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THE EXTENDED TRA MODEL FOR THE ASSESSMENT OF FACTORS DRIVING INDIVIDUALS' BEHAVIORAL INTENTION TO USE CRYPTOCURRENCY

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ABSTRACT

Aim/Purpose	The aim of this study was to explore the factors driving individuals' behavioral intention to use cryptocurrency in Saudi Arabia using the extended TRA model.
Background	Despite the great potential of cryptocurrencies and the exponential growth of cryptocurrency use throughout the world, scholarly research on this topic remained scarce. Whereas prior studies are mostly done in developed countries or specific cultural contexts, limiting the generalizability of their results, they mainly used technology adoption models that cannot fully explain the acceptance of new technology involved with financial transactions such as cryptocurrency and provided contradictory evidence. Entire regions have been excluded from the research on this topic, including Saudi Arabia which has a high potential to increase the volume of cryptocurrency use.

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Methodology	This study extends the theory of reasoned action (TRA) with the factors from technology adoption models that proved relevant for this topic, namely perceived usefulness, perceived enjoyment, perceived innovativeness, and perceived risk with three sub-factors: security, financial, and privacy risk. Data are collected using a quantitative research methodology from 181 respondents residing in Saudi Arabia and then analyzed by several methods, including exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modeling (SEM).
Contribution	This study contributes to the scientific knowledge by extending the TRA model with a range of factors from the technology adoption field, thus enabling the analysis of this topic from human, financial, and technology perspectives and providing additional empirical evidence on the factors that previously either provided contradictory evidence or were not explored in this field. This research also provides the first empirical data on this topic in Saudi Arabia and enables further research on the topic and a comparison of the results. The study also contributes to practice by enhancing the actual understanding of the phenomena and providing valuable information and recommendations for governments, investors, merchants, developers, and the general population.
Findings	The study found attitude, subjective norm, perceived usefulness, perceived enjoyment, personal innovativeness, privacy risk, and financial risk as significant predictors of the intention to use cryptocurrencies, whereas the influence of security risk was not found to be significant in Saudi Arabia.
Recommendations for Practitioners	Using this study's results, governments can create appropriate legal frameworks, developers can design fewer complex platforms, and merchants may create appropriate campaigns that emphasize the benefits of cryptocurrency use and transpire trust in cryptocurrency transactions by enhancing the factors with a positive impact, such as usefulness, enjoyment, and personal innovativeness while reducing concerns of potential users regarding the risky factors. By promoting a positive user experience, they can also improve attitudes and social norms towards cryptocurrencies, thus further stimulating the interest in their use.
Recommendations for Researchers	As this study validated the influence of factors from technology, financial, and human-related fields, researchers may follow this approach to ensure a comprehensive analysis of this complex topic, especially as privacy risk was never examined in this context, while personal innovativeness, perceived enjoyment, financial, and security risk were explored in just a few studies. It is also recommended that researchers explore the impact of each part of subjective norms: social media, friends, and family, as well as how information on the benefits of cryptocurrencies affects the perception of the factors included.
Impact on Society	Understanding the factors affecting cryptocurrency use can help utilize the full potential of cryptocurrencies, especially their benefits for developing countries reflected in safe, speedy, and low-cost financial transactions with no need for an intermediary. The research model of this study could also be used to investigate this topic in other contexts to discover similarities and differences, as well as to investigate other information systems.
Future Research	Future studies should test this research model in similar and different contexts to determine whether its validity and study results depend on cultural and contextual factors. They can also include different or additional variables, or use mixed methods, as interviews would augment the comprehension of this topic.

Future studies may also explore whether the impact of variables would remain the same if circumstances changed or use cases expanded, and how the preferences of the target population would change within a longitudinal time frame.

Keywords cryptocurrency, TRA model, behavioral intention to use cryptocurrency, Saudi Arabia

INTRODUCTION

In the last 30 years, the world has gone through many changes that have significantly improved the way of life, business, and communication but have also caused many concerns. While globalization provided humankind with many new opportunities, its unequal effects across the world and various corporate scandals provoked its sharp criticism (Aysan et al., 2021). Similarly, the rapid progress of information technology has allowed instant communication and connectedness around the globe, but it also raised concerns about data privacy and security compromising (Abbasi et al., 2021). The result of these processes was increased regulatory control but also a series of counter-surveillance measures like the emergence of the first digital currency Bitcoin after the global crisis in 2008 in response to reduced trust in the official financial system (Nofer et al., 2017).

Based on, at that time, innovative blockchain technology, created by Satoshi Nakamoto, Bitcoin was intended to create a system where individuals can conduct safe, speedy, and low-cost transactions with digital tokens in a virtual environment (Nakamoto, 2008). Soon, more than 1,600 cryptocurrencies entered circulation and several multinational companies accepted cryptocurrency as a payment method, e.g., Microsoft, Dell, Tesla, and Ali-Express (Abbasi et al., 2021). Currently, there are around 300 million cryptocurrency users with around 5.8-11.5 million active wallets (TripleA, 2021), and the cryptocurrency market value reached almost $2 trillion in 2021 (Coin Market Cap, 2021). For these reasons, cryptocurrency had been anticipated to disrupt the official financial system and become a mainstream currency (Alharbi & Sohaib, 2021). Yet, although its full potential can be achieved only if it is widely accepted by users (Abbasi et al., 2021), cryptocurrency use has remained limited in scope and geographical distribution (Sohaib et al., 2019).

Moreover, despite the different economic implications of cryptocurrencies and the growing interest of private and official stakeholders, scholarly research on the factors that influence individuals' intention to use cryptocurrency is still scarce (Al-Amri et al., 2019; Arias-Oliva et al., 2021). Also, prior studies mostly used technology adoption models that cannot fully explain the acceptance of new technology involved with financial transactions, such as cryptocurrencies (Won-Jun, 2018). Previous research has also provided contradictory evidence on some factors that affect the use of cryptocurrency, while several factors related to technology adoption topics had never been tested in this field (Abramova & Böhme, 2016; Al-Amri et al., 2019; Noreen et al., 2021).

Additionally, prior research on cryptocurrency has mostly been conducted in western countries (Ter Ji-Xi et al., 2021) or specific cultural contexts (Shahzad et al., 2018; Walton & Johnston, 2018; Zamzami, 2020), which limits the applicability of their results in other cultural contexts, especially the specific ones such as Saudi Arabia. First, Saudis are keen to early adopt any new technology, which ranks Saudi Arabia among the 50 most technologically advanced countries in the world (Getzoff, 2020). Thus, Saudi Arabia has the high potential to increase the scope of cryptocurrency use and take advantage of potentially high returns on investments in cryptocurrencies, cost savings in financial transactions, and opportunities for other use cases, such as a payment method.

Yet, although the rate of cryptocurrency use is growing (Al Bawaba, 2021), it is still in the initial stage (Noreen et al., 2021; TripleA, 2021). Most Saudis are aware of cryptocurrency's existence and features, but only a minority use them (Noreen et al., 2021). There is also an ongoing debate about cryptocurrency compliance with *Sharia* law (Asif, 2018). Moreover, the Saudi government has not yet approved Bitcoin as a currency for the general population, but allowed its use for government-to-government payments with the UAE and domestic and cross-border commercial bank transactions

(Saudi Central Bank & Central Bank of the UAE, 2020, p. 16), thus sending confusing signals to potential users. For these reasons, understanding the factors affecting cryptocurrency use in this country is pivotal. Still, due to date, there were only two exploratory studies on cryptocurrencies in Saudi Arabia – one on the general image of digital currency in Saudi Arabia (Noreen et al., 2021), and one about attitudes towards cryptocurrency in the five GCC countries, including Saudi Arabia (Abdeldayem & Aldulaimi, 2020).

In this regard, the purpose of this study was to explore the factors that influence the behavioral intention of Saudi citizens to use cryptocurrency. The primary objective was to discover what motivates and what deters individuals from using cryptocurrencies in Saudi Arabia, while the secondary objective was to explore the direct and indirect relations between these factors. The study has several contributions. To fill the gap of mostly technology-based prior research on cryptocurrency and examine this topic from human, financial, and technology perspectives, this study developed a unique research model based on the attitudinal theory of reasoned action (TRA) that was extended with several factors from technology adoption models that have been proven relevant for this field. By empirically testing this model in Saudi Arabia, the study enriches the theoretical knowledge and provides the first empirical data on this topic in Saudi Arabia, enhances the comprehension of this phenomenon, and provides valuable information and recommendations for various stakeholders, such as governments, investors, merchants, developers, and the general population.

The paper is organized as follows. The next section presents the theoretical background by discussing cryptocurrency features, previous empirical research on behavioral intention to use cryptocurrency, and theories employed to examine this topic. The following section discusses hypotheses development and the research model, followed by the section that describes the research methodology. The next section presents the results of this study, followed by a discussion of the findings and their implications. Finally, the last section presents the conclusion and limitations of this study and provides future research directions.

THEORETICAL BACKGROUND

INTRODUCTION TO CRYPTOCURRENCY

Cryptocurrency is a digital token that users exchange within a distributed, decentralized, peer-to-peer virtual network (Hileman & Rauchs, 2017). Each cryptocurrency transaction is triggered by a private key that proves the ownership of cryptocurrencies and then validated with secure cryptographic algorithms (Nakamoto, 2008). For this reason, there is no need for third-party validation of transactions (Rejeb et al., 2021). Validated transactions are then grouped into blocks and linked to each other creating a shared ledger that is constantly updated providing users with the entire transaction history (Nakamoto, 2008). Users have no identities attached and can leave this network at any time (Hileman & Rauchs, 2017).

The first cryptocurrency was Bitcoin which emerged in 2008 after the global crisis. Its great popularity led to the emergence of over 1,600 cryptocurrencies enabling the creation of an ecosystem where cryptocurrencies are exchanged among themselves or with national currencies (Hileman & Rauchs, 2017). Simultaneously with the growing rate of its acceptance by individuals and merchants, cryptocurrency value and use cases have increased in the same span (Rejeb et al., 2021). Currently, the most often use case of cryptocurrency is a speculative investment, when users tend to obtain potentially high yield because of cryptocurrency's high price variations (Baur et al., 2018). For instance, Bitcoin's value in 2017 was $15,000, and at the end of 2021 was $62,256 (Coin Market Cap, 2021). In developing countries, cryptocurrency use also provides better access to savings and credit facilities (Manyika et al., 2016). Users may also earn a fee from the network for mining, or computing large amounts of hashes to find valid blocks to add them to the blockchain (Rejeb et al., 2021). Cryptocurrency is also used as a medium of exchange between countries and platforms, but one of the most promising

cryptocurrency use cases is its use as a payment method that currently involves more than 18,000 businesses in different industries (Abbasi et al., 2021; Al-Amri et al., 2019; Hileman & Rauchs, 2017).

Yet, cryptocurrencies have also raised concerns regarding their security and impact on society (Al-Amri et al., 2019). As there is no central authority that monitors this system, users cannot recover their funds in case of theft of cryptocurrencies by malware attacks or their accidental loss (Shovkhalov & Idrisov, 2021). There were also several scams, e.g. BitGrail in Italy, Mt. Gox in Japan, and Cubits in the UK (Mangano, 2020). Moreover, the anonymity of cryptocurrency users may create a shadow economy (Nofer et al., 2017) and black markets for illegal operations, like drug trafficking, weapons trade, or fraudulent transactions that cannot be traced nor restricted (Aysan et al., 2021). There is also a harmful environmental impact of cryptocurrencies mining due to the vast energy consumption (Saiedi et al., 2021). For these reasons, some countries discourage cryptocurrency use, e.g. Germany and the US (Rejeb et al., 2021), some prohibit it, like China, Iran, and Bangladesh (Pandya et al., 2019), while some try to regulate this area, or develop their own cryptocurrencies (Mangano, 2020; Nofer et al., 2017).

Despite that, cryptocurrency use has been growing constantly, reaching a market cap of almost $2 trillion (Coin Market Cap, 2021), with 16,000 million units of Bitcoin in circulation (Rejeb et al., 2021). Yet, it is still limited and unequally distributed around the globe, so the potentials for its use remain untapped (Abbasi et al., 2021; Alharbi & Sohaib, 2021). For instance, in Saudi Arabia, there were 452,778 users in 2021, which is just 1.30% of the entire population and is very low compared to 12.73% in Ukraine, 11.91% in Russia, 8.31% in the US, or 7.30% in India (TripleA, 2021). Yet, Saudi Arabia has recently recorded a growing interest in cryptocurrency investment (Al Bawaba, 2021), which imposes the need to find out what may additionally improve the rate of cryptocurrency use so that cryptocurrency potentials can be fully employed.

Empirical Research on Behavioral Intention to Use Cryptocurrency

Regardless of the growing interest of researchers, scholarly research about factors influencing cryptocurrency use both remained scarce and provided contradictory evidence (Al-Amri et al., 2019; Arias-Oliva et al., 2021). Although most studies found a positive attitude towards cryptocurrency as the most significant predictor of behavioral intention towards its use (Albayati et al., 2020; Mazambani & Mutambara, 2019; Schaupp & Festa, 2018; Zamzami, 2020), they found different factors affecting this attitude. For example, trust was found as the most significant factor for a positive attitude toward Bitcoin use in South Africa (Jankeeparsad & Tewari, 2018), Korea (Lee et al., 2018), Malaysia (Sas & Khairuddin, 2017), Cyprus (Zarifis et al., 2014), and China (Shahzad et al., 2018). Yet, Alaeddin and Altounjy (2018) also found the influence of user satisfaction, Sohaib et al. (2019) found the influence of innovativeness and optimism, whereas Sun et al. (2020) and Ostern (2018) found the knowledge about cryptocurrencies as the most significant factors of a positive attitude towards cryptocurrencies.

Similarly, Walton and Johnston (2018) discovered that people rather invest in Bitcoin if their social group of family, friends, and peers have a positive attitude towards cryptocurrency and invest in it, which was confirmed by several studies (Boxer & Thompson, 2020; Gazali et al., 2019; Jankeeparsad & Tewari, 2018; Kim, 2021; Schaupp & Festa, 2018). Still, Zamzami (2020) has not found subjective norm as an influencing factor in Indonesia, nor Mazambani and Mutambara (2019) in South Africa, Ullah et al. (2021) found its negligible impact in Pakistan, and Arias-Oliva et al. (2021) discovered it as an enabling factor with a positive influence on intention to use cryptocurrency in Spain.

Also, several studies found a significant negative effect of perceived risk on the intention to use cryptocurrency (Abramova & Böhme, 2016; Gazali et al., 2019; Gil-Cordero et al., 2020; Sohaib et al., 2019; Sun et al., 2020), whereas other studies have not found its influence (Nadeem et al., 2021; Nuryyev et al., 2018; Ter Ji-Xi et al., 2021; Yoo et al., 2020), and Arias-Oliva et al. (2021) found its

both positive and negative influence depending on specific circumstances and social influences. Some studies also found a significant positive impact of perceived usefulness and ease of use (Albayati et al., 2020; Arias-Oliva et al., 2019; Nadeem et al., 2021; Nuryyev et al., 2018), and other authors only found their indirect effect (Shahzad et al., 2018; Walton & Johnston, 2018), or that it fluctuates within various consumer categories (Janssen et al., 2015). Similarly, while several studies found personal innovativeness as a good predictor of intention to use cryptocurrency (Abbasi et al., 2021; Sohaib et al., 2019; Sun et al., 2020), others found it had a negligible impact (Ullah et al., 2021). Previous studies have also found the impact of perceived benefits (Gazali et al., 2019; Yoo et al., 2020), performance expectancy (Arias-Oliva et al., 2019), effort expectancy and facilitating condition (Jankeeparsad & Tewari, 2018; Ter Ji-Xi et al., 2021), perceived enjoyment (Nadeem et al., 2021), and other factors.

Therefore, depending on their research model, studies have found the impact of different factors, or they found the different influences of the same factors due to different cultural and other contexts. Moreover, some regions remained unexplored regarding this topic. For example, there were only two exploratory studies in Saudi Arabia although Saudis are inclined to early adopt any new technology (Getzoff, 2020; Saudi General Authority for Statistics, 2021). Abdeldayem and Aldulaimi (2020) found that 83.6% in the five GCC countries – Bahrain, Kuwait, Oman, Saudi Arabia, and UAE – at least heard about cryptocurrencies, but 85% still do not own any kind of cryptocurrency, whereas Noreen et al. (2021) discovered that 67% Saudis are aware of Bitcoin existence, but still hesitate to use it due to a lack of trust and no backup of official institutions, as well as due to the confusing stance of the government towards Bitcoin acceptance as a payment method.

Therefore, prior research either provided contradictory evidence on some factors influencing intention to use cryptocurrency or not included some factors and countries at all, while their results also cannot be generalized for all cultural contexts. Hence, more research is needed to find out what motivates and what deters people from using cryptocurrency in specific contexts such as Saudi Arabian.

Theory of Reasoned Action (TRA)

The theory of reasoned action (TRA), developed in the 1980s by Fishbein and Ajzen (1980), tends to explain human behaviors that are under the control of individuals. Originating from social psychology, this theory argues that the primary determinant of behavior is a person's intention to perform that behavior, or the degree to which a person is willing to execute that behavior. Behavioral intention is under the influence of two factors – an individual's attitude towards that behavior and subjective norms (Ajzen, 2020). The attitude towards certain behavior refers to an individual's evaluation of the effects of performing that behavior, whereas the subjective norm is an individual's perception of social pressure towards performing (or not) that behavior (Fishbein & Ajzen, 1980). Therefore, the TRA theory suggests a linear relationship in which attitude and subjective norm influence behavioral intention, subsequently determining the actual behavior of an individual. Hence, the higher the social pressure and the better the attitude towards certain behavior, the greater the intention towards performing that behavior, and thus more likely that behavior to be executed.

The main strength of the TRA lies in its simplicity, good explanatory power, and its ability to employ an array of factors that work jointly in affecting an individual's behavior linearly and sequentially (Ajzen, 2020; Boxer & Thompson, 2020). In this regard, it can be used in different areas of research, including the field of cryptocurrency use (Al Shehhi et al., 2014). For instance, Gazali et al. (2019) used the TRA to explain the relationship between the factors influencing the intention to invest in Bitcoin, whereas Boxer and Thompson (2020) used the TRA in combination with the theory of planned behavior (TPB) to explain the role of herd behavior in cryptocurrency investment markets. The explanatory power of this theory is also confirmed in other technology adoption fields, such as the acceptance of Internet banking services (Al-Ajam & Nor, 2015) and e-government systems (Rana & Dwivedi, 2015).

Still, prior studies on cryptocurrency mostly used technology adoption models. The most used was the Technology Acceptance Model (TAM) which implies that the intention to accept new technology depends on perceived usefulness and perceived ease of use of new technology (Venkatesh et al., 2003). The Unified Theory of Acceptance and Use of Technology (UTAUT) identifies four determinants of intention to use new technology: performance expectancy, effort expectancy, social influence, and facilitating condition (Venkatesh et al., 2003). The Technology Readiness Index (TRI) involves optimism and innovativeness as motivators to accept new technology, and discomfort and insecurity as inhibitors of its use (Parasuraman, 2000). Also, the Diffusion of Innovation Theory (DIT) implies that new technology is accepted over time, through a communication process, depending on its relative advantages, observability, trialability, complexity, and compatibility (Min et al., 2019).

Although each of these models explores different factors, their common element is the relevance of individual beliefs and attitudes, previous experience, and social influences on behavior towards new technology. However, these models cannot fully explain the acceptance of new technology involved with financial transactions such as cryptocurrency (Won-Jun, 2018) since it, besides the novelty, includes various financial, security, and human risks that can be better explained with attitudinal models such as the TRA and TPB (Al-Amri et al., 2019). Therefore, the best approach to research this topic comprehensively is to combine the factors from technology adoption and attitudinal models, as some previous studies have already done (Boxer & Thompson, 2020; Ullah et al., 2021; Yoo et al., 2020). Following their approach, this study has combined the attitudinal TRA model with several factors from technology adoption models that proved relevant for this topic of research in the Saudi Arabian context.

HYPOTHESES DEVELOPMENT AND RESEARCH MODEL

Given the above explanations and identified research gaps, this study has explored three factors of the attitudinal TRA model – subjective norm, attitude, and behavioral intention – and three factors from technology adoption models that proved relevant in the field of cryptocurrency use – perceived usefulness, perceived enjoyment, and perceived innovativeness – as well as the perceived risk that is imminent to financial transactions.

SUBJECTIVE NORM

Subjective norm, as part of the TRA model, refers to a subjective evaluation of social pressure from a relevant reference group to exhibit certain behavior (Ajzen, 2020). When a person believes that its reference group, such as society or friends and family, perceives certain technology positively or is engaged in its use, the likelihood of its usage by that person increases (Walton & Johnston, 2018). Its effect on cryptocurrency use has been proved in several studies. According to Al-Amri et al. (2019), cryptocurrency use depends on the rate of its use by other people. Boxer and Thompson (2020) found that individuals show herd behavior by imitating others who invest in Bitcoin, which confirms a positive impact of subjective norms on both attitude and intention towards cryptocurrency use. Similar findings had Kim (2021) who explored the use of Bitcoin in the era of COVID-19 in the United States, as well as other studies that explored this factor (Gazali et al., 2019; Jankeeparsad & Tewari, 2018; Schaupp & Festa, 2018; Walton & Johnston, 2018). Accordingly, the study tested the following hypothesis:

H1: Subjective norm has a significant positive effect on the intention to use cryptocurrency in Saudi Arabia.

ATTITUDE

Attitude is the second factor in the TRA model (Ajzen, 2020), which refers to the sum of a person's subjective knowledge regarding certain behavior and its subjective evaluation of the effects of per-

forming this behavior, in this case, cryptocurrency use, that directly influences its behavioral intention to execute such behavior, in this case, to use (or not) cryptocurrency (Yoo et al., 2020). As mentioned, several studies found attitude as a significant factor in the intention to use cryptocurrency. According to Albayati et al. (2020), Gazali et al. (2019), and Boxer and Thompson (2020), attitude is a strong predictor of behavioral intention to use cryptocurrencies for financial transactions, whereas Zamzami (2020) found it as the only significant factor of using digital money in Indonesia. The attitude was also a good predictor of cryptocurrency use in Korea (Yoo et al., 2020), South Africa (Mazambani & Mutambara, 2019), and the US (Schaupp & Festa, 2018). In line with that, the following hypothesis was tested:

H2: Attitude has a significant positive effect on the intention to use cryptocurrency in Saudi Arabia.

Perceived Risk

Perceived risk is an individual's subjective evaluation of the amount of danger or possible negative consequences involved in cryptocurrency use (Mendoza-Tello et al., 2018). Therefore, it negatively influences the intention to use cryptocurrency (Abramova & Böhme, 2016; Gil-Cordero et al., 2020; Sun et al., 2020) since the insecurity of cryptocurrencies acts as an inhibitor of their use (Sohaib et al., 2019). Still, perceived risk was not found to be significant for the intention to use cryptocurrency in Spain (Arias-Oliva et al., 2019), Korea (Yoo et al., 2020), Taiwan (Nuryyev et al., 2018), and Malaysia (Ter Ji-Xi et al., 2021). Given this contradictory evidence, and to explore this factor in more detail, perceived risk in this study has been divided into the three sub-types – privacy risk, security risk, and financial risk.

Privacy risk

Privacy risk refers to the perceived possibility of privacy data loss that could occur as a consequence of adopting new technology (Abramova & Böhme, 2016). Although this construct has not yet been employed in the cryptocurrency use field, prior studies have shown that potential users have concerns about possible data leaks (Abramova & Böhme, 2016) due to malware attacks, theft, or accidental loss of their private key (Nofer et al., 2017). In this regard, this study has tested the following hypotheses:

H3a: Privacy risk has a significant negative effect on attitude towards cryptocurrency use in Saudi Arabia.

H4a: Privacy risk has a significant negative effect on the intention to use cryptocurrency in Saudi Arabia.

Security risk

Security risk refers to the subjective evaluation of the technical security of cryptocurrency (Nuryyev et al., 2018). According to Abramova and Böhme (2016), potential users have concerns regarding possible failures of this technology, which is why perceived security is a strong predictor of their attitude and intention to use Bitcoin (Sohaib et al., 2019; Won-Jun, 2018). Accordingly, the following hypotheses were tested:

H3b: Security risk has a significant negative effect on attitude towards cryptocurrency use in Saudi Arabia.

H4b: Security risk has a significant negative effect on the intention to use cryptocurrency in Saudi Arabia.

Financial risk

Financial risk accounts for the subjective evaluation of possible monetary losses associated with cryptocurrency use (Gazali et al., 2019). Although it is imminent to financial transactions related to

cryptocurrency use, this construct has been explored in a small number of studies. According to Abramova and Böhme (2016), financial risk has a significant impact on perceived risk, which in turn has a statistically negative impact on intention to use cryptocurrencies, while Gazali et al. (2019) argue that the influence of financial risk depends on the financial risk tolerance of an individual. Accordingly, the following hypotheses were tested:

H3c: Financial risk has a significant negative effect on attitude towards cryptocurrency use in Saudi Arabia.

H4c: Financial risk has a significant negative effect on the intention to use cryptocurrency in Saudi Arabia.

Perceived Usefulness

Perceived usefulness, as part of the TAM model, refers to the subjective evaluation of cryptocurrency's utility and performance (Shahzad et al., 2018). It is one of the most explored factors of new technology adoption. According to Albayati et al. (2020) and Won-Jun (2018), perceived usefulness is a strong predictor of attitude towards cryptocurrency use, whereas Jankeeparsad and Tewari (2018) argue that it positively influences behavioral intention to use cryptocurrency. Such findings are confirmed in China (Nadeem et al., 2021), Taiwan (Nuryyev et al., 2018), Spain (Arias-Oliva et al., 2019; Mendoza-Tello et al., 2018), and the US (Schaupp & Festa, 2018). Therefore, this study tested the following hypotheses:

H5: Perceived usefulness has a significant positive effect on attitude towards cryptocurrency use in Saudi Arabia.

H6: Perceived usefulness has a significant positive effect on the intention to use cryptocurrency in Saudi Arabia.

Perceived Enjoyment

Perceived enjoyment refers to a person's perception that cryptocurrency use may provide it with happiness, fun, or satisfaction (Nadeem et al., 2021). It can be linked to the complexity of new technology, which is part of the DIT, and discomfort in its use, as part of the TRI. Empirical evidence on this factor is still scarce since only a few studies on cryptocurrency have employed it. For instance, Nadeem et al. (2021) found that perceived enjoyment positively influences perceived ease of use that in turn positively affects attitude and intention to use cryptocurrency. According to Alharbi and Sohaib (2021) and Sohaib et al. (2019), discomfort is an inhibitor of cryptocurrency use, whereas Abramova and Böhme (2016) claim that a person is less likely to use cryptocurrency if it considers its use complicated. Accordingly, this study has tested the following hypotheses:

H7: Perceived enjoyment has a significant positive effect on attitude towards cryptocurrency use in Saudi Arabia.

H8: Perceived enjoyment has a significant positive effect on the intention to use cryptocurrency in Saudi Arabia.

Personal Innovativeness

Personal innovativeness refers to a person's tendency to try new technology earlier than a reference group (Alharbi & Sohaib, 2021). As part of the TRI, it was explored in just a few studies about cryptocurrency use. For instance, Sohaib et al. (2019) found that innovative people in Australia are more likely to use cryptocurrency, which was confirmed by Sun et al. (2020) in South Korea and China, and Abbasi et al. (2021) in Malaysia. In this regard, this study has tested the following hypotheses:

H9: Personal innovativeness has a significant positive effect on attitude towards cryptocurrency use in Saudi Arabia.

H10: Personal innovativeness has a significant positive effect on the intention to use cryptocurrency in Saudi Arabia.

Research Model

In line with the above hypotheses, this study has developed a unique research model based on the theory of reasoned action and extended with several factors from technology adoption models, namely perceived usefulness, perceived enjoyment, perceived innovativeness, and perceived risk with the three sub-factors: security, financial, and privacy risk. The research model is presented in Figure 1.

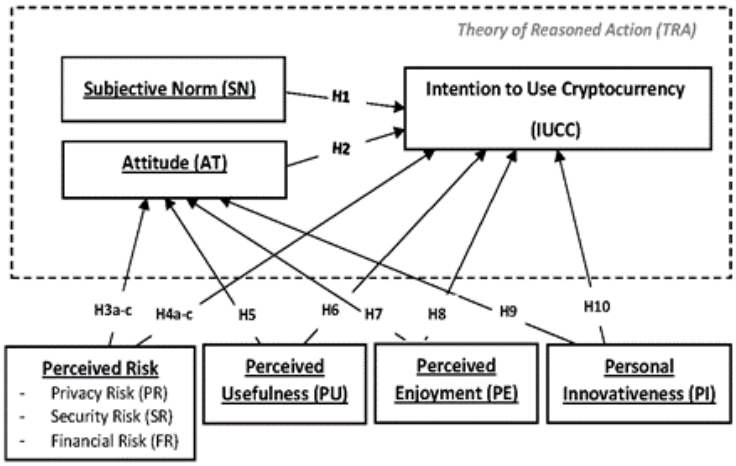

Figure 1. Research model

Whereas the TRA theory has already proved its explanatory power in the field of cryptocurrency use (Boxer & Thompson, 2020; Gazali et al., 2019), this theory can also better explain the formation of attitudes towards behaviors under individual control, especially the risky elements of cryptocurrency use (Al-Amri et al., 2019). Additional factors have also been proved as significant in this field since they can explain technological aspects of cryptocurrency use (Mendoza-Tello et al., 2018). Used together, they can provide comprehensive results on the factors influencing intention to use cryptocurrency, especially as some of the added factors have shown mixed results in previous studies or had not yet been tested in the field of cryptocurrency use (Abramova & Böhme, 2016; Al-Amri et al., 2019).

Research Methodology

Research Design

The study has used a positivistic research paradigm, a mono-method research approach, and a cross-sectional research design. After selecting the main topic (cryptocurrency) and the geographical area (Saudi Arabia), a literature review identified research gaps and contradictory findings on the selected topic enabling the development of the hypotheses and research model (Saunders et al., 2016). After that, factors included in the research model were operationalized and transformed into a questionnaire to test the hypotheses. Data are collected from September to November 2019.

Measurement Items

To ensure the validity and reliability of the study, all measurement items of the constructs were modified from existing literature to fit the context of this research. As presented in Table 1, the study used 44 items adapted from various sources to measure nine constructs. Each item was measured with a five-point Likert scale: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly

agree, requiring respondents to indicate the degree of their agreement or disagreement with the measurement item (Saunders et al., 2016).

Table 1. Constructs, measurement items, and sources

Constructs		Code	Measurement Items	Sources
Subjective Norm (SN)		SN1	People who are important to me, influencing me to use cryptocurrency in order to buy or sell products is a good way of trading.	Walton & Johnston (2018); Mazambani & Mutambara (2019); Abbasi et al. (2021)
		SN2	People who are important to me, influencing me to try cryptocurrency.	
		SN3	People who are important to me, influencing me to depict a positive sentiment to engage in using cryptocurrency.	
		SN4	People who are important to me influenced my decision to make purchases through cryptocurrency.	
		SN5	People who are important to me, encourage me whether to use cryptocurrency.	
Attitude (AT)		AT1	I think that buying cryptocurrency is a good idea.	Walton & Johnston (2018); Gazali et al. (2019); Mazambani & Mutambara (2019)
		AT2	I think that using cryptocurrency for financial transactions would be a wise idea.	
		AT3	In my opinion, it is desirable to use cryptocurrency as a currency.	
		AT4	I feel good about using cryptocurrency.	
		AT5	I am excited about the idea of using cryptocurrency.	
Perceived Risk	Privacy Risk (PR)	PR1	Information containing my cryptocurrency payment transactions can be miss-utilized by others.	Abramova & Böhme (2016); Nadeem et al. (2021)
		PR2	I do not feel safe providing personal private information over cryptocurrency payments.	
		PR3	I do not trust the ability of cryptocurrency payment service providers to protect my privacy.	
		PR4	I am concerned with the privacy security of using cryptocurrency.	
		PR5	I think that owning cryptocurrency has privacy risks.	
	Security Risk (SR)	SR1	Cryptocurrency enables to transfer money securely.	Abramova & Böhme
		SR2	Cryptocurrency empowers me with the control of my money.	

Constructs		Code	Measurement Items	Sources
		SR3	I am concerned with the security of using cryptocurrency.	(2016); Walton & Johnston (2018); Sohaib et al. (2019)
		SR4	I am worried about using cryptocurrency because other people may be able to access my account.	
		SR5	I do not trust cryptocurrency as I trust other currencies.	
	Financial Risk (FR)	FR1	The cost of cryptocurrency is very high for me.	Gazali et al. (2019); Abramova & Böhme (2016)
		FR2	Inability to convert cryptocurrency to conventional currencies, or not at a reasonable price.	
		FR3	Losses due to counterparties failing to meet contractual payments or settlement obligations.	
		FR4	Losses due to security incidents (e.g.+ lost passwords, malware).	
		FR5	I think that there would be problems with my financial transactions while using cryptocurrency.	
Perceived Usefulness (PU)		PU1	I perceive that my purchase would be more quickly using cryptocurrency.	Sohaib et al. (2019); Won-Jun (2018); Abramova & Böhme (2016); Arias-Oliva et al. (2019)
		PU2	I perceive that my purchasing tasks would be more easily using cryptocurrency.	
		PU3	Cryptocurrency would enhance my effectiveness in purchasing.	
		PU4	Cryptocurrency would enhance my efficiency in making a purchase.	
		PU5	Cryptocurrency would enable me to make better decisions in making a purchase.	
Perceived Enjoyment (PE)		PE1	Using cryptocurrency is fun for me.	Sohaib et al. (2019); Nadeem et al. (2021); Abbasi et al. (2021)
		PE2	Using cryptocurrency gives me pleasure.	
		PE3	I enjoy using cryptocurrency.	
		PE4	I am flexible when I use cryptocurrency.	
		PE5	I am uninventive when I use cryptocurrency.	
Personal Innovativeness (PI)		PI1	If I heard about a new cryptocurrency, I would look for ways to experiment with it.	Alharbi & Sohaib (2021); Sohaib et al.
		PI2	Among my peers, I am usually the first to try out a new cryptocurrency.	

Constructs	Code	Measurement Items	Sources
	PI3	I find it stimulating to be original in my thinking and behavior.	(2019); Abbasi et al. (2021)
	PI4	I like to experiment with a new cryptocurrency.	
Intention to Use Cryptocurrency (IUCC)	IUCC1	I intend to use cryptocurrency as an alternative source of currency to buy or sell products in the future.	Won-Jun (2018); Nadeem et al. (2021); Mazambani & Mutambara (2019); Arias-Oliva et al. (2019)
	IUCC2	I believe using cryptocurrency is very helpful to timely fulfill my obligations.	
	IUCC3	I intend to use cryptocurrency on a regular basis.	
	IUCC4	I will encourage others to use cryptocurrency as a mode of exchange.	
	IUCC5	I prefer to use cryptocurrency for game purposes only.	

Data Collection

The study has used a quantitative data collection method – an online, closed-ended, self-administered survey that enables the efficient process of data collection and the replicability of the study (Saunders et al., 2016). The link to the survey was posted on Twitter and the post was retweeted by several users. Using this social network for data collection was effective in reaching more participants living in Saudi Arabia since most Saudi citizens are actively using Twitter (Saudi General Authority for Statistics, 2021). The survey was hosted on the Qualtrics platform. To avoid potential biases, participants were informed about the purpose of the study and that only aggregated results would be used and reported, as well as that their participation in this research is voluntary and anonymous, and they can withdraw from it at any time (Podsakoff et al., 2003).

The questionnaire included a series of demographic questions to obtain data from the participants about their age, gender, nationality, and education, as well as the abovementioned items adapted from previously validated instruments in the cryptocurrency use field (Table 1). Following the procedure proposed by Brislin (1986), the questionnaire was originally written in English, and then translated to Arabic by a Professional NAATI-accredited translator (NAATI No. CPN5OQ23X). The questionnaire used a five-point Likert scale ranging from (1) strongly disagree to (5) strongly agree (Saunders et al., 2016).

The Study Sample

The target population of this research constituted people residing in Saudi Arabia. The intended population sample was set at approximately 200 respondents. The study used a probability sampling technique that implies that every member of the population has the same chance of being selected (Vehovar et al., 2016). After deleting incomplete surveys, the final sample of this study included 181 respondents residing in Saudi Arabia. The high response rate (90%) allowed a reliable survey outcome (Saunders et al., 2016). As presented in Table 2, most respondents were male (94.5%), Saudis (96.1%), 30-39 years old (45.3%), and with a bachelor's degree (68%). Such a sample composition is consistent with the literature on the average of those who use cryptocurrency (Al Shehhi et al., 2014; Alshamsi & Andras, 2019; Hasso et al., 2019).

Table 2. Demographic characteristics of respondents

Category		Frequency	Percentage (%)	Valid Percentage (%)	Cumulative percentage (%)
Gender	Male	171	94.5	94.5	94.5
	Female	10	5.5	5.5	100.0
Age	Less than 20 years	4	2.2	2.2	2.2
	20-29 years	68	37.6	37.6	39.8
	30-39 years	82	45.3	45.3	85.1
	40-49 years	27	14.9	14.9	100.0
	Over 50 years	0	0	0	100.0
Nationality	Saudi	174	96.1	96.1	96.1
	Non-Saudi	7	3.9	3.9	100.0
Education Level	High School	6	3.3	3.3	3.3
	College degree	22	12.2	12.2	15.5
	Bachelor's degree	123	68.0	68.0	83.4
	Postgraduate degree	30	16.6	16.6	100.0

DATA ANALYSIS AND RESULTS

Data collected were analyzed with several methods by utilizing SPSS (Version 22.00) and Amos (Version 22.0) programs. After providing a summary of the sample size by descriptive statistics (Saunders et al., 2016), a two-step procedure for the data analysis was employed. First, the measurement model was assessed to determine the relationships between the measurement items and constructs and confirm the validity of the constructs, and then the structural model was assessed to examine the direction and strength of the relationships between the constructs (Hair et al., 2014).

DESCRIPTIVE STATISTICS

Descriptive statistics allowed to evaluate the actual values of variance to depict the homogeneity of variables within factors (Saunders et al., 2016). Table 3 presents the average values for each factor. The mean value and standard error of the mean show how accurately the sample reflects the wider population, while the standard deviation describes the responses provided by the participants to the items of the instrument administered to them. Skewness and Kurtoses scores between the critical values of ±2 show that variables were normally distributed.

Table 3. Descriptive statistics

Variable	Mean	St. Error	St. Deviation	Skewness	Kurtosis
SN	2.69	0.069	0.933	0.287	-0.709
AT	2.04	0.087	1.173	1.250	0.758
PR	3.80	0.103	1.365	-0.944	-0.442
SR	2.76	0.081	1.092	0.090	-0.722
FR	3.28	0.100	1.240	0.125	-1.077
PU	2.04	0.087	1.166	1.265	0.860
PE	2.32	0.090	1.207	0.847	0.037
PI	2.63	0.096	1.294	0.541	-0.793
IUCC	2.08	0.085	1.137	1.157	0.654

Measurement Model Assessment

Measurement model validity is evaluated by items loadings and Cronbach's alpha. First, the exploratory factor analysis (EFA) was used to define the optimal number of items of the instrument administered to the sample (Saunders et al., 2016). Based on the factor correlation matrix, maximum likelihood extraction with oblique rotation (Oblimin) was used, which resulted in the pattern matrix of items showing their loadings. To confirm the validity of the model, the loadings of measurement items should be significant ($p < 0.05$) and greater than 0.5 on their hypothesized construct (Hair et al., 2014). The reliability of the model is assessed by Cronbach's alpha, which evaluates the internal consistency of each of the instrument`s constructs, and should be close to 1 so the instrument can yield reliable scores (Saunders et al., 2016). The most preferred values of Cronbach's alpha are within a range of 0.70-0.95 (Bujang et al., 2018). As presented in Table 4, all criteria are met, showing that all constructs in the measurement model had adequate reliability.

Table 4. Items loadings and Cronbach's alpha

Items	Loading	Cronbach's Alpha	Result
Subjective Norm (SN)		0.875	Very Good
SN2	0.632		
SN3	0.913		
SN4	0.894		
SN5	0.766		
Attitude (AT)		0.967	Excellent
AT1	0.556		
AT2	0.647		
AT3	0.642		
AT4	0.647		
AT5	0.570		
Privacy Risk (PR)		0.965	Excellent
PR2	0.702		
PR3	0.769		
PR4	0.846		
PR5	0.738		
Security Risk (SR)		0.671	Acceptable
SR3	0.586		
SR4	0.754		
SR5	0.600		
Financial Risk (FR)		0.786	Acceptable
FR1	0.776		
FR2	0.756		
FR4	0.665		
Perceived Usefulness (PU)		0.960	Excellent
PU2	-0.668		
PU3	-0.777		
PU4	-0.808		
Perceived Enjoyment (PE)		0.940	Excellent
PE2	-0.586		
PE3	-0.696		
PE4	-0.589		
Personal Innovativeness (PI)		0.923	Excellent
PI1	0.664		

Items	Loading	Cronbach's Alpha	Result
PI2	0.798		
PI3	0.707		
PI4	0.719		
Intention to Use Cryptocurrency (IUCC)		0.952	Excellent
IUCC1	0.801		
IUCC2	0.841		
IUCC3	0.687		
IUCC4	0.753		

Structural Model Assessment

The next step was the confirmatory factor analysis (CFA) which evaluated the construct validity of the instrument (Saunders et al., 2016). The results of the R square (R^2) variance indicated that selected components explain 84.04% of the total variance, confirming the factor structure generated by the previous step. Finally, the structural model was assessed by structural equation modeling (SEM) which tests the hypotheses and reveals the relationships of the constructs in the research model by estimating path coefficients (β) and their corresponding significance (p-value) (Hair et al., 2014). To support the hypothesis, the individual path, or standardized beta coefficient (β) should exceed 0.1 and be significant (p-value) at least at the 0.05 level (Saunders et al., 2016). The results of the structural model assessment are presented in Table 5 and Figure 2. Table 5 presents the path coefficients (β), t-statistics, p-value (p), and the hypotheses testing results for each proposed hypothesis, while Figure 2 presents the structural model with standardized estimates (β). As shown, all hypotheses, except H3b and H4b, were supported.

Table 5. Hypotheses' path coefficients, t-statistics, and p-values

Hypothesis	Path	Path coefficient	t-statistics	p-value	Results
H1	SN → IUCC	0.235	4.672	0.000	Supported
H2	AT → IUCC	0.293	2.506	0.012	Supported
H3a	PR → AT	-0.190	-4.185	0.000	Supported
H3b	SR → AT	0.028	0.602	0.547	Not supported
H3c	FR → AT	-0.106	-2.144	0.032	Supported
H4a	PR → IUCC	-0.141	-2.536	0.011	Supported
H4b	SR → IUCC	-0.009	-0.176	0.860	Not supported
H4c	FR → IUCC	-0.192	-3.209	0.001	Supported
H5	PU → AT	0.476	6.762	0.000	Supported
H6	PU → IUCC	0.254	2.674	0.008	Supported
H7	PE → AT	0.421	6.004	0.000	Supported
H8	PE → IUCC	0.205	2.208	0.027	Supported
H9	PI → AT	0.143	3.374	0.000	Supported
H10	PI → IUCC	0.259	4.853	0.000	Supported

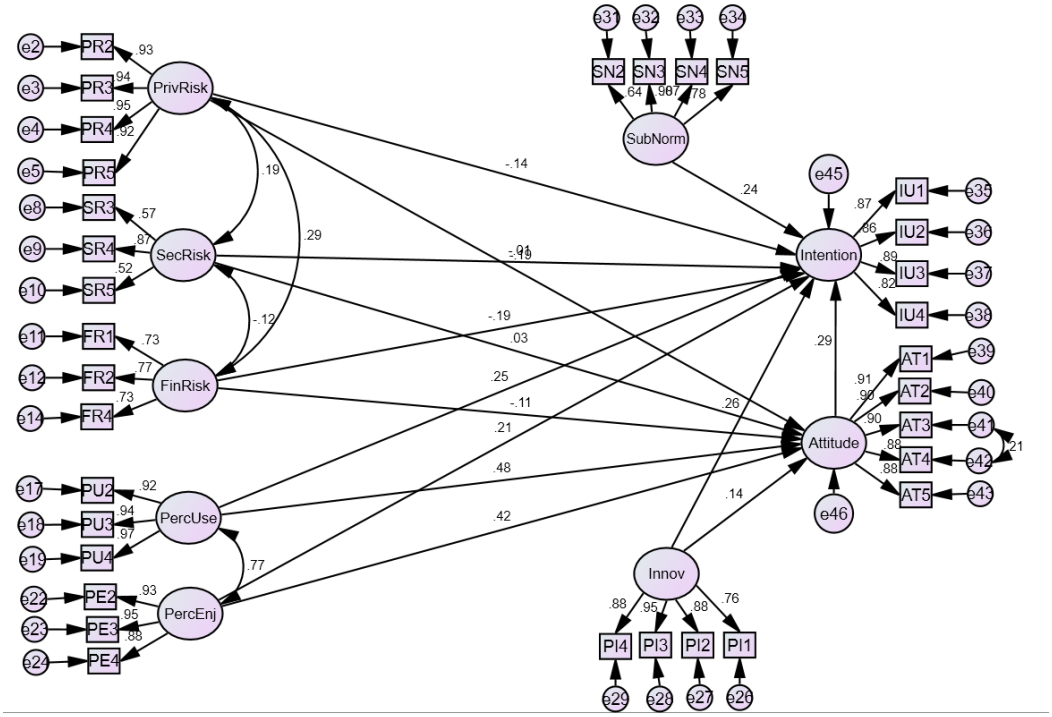

Figure 2. The structural model

The study results show that subjective norm (β = 0.235, p < 0.001) and attitude (β = 0.293, p = 0.012) have a significant and positive influence on intention to use cryptocurrency. Both privacy risk (β = –0.190, p < 0.001) and financial risk (β = –0.106, p = 0.032) have a significant negative impact on attitude, while there is no evidence that security risk (β = 0.028, p = 0.547) has a significant negative impact on attitude. Similarly, privacy risk (β = –0.141, p = 0.011) and financial risk (β = –0.192, p = 0.001) have a significant negative effect on intention to use cryptocurrency, while the results have not confirmed the influence of security risk on intention to use cryptocurrency, as the significance value was above the 0.05 threshold (β = –0.009, p = 0.860). Perceived usefulness has a significant positive effect on attitude (β = 0.476, p < 0.001) and intention to use cryptocurrency (β = 0.254, p = 0.008). Similarly, perceived enjoyment significantly and positively influences attitude (β = 0.421, p < 0.001) and intention to use cryptocurrency (β = 0.205, p = 0.027). Personal innovativeness also has a significant and positive impact on attitude (β = 0.143, p < 0.001) and intention to use cryptocurrency (β = 0.259, p < 0.001).

DISCUSSION OF RESEARCH FINDINGS

FINDINGS

Given concerns related to their use and the apprehensiveness of the unknown among potential users (Al-Amri et al., 2019; Sohaib et al., 2019), cryptocurrency use is still limited. There is also scarce scholarly research on the factors influencing the behavioral intention to use cryptocurrency (Abbasi et al., 2021; Al-Amri et al., 2019; Arias-Oliva et al., 2021), mostly based on technology adoption models, with contradictory evidence (Ajzen, 2020; Noreen et al., 2021; Zamzami, 2020), and the limited generalizability of the results (Ter Ji-Xi et al., 2021; Walton & Johnston, 2018), especially in specific cultural contexts such as Saudi Arabian. For these reasons, this study has explored the factors influencing the behavioral intention of Saudi citizens to use cryptocurrencies from human, financial, and security perspectives by combining factors from attitudinal and technology adoption models.

Using a quantitative research methodology, this research has confirmed some previous study results and came to new findings:

- This study has found a significant positive influence of attitude on the intention to use cryptocurrency (H2).
- The study has also found a significant positive influence of subjective norm on the intention to use cryptocurrency (H1).
- This study has found that perceived usefulness, perceived enjoyment, and personal innovativeness significantly and positively influence both the attitude toward cryptocurrency (H5, H7, H9, respectively) and the behavioral intention to use it (H6, H8, H10, respectively).
- The study has also found that privacy risk and financial risk have a significant negative effect on the attitude toward cryptocurrency (H3a, H3c, respectively) and the intention to use cryptocurrency (H4a, H4c, respectively).
- Finally, this study has not found the influence of security risk on the attitude toward cryptocurrency (H3b) nor the intention to use cryptocurrency (H4b).

These findings imply that:

- In line with the TRA model (Ajzen, 2000), people are more likely to use cryptocurrency if they have a positive attitude (H2) towards it (Albayati et al., 2020; Gazali et al., 2019; Mazambani & Mutambara, 2019; Schaupp & Festa, 2018; Zamzami, 2020), especially if they experience positive subjective norms towards such behavior (H1) from thier reference group (Al-Amri et al., 2019; Gazali et al., 2019; Jankeeparsad & Tewari, 2018; Sas & Khairuddin, 2017; Schaupp & Festa, 2018), and particularly if their friends and family use cryptocurrency (Boxer & Thompson, 2020; Walton & Johnston, 2018).
- People are more likely to have a positive attitude toward cryptocurrency if they perceive it as useful (H5) (Albayati et al., 2020; Arias-Oliva et al., 2019; Nadeem et al., 2021; Nuryyev et al., 2018), enjoyable (H7) (Nadeem et al., 2020), and as a means of enhancing their personal innovativeness (H9) (Abbasi et al., 2021; Sohaib et al., 2019; Sun et al., 2020), as well as if they perceive it as not risky in terms of privacy data leaks (H3a) and financial losses (H3c) (Abramova and Böhme, 2016; Gazali et al., 2019; Nofer et al., 2017).
- People are more likely to engage in cryptocurrency use if they consider it useful (H6) in terms of enabling easy, fast, and low-cost transactions or a high yield on investment (Arias-Oliva et al., 2019; Baur et al., 2018; Jankeeparsad and Tewari, 2018; Mendoza-Tello et al., 2018; Nuryyev et al., 2018), providing a person with joy and comfort in its use (H8) (Abramova and Böhme, 2016; Alharbi & Sohaib, 2021; Nadeem et al., 2020), and enhancing their personal innovativeness (H10) (Sohaib et al., 2019; Sun et al., 2020), but at the same time not bearing a high risk of privacy data leaking (H4a) or financial losses (H4c) (Nofer et al., 2017).
- Potential users do not consider security risk as relevant for their attitude toward cryptocurrency (H3b) or their intention to use cryptocurrency (H4b), as they do not perceive cryptocurrency use as risky in terms of technology failure, which is partially consistent with prior literature that argues that the use of cryptocurrencies is usually considered safe due to their cryptographic security (Hileman & Rauchs, 2017; Nadeem et al., 2021; Nuryyev et al., 2018), but also that the impact of security risk depends on a person's knowledge and information about cryptocurrencies (Noreen et al., 2021; Shovkhalov & Idrisov, 2021).

Therefore, this study has shown that behavioral intention to use new technology involved with financial transactions depends on various human, financial, and technology-related factors, thus confirming that such a complex topic can only be thoroughly evaluated by combining the factors from attitudinal and technology acceptance models. These results also indicate that providing potential users with information on the benefits of cryptocurrencies, such as their usefulness in conducting fast, safe

and low-cost financial transactions and gaining potentially high yield on investment, their comfortable use, and the low risk of cryptographic technology, is more likely to improve their attitude and intention to use cryptocurrency. By spreading the word about this, they are more likely to improve social norms towards cryptocurrency use, thus additionally increasing the rate of its use. Also, their sense of personal innovativeness is more likely to be enhanced by expanding cryptocurrency use cases, e.g., by accepting it as a payment method, thus further improving their attitudes and intentions towards cryptocurrency use and additionally increasing cryptocurrency use, enabling its full potential to be utilized, which is the ultimate goal.

IMPLICATIONS

This study has several theoretical implications. First, this study provides a new unique research model for the evaluation of factors driving individuals' behavioral intention to use cryptocurrency from human, financial, and technology perspectives. In this way, the study enables a comprehensive analysis of this topic, contributes to the extension of the TRA theory with a range of factors from the technology adoption field, and proves the validity of the TRA when it is not used in its original form. Secondly, by exploring the three sub-factors of perceived risk, this study improves the current theoretical knowledge and provides empirical evidence on their impact on attitude and intention to use cryptocurrency, especially as privacy risk was explored for the first time in this field, whereas other risk sub-types have been explored in just a few prior studies. Third, the study enriches the theoretical knowledge on the influence of other factors explored that either provided contradictory evidence in previous studies or were not previously used in this field. Finally, this research provides the first empirical evidence on this topic in Saudi Arabia and enables further research on this topic in similar and different cultural contexts, enabling both a comparison of study results and a confirmation of this research model in different contexts.

This study also has several practical implications. First, by showing to what extent each of the factors influences the decisions about cryptocurrency use, this research enhances the actual understanding of this phenomenon. Secondly, the study provides valuable information on cryptocurrency use to various stakeholders, such as governments, investors, merchants, developers, and the general population enabling them to make better decisions, evaluate current and predict future attitudes and intentions of potential cryptocurrency users, create appropriate policies and campaigns to stimulate further interest in cryptocurrency use, as well as anticipate legal, economic and environmental effects of cryptocurrency use in both short- and long-term.

For instance, using this study results, the governments can create appropriate legal frameworks for cryptocurrency use that enhance the factors with a significant positive impact, such as usefulness and enjoyment, while reducing the impact of the risky factors, as well as create appropriate policies and provide incentives for the alternative use cases of cryptocurrencies, such as payment methods. Developers can design platforms that transpire trust in cryptocurrency transactions, while merchants may create appropriate campaigns to inform customers on how to purchase, trade, and exchange cryptocurrency putting emphasis on their personal innovativeness and emphasizing the benefits, easiness, usefulness, and enjoyment of using cryptocurrencies as alternative payment methods. Investors may also enhance cryptocurrency investments by establishing trust and reducing the concerns of potential users. Finally, by promoting a positive user experience, all stakeholders may enhance social norms towards cryptocurrencies, and thus further increase the interest in their use, enabling the full potential of cryptocurrencies to be utilized.

CONCLUSION

Since their inception in 2008, cryptocurrencies have gained great popularity, providing anonymous, safe, fast, and low-cost financial transactions, with no need for third-party authorization. However, despite the exponential growth of their acceptance worldwide, cryptocurrency use has remained limited, while scholarly research on the factors influencing behavioral intention to use cryptocurrency is

still scarce. Prior studies are mostly done from developed countries' perspectives or in specific cultural contexts, provided contradictory evidence, and mainly used technology adoption models that cannot fully explain the acceptance of technology involved with financial transactions. Moreover, entire regions have been excluded from the research on this topic, including Saudi Arabia which has the high potential to increase the volume of cryptocurrency use.

To fill these research gaps, this study has explored the factors influencing the behavioral intention of Saudi citizens to use cryptocurrencies from human, financial, and security perspectives by developing a unique research model based on the theory of reasoned action and extended with several factors from technology adoption models that proved relevant for this topic, namely perceived usefulness, perceived enjoyment, perceived innovativeness, and perceived risk with three sub-factors: security, financial, and privacy risk. Using a quantitative research methodology, data are collected from 181 respondents residing in Saudi Arabia and analyzed with several methods. The study confirmed the reliability and validity of the research model that explained 84.04% of the total variance. The results confirmed the influence of all examined factors, except security risk, indicating that Saudi citizens are more likely to use cryptocurrencies if they have a positive attitude towards cryptocurrencies, that is supported by positive subjective norms towards their use, and perceive cryptocurrencies as useful, enjoyable, and not risky in terms of privacy data leaks and financial losses, that at the same time enhance their personal innovativeness. The study has several theoretical and practical contributions discussed above.

Despite many contributions, this study has several limitations that might direct future research. First, a smaller sample and not dividing participants into groups based on their knowledge of cryptocurrency might have distorted the findings of this study, as those with knowledge about this technology might have valued different factors or given them greater weight than those with less knowledge about cryptocurrencies. Thus, future research should include a greater number of respondents and explore the impact of the factors in relation to their knowledge and information about cryptocurrencies to improve the explanatory power of this research model. Secondly, the cross-sectional nature of the study disabled the analysis of possible changes in attitudes and intentions towards cryptocurrency use over time. Hence, future studies may investigate whether the impact of variables would remain the same if circumstances changed or use cases expanded, and how the preferences of the target population would change within a longitudinal time frame.

Third, the focus of this study on the specific theory and factors has limited its ability to explore other factors that might have also been significant for this field, as well as to explore the specific factors in more detail. Therefore, future studies can include different or additional variables, e.g., trust, perceived behavioral control, or facilitating conditions, as well as explore the impact of each part of subjective norm, namely social media, friends, and family to determine their individual influence and if this impact is related to the country's context. Future studies can also investigate how provided information on the benefits of cryptocurrencies affects the perception of the risk, usefulness, and enjoyment, and whether the influence of these factors would change if other use cases were introduced.

Also, as this study used a survey that could have provided only the general findings on this topic, future studies might use mixed methods, as interviews augment the comprehension of factors' influence and their interrelationships. Finally, the focus of this study on one country with a specific cultural context might limit the generalizability of its findings. Thus, future studies might test this research model in both similar and different contexts to enable a comparison of the results and determine whether the validity of this research model and study results depend on cultural and contextual factors, thus further expanding the current theoretical knowledge and providing additional empirical evidence and information to key stakeholders.

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- Developing a cognitive culture model in E-commerce, 2014
- Exploring AIIA members' innovation culture from an employees' and competitors' viewpoint, 2013-2016
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