of which only 6.1 million are active users that perform one transaction per month, at least (Dean, 2023). This is less than 11% of the registered users engaging in actual transactions. Why very few registered users are actively using cryptocurrency exchanges? What factors explain the use of cryptocurrency exchanges? In search for a hint of an answer,

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the authors examined information systems (IS) literature. A search of the eLibrary database of the Association for Information Systems using the keywords "cryptocurrency," "cryptocurrency exchanges," "cryptocurrency adoption," and "cryptocurrency exchanges adoption" for papers published between 2010 and 2022 yielded 35 articles from the following major IS conferences or journals: ICIS, AMCIS, ECIS, PACIS, BLED, and Communications of the Association for Information Systems. Most of the published papers focused on specific cryptocurrencies (e.g., bitcoin and ethereum) or on related fintech technologies (e.g., blockchain and digital business models). Even though some of the papers specifically addressed cryptocurrency exchanges (e.g., Marella et al., 2021), none of the 35 articles specifically focused on identifying the factors explaining the adoption of cryptocurrency exchanges. This suggests that cryptocurrency exchanges and the factors that may explain their adoption are like an unchartered territory that requires more academic research to shed a light on a phenomenon that attracts more and more businesses and people worldwide (Dean, 2023). In this study, the authors aimed to address the following research questions: What key factors participate in explaining the adoption of cryptocurrency exchange platforms and what is their potential impact on the use of the platforms?

The authors reviewed relevant theories on the adoption of technology and innovations in order to identify key factors of cryptocurrency exchanges adoption and develop a conceptual model that would have a potentially high explanatory power. The next section provides the literature review on which the authors drew to determine the factors to be included in their model. Then, based on the theoretical background, the authors discuss the conceptual model along with the relevant research propositions. Finally, they examine the theoretical and potential practical implications of their research model.

THEORETICAL BACKGROUND

Based on the theory of reasoned action (TRA), the technology acceptance model (TAM) has become a cornerstone for explaining technology adoption in the IS field.

The Theory of Reasoned Action and Technology Acceptance

The TRA states that a "person's performance of a specific behavior is determined by his/her behavioral intention (BI), and BI is, in turn, influenced by the person's attitude and subjective norm (SN) concerning the behavior in question" (Davis et al., 1989, p.). According to Fishbein and Ajzen (1975), BI measures people's intention to perform a specified behavior, and attitude is an individual's positive or negative feelings about performing a target behavior. Subjective norm refers to a "person's perception that most people who are important to him think he should or should not perform the behavior in question" (Fishbein & Ajzen, 1975, p. 302). According to the TRA, "one's attitude toward a behavior is determined by his or her salient beliefs about the consequences of performing the behavior multiplied by the evaluation of those consequences" (Davis et al., 1989, p. 984). The TRA defines beliefs as a person's "subjective probability that performing [a] target behavior will result in consequence," and subjective norm as the "multiplication of one's normative beliefs and his or her motivation to comply with these beliefs" (Davis et al., 1989, p. 984).

According to the TAM, at its core, technology adoption is determined by those beliefs that a user holds about the target technology's perceived usefulness and perceived ease of use. Perceived usefulness is the extent to which users believe that the technology will help them perform their job better. On the other hand, perceived ease of use refers to the degree to which users believe that using the technology would be free of effort (Davis, 1989). According to the TAM, users' perceptions, in turn, determine their attitude (i.e., favorableness or unfavorableness) toward using the technology, which attitude will determine the users' BI to use the technology. Finally, the TAM suggests that the intention may lead to the actual use of the technology.

Over the year, several studies have used the TRA as theoretical foundation to explain the adoption of specific digital currencies (e.g., bitcoin) or technologies that are similar to cryptocurrency exchanges (e.g., online banking). For instance, Vatanasombut et al. (2008) found that perceived usefulness

and perceived security have a significant impact on trust in online banking, which, in turn, has a significant impact on the continuance intention to use online banking. Shen et al. (2010) also found that perceived usefulness and perceived ease-of-use, along with security cost and trust in a financial institution, have a significant impact on the intention to adopt mobile banking. In addition, Illia et al. (2015) found that perceived usefulness, perceived ease-of-use, and technology readiness play a key role in the decision to adopt mobile banking.

More recently, Arias-Olivia et al. (2019) found that perceived usefulness (or performance expectancy) and perceived ease-of-use (or effort expectancy) have an impact on people's intention to use specific cryptocurrencies. Walton and Johnston (2018) determined that perceived usefulness and perceived ease-of-use have an impact on attitude towards (and the intention to use) bitcoin.

Consistently with the TRA and previous studies on technology adoption, the authors argue that the perception of cryptocurrency exchanges (in terms of perceived usefulness and perceived ease-of-use) is a key factor that will have a direct impact on their adoption.

The Social Influence Theory

Social influence is another factor that plays a role in technology adoption. Proposed by Kelman (1958), the social influence theory states that people's attitudes, beliefs, and subsequent actions or behaviors are influenced by referent others through unconscious processes or via overt social pressure. According to Kelman (1958), there are three types of unconscious processes or social pressures: Compliance, identification, and internalization. Compliance occurs when people are influenced to adopt an induced behavior to gain rewards (or approval) and avoid punishments (or disapproval) from a group. Identification happens when people adopt an induced behavior to create or maintain a beneficial relationship to a group. Finally, internalization occurs when people accept influence after perceiving the content of an induced behavior to be rewarding.

In the IS literature, scholars frequently referred to subjective norms and critical mass, two theoretically distinct types of social influence, as determinants of technology use (Cho, 2011; Illia et al., 2018). Both concepts assume that, in general, people face some uncertainty regarding the appropriateness of various actions (e.g., choosing between different technologies to perform a task) and that social influence shapes people's perceptions and behavior. They also assume that people's beliefs about a technology are vague and ill-informed before (actually) using that technology. Therefore, people tend to choose a course of action by relying on the opinions or the actions of others (i.e., subjective norms). Also, as the number of users of a technology in their social circle increases (i.e., perceived critical mass), people tend to receive increasing social pressure, which can increase the chance that they will adopt the same technology (Rogers, 1995; Singer, 2022). Nevertheless, the two concepts are fundamentally different in many ways.

Subjective Norms

The concept of subjective norms was introduced by Ajzen (1991) who developed the theory of planned behavior (TPB) for the purpose of improving the predictive power of the TRA. It refers to the "perceived social pressure to perform or not to perform [a] behavior" such as using a specific technology to perform a task (Ajzen, 1991, p. 888). The reason why subjective norms have a social pressure role lays in the belief that, when facing uncertainty, following what referent others say and do can help make better decisions (Griskevicius et al., 2006). Over the years, numerous studies found that subjective norms have a significant impact on people's perception and beliefs about technology (e.g, Beldad & Hegner, 2018; Homburg et al., 2009; Teo, 2010). In this study, the authors argue that subjective norms will have an impact on people's perceived usefulness and perceived ease-of-use of cryptocurrency exchanges.

Critical Mass

Critical mass refers to "the point at which enough individuals have adopted an innovation so that the innovation's further rate of adoption becomes self-sustaining" (Rogers, 1995, p. 313). This is

consistent with the commonsense idea that the higher the number of users of a particular technology in a specific community (e.g., workplace and circle of friends), the more pressure there may be on other people to adopt the technology in question. In the business and IS field, previous studies showed that critical mass (or perceived technology popularity) has a positive impact on the adoption of a variety of technology, ranging from mobile wallet (Seetharaman et al., 2017), to instant messaging systems (Strader et al., 2007), to electric vehicules (Zhou & Li, 2018), and Internet banking (Lee & Kim, 2020), among others. Although the actual critical mass threshold is difficult to determine, each potential user may have their own perceived critical mass based on the growing number of adopters of specific technologies in their social circles (Cho, 2011). As previous studies (e.g., Cho, 2011; Illia et al., 2018), in this study the authors used the concept of perceived critical mass to refer to users' perception of whether the critical mass threshold is reached (or how soon it will be).

Technology Readiness and Trust

In this subsection, the authors will define and detail the concepts of technology readiness and trust.

Technology Readiness

Parasuraman (2000) defined technology readiness as a person's "propensity to embrace and use new technologies for accomplishing goals in home life and at work" (p. 308). It encompasses self-efficacy and determines a person's predisposition to use a new technology (Illia et al., 2022; Shen et al., 2010). According to Parasuraman, two enablers (i.e., optimism and innovativeness) and two inhibitors (i.e., discomfort and insecurity) participate in determining a person's technology readiness. Optimism is the degree to which a person believes that technology has benefits and using it can help them have more control over their lives. Innovativeness refers to people's desire to experiment with innovations and new technologies. Discomfort is associated with the feeling of lack of control over technology and lack of confidence in making technology work. Insecurity refers to the need for assurance that a technology will operate reliably. Parasuraman, who developed the technology readiness index, sustained that a person may harbor both enabler and inhibitor feelings towards technology. In this study, the authors argue that technology readiness will have an impact on people's propensity of trusting and using cryptocurrency exchanges.

Trust

From the business and social psychology perspective, trust is the willingness of a trusting party to engage in a transactional relationship with a business (Carlos Roca et al., 2009). This kind of trust, known as transaction-specific trust, is the trusting party's perceived credibility, benevolence, and integrity of the business (Schoorman et al., 2007). Perceived credibility relies on reputation; it is the belief that the business has the required expertise to effectively and reliably offer the good or service needed by the trusting party (Wang et al., 2003). Perceived benevolence is the extent to which the trusting party believes that the business intends to do good beyond its own profit motives (Schoorman et al., 2007). On the other hand, perceived integrity is the perception that the business will act with honesty and adhere to a set of principles or rules of exchange during and after a transaction (Schoorman et al., 2007). In a computer-mediated environment, transaction-specific trust becomes an issue, typically, because key elements of personal interactions (e.g., facial expression, gestures, and body language) are missing. Trust can also be system-specific, meaning intrinsic to the technology or how it is perceived. According to Grabner-Kräuter (2002), this type of trust is due to uncertainty with the perceived security of the data channel (i.e., the network) or with the "final points" (e.g., the business' server or the customer's computer).

Similarly to previous studies that examine the impact of risk and trust in the context of adopting specific cryptocurrencies (Walton & Johnson, 2018) or technologies such as e-banking (Illia et al., 2022), in this study the authors contend that both transaction-specific trust and system-specific trust will have an impact on people's intention to use cryptocurrency exchange platforms.

Perceived Risk and Risk Propensity

Perceived risk is the degree to which a user feels the uncertainty and the possible adverse consequences of using online services (Featherman & Pavlou, 2002). It acts as an inhibitor to purchase or usage behavior. A rich literature stream developed multiple dimensions of perceived risk. Cox (1967) identified two major categories of perceived risk, namely performance risk and psychosocial risk. Cunningham (1967) broke the two categories into the following six dimensions:

1. **Performance Risk:** It is the possibility of a product or service malfunctioning and not performing as it was designed and advertised, and therefore failing to deliver the desired benefits (Grewal et al., 1994).
2. **Financial Risk:** It is the potential monetary outlay associated with the initial purchase price as well as the subsequent maintenance cost of a product or service (Grewal et al., 1994).
3. **Time Risk:** It is the time lost making a purchase or using a service only to have to replace it if it does not perform to expectations.
4. **Safety Risk:** It is
5. **Social Risk:** It is the loss of status in one's social group as a result of adopting a product or service, looking foolish or untrendy.
6. **Psychological Risk:** It occurs when a user or a customer experience frustration and harm to their self-image as a result of buying or using a non-performing product or service.

Featherman and Pavlou (2002) also defined privacy risk as an additional risk dimension that is related to the potential loss of control over personal information. The extreme case of privacy risk is when a criminal uses a person's stolen identity to perform fraudulent transactions.

According to Alleyne and Broome (2011), people differ in terms of their risk propensity, which is the degree to which they are willing to venture into unknown territory or engage in risky activities. Using cryptocurrency exchange platforms can be considered a risky activity because of the potential of losing money by investing in volatile cryptocurrencies (Marella et al., 2021).

Several studies showed that perceived risk has an impact on the adoption of technology that are similar to cryptocurrency exchanges like online banking. For instance, considering different aspects of risk, Wang et al. (2014) and Chiou and Shen (2012) showed that perceived risk has a negative impact on engaging in online banking. More recently, Walton and Johnson (2018) found that perceived risk has impact on people's perception and intention to use bitcoins. Over the years, studies also showed that risk propensity has an impact on innovativeness (Das & Joshi, 2007), people's intention to use online banking (Marafon et al., 2018) or to invest in general (Alleyne & Broome, 2011; Illia et al., 2022).

The Innovation Resistance Theory

The innovation resistance theory (IRT) aims to explain why people resist using innovations even when those innovations are considered desirable (Ram & Sheth, 1989). According to the IRT, typically, people resist using innovations because of barriers that may be either functional or psychological in nature.

Functional Barriers

Functional barriers arise when an innovation requires some kind of change in users' daily routines, which can be seen as disruptive. Ram and Sheth (1989) identified three functional barriers: Usage barrier, value barrier, and risk barrier. With technology (e.g., cryptocurrency exchanges), the usage barrier can occur when the technology does not fit with potential users' practices, workflow or habits. As a result, the potential users may resist using the technology because they may think that it would require them effort to learn and utilize. According to Ram and Sheth (1989), the value barrier occurs when a technological innovation does not offer a strong performance-to-price value compared with

competing alternatives (e.g., spending time learning, trading, and paying transactions fees through crypto exchanges vs. using the service of a crypto asset management firm). According to Rammile and Nel (2012), the risk barrier is due to the fear of making mistakes and feeling insecure while conducting business using technology; it is related to self-efficacy.

Psychological Barriers

Psychological barriers arise when people resist a technology innovation because it conflicts with their belief structure. Ram and Sheth (1989) identified two types of psychological barriers, namely tradition barrier and image barrier. Tradition barriers occur when a technology innovation has the potential of making a customer do something that changes their established traditions. For example, some bank customers may have well-established habits of interacting with bank tellers when doing their transactions. Those kind of customers are more likely to resist using ATM machines (Laukkanen et al., 2008). According to Ram and Sheth, image barriers occur when people resist using a product because of stereotyped thinking concerning the product (e.g., country of origin and brand name). Some people have the negative "hard-to-use" image of technology in general which can be an image barrier that can hinder the adoption of technology (Rammile & Nel, 2012). For cryptocurrency exchanges, an image barrier can be defined as a negative perception of them as a result of the "hard-to-use" image of the technology in general.

Based on the literature review, in the next section the authors present a research framework along with a series of propositions.

RESEARCH MODEL AND PROPOSITIONS

Research Model

Drawing on the TRA and the TAM, the authors suggest that perceived usefulness and perceived ease of use will have a direct impact on people's intention to use cryptocurrency exchanges, which, in turn, will impact their actual use. Consistently with the TPB (Ajzen, 1991) and studies that evidenced that subjective norms have a significant impact on people's perception and beliefs about technology Beldad & Hegner, 2018; Homburg et al., 2009; Teo, 2010), the authors' research model (Figure 1), predicts that subjective norms will be an antecedent of perceived usefulness and perceived ease of use. The model also predicts that perceived critical mass will have a direct impact on the intention to use cryptocurrency exchanges, as well as a moderating effect on the relationship between perceived usefulness and perceived ease of use, on the one hand, and the intention to use cryptocurrency exchanges on the other hand.

Furthermore, the model predicts that people's technology readiness will have a direct impact on their trust in cryptocurrency exchanges. As in previous studies that focused on financial technology such as mobile banking (Illia et al., 2022; Shen et al., 2010), in this study, the authors presume trust to have a direct impact on the intention to use cryptocurrency exchanges.

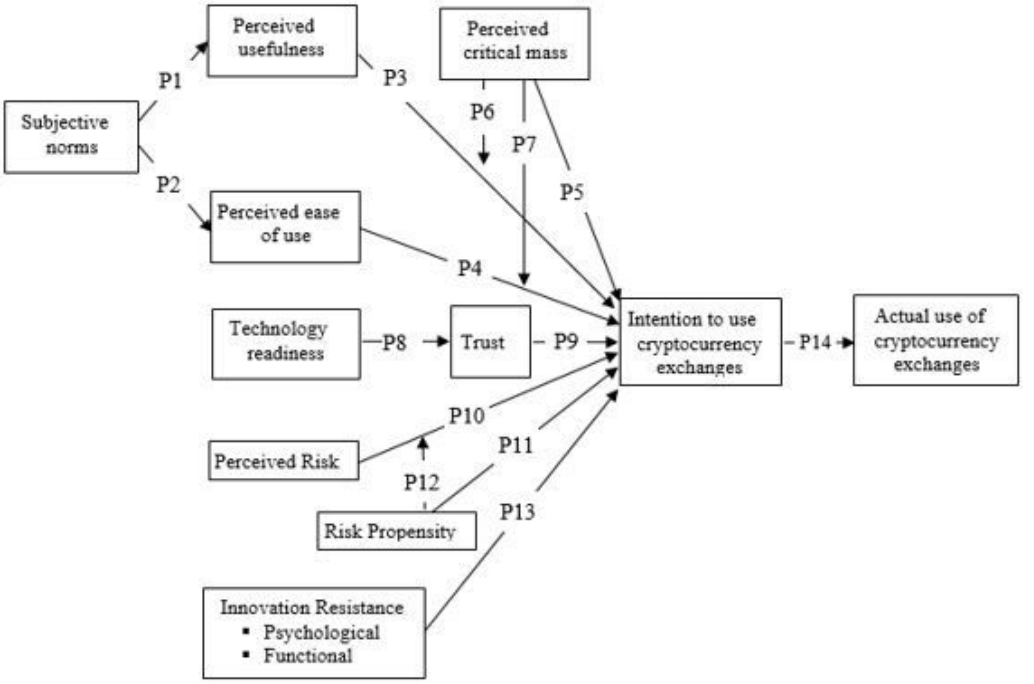
Based on previous studies on fintech such as mobile banking (Chiou & Shen, 2012; Walton & Johnston, 2018; Wang et al., 2014), the authors' research model predicts that perceived risk and risk propensity will have a direct impact on the intention to use cryptocurrency exchanges. The model also predicts that risk propensity will have a moderating effect on the relationship between perceived risk, on the one hand, and the intension to use cryptocurrency exchanges, on the other hand.

Building on previous studies showing that innovation resistance has a negative impact on using fintech (Illia et al., 2022; Kaur et al., 2020; Rammile & Nel, 2012; Yu & Chantatub, 2016), the model predicts that innovation resistance (both psychological and functional) will have a direct impact on the intention to use cryptocurrency exchanges.

Research Propositions

According to the TPB (Ajzen, 1991), perceived social pressure from referent others (or subjective norms) can affect people's behavior indirectly by shaping their perception over time. This means

Figure 1. Caption in words



subjective norms may have an impact on how useful people perceive cryptocurrency exchanges to be. Therefore, the authors put forward the following propositions:

Proposition One: Subjective norms will have a significant impact on the perceived usefulness of cryptocurrency exchanges.

If people's perception about the usefulness of cryptocurrency exchanges can be influenced by subjective norms, their perceived-ease-of-use of cryptocurrency exchanges may also be influenced by subjective norms.

Proposition Two: Subjective norms will have a significant impact on the perceived ease of use of cryptocurrency exchanges.

A strong body of research has confirmed the main idea of the TAM, that is, perceived usefulness and perceived ease of use are antecedents of the intention to use technology in general (Arias-Oliva et al., 2019; Walton & Johnston, 2018). It can, therefore, be expected that the relationship between perceived usefulness and perceived ease of use, on the one hand, and the intention to use cryptocurrency exchange platforms, on the other hand, to be strong. Thus, the authors put forward the following propositions:

Proposition Three: Perceived usefulness will have a significant effect on people's intention to use cryptocurrency exchanges.

Proposition Four: Perceived ease of use will have a significant effect on people's intention to use cryptocurrency exchanges.

According to the diffusion of innovation theory, the adoption and spread of an innovation depend on the critical mass of users defined as the point at which enough individuals have adopted the innovation so that its further rate of adoption becomes self-sustaining (Rogers, 1995). Technology users may have their own perception of whether the critical mass of users has been (or is about to be) reached (Cho, 2011; Illia et al., 2018). If a person's perception that more and more people in their environment or circle of friends are using cryptocurrency exchanges may have a direct impact on their intention to use the service.

Proposition Five: The perceived critical mass of users will have a positive direct impact on the intention to use cryptocurrency exchanges.

Strader et al. (2007) postulated that critical mass and usefulness, as two value-oriented factors, should be linked when exploring their impact on technology use. This suggests that perceived critical mass may also have an indirect impact on technology adoption through a possible interaction effect with perceived usefulness. This means that people who have perceived cryptocurrency exchanges, as being useful may see their intention to use cryptocurrency exchanges grow stronger as a result of their perception that the critical mass of users is growing more and more. Therefore, the authors put forward the following proposition:

Proposition Six: The perceived critical mass will moderate the impact of perceived usefulness on the intention to use cryptocurrency exchanges, such that the higher the perceived critical mass, the stronger the impact.

Likewise, it can also be argued that people who have perceived cryptocurrency exchanges as being easy to use may also see their intention to adopt cryptocurrency exchanges grow stronger as a result of their perception that the critical mass of users is growing more and more. Thus, the authors developed the following proposition:

Proposition Seven: The perceived critical mass will moderate the impact of perceived ease of use on the intention to use cryptocurrency exchanges, such that the higher the perceived critical mass, the stronger the impact.

According to Pew Research Center (2017), more than half of the people who use the Internet and cellphones do not engage in online shopping or online banking due to security and trust concerns. Survey data on U.S. digital buyers (Coppola, 2021) also showed that the largest group of digital buyers are millennials (age 25-34), followed by people 35 to 44 years old. One possible explanation could be that younger people are more technology savvy. From this perspective, technology readiness may be a factor that helps younger people overcome the psychological barriers, take risk, and trust virtual entities. Therefore, the authors put forward the following proposition:

Proposition Eight: Technology readiness will have a significant impact on people's trust in cryptocurrency exchanges.

Technology readiness has four dimensions, with two of the dimensions (i.e., optimism and innovativeness) considered enablers for technology adoption. Thus, the authors put forward the following two propositions:

Proposition Eight (a): Optimism will have a positive impact on people's trust in cryptocurrency exchanges.

Proposition Eight (b): Innovativeness will have a positive impact on people's trust in cryptocurrency exchanges.

The other two dimensions of technology readiness (i.e., discomfort and insecurity) are considered as inhibitors for technology adoption. Therefore, the authors suggest the propositions:

Proposition Eight (c): Discomfort will have a negative impact on people's trust in cryptocurrency exchanges.
Proposition Eight (d): Insecurity will have a negative impact on people's trust in cryptocurrency exchanges.

Trust was proven to be an antecedent of engaging in virtual transactions (Illia et al., 2022; Shen et al., 2010; Vatanasombut et al., 2008); it has multiple dimensions (Grabner-Kräuter, 2002). In this study, the authors argue that transaction-specific trust (i.e., trust in the company operating the cryptocurrency exchanges) and system-specific trust (i.e., trust in the technology involved in operating the cryptocurrency exchanges) will have a significant impact on the intention to use cryptocurrency exchanges. In the light of this, the authors put forward the following proposition:

Proposition Nine (a): Transaction-specific trust in cryptocurrency exchanges will have a significant impact on the intention to use cryptocurrency exchanges.
Proposition Nine (b): System-specific trust in cryptocurrency exchanges will have a significant impact on the intention to use cryptocurrency exchanges.

Since perceived risk acts as an inhibitor to purchase or usage behavior (Illia et al. 2022), it can be expected that perceived risk will negatively affect people's intention to use cryptocurrency exchanges. Thus, the authors put forward the following proposition:

Proposition Ten: Perceived risk will have a negative impact on people's intention to use cryptocurrency exchanges.

Perceived risk can negatively impact the intention to use cryptocurrency exchanges, but people differ in terms of risk propensity. It can be expected that people with high risk propensity will be more willing to use cryptocurrency exchanges. Thus, risk propensity can have a direct positive impact on the intention to use cryptocurrency exchanges. Therefore, the authors put forward the following proposition:

Proposition Eleven: Risk propensity will have a positive direct impact on people's intention to use cryptocurrency exchanges.

Prior studies (Illia et al., 2022; Marafon et al., 2018) showed that risk propensity influences the relationship between perceived risk and intention to use technology in the context of Internet banking. It is possible to expect that, compared to people with low-risk propensity who perceived cryptocurrency exchanges to be risky, those with high-risk propensity who perceived cryptocurrency exchanges to be risky will be more willing to use them. This means that risk propensity can also have a moderating effect on the relationship between perceived risk and the intention to use cryptocurrency exchanges. This relationship is reflected in the following proposition:

Proposition Twelve: Risk propensity will moderate the impact of perceived risk on the intention to use cryptocurrency exchanges.

According to the IRT, people may resist using technology because of barriers that can be functional or psychological in nature. Previous studies (Rammile & Nel, 2012; Yu & Chantatub, 2016) showed that both functional and psychological forms of innovation resistance have a negative impact on using technology such as mobile banking. In this study, the authors argue that innovation resistance will have a negative impact on people's intention to use cryptocurrency exchanges. The following propositions articulate these relationships:

Proposition Thirteen (a): Psychological innovation resistance has a negative impact on the intention to use cryptocurrency exchanges.

Proposition Thirteen (b): Functional innovation resistance has a negative impact on the intention to use cryptocurrency exchanges.

Earlier, based on the TRA and previous research (Arias-Oliva et al., 2019; Walton & Johnston, 2018), the authors hypothesised that perceived usefulness and perceived ease of use have an impact on people's intention to use cryptocurrency exchanges. According to the TRA, intention, which is the cognitive representation of a person's readiness to perform a given behavior, is the best predictor of behavior (Fishbein & Ajzen, 1975). It can be argued that people's intention to use cryptocurrency exchanges will have an impact on both the frequency and the intensity of their cryptocurrency exchanges' use. Therefore, the authors put forward the following proposition:

Proposition Fourteen: The intention to use cryptocurrency exchanges will have a positive impact on the actual use of cryptocurrency exchanges in terms of frequency and intensity of use.

IMPLICATIONS AND LIMITATIONS

As the authors indicated in the introduction, the search of the eLibrary database of the Association for Information Systems for papers published between 2010 and 2022 showed that few papers were devoted to cryptocurrency exchange platforms and the factors that may explain their adoption. This suggests that the topic is an uncharted territory that requires more research in order to shed light on a phenomenon that attracts more and more businesses and people worldwide (Dean, 2023). Therefore, one of the main theoretical contributions of this research is filling the void by developing a conceptual model of cryptocurrency exchanges' adoption that has a solid theoretical foundation. The proposed model is grounded on multiple theories (e.g., IRT, critical mass theory, risk propensity theory, and social influence theory) that, together, can help capture the risky nature and the complexity of the phenomenon.

Although the model is conceptual in nature, its solid theoretical foundation points to some practical implications, specifically for marketing strategies undertaken by companies that operate cryptocurrency exchanges. For instance, first, if it turns out that perceived critical mass has a significant moderating effect on the relationship between the perceived usefulness and the perceived ease of use of cryptocurrency exchanges, on the one hand, and the intention to use cryptocurrency exchanges, on the other hand (as the authors hypothesized), perceived critical mass represents a key piece of information that cryptocurrency exchange platforms may use in advertising and marketing campaigns that target nonactive users in an attempt to increase the number of active users. In other words, companies behind cryptocurrency platforms can drive usage by promoting and making their growing number of active users highly visible to their registered users who are not active. Doing so may have a positive impact on nonactive registered users' decision of becoming active users. Secondly, the testing of the impact of perceived risk along with the potential moderating effect of risk propensity can also have a practical implication. If it turns out that risk propensity has a significant moderating effect on the relationship between perceived risk and the intention to use cryptocurrency exchanges, which means companies behind cryptocurrency platforms may need to develop and use different strategies for attracting users

with low-risk propensity versus those with high-risk propensity. Finally, the testing of the impact of the innovation resistance-related factors can help shed light on which type of barriers–psychological or functional–play a more significant role in using cryptocurrency exchanges.

This study has limitations. First, the study is conceptual in nature, which means that, although is the authors offered a strong theoretical foundation for the research model and the propositions, empirical testing is needed to add data-driven support to the model. Second, this study did not include the mediating effect of attitude as the TRA (Fishbein & Ajzen, 1975) and the initial TAM (Davis, 1989) suggested. This choice was for two reasons. One is because Legris et al.'s (2003) meta-analysis suggested that attitude does not mediate the influence of perceived usefulness or perceived ease of use on either the usage or the BI to use technology in general. The second reason is the need to keep the research model focused on the more theoretically relevant factors.

CONCLUSION

In this research, the authors attempted to fill a void in the existing IS literature on cryptocurrency where a search of the Association for Information Systems' eLibrary database for papers published between 2010 and 2022, showed that, while an existing body of research is available on specific cryptocurrencies (e.g., bitcoin and ethereum) and on related fintech technologies (e.g., blockchain and digital business models), little research reported on cryptocurrency exchanges and their adoption. In this research, the authors used a multitheory approach to identify key factors of the adoption of cryptocurrency exchanges and develop a conceptual model, along with 14 research propositions. The research model extended the TAM and emphasized the role of psychological innovation resistance, functional innovation resistance, technology readiness and trust, perceived risk and risk propensity, subjective norms, and critical mass of users. Although explicit prescriptions should await empirical support for the propositions, the research model and the supporting literature suggest potential theoretical and practical implications. In particular, the testing of the research model may provide some grounds for businesses offering cryptocurrency exchange platforms to revisit and design their marketing strategies in a way that may help increase the number of active users.

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. doi:10.1016/0749-5978(91)90020-T

Alleyne, P., & Broome, T. (2011). Using the theory of planned behaviour and risk propensity to measure investment intentions among future investors. *Journal of Eastern Caribbean Studies*, *36*(1), 1–20.

Arias-Oliva, M., Pelegrín-Borondo, J., & Matías-Clavero, G. (2019). Variables influencing cryptocurrency use: A technology acceptance model in Spain. *Frontiers in Psychology*, *10*, 475. doi:10.3389/fpsyg.2019.00475 PMID:30949085

Beldad, A. D., & Hegner, S. M. (2018). Expanding the technology acceptance model with the inclusion of trust, social influence, and health valuation to determine the predictors of German users' willingness to continue using a fitness app: A structural equation modeling approach. *International Journal of Human-Computer Interaction*, *34*(9), 882–893. doi:10.1080/10447318.2017.1403220

Carlos Roca, J., José García, J., & José de la Vega, J. (2009). The importance of perceived trust, security, and privacy in online trading systems. *Information Management & Computer Security*, *17*(2), 96–113. doi:10.1108/09685220910963983

Chiou, J.-S., & Shen, C.-C. (2012). The antecedents of online financial service adoption: The impact of physical banking services on Internet banking acceptance. *Behaviour & Information Technology*, *31*(9), 859–871. doi:10.1080/0144929X.2010.549509

Cho, H. (2011). Theoretical intersections among social influences, beliefs, and intentions in the context of 3G mobile services in Singapore: Decomposing perceived critical mass and subjective norms. *Journal of Communication*, *61*(2), 283–306. doi:10.1111/j.1460-2466.2010.01532.x

Coppola, D. (2021, August 23). *U.S. digital buyer distribution 2020, by age group*. https://www.statista.com/statistics/469184/us-digital-buyer-share-age-group/

Corporate Finance Institute. (2023, July 7). *Cryptocurrency exchanges*. https://corporatefinanceinstitute.com/resources/knowledge/other/cryptocurrency-exchanges/

Cox, D. F. (Ed.). (1967). *Risk taking and information handling in consumer behavior*. Harvard University Press.

Cunningham, S. M. (1967). The major dimensions of perceived risk. In D. F. Cox (Ed.), Risk taking and information handling in consumer behavior. Harvard University Press.

Das, S. R., & Joshi, M. P. (2007). Process innovativeness in technology services organizations: Roles of differentiation strategy, operational autonomy, and risk taking propensity. *Journal of Operations Management*, *25*(3), 643–660. doi:10.1016/j.jom.2006.05.011

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Management Information Systems Quarterly*, *13*(3), 319–340. doi:10.2307/249008

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 903–1028. doi:10.1287/mnsc.35.8.982

Dean, B. (2023, March 27). *Coinbase usage and trading statistics (2023)*. https://backlinko.com/coinbase-users

Featherman, M. S., & Pavlou, P. A. (2002). Predicting e-services adoption: A perceived risk facets perspective. *Proceedings of the 8th Americas Conference on Information Systems*.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Addison-Wesley.

Grabner-Kräuter, S. (2002). The role of consumers' trust in online-shopping. *Journal of Business Ethics*, *39*(1), 43–50. doi:10.1023/A:1016323815802

Grewal, D., Gotlieb, J., & Marmorstein, H. (1994). The moderating effects of message framing and source credibility on the price-perceived risk relationship. *The Journal of Consumer Research*, *21*(1), 145–153. doi:10.1086/209388

Griskevicius, V., Goldstein, N. J., Mortensen, C. R., Cialdini, R. B., & Kenrick, D. T. (2006). Going along versus going alone: When fundamental motives facilitate strategic (non)conformity. *Journal of Personality and Social Psychology*, *91*(2), 281–294. doi:10.1037/0022-3514.91.2.281 PMID:16881765

Homburg, C., Wieseke, J., & Kuehnl, C. (2009). Social influence on salespeople's adoption of sales technology: A multilevel analysis. *Journal of the Academy of Marketing Science*, *38*(2), 159–168. doi:10.1007/s11747-009-0157-x

Illia, A., Lawson-Body, A., Akalin, G., & White, L. (2022). Impact of innovation resistance, trust, and risk propensity on the use of investment apps. *Issues in Information Systems*, *23*(3), 209–220.

Illia, A., Lawson-Body, A., Lee, S., & Akalin, G. I. (2018). The moderating effect of motivation to comply and perceived critical mass in smartphones' adoption. *International Journal of Technology and Human Interaction*, *14*(3), 21–38. doi:10.4018/IJTHI.2018070102

Illia, A., Ngniatedema, T., & Huang, Z. (2015). A conceptual model for mobile banking adoption. *Journal of Management Information and Decision Sciences*, *18*, 93–103.

Kaur, P., Dhir, A., Singh, N., Sahu, G., & Almotairi, M. (2020). An innovation resistance theory perspective on mobile payment solutions. *Journal of Retailing and Consumer Services*, *55*, 1–11. doi:10.1016/j.jretconser.2020.102059

Kelman, H. C. (1958). Compliance, identification, and internalization: Three processes of attitude change. *The Journal of Conflict Resolution*, *2*(1), 56–60. doi:10.1177/002200275800200106

Kharpal, A. (2021, April 6). *Cryptocurrency market value tops $2 trillion for the first time as ethereum hits record high*. https://www.cnbc.com/2021/04/06/cryptocurrency-market-cap-tops-2-trillion-for-the-first-time.html

Laukkanen, P., Sinkkonen, S., & Laukkanen, T. (2008). Consumer resistance to Internet banking: Postponers, opponents, and rejectors. *International Journal of Bank Marketing*, *26*(6), 440–455. doi:10.1108/02652320810902451

Lee, J.-M., & Kim, H.-J. (2020). Determinants of adoption and continuance intentions toward Internet-only banks. *International Journal of Bank Marketing*, *38*(4), 843–865. doi:10.1108/IJBM-07-2019-0269

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management*, *40*(3), 191–204. doi:10.1016/S0378-7206(01)00143-4

Marafon, D. L., Basso, K., Espartel, L. B., de Barcellos, M. D., & Rech, E. (2018). Perceived risk and intention to use Internet banking. *International Journal of Bank Marketing*, *36*(2), 277–289. doi:10.1108/IJBM-11-2016-0166

Marella, V., Roshan, M., Merikivi, J., & Tuunainen, V. (2021). Rebuilding trust in cryptocurrency exchanges after cyber-attacks. *Proceedings of the 54th Hawaii International Conference on System Sciences*. doi:10.24251/HICSS.2021.684

Parasuraman, A. (2000). Technology readiness index (TRI): A multiple-item scale to measure readiness to embrace new technologies. *Journal of Service Research*, *2*(4), 307–320. doi:10.1177/109467050024001

Pew Research Center. (2017, August 10). *The fate of online trust in the next decade*. https://www.pewresearch.org/internet/2017/08/10/the-fate-of-online-trust-in-the-next-decade/

Ram, S., & Sheth, J. N. (1989). Consumer resistance to innovations: The marketing problem and its solutions. *Journal of Consumer Marketing*, *6*(2), 5–14. doi:10.1108/EUM0000000002542

Rammile, N., & Nel, J. (2012). Understanding resistance to cell phone banking adoption through the application of the technology acceptance model (TAM). *African Journal of Business Management*, *6*(1), 86–97. doi:10.5897/AJBM11.635

Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). Free Press.

Schoorman, F. D., Mayer, R. C., & Davis, J. H. (2007). An integrative model of organizational trust: Past, present, and future. *Academy of Management Review*, *32*(2), 344–354. doi:10.5465/amr.2007.24348410

Seetharaman, A., Kumar, K. N., Palaniappan, S., & Weber, G. (2017). Factors influencing behavioural intention to use the mobile wallet in Singapore. *Journal of Applied Economics and Business Research*, *7*(2), 116–136.

Shen, Y.-C., Huang, C.-Y., Chu, C.-H., & Hsu, C.-T. (2010). A benefit-cost perspective of the consumer adoption of the mobile banking system. *Behaviour & Information Technology*, *29*(5), 497–511. doi:10.1080/01449290903490658

Singer, L. (2022). *On the diffusion of innovations: How new ideas spread* [Blog post]. https://leif.me/on-the-diffusion-of-innovations-how-new-ideas-spread/

Strader, T. J., Ramaswami, S. N., & Houle, P. A. (2007). Perceived network externalities and communication technology acceptance. *European Journal of Information Systems*, *16*(1), 54–65. doi:10.1057/palgrave.ejis.3000657

Teo, T. (2010). A path analysis of pre-service teachers' attitudes to computer use: Applying and extending the technology acceptance model in an educational context. *Interactive Learning Environments*, *18*(1), 65–79. doi:10.1080/10494820802231327

Vatanasombut, B., Igbaria, M., Stylianou, A., & Rodgers, W. (2008). Information systems continuance intention of web-based applications customers: The case of online banking. *Information & Management*, *45*(7), 419–428. doi:10.1016/j.im.2008.03.005

Walton, A., & Johnston, K. (2018). Exploring perceptions of bitcoin adoption: The South African virtual community perspective. *Interdisciplinary Journal of Information, Knowledge, and Management*, *13*, 165–182. doi:10.28945/4080

Wang, S., Hsu, M., Pelton, L., & Xi, D. (2014). Virtually compatible or risky business? Investigating consumers' proclivity toward online banking services. *Journal of Marketing Channels*, *21*(1), 43–58. doi:10.1080/1046669X.2013.832466

Wang, Y.-S., Wang, Y.-M., Lin, H.-H., & Tang, T.-I. (2003). Determinants of user acceptance of Internet banking: An empirical study. *International Journal of Service Industry Management*, *14*(5), 501–519. doi:10.1108/09564230310500192

Yu, C.-S., & Chantatub, W. (2016). Consumers' resistance to using mobile banking: Evidence from Thailand and Taiwan. *International Journal of Electronic Commerce Studies*, *7*(1), 21–38. doi:10.7903/ijecs.1375

Zhou, Y., & Li, S. (2018). Technology adoption and critical mass: The case of the U.S. electric vehicle market. *The Journal of Industrial Economics*, *66*(2), 423–480. doi:10.1111/joie.12176

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