UNIVERSIDADE CATÓLICA PORTUGUESA

WILL PEOPLE USE CRYPTOCURRENCIES? EXTENDING A MODEL OF CRYPTOCURRENCY ADOPTION PREDICTORS BY EXPLORING THE ROLE OF TRUST IN (CRYPTO)CURRENCIES

Dissertation to Universidade Católica Portuguesa to obtain a Master's Degree in Business & Economic Psychology

By

Santiago Agustin Waisman

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Abstract

During the last few years, the financial world has been disrupted by the appearance of cryptocurrencies as a new way to carry out economic transactions, with a dramatic growth in use worldwide. Nonetheless, as any new technology, the drivers behind its adoption in different contexts need to be better understood. This work aimed to further the knowledge on cryptocurrency adoption grounded on the Unified Theory of Acceptance and Use of Technology (UTAUT) model, while extending it with new variables, particularly trust which the literature shows has having a high predictive ability. Moreover, it aimed to understand the model's applicability across contexts to explore contextual specificities that may determine the adoption of new technologies, by testing a model with 163 participants from Argentina and another with 139 from Portugal. The UTAUT model showed a good fit for both samples, explaining over 61% of the variance on intention to use cryptocurrency for Argentina and 63% for Portugal, with performance expectancy having the highest predictive value for both samples. Furthermore, equal predictors showed unequal significance levels between samples, and even significant results with opposite directions, which highlights the need for more cross-cultural research in predictors of technologies adoption.

Keywords: Cryptocurrency, UTAUT, Technology Adoption, Fintech, cross-cultural research, behavioural intentions

Resumo

Durante os últimos anos, o mundo financeiro foi abalado pelo aparecimento das criptomoedas como uma nova forma de realizar transações económicas, com um crescimento dramático da sua utilização em todo o mundo. No entanto, como qualquer nova tecnologia, os determinantes da sua adopção em diferentes contextos precisam de ser melhor compreendidos. Este trabalho teve como objetivo aprofundar o conhecimento sobre a adopção das criptomoedas, estudando-as sob à luz do modelo da Teoria Unificada de Aceitação e Uso de Tecnologia (UTAUT), estendendo-o com novas variáveis, particularmente a confiança, que a literatura demonstrou ter elevada capacidade preditiva. Além disso, este estudo visou compreender a aplicabilidade do modelo em diferentes contextos para explorar variáveis contextuais que possam influenciar a adopção de novas tecnologias, testando dois modelos, um numa amostra de 163 participantes da Argentina e outro em 139 de Portugal. O modelo UTAUT demostrou um bom ajuste em ambas as amostras, explicando mais de 61% da variância da intenção de usar criptomoedas na Argentina e 63% em Portugal, sendo a expectativa de desempenho a variável com maior poder preditivo. Além disso, iguais variáveis mostraram diferentes níveis de significância entre amostras, e mesmo resultados significativos com direções opostas, o que salienta a necessidade de mais investigação de comparação de culturas com foco em preditores do uso de tecnologias.

Keywords: criptomoedas, UTAUT, adopção de tecnologia, fintech, investigação cultural, intenção comportamental

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1. Introduction

During the last couple of years, the area of Financial Technology (FinTech) has been going through an exponential growth, fueled by consumers who want their financial services to be digitalized in order to provide a better experience with said products. Among the most relevant trends in FinTech, blockchain technology, and in particular cryptocurrencies, monetary systems which utilize this technology, are becoming more and more relevant every day. These have gained a predominant place in the media and went from something only known to technology enthusiasts into something more and more people are getting familiar, with every passing day (Shin, 2019). This has led to a rapid development in companies offering services related to the exchange of cryptocurrencies, as well as the development of government backed currencies using blockchain technology, with the most relevant applications in China and India being expected in the near future. Estimations from the World Economic Forum (2015) predict that by 2027, 10% of the world's GDP will be stored in blockchain, with some predictions placing the average annual growth rate of cryptocurrencies in 62.1% until the year 2025 (Business Wire, 2017).

As in any new technology development, interest is also increasing in the prediction of consumers adoption of it, by considering what technical advantages it is perceived as having over other technologies and the value it provides. Some of the opportunities it offers include fast, efficient, traceable, and secure transactions. However, the drawbacks present in this innovation must also be considered, such as their inherent risk, their environmental impact or the technological and financial difficulty of using them. Moreover, illegal activities have been associated cryptocurrencies, such as drug trafficking, money laundering, tax evasion, extortion and theft of large amounts of cryptocurrencies themselves (Bloomberg, 2017), which may also have an impact in the trust people have in them.

In recent years, studies have been trying to understand the behavioral predictors of cryptocurrency adoption. The most prevalent models used include variations of the Unified Theory of Acceptance and Use of Technology model (UTAUT) (Venkatesh et al., 2003; Arias-Oliva, Pelegrín-Borondo & Matías-Claver, 2019; Lopez & Camberos, 2021; Walton & Johnston, 2018), which is grounded on the Technology Acceptance

Model (TAM), first proposed by Davis (Davis, Bagozzi & Warshaw, 1989). Both models are also based on Ajzen's theory of planned behavior (Ajzen, 1991), which has also been utilized in studies analyzing cryptocurrency use (Yoo, Bae, Park & Yang, 2020).

Despite the fact that TAM and UTAUT, have been some of the most used models for analyzing technology adoption, their predictive power has been criticized, which means there is room for improving the existent model. Discussions within the research lines concerning technology adoption claim there are still important concerns that need to be addressed in order to extend the applicability of these models. Specifically, researchers on the UTAUT model have proposed that studies on the field should not only focus on applying the model to new technologies and populations, but also on making the model more robust by adding constructs which contribute to the theoretical mechanisms described within the model. At the same, this model should consider contextual variables that may have an effect on the adoption of technology, which are not included in most versions of it (Venkatesh et al., 2012).

To follow this line of research, one of the key variables to consider regarding predictors of the adoption of cryptocurrencies is trust, which is not considered in the referred models. Other studies have analyzed the role of trust as one of the main predictors of cryptocurrency adoption (Alaeddin & Altounjy, 2018; Albayati, Kim & Rho, 2020; Shin, 2019), while also being included in studies applying the UTAUT model for cryptocurrency adoption (Lopez & Camberos, 2020). The study of trust in psychology has many different areas of focus, including accounts such as the dual-mode model proposed by Siegrist, Earle and Gutscher's (2003), which differentiates between 1) social trust, understood as the willingness to make oneself vulnerable towards others in a particular context (in this case the others would be the people involved in the use of a certain cryptocurrency), which is guided mostly by emotions, and 2) confidence, the belief that certain future events will occur as expected (for example that transactions using cryptocurrencies will be accurately completed). Also relevant is technological trust, which is explained as individual perceptions and assessments of technology related trust issues, based on the advantage to use, expectation regarding the technology usability, and perception of its user's skills (Leppanen, 2010);

Despite the existing research on trust as a predictor of cryptocurrency adoption, one aspect that has not been covered is the role of confidence in the country's currency as a store of value, defined as the confidence that money in that currency will retain its

value over time, maintaining purchasing power (Mattke, Maier & Reis, 2020). This variable has been linked by economists to the price of cryptocurrencies, which in turn is associated with its adoption (Huang et al., 2021). In the current global context where higher levels of inflation have led to concerns in different parts of the world regarding the value of their money, this question becomes increasingly relevant.

Moreover, one of the main aspects to further the understanding of technology adoption is to analyze how contextual differences may modify the model's predictive power. This is a fundamental point of this study, which aims to compare how the model applied to distinct populations, in countries with differing economic, cultural and political situations, such as Argentina and Portugal as examples. This area of study in technology acceptance is a new field that needs to be explored to strengthen the applicability of the model and its use for decision-makers. One previous study analyzed cultural differences impacting the adoption of cryptocurrency by utilizing the UTAUT model and Hofstede's cultural comparison theory (Jung et al., 2018), but more research on the topic is needed to understand how they affect the model. Thus, the present study, framed in the field of cross-cultural psychology, aimed to explore potential differences that could be a topic of research for future work, in addition to the role of trust and specifically confidence, along other predictors of adoption.

PART 1 – THOERETICAL FRAMEWORK

2. Literature Review

2.1. Cryptocurrency

The main definition used to understand what cryptocurrencies are is that they are a type of digital currency, which is based on a peer-to-peer network while also using elements of cryptography to encrypt the information involved in transactions. One of the most relevant consequences of this is that no mediator is involved in the transaction, while also providing for a high level of security due to the encryption, ensuring that the rules coded in the cryptocurrencies are secure (Narayanan et al., 2016; Arli, van Esch, Bakpayev & Laurence, 2020). What differentiates cryptocurrencies from other forms of digital currency or a fiat currency (money issued by governments, backed by central banks), is that due to the use of a peer-to-peer network, they have decentralized control, meaning that control is distributed among members of the network (Trautman, 2014).

The key technology behind the way cryptocurrencies work is the blockchain (Johansen, 2018). Blockchain is basically a database that grants users the ability to keep all the transactions in a shared digital ledger, so that all the transactions are visible, verified and should be trusted, providing the assumption that there is transparency behind the currencies. This innovation is achieved through the use of encryption. Each transaction done using a cryptocurrency has a cryptographic hash function, which are mathematical algorithms based on cryptography that utilize a data imput of any length, which is then returned as certain type of data determined by a mathematical function “h” (Rudlang, 2017). Transactions are registered in blocks, which are a group of records that were verified by peers in the network, which are linked using this hash functions. Since a small change in the input of the function completely changes the output, this makes it incredibly hard to tamper with the blockchain, so that when a community has validated a certain block it becomes practically immutable. As mentioned, all transactions are stored in “blocks” which are structured in a “chain” of history. Thus, the transactions are verified by miners, which are individual computers that through mathematical functions confirm that a transaction was effectively made. There are several uses for Blockchains that are not only related to currency, such as asset management, fundraising, supply chain management, copyright, digital art or identity management (Elsden et al., 2018).

Cryptocurrency has been classified by the World Bank as a subset of digital currency, which is defined as digital representations of value, distinct from electronic money, which is just a mechanism for digital payments. Thus, cryptocurrencies work as an alternative to government emitted currency, which can be used as an exchange method independent from a central bank, while being secured by a cryptographic mechanism (Natarajan et al., 2017). Concerning the actual use of cryptocurrency, potential users can obtain them in several ways, the most common being through entities known as exchanges, which offer the services of exchanging fiduciary money for cryptocurrencies for a fee (Houben & Snyers, 2018), allowing users to buy and exchange them in a manner similar to regular currency exchanges. Besides this method, users can receive cryptocurrencies as a payment for goods and services, receiving them through a digital wallet, or buying them through peer to peer platforms to other individual users willing to sell them for fiduciary money.

Digital wallets are the main technological tool used to store and transfer cryptocurrency, containing the cryptographic keys that provide access to each individuals' assets (Financial Action Task Force, 2014). This role is usually handled by the previously mentioned cryptocurrency exchanges, in a manner that works akin to a bank account app, though many tools exist that only involve the storage and transaction features, without allowing exchange for fiduciary money in the wallet itself. (Houben & Snyers, 2018).

Overall, the use of cryptocurrencies at a global level has been growing by leaps and bounds since they first came into existence in 2009. Estimates by the research firm Chainalysis indicater that as of 2022, there are 320 million users of cryptocurrency worldwide. More specifically, the same report estimates that Argentina has an estimated adoption of 5.2% of the population, while in Portugal the estimated rate is 2.37%, indicating that there may be differences worth exploring in their overall adoption.

2.2.Theory of Planned Behaviour

In the search to explain what determines to use of specific technologies, social scientists have proposed a myriad of different theories and models which aim to give an explanation to the main drivers of behavior, and more specifically behavioral intentions, which has been the main topic of study for many of these lines of research.

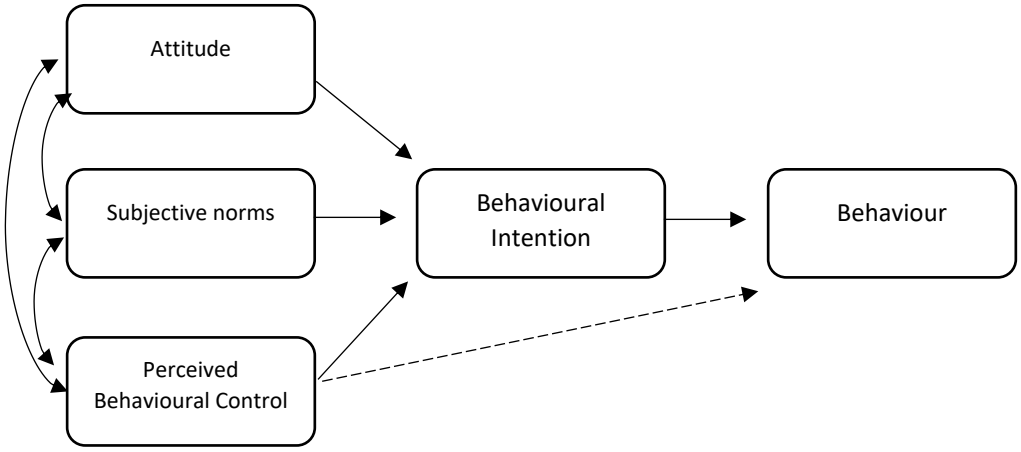
The Theory of Planned Behaviour (TPB) is a behavioural intentions theory which was based on the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), one of the most popular theories used to understand what determines a person's behavioral intention. The authors defined three main variables of the model as follows, attitude consisting of an individual evaluation of an object, belief which refers to a link between an object and some attribute, and behavior as an outcome or intention (Lai, 2017). According to the model, attitudes are part of the affective domain and form their basis on a set of beliefs about the behavioral object, e.g. "using cryptocurrency is convenient", with an additional important variable being the person's subjective norms regarding what they perceive to be , that being the attitude and/or behavior of their immediate social circles towards a certain behavior, e.g. "my friends are using cryptocurrency and using them would give me their approval".

On the same note, Fishbein and Ajzen (1975) argue that the intention to use a new technology is determined by an individual's behavioral attitude and subjective norm that, with behavioral intention explaining the individual's reasoning behind the use of said technology as a proxy tomeasure of actual behavior. Following the model, if the intention behind use is strong enough, it will eventually result in actual use. They define this attitude as "a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" (Fishbein & Ajzen, 1975). In other words, in the case of our study the attitude is the learned evaluative tendency or predisposition towards cryptocurrencies.

The Theory of Planned Behavior (TPB) introduced by Ajzen proposed in 1991 an extension of the Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975) , aimed to extend the original model, by including an additional determinant of intentions – the perceived behavioral control. This new control variable, perceived behavioral control, refers to the perception of one's control over internal and external constraints on behavior, which he defined as the perceptions of how easy or difficult performing a certain behavior is. The model proposes that in situations where someone has full control over individual actions, their behavior can be predicted with intention alone, and on the other hand, if the person has less control over their actions, the influence of the perceived behavioral control will be stronger, and the individual's own confidence, or self-efficacy, will determine actual behavior (Ajzen, 1991). Perceived behavioral control in addition to directly affecting actual behavior, also affects it indirectly through

the behavioral intention, while also correlations with subjective norm and attitude towards the behavior (Ajzen, 1991), The graphical representation of the model of the Theory of Planned Behavior can be seen in Figure 1.

Figure 1 - *Theory of Planned Behaviour (Ajzen, 1991)*



2.3.Technology Acceptance Model

The area of research regarding the acceptance and use of technology a widely developed field that combines psychological and social variables with technical aspects of the technologies involved (Venkatesh, Davis, & Morris, 2007), focusing both on individual acceptance, as well as adoption by groups and organizations (Venkatesh, Thong & Xu, 2013). Several competing models have been proposed and tested to explain and predict user acceptance of technology, including the Theory of Reasonable Action (TRA) (Fishbein and Ajzen, 1975), Theory of Planned Behaviour (TPB) (Ajzen, 1985), the Technology Acceptance Model (TAM) (Davis, Bogozzi & Warshaw, 1989), which is based on the previous two models, the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis & Davis, 2003), which is an extension of TAM, and the Theory of Diffusion of Innovations (TDI) (Rogers, 1995).

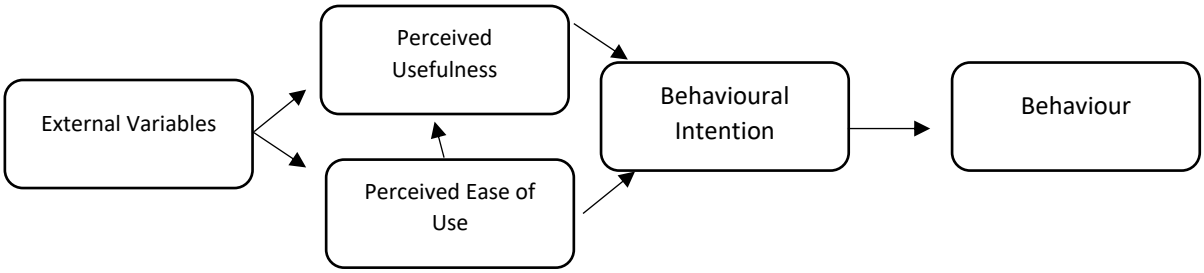
The TAM, developed by Davis (1989), is one of the most popular models applied to the prediction of the use and acceptance of technology by individual users. Several studies have analyzed the predicted power of TAM to different types of technology, from information systems to agricultural techniques (Surendran, 2012), finding it suitable to explain the adoption of technologies such as consumer behavior theory, the introduction of the World Wide Web, the examination of web-based

technologies, exploration of reasons for consumer usage of the wireless internet, online banking and generally e-commerce, among other recent innovations related to information technology (IT). In its original form, TAM explains the user's adoption of a new technology by three main variables; perceived usefulness, perceived ease of use and attitude toward the use of said technology (Taherdoost, 2018). These variables work as predictors of the behavioral intentions to use the technology.

PU can be defined as the belief that a technology will enhance the user's performance or their ability to achieve their goals. This variable is meaningful because users tend to be more likely to have the intention to use a certain technology if it has the capacity to help them achieve their goals, though other factors such as the simplicity or difficulty of the system also come into play. This is where the other key variable, perceived ease of use, which refers to the degree of users' belief that using the new technology will be free of effort, help explain this behavior. How easy or difficult the technology is to use will work as an enabler or a barrier towards its adoption, affecting its perceived usefulness while also influencing the attitude towards it (Davis, Bogozzi & Warshaw, 1989). Empirical tests of TAM have found that perceived usefulness has consistently been a strong predictor of usage intentions, while perceived ease of use has shown a less consistent effect on intention across previous studies (Venkatesh & Davis, 2000). The attitude refers to the positive or negative feeling towards the technology. This variable is a key predictor towards its adoption, but it is important to consider that it can also be affected by others attitudes as well, which is included as social norm in some versions of the TAM (Davis, Bogozzi & Warshaw, 1989; Albayati, Kim & Rho, 2020).

The above mentioned three variables predict behavioral intention to use the technology, referring to the user's perceived likelihood that they will use the new technology. Behavioral intention helps users to accept useful technologies, or reject the ones that are not, but also it is the driver of their belief to have intentional behavior (Ajzen, 1985; Albayati, Kim & Rho, 2020). One of the main versions of the model is represented in figure 2 (Venkatesh & Davis, 1996)

Figure 2 - *Technology Acceptance Model (TAM) (Venkatesh & Davis, 1996)*



Despite the widely spread use of TAM, some criticisms have been made that should be considered. Chuttur (2009) summarizes most of these criticisms in three categories, methodological, which argue that self-report measurements are not the most accurate way to measure technology acceptance, limitations with the variables and their relationships, which encompass arguments that the relationship between the variables in the model may change depending on the context (such as voluntary vs. mandatory use of the technology) and that other variables influencing perceived usefulness, perceived ease of use and attitudes should be added to model, and theoretical limitations. These last limitations include the fact that intentions may not necessarily predict actual use (Bagozzi, 2007), claiming that behavior should be treated as one of the model's variables, while also arguing that TAM is a deterministic model where a person's actions are assumed to be determined by their intentions to act, without considering the fact that evaluation and reflection may change their course of action. Benbasat and Barki (2007) claim that TAM has led to little in terms of actionable research which can help the design and practice of new technologies, creating an illusion of accumulation of knowledge without providing a a clearer picture of the technology adoption. All these limitations mentioned led to several researchers trying to improve the model in order to address its weaker aspects, while also opening the possibility of proposing new models partially based on TAM.

2.4.Unified Theory of Acceptance and Use of Technology

One model that tried to synthetize the current research on technology acceptance was proposed by Venkatesh, Morris, Davis, and Davis (2003), the unified theory of acceptance and use of technology (UTAUT). The model was first constructed by reviewing and comparing the most widely used user acceptance models, with roots in information systems, psychology and sociology, which include the following models: Theory of Reasoned Action (Fishbein & Ajzen, 1975), Technology Acceptance Model

(Davis, 1989), Motivational Model (Davis et. al, 1992), Theory of Planned Behavior (Ajzen, 1985), Model of Personal Computer Utilization (Thompson et. al, 1991), Theory of Diffusion of Innovations (TDI) (Rogers, 1995) and the Social Cognitive Theory (Bandura, 1986).

This thorough revision led to the identification of four main variables: performance expectancy, effort expectancy, social influence (or social norm), and facilitating conditions; and four moderators (age, gender, experience, and voluntariness) which serve as predictors for the behavioral intention to use a technology in addition to the behavior itself of technology use, applied mainly in organizational contexts. Following UTAUT, performance expectancy, effort expectancy, and social influence were found to influence behavioral intention to use a new technology, while behavioral intention and the facilitating conditions predict the actual use (Venkatesh, Thong & Xu, 2012).

Since its original publication, the UTAUT (Venkatesh et al., 2003) has served as one of the main models used for technology adoption, being applied to the study of a variety of technologies in organizational and non-organizational settings (Venkatesh et al., 2012). According to Venkatesh et al. (2012) the model has been continuously strengthened by its many applications and replications in organizational settings, which have made use of all or part of the UTAUT model. Within these applications there are three main types of extensions which aim to further its applicability, the first type pertained the examination of UTAUT in new contexts, such as new technologies, new user's populations and new cultural settings; the second type concerned the addition of new constructs or variables which aimed to extend the scope of the main theoretical mechanisms described in the UTAUT model and finally, the third type has been the inclusion of variables not theoretically related to the model, which work as exogenous predictors of the model's variables (Venkatesh et al., 2012).

While the various studies contributed to understanding the utility of UTAUT in different contexts, in 2012 Venkatesh et al. (2012) indicated that there was still a need for systematic investigation and theorization of salient factors that would apply to the context of consumer technology use. Hence, building upon the previous extensions of UTAUT, and paying special attention to the consumer use context the UTAUT2 model was developed (Venkatesh et al., 2012). However, in the same paper in which the UTAUT2 model was presented, the authors noted that the UTAUT model was originally developed

to work in organizational settings explaining how employees accept and use new technology, and how it is of utmost importance to examine how it can be extended to other contexts closer to consumer's technology context, which is an ever-growing multi-billion dollar industry in itself (Stofega and Llamas, 2009).

The UTAUT2 model added three new constructs to the original UTAUT, namely: "hedonic motivation", "price value" and "experience and habit". Venkatesh et al. (2012) defines hedonic motivation as the fun or pleasure derived from the use of a technology. In turn, because the cost and price structure can have a significant impact on the use of technology, price value is understood as the consumers' cognitive trade-off between the perceived benefits of the use and the monetary cost of it. Thus, price value is positive when the perceived benefits of using a technology outweigh the monetary cost and in turn in those cases price value has a positive impact on intention (Venkatesh et al., 2012).

Finally, the authors of UTAUT2 added experience and habit to the model:, with experience referring to a previous opportunity to use a specific technology and is generally operationalized as the amount of time incurred since the initial use by an individual; and, while habit is defined as the extent to which people tend to perform behaviors in an automatic manner due to the consequences of learning (Limayem et al. 2007). Although conceptualized in a rather similar way, habit has been operationalized with two variations: similarly to experience, as a prior behavior (Kim & Malhotra, 2005); and second, measured as the degree to which an individual believes a certain behavior is done automatically (Limayem et al. 2007).

2.5.Trust

The topic of trust and its influence on decision-making has long been studied in the social sciences, as for example how it affects risk perception when making decisions (Siegrist, 2019). There are many different conceptualizations of trust for academic studies, which as Siegrist (2019) proposes, can be synthetized under the categories general trust, social trust and confidence.

General trust theorizations refer to how much a person believes in someone or something as a general trait, usually in terms of social interactions (Siegrist, Gutscher, & Earle, 2005; Smith & Mayer, 2018). People who show a high degree of general trust, believe in others whom they did not have previous personal interactions and perceive fewer amount of risks related with a variety of technological and societal hazards in

comparison to people who show a low-level trust. Considering the general nature of this construct, its use concerning the use of technology has been relatively low compared to other models of trust.

In various contexts, people need to rely on others whom they are not personally acquainted with, or depend on institutions which have the responsibility to regulate certain risks. This is usually the case with respect to the use of technology, where people do not possess technical information on how they work, so they must rely on other cues to determine whether to trust a certain technology, based on how it is socially assessed by regulators and other people. The main model used suggest two types of trust, labeled as social trust and confidence (Earle, 2010b; Earle et al., 2007).

This model indicates social trust depends on the judgment of similarities in intentions and values, with previous research on the area of risk demonstrating that people trust institutions with values they perceive to be similar to their own (Siegrist, 2019). This construct has also been termed by other researchers as integrity-based trust, which basically refers to the same general concept (Terwel, Harinck, Ellemers, & Daamen, 2009). On the other hand, confidence is defined as being substantiated on evidence or past experiences suggesting certain future events will occur as expected (Siegrist, 2019).

Most studies on the topic have found that trust and confidence are strongly correlated (Allum, 2007; Earle & Siegrist, 2006; Siegrist, 2019), while some studies consider them as separate predictors (Nakayachi & Cvetkovich, 2010; Siegrist et al., 2012), assuming no causal relationship between the constructs, and lastly others that claim a causal relationship between trust and confidence, meaning they could be considered conjointly in some models (Allum, 2007).

On the topic of cryptocurrency adoption, Shin has been the main researcher studying the effects of trust as a main predictor (Shin, 2017; Shin, 2020). In his work he analyzed the role of social, technological and institutional trust in the adoption of cryptocurrency, particularly focusing on the decentralized nature of the technology behind them. In said studies, all constructs of trust were found to be strong predictors of adoption.

2.6. Application of UTAUT and Trust Models to Cryptocurrency Adoption

As previously stated, several studies have applied different variations of the UTAUT model for cryptocurrency adoption (Arias-Oliva et al., 2019; Cheng, 2020; Esmaeilzadeh, Subramanian & Cousins, 2019; Lopez & Camberos, 2020; Ter Ji-Xi, Salamzadeh & Teoh, 2021; Alzahrani & Daim, 2019; Jung et al., 2018; Mahomed, 2017; Novendra & Gunawan, 2017). Among these studies, a myriad of variables were added to the original model in order to increase the variance explained by it. Among the most widely used were risk perception, attitude and perceived knowledge, which were significant predictors in most studies. Considering the main predictors found in these studies, performance expectancy was consistently found to be the stronger predictor, accounting for most of the model's variance, followed by facilitating factors. As for the other variables, effort expectancy and social influence, mixed results were found, which may indicate exogenous variables that may influence the effect. Specifically considering the addition of trust as a predictor, previous studies done in Mexico (Lopez & Camberos, 2020) showed that it was a significant predictor of cryptocurrency adoption when added to the UTAUT model.

Last of all, when taking into account the comparison of the model between different countries, Jung and colleagues carried out a study in Vietnam, South Korea and China looking to assess whether cultural differences, as expressed through Hofstede's model (2010), had an impact on the UTAUT model for cryptocurrency adoption. In this study, significant differences were found between countries among all levels, though the mechanisms by which these differences come to be, still need to be further studied.

2.7. Study Aims and Hypotheses

Considering the current context where cryptocurrencies are having prevalent role in the public sphere, this study aims to identify which variables predict adoption of cryptocurrencies, as well as an exploration of the differences in the applicability of the model to different contexts. To achieve this goal, the study aimed to apply the UTAUT2 model (Ventrakesh, 2003; Ventrakesh, Thong & Xu, 2012) to the topic of cryptocurrencies adoption and extend it, by adding the variables trust, risk perception and perceived knowledge. As such, the model aimed to have intention to use cryptocurrency as its dependent variable, while containing the following independent variables as predictors: performance expectancy, effort expectancy, social influence, facilitating factors, perceived risk, attitude towards cryptocurrency, trust and perceived knowledge. As a part of the study in question, the hypotheses 1, 2 and 4 will be a replication of the

ones analyzed by Arias-Oliva and colleagues (2019), while hypothesis 3, 5, 6, 7 and 8 differ from said work .

Therefore, the study proposes the following hypotheses:

H1. Performance expectancy regarding the use of cryptocurrencies is a positive predictor of the intention to use them

H2. Effort expectancy regarding the use of is a positive predictor of the intention to use them.

H3. Social influence regarding the use of cryptocurrencies is not a positive predictor of the intention to use them.

H4. Facilitating conditions for the use of cryptocurrencies is a positive predictor of the intention to use them.

H5. The perceived risk of using cryptocurrencies is a negative predictor of the intention to use them

H6. Attitude toward the use of cryptocurrencies is a positive predictor of the intention to use them

H7. Trust in cryptocurrencies is a positive predictor of the intention to use them.

H8. Knowledge about cryptocurrencies is a positive predictor of the intention to use them.

4. PART 1 – THOERETICAL FRAMEWORK

3. Method

3.1. Study Design

The present study was conducted using a cross-sectional quantitative correlational design, which was applied on two separate samples simultaneously.

3.2 Sample

Two convenience non-probabilistic samples of participants were recruited to take part in this study, one from Argentina and another from Portugal. To determine the adequate sample size required to test the model with a power level of .80, the Gpower software was used, proposing a number of 156 participants as necessary to achieve such power level.

The participants were recruited online, via social media, through snowball sampling technique, where they were invited to take part in a survey study researching the use of new financial technology. All participants provided their informed consent to participate, detailing the purpose and the conditions involved.

Overall, 163 participants from Argentina and 139 from Portugal completed the survey. This numbers did not include five participants from Argentina and three from Portugal who did not finish the survey, thus were removed from the sample.

To assess the composition of both samples, several control variables were analyzed as can be seen in Table 1 and 2. For the Argentinian sample, 63% (n=100) participants were male, 92.1% (151) considered themselves to have a medium socio-economic level, 1.2% (n=2) a medium low and 6.1% (n=10) a medium high level. Considering their education, 9.2% (n=15) had high school level education, 82.8% (n=135) university level and 8% (n=13) had postgraduate degrees. Regarding their perceived level of technological knowledge 4.9% (n=8) considered it basic, 71.8% (n=117) intermediate and 23.3% (n=38) advanced, while 34.9% (n=57) answered they had previous experience using cryptocurrency, with 65.1% (n=106) claim they did not.

As for the Portuguese sample, 58.3% (n=81) participants were male,; 77% (107) considered themselves to have a medium socio-economic level, 2.1% (n=3) a medium low, 18.7% (n=26) and 2.2% (n=3) a high level. Regarding their education, 18.6% (n=26) had completed high school level education, 52.5% (n=73) university level and 28. 8%

(n=40) had postgraduate degrees. Lastly, when asked about their perceived level of technological knowledge 5% (n=7) considered it basic, 70.5% (n=98) intermediate and 24.5% (n=34) advanced, while 29.5% (n=41) claimed they had previous experience using cryptocurrency, with 70.5% (n=98) answering they didn't.

Table 1

Argentinian sample characteristics

		N	*Percentage*
Gender	*Male*	*100*	*62%*
	Female	*63*	*38%*
Country of residence	*Argentina*	*162*	*99.4%*
	Missing	*1*	*0.6%*
Socioeconomic level	*Low*	*0*	
	Medium low	*2*	*1,2%*
	Medium	*151*	*92.6%*
	Medium high	*10*	*6.1%*
	High	*0*	
Education level	*Highschool*	*15*	*9.2%*
	University	*135*	*82.8%*
	Postgraduate	*13*	*8%*
Perceived level of technological knowledge	*Basic*	*8*	*4.9%*
	Intermediate	*117*	*71.8%*
	Advanced	*38*	*23.3%*
Previous experience using cryptocurrency	*Yes*	*57*	*34.9%*
	No	*106*	*65.1%*

Table 2

Portuguese sample characteristics

		N	*Percentage*
Gender	*Male*	*81*	*58.3%*
	Female	*58*	*41.7%*
Country of residence	*Portugal*	*137*	*97.9%*
	Missing	*3*	*2.1%*
Socioeconomic level	*Low*	*0*	
	Medium low	*3*	*2.1%*
	Medium	*107*	*77%*
	Medium high	*26*	*18.7%*
	High	*3*	*2.2*
Education level	*Highschool*	*26*	*18.6%*
	University	*73*	*52.5%*
	Postgraduate	*40*	*28.8%*
Perceived level of technological knowledge	*Basic*	*7*	*5%*
	Intermediate	*98*	*70.5%*
	Advanced	*34*	*24.5%*
Previous experience using cryptocurrency	*Yes*	*41*	*29.5%*
	No	*98*	*70.5%*

3.2.Instruments

Unified theory of acceptance and use of technology questionnaire (UTAUT2)

An adaptation of the UTAUT2 questionnaire was used, based on the work by Venkatesh and colleagues (Venkatesh et al., 2012; Venkatesh, 2003; Venkatesh & Davis, 2000;), applied to the use of cryptocurrency. To do this, instruments used on previous similar studies on the adoption of cryptocurrency were adapted (Arias-Oliva et al., 2019; Lopez & Camberos, 2020; Shahzad et al., 2018), using the variables of the UTAUT2 model, intention to use cryptocurrency (IU), performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating factors (FF), while including additional variables to it, perceived risk (PR) (Faqih, 2016; Shim & Lee, 2011; Arias-Oliva et al., 2019), attitude (A) (Shin, 2017; Shin, 2020), trust (T) (Shin, 2020; Albayati,

Kim & Rho, 2020; Shahzad et al., 2019) and perceived knowledge (PK) (Arli et al., 2020). The questionnaire consisted of 31 items on a Likert scale style answer ranging from 1 to 5, with 1 being strongly disagree, 2 somewhat disagree, 3 neither agree nor disagree, 4 somewhat agree and 5 strongly agree.

IU: Assesses the intention to use a cryptocurrency in the future – items 1 to 3

PE: Measures the degree to which a person considers that using cryptocurrency would be useful to enhance his or her performance – items 4 to 7

EE: Measures the perceived ease of use concerning cryptocurrency – items 8 to 11

SI: Assesses the degree a person perceives that others believe that he or she should use cryptocurrency – items 12 to 14

FF: Assesses the degree to which a person believes that he or she has the necessary resources to use cryptocurrency – items 15 to 18

PR: Measures the perceived uncertainty and possible undesirable consequences of using cryptocurrency – items 18 to 21

A: Assesses whether a person evaluates cryptocurrency as something attractive or that they have positive feelings towards – items 22 to 24

T: Measures the degree of confidence a persona has that cryptocurrency works towards their best interest – items 25 to 28

PK: Measures the self-assessed knowledge towards cryptocurrency – items 29 to 31

Sociodemographic survey

A survey was constructed to assess a number of sociodemographic variables that were used as control variables. This included the gender of the participant, socioeconomic level, education level, perceived technology knowledge and whether they had previous experience with cryptocurrency.

Both instruments were first redacted in English, to be later translated to Portuguese and Spanish. This was done with the assistance of translators, who helped construct the instruments which were tested with native speakers to analyze whether they retained the meaning.

3.3.3.4 Data Collection and Analysis Procedure

This study was carried out as an online survey based on questionnaire, applied through the Qualtrics platform, and distributed via social media, including Whatsapp, Facebook, Instagram and Reddit, and email. An invitation message was redacted and distributed to several people, who resent it to people in their social circle. For the Portuguese sample, the questionnaire was also posted onto survey exchange groups, where researchers answer other studies' quizzes and in return have their own answered by the research community. Participants for each sample received the message and the questionnaire in their respective language, Spanish for Argentina, Portuguese for Portugal.

When completing the survey, participants had to read a consent form detailing the purpose of the study, where they had agreed to take part, indicating that they understood the aim of the study, that participation took place voluntarily and that they could abandon the study at any point with no consequences. Afterwards, participants had to answer the sociodemographic survey, and after its completion they were shown a brief text serving as an introduction to cryptocurrency, providing an explanation on what they are, their main benefits and concerns. The study then proceeded to present the adapted UTAUT2 questionnaire, where participants had to rate on a Likert scale from 1 to 5 how much they agreed with the statements presented. Once that part was completed, participants received a confirmation their answers were registered and were thanked for their participation.

Regarding the data analysis, the data was exported to SPSS to create a database. A descriptive analysis was calculated with respect to the control variables as well as the UTAUT2 variables. To examine if there were significant differences between samples regarding the control variables, a multivariate ANOVA analysis was used including gender, socioeconomic level, education level, perceived technological knowledge and previous use of cryptocurrency. Last of all, a multiple linear regression was performed in order to analyze the models fit for both samples and the predictive strength of the model's variables.

4. Results

Regarding the variables used in the UTAUT model, descriptive statistics were used to assess the mean and standard deviation for each of the model's variables, which are summarized in table 3.

Table 3

Descriptive statistics for the Argentinian sample

	Argentinian Sample		*Portuguese Sample*	
	M	*SD*	*M*	*SD*
Intention to use cryptocurrency	*3.25*	*.99*	*3.22*	*.95*
Performance expectancy	*3.54*	*.81*	*3.08*	*.92*
Effort expectancy	*2.91*	*.67*	*3.05*	*.76*
Social influence	*3.26*	*.57*	*3.03*	*.64*
Facilitating factors	*3.43*	*.78*	*3.54*	*.63*
Perceived risk	*3.96*	*.77*	*4.47*	*.36*
Attitude towards cryptocurrency	*3.33*	*.96*	*3.47*	*.87*
Trust	*2.99*	*.59*	*2.5*	*.46*
Perceived knowledge	*3.22*	*.99*	*2.45*	*.22*

To understand the predictive ability of the model applied to the intention to use cryptocurrency (IC), a multiple linear regression was performed, using performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating factors (FF), perceived risk (PR), attitude (A), trust (T) and perceived knowledge (PK) as predictors for IC. No multicollinearity problems were detected in the analysis for either sample.

The results of the analysis show that the model has a high fit for both samples, showing statistically significant results for the Argentinian sample (R^2 = 0.61, F(8, 154) = 600.08, p = < .001), where the model predicted 61% of the variation in IC, as well as the Portuguese sample (R^2 = 0.63, F(8, 130) = 2193.36, p = < .001) where the model accounted for 63% of the variation in IC.

Among the predictive variables in the model, table 3 summarizes the findings for the Argentinian sample, finding significant results for PE (β = .60, p = < .001), FF (β = .14, p = < .05), PR (β = -.31, p = < .001), A (β = .29, p = < .001) and PK (β = -.13, p = < .01).

Table 34

UTAUT Model applied to the intention to use cryptocurrency, Argentinian sample

	β	*SE*	*p*
Performance expectancy	*.60****	*.11*	*<.001*
Effort expectancy	*-.17*	*.09*	*.075*
Social influence	*.04*	*.08*	*.61*
Facilitating factors	*.14**	*.07*	*.04*
Perceived risk	*-.31****	*.06*	*<.001*
Attitude	*.29****	*0.8*	*<.001*
Trust	*-.15*	*.08*	*.15*
Perceived knowledge	*-.13***	*.04*	*<.01*

*Notes: * = p < .05, ** = p < .01, *** = p < .001*

Considering the Portuguese sample, the results presented (table 4) show significant results for PE (β = .49, p = < .001), EE (β = .11, p = < .001), FF (β = .29, p = < .001), PR (β = .21, p = < .001), A (β = .22, p = < .001) and T (β = .18, p = < .001).

Table 4

UTAUT Model applied to the intention to use cryptocurrency, Portuguese sample

	β	*SE*	*p*
Performance expectancy	*.49****	*.05*	*<.001*
Effort expectancy	*-.11****	*.02*	*<.001*
Social influence	*-.04*	*.03*	*.19*
Facilitating factors	*.29*****	*.09*	*<.001*
Perceived risk	*.21****	*.04*	*<.001*

Attitude	*.22****	*0.4*	*<.001*
Trust	*.18***	*.09*	*<.01*
Perceived knowledge	*-.07*	*-.02*	*.255*

*Notes: * = p < .05, ** = p < .01, *** = p < .001*

Considering the hypotheses proposed, the following can be concluded from each sample's results.

H1, H4 and H6 were supported for both samples, showing significant results for both the Argentinian sample and the Portuguese one for PE (β = .60, p = < .001) (β = .49, p = < .001) , for FF (β = .14, p = < .05) (β = .29, p = < .001) and A (β = .29, p = < .001) (β = .22, p = < .001). H3 was also sustained for both samples, with SI showing not significant results for them.

H2 and H7 were confirmed only for the Portuguese sample, with significant results for EE (β = .11, p = < .001) and T (β = .18, p = < .001). For the Argentinian sample, both variables showed not significant results.

H5 and H8 were only supported for the Argentinian sample, getting significant results for PR (β = -.31, p = < .001) and PK (β = -.13, p = < .01). In the case of the Portuguese sample, for PR it presented significant results, but opposite the hypothesis, showing a positive association (β = .21, p = < .001). No significant results were found for PK in the Portuguese sample.

5. Discussion

The current study aimed to understand the main predictors of the intention to use cryptocurrency, applying a modified version of the UTAUT 2 model (Venkatesh et al., 2003; Venkatesh, Thong & Xu, 2012), adding trust as a key variable, following previous research which found that it was an important factor when trying to assess the adoption of cryptocurrency (Shin, 2019; Lopez Zambrano, Camberos-Castro & Villareal-Peralta, 2021), while also conducting the study with two different samples from countries with distinct economic and cultural context, such as Argentina and Portugal. This last fact was one of the main innovative aspects of this work, since the comparison between samples opens new lines of research looking to understand how contextual factors may affect the predictors of the intention to use a new technology such as cryptocurrency.

Taking into account the theoretical implications of this research, Venkatesh and colleagues proposed that in order to strengthen the research on the UTAUT model, more studies needed to be conducted taking into account three main aspects: first the application of the model on new technologies and populations; second adding new constructs which add on the theoretical mechanisms described within the model; and third taking into account exogenous variables that may affect the model (Venkatesh et al., 2012).

Following the first point, the modified version of the UTAUT used in the current study has shown to be a very good predictor of the intention to use cryptocurrency, showing that despite differences in the predictive strength of its variables depending on the sample, it is still applicable to different contexts and technologies, adding to previous similar research that applied this model on different populations (Arias-Oliva et al., 2019; Cheng, 2020; Esmaeilzadeh, Subramanian & Cousins, 2019; Lopez & Camberos, 2020; Ter Ji-Xi, Salamzadeh & Teoh, 2021). Consistent with these previous studies, the model was able to predict to a high degree the intention to use cryptocurrency, while also finding that performance expectancy was the main predictor. Nonetheless, it is important to point out that considerable differences were found in the results for the predictive variables between samples, also showing differences with the research mentioned above, aspects that require to be further understood with additional research.

On another note, regarding the second point, the addition of trust to the model as a new endogenous predictor has shown differing results, being significant only for the

Portuguese sample, which demands further research to be properly understood. One possible explanation concerns the third point mentioned by Venkatesh and colleagues (2012), which proposes to analyze exogenous variables that may be causing differences between samples, such as cultural, economic or regulatory factors. Following this argument, further research is needed to properly understand this, however there are some potential explanations that could be explored in the near future. One potential explanation for the lack of significance for the Argentinian sample could be that the lack of trust in most financial assets available outside the US dollar (Massot, 2021), caused by the particular economic context in Argentina, make this variable a less important factor when determining the intention to use them. To provide support for this assumption, more research needs to be conducted on the trust on financial assets and the relationship of this variable to the intention to use finance related products or technology.

Considering the predictive strength of effort expectancy, which is only statistically significant for the Portuguese sample, and the facilitating factors, which have almost double the predictive power for the former when compared to the latter, one possible explanation could be due the widespread availability and publicity of mobile apps for users of cryptocurrency in Argentina when compared to Portugal, which could mean that the resources necessary to use the technology are more readily available while also making potential users perceive the technology as easier to use or learn. This needs to be studied in more detail in the future, but as a reference, according to a study published by 21% of respondents from Argentina claimed they had used cryptocurrency before, compared to 14% from Portugal, with the number for Argentina in 2022 expected to be much higher considering the creation of several cryptocurrency platforms and its acceptance as a payment method.

Following this, perceived risk showed opposite results, which for the Argentinian sample indicate it negatively predicts the intention to use, but for the Portuguese sample it appears as a positive predictor. Although further research should be done on this topic, the meaning towards cryptocurrency found in each country, which is closely related to the economic and cultural context, could be what causes this difference. In the case of Argentina, a possible assumption could be that due to the monetary instability and the difficulty for most citizens to access stable financial instruments, cryptocurrencies may be seen as less risky than other options, while for Portugal, having a stronger currency and better access to financial services, people with intention to use cryptocurrency find

them as a risky alternative whether people are willing to use it or not. This last point follows some of the lines of research proposed by Luther (2015) and by Al-Amri and colleagues (2019), who mention monetary instability as a factor to consider when analyzing perceived risk and intention to use cryptocurrencies.

On another note, the variable of social influence, which is present in most applications of the UTAUT, was found not to be statistically significant for both samples, as predicted in the hypothesis. Previous studies did not find it to be a significant predictor (Arias-Oliva et al., 2019; Cheng, 2020; Esmaeilzadeh, Subramanian & Cousins, 2019; Lopez & Camberos, 2020), though one aspect to consider is that a previous studies (Ter Ji-Xi, Salamzadeh & Teoh, 2021), social influence was found to have a significant effect on intention to use cryptocurrency when age was added as a moderator. This however was not part of the analysis done in this study. Some of the possible explanations that should be further explored are that the use of cryptocurrency may be a decision that is usually taken in an individual context after a lot of personal deliberation, which reduces the importance of social influence. It is also possible that due to the stage of the adoption and widespread knowledge in both countries, most people may not have someone in their social circle with a strong opinion about cryptocurrency, which also could explain this result. This also could be moderated by age, meaning that these aspects may be different depending on age group. All these arguments require more studies to focus on said topic to add to the understanding of social influence applied to this specific situation.

Overall, this study shows that the UTAUT model is a solid model when trying to understand the intention to use cryptocurrency on different contexts. However, one of the main conclusions supported by this study is that there is no one-size-fits-all answer to the question of which variables best predict the intention to use cryptocurrency, since the application of the UTAUT model seems to be influenced by contextual factors which could include culture, historical contingencies, political situation and economics, among other variables. This demands further research to be pursued in order to establish how these factors affect the application of the model for a specific context.

Regardless of these considerations, this study provides further support for the utilization of these findings to device better strategies to influence the adoption of cryptocurrency, whether they come from business, government, or other organizations. Understanding the main drivers of adoption is one of the most important factors when

implementing policies and deciding business actions, thus having a better grasp of what motivates people to adopt cryptocurrency will prepare those in decision-making roles to take more effective action.

Limitations and Future Recommendations

Considering the current study, there are limitations to be taken into account when discussing the results. First, regarding the sampling method used, which consisted of a convenience non-probabilistic sample, there is a high risk for selection bias which may have led to results that do not reflect the actual population studied. Furthermore, the fact that the samples mostly consisted of participants with medium socioeconomic level with university degrees in both countries, may indicate further bias, since that may not be representative of the respective populations. Lastly, the size of the sample prevented the use of more robust statistical analyze, that may have resulted in more reliable results. To remedy this limitation, future research should utilize a probabilistic method for sampling, which results in a representative sample, while also getting a sample size big enough to be able to perform more robust statistical analysis.

Other methodological considerations that served as limitations for the study include the fact that the questionnaire used was not validated for the populations studied. This is of particular importance when considering whether it was properly measuring the variables which the study aimed to assess. One step that should be included in further studies is including analysis for validity and reliability of the scales in question, which would mean more precision regarding the instruments.

Last of all, since the study used a correlational design with self-reported measurements, the predictive power of each variable is not as reliable as an experimental study, which could bring more explicative power to the variables in the model.

As part of the future on this topic of study, more research needs to be conducted in order to understand the contextual variables that may influence the UTAUT model for different situations. This further research should include a detailed account of economic, legal, cultural and political variables that may influence the adoption of a technology such as cryptocurrency, while also taking a thorough approach regarding the methodology applied. Moreover, the study of UTAUT model would greatly benefit from using experimental designs to further test its explicative capabilities.

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Appendixes

Appendix I – English Survey

This agreement relates to your participation in a study led by the Universidade Católica Portuguesa as a part of a master's degree dissertation to better understand the adoption of cryptocurrencies. Please read carefully before signing.

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that all information provided is anonymous and strictly confidential. I understand that my participation is voluntary and that I am free to withdraw at any time.

Demographic information

Age:

Gender:

Country:

Socioeconomic level:

Education level:

Technological knowledge level:

Previous experience with cryptocurrency:

Cryptocurrencies represent a novel method of exchange without physical form, created to facilitate online payments and transactions. Like other innovations, cryptocurrencies have enormous potential, but can be used for either good or bad purposes. Cryptocurrencies reduce intermediation and transaction costs, while offering inalterable, anonymous, and traceable transactions, but they could also be insecure and risky if used incorrectly. Today, there are different concerns regarding this technology. Among them are the fact that it currently suffers from significant legal gaps, enabling it to be used for illegal and opaque operations, the volatility of its value, which poses financial risks, or the fact that the companies that allow their exchange are not as trusted as banks. Despite these concerns, some people claim that cryptocurrencies could potentially bring revolution in the social structure of the future economic system.

All items in the study will be presented in a likert scale style of answer from 1 to 5, with values 1-strongly disagree, 2-disagree, 3-neither agree nor disagree, 4-agree and 5-strongly agree.

Intention to use (IU) - TAM2 scale (Venkatesh and Davis, 2000; Arias-Oliva et al., 2019)

IU1: I intend to use cryptocurrencies

IU2: I predict that I will use cryptocurrencies

IU3: I am sure I will use cryptocurrencies in the future

Performance Expectancy (PE) UTAUT2 scale (Venkatesh et al., 2012; Arias-Oliva et al., 2019)

PE1: Using cryptocurrencies will increase opportunities to achieve important goals for me

PE2: Using cryptocurrencies will help me achieve my goals more quickly

PE3: Using cryptocurrencies will increase my standard of living

PE4: Using cryptocurrencies is more desirable than my country's currency

Effort expectancy (EE) - UTAUT2 scale (Venkatesh et al., 2012; Arias-Oliva et al., 2019)

EE1: It will be easy for me to learn how to use cryptocurrencies

EE2: Using cryptocurrencies will be clear and understandable for me

EE3: It will be easy for me to use cryptocurrencies

EE4: It will be easy for me to become an expert in the use of cryptocurrencies

Social Influence (SI) - UTAUT2 scale (Venkatesh et al., 2012; Arias-Oliva et al., 2019)

SI1: The people who are important to me will think that I should use cryptocurrencies

SI2: The people who influence me will think that I should use cryptocurrencies

SI3: People whose opinions I value would like me to use cryptocurrencies

Facilitating factors (FF) - UTAUT2 scale (Venkatesh et al., 2012; Arias-Oliva et al., 2019)

FF1: I have the necessary resources to use cryptocurrencies

FF2: I have the necessary knowledge to use cryptocurrencies

FF3: Cryptocurrencies are compatible with other technologies that I use

FF4: I can get help if I have difficulty using cryptocurrencies

Perceived Risk (PR) - (Faqih, 2016; Shim & Lee, 2011; Arias-Oliva et al., 2019)

PR1: Using cryptocurrencies is risky

PR2: There is too much uncertainty associated with the use of cryptocurrencies

PR3: Compared with other currencies or investments, cryptocurrencies are riskier

Attitude (A) – (Shin, 2017; Shin, 2020)

A1: I would have positive feelings towards cryptocurrencies in general.

A2: The thought of using cryptocurrencies is appealing to me.

A3: It would be a good idea to use cryptocurrencies.

Trust (T) – (Siegrist, Earle & Gutcsher, 2003; Albayati, Kim & Rho, 2020)

T1: There is an honest communication about the risks and consequences involved with cryptocurrencies

T2: The system behind cryptocurrencies gives the impression that it keep promises and commitments.

T3: I believe the way cryptocurrencies work keep my best interests in mind

Knowledge (K) (Arli et al., 2020)

K1: I feel knowledgeable about cryptocurrency

K2: Respecting cryptocurrency, I do not know a lot

K3: Compared to most people, I know more about cryptocurrency

Appendix I – Spanish Survey

Este acuerdo está relacionado a su participación en un estudio llevado a cabo por la Universidade Católica Portuguesa como parte de una tesis de maestría que investiga la adopción de criptomonedas. Por favor leer atentamente antes de firmar.

He leído y entiendo la información provista y he tenido la oportunidad de hacer preguntas. Entiendo que toda la información provista es anónima y estrictamente confidencial. Entiendo que mi participación es voluntaria y puedo retirarme del estudio en cualquier momento.

Información demográfica

Edad:

Sexo:

País:

Nivel socioeconómico:

Nivel educativo:

Nivel de conocimiento tecnologico:

Experiencia previa con criptomonedas:

Las criptomonedas representan un novedoso método de intercambio sin forma física, creado para facilitar pagos y transacciones online. Como otras innovaciones, las criptomonedas tienen un gran potencial, pero se pueden utilizar para propósitos positivos o negativos. Las criptomonedas reducen la intermediación y los costos de transacción, ofreciendo transacciones que son anónimas, rastreables e inalterables, pero también pueden ser inseguras y riesgosas si son utilizadas de forma incorrecta. Hoy en día hay diferentes preocupaciones con respecto a esta tecnología. Entre ellos están el hecho de que actualmente sufre de ciertos huecos legales que permiten que pueda ser utilizadas para operaciones opacas o ilegales, la volatilidad de su valor, que trae consigo riesgos financieros, o el hecho de que las compañías que permiten su intercambio no poseen la confianza de bancos establecidos. A pesar de estos recaudos, algunas personas

consideran que las criptomonedas tienen el potencial de revolucionar sociedad y el futuro de nuestro sistema económico.

Todos los items en este estudio serán presentados con una escala de respuesta tipo likert del 1 al 5, siendo los valores 1-muy desacuerdo, 2-desacuerdo, 3-ni de acuerdo ni desacuerdo, 4- de acuerdo y 5- muy de acuerdo.

Intention to use (IU) - TAM2 scale (Venkatesh and Davis, 2000; Arias-Oliva et al., 2019)

IU1: Tengo la intención de usar criptomonedas

IU2: Estoy seguro de que usaré criptomonedas en el futuro

IU3: Puedo predecir que usaré criptomonedas

Performance Expectancy (PE) UTAUT2 (Venkatesh et al., 2003; Venkatesh et al., 2012; Arias-Oliva et al., 2019)

PE 1: El uso de criptomonedas aumentará las oportunidades de lograr metas importantes para mí

PE 2: El uso de criptomonedas me ayudará a alcanzar mis metas más rápidamente

PE 3: Usar criptomonedas mejorará mi nivel de vida

PE 4: Las criptomonedas son más deseables que la moneda de mi país

Effort Expectancy (EE) UTAUT2 (Venkatesh et al., 2003; Venkatesh et al., 2012; Arias-Oliva et al., 2019)

EE1: Me será fácil aprender a usar criptomonedas

EE2: Usar criptomonedas será claro y comprensible para mí

EE3: Me será fácil usar criptomonedas

EE4: Me será fácil convertirme en un experto en el uso de las criptomonedas.

Social Influence (SI) UTAUT2 (Venkatesh et al., 2003; Venkatesh et al., 2012; Arias-Oliva et al., 2019)

SI1: Las personas que son importantes para mí piensan que debo usar criptomonedas.

SI2: Las personas que me influyen piensan que debo usar criptomonedas.

SI3: A personas cuyas opiniones valoro les gustaría que usara criptomonedas.

Facilitating factors (FF) UTAUT2 (Venkatesh et al., 2003; Venkatesh et al., 2012; Arias-Oliva et al., 2019)

FF1: Tengo los recursos necesarios para usar criptomonedas.

FF2: Tengo los conocimientos necesarios para utilizar criptomonedas.

FF3: Las criptomonedas son compatibles con otras tecnologías que utilizo

FF4: Puedo obtener ayuda si tengo dificultades para usar criptomonedas

Perceived Risk (PE) (Faqih, 2016; Shim & Lee, 2011; Arias-Oliva et al., 2019)

RP1: Usar criptomonedas es arriesgado

RP2: Hay demasiada incertidumbre asociada con el uso de criptomonedas

RP3: En comparación con otras monedas o inversiones, las criptomonedas son más riesgosas

Attitude (A) – (Shin, 2017; Shin, 2020)

A1: Tengo sentimientos positivos hacia las criptomonedas en general.

A2: La idea de usar criptomonedas es atractiva para mí.

A3: Usar criptomonedas sería una buena idea.

Trust (T) – (Siegrist, Earle & Gutcsher, 2003; Albayati, Kim & Rho, 2020)

ST1: Hay una comunicación honesta sobre los riesgos y consecuencias involucrados con las criptomonedas.

ST2: El sistema detrás de las criptomonedas da la impresión de que mantiene sus compromisos y promesas.

ST3: Creo que la forma en que funcionan las criptomonedas tiene mis intereses en consideración.

Knowledge (K) (Arli et al., 2020)

K1: Siento que tengo buen conocimiento sobre criptomonedas

K2: En lo que se refiere a criptomonedas, yo realmente no se demasiado

K3: Comparado con la mayoría de las personas, yo sé más sobre criptomonedas

Appendix I – Portuguese Survey

Este acordo está relacionado a sua participação num estudo realizado pela Universidade Católica Portuguesa como parte de uma dissertação de mestrado realizada por Santiago Waisman, e orientada pelo Prof. Dr. Rui Gaspar. O objetivo do projeto é investigar os diferentes fatores psicológicos enquanto preditores da utilização de criptomoedas. Como participante, irá receber uma breve explicação do que são as criptomoedas e dos seus usos, e serão feitas perguntas sobre o seu nível de concordância com algumas afirmações relacionadas com criptomoedas, como por exemplo "Será fácil para mim aprender a usar criptomoedas".

O questionário deverá demorar entre 10 e 15 minutos para completar. Por favor, leia as questões atentamente antes de responder.

Toda a informação fornecidas será anónima e estritamente confidencial, sendo só acessível para o investigador. Nenhuma informação sensível que o/ possa identificar ou a outras pessoas será pedida.

A sua participação neste estudo é voluntária. Pode decidir abandonar o estudo a qualquer momento sem nenhuma penalidade. É livre de se recusar a responder a qualquer pergunta que deseje, por qualquer motivo.

Se tiver alguma pergunta sobre o estudo ou os procedimentos, ou quiser saber mais sobre os resultados uma vez que esteja completado, pode se contatar com o investigador (Santiago Waisman: sawaisman14@gmail.com)

Ao selecionar "Sim, estou de acordo" confirma o seu consentimento com a informação apresentada.

Informação demográfica

Idade:

Sexo:

País:

Nível socioeconômico:

Nível educativo:

Nível de conhecimento tecnológico:

Experiencia anterior com criptomoedas:

As criptomoedas representam um novo método de troca sem forma física, criado para facilitar pagamentos e transações online, com base na utilização da criptografia. A tecnologia por detrás das mesmas, blockchain, proporciona um meio seguro e descentralizado para todas as transações, o que significa que não há nenhum intermediário envolvido, sendo possível fazer transações inalteráveis, anónimas e rastreáveis a um custo reduzido. As criptomoedas têm o potencial para ser utilizadas de várias formas impactantes, tais como a prestação de serviços financeiros a quem está fora do sistema bancário, e permitir a compra e venda de arte digital e outros objetos colecionáveis sem intermediários. Apesar deste potencial, devido ao seu rápido crescimento, as consequências da sua utilização ainda não são claras. A legislação existente relativa à sua utilização ainda está em revisão, o que permite a sua utilização tanto para operações legais como ilegais, para além da volatilidade do seu valor e do impacto ambiental da sua utilização, que deixam questões que ainda têm de ser abordadas.

Todos os itens neste estudo serão apresentados com uma escala de resposta tipo likert de 1 a 5, sendo os valores 1-Discordo totalmente, 2- Discordo, 3-Nem discordo nem concordo, 4- Concordo e 5- Concordo totalmente.

Intention to use (IU) - TAM2 scale (Venkatesh and Davis, 2000; Arias-Oliva et al., 2019)

IU1: Tenho a intenção de usar criptomoedas

IU2: Tenho a certeza que usarei criptomoedas no futuro

IU3: Posso prever que usarei criptomoedas

Performance Expectancy (PE) UTAUT2 (Venkatesh et al., 2003; Venkatesh et al., 2012; Arias-Oliva et al., 2019)

PE 1: O uso de criptomoedas aumentará as oportunidades de atingir objetivos importantes para mim

PE 2: O uso de criptomoedas vai-me ajudar a alcançar os meus objetivos mais rapidamente

PE 3: Usar criptomoedas melhorará o meu nível de vida

PE 4: As criptomoedas são mais desejáveis do que a moeda do meu país

Effort Expectancy (EE) UTAUT2 (Venkatesh et al., 2003; Venkatesh et al., 2012; Arias-Oliva et al., 2019)

EE1: Será fácil para mim aprender a usar criptomoedas

EE2: A utilização de criptomoedas será clara e compreensível para mim

EE3: Será fácil para mim usar criptomoedas

EE4: Será fácil para mim tornar-me num especialista na utilização de criptomoedas.

Social Influence (SI) UTAUT2 (Venkatesh et al., 2003; Venkatesh et al., 2012; Arias-Oliva et al., 2019)

SI1: As pessoas que são importantes para mim pensam que devo usar criptomoedas.

SI2: As pessoas que tem influência nas minhas decisões pensam que devo usar criptomoedas.

SI3: As pessoas cujas opiniões valorizo gostariam de que eu usasse criptomoedas.

Facilitating Factors (FF) UTAUT2 (Venkatesh et al., 2003; Venkatesh et al., 2012; Arias-Oliva et al., 2019)

FF1: Tenho os recursos necessários para usar criptomoedas.

FF2: Tenho os conhecimentos necessários para utilizar criptomoedas.

FF3: As criptomoedas são compatíveis com outras tecnologias que utilizo

FF4: Posso obter ajuda se tiver dificuldades para usar criptomoedas

Perceived Risk (PE) (Faqih, 2016; Shim & Lee, 2011; Arias-Oliva et al., 2019)

RP1: Usar criptomoedas é arriscado

RP2: Há demasiada incerteza associada ao uso de criptomoedas

RP3: Em comparação com outras moedas ou investimentos, as criptomoedas são mais arriscadas

Attitude (A) – (Shin, 2017; Shin, 2020)

A1: Tenho sentimentos positivos em relação as criptomoedas em geral.

A2: A ideia de usar criptomoedas é atrativa para mim.

A3: Usar criptomoedas seria uma boa ideia.

Social trust Cryptocurrencies (STC) – (Siegrist, Earle & Gutcsher, 2003; Albayati, Kim & Rho, 2020)

T1: Há uma comunicação honesta sobre os riscos e consequências envolvidos com as criptomoedas.

T2: O sistema por detrás das criptomoedas dá a impressão de que cumpre os seus compromissos e promessas.

T3: Acredito que a forma como funcionam as criptomoedas ajudam a manter os meus interesses em consideração.

T4: Acredito que as criptomoedas são mais confiáveis e seguras do que a moeda do meu país

Knowledge (K) (Arli et al., 2020)

K1: Sinto que tenho bom conhecimento sobre criptomoedas

K2: No que se refere as criptomoedas, eu realmente não sei muito

K3: Comparado com a maioria das pessoas, eu sei mais sobre criptomoedas