Influencing Factors for Blockchain and Cryptocurrency Adoption from a Perception Perspective

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Abstract: **Cryptocurrencies are one of the main application domains of blockchain technology and have proliferated in the past years with investors seeking alternative ways to established currencies for speculation or value storage. However, not all investors have the same motivation, nor invest large amounts of money. On the contrary, word of mouth and peer to peer influence play an important role in cryptocurrency adoption. This work is exploratory research on the factors that influence cryptocurrency adoption, with focus on the way investors perceive the cryptocurrency market. A qualitative approach is followed with semi-structured interviews on United Kingdom cryptocurrency investors. The key findings from the study can be summarized in two key dimensions. The first dimension is that a significant factor that influences cryptocurrency adoption is the perceived return on investment, while the second dimension is that peer and friend influence is a quite strong factor as well. The study contributes to the existing body of knowledge and promotes the agenda for future research in the domain.**

Keywords: **Cryptocurrency adoption, Blockchain technology, Technology Acceptance Model.**

I. INTRODUCTION

Blockchain technology (BT) is a form of a public ledger that enables decentralized transactions in the financial domain, but is also utilized in more general settings [1]. In brief, BT allows users to document transactions on a public record and once the transaction has been committed it cannot be altered. BT relies on cryptography as a way to eliminate the need for any third-party, such as a financial institution, to mediate, verify transactions and guarantee trust in the system. BT has evolved since the early days and is considered as a valid approach for a wide range of applications that can be potentially found in numerous areas including electronic health records, intellectual property, insurance, identity management, E-voting, notary and law, and privacy/security among others. At early years around 82% of BT use cases were found in financial services, while later other applications of BT were evolving leaving the financial services at a 46% of BT use cases [2]. Some growing application domains of BT include industrial products and manufacturing, supply chain, smart contracts, energy and utilities and healthcare. As with any novel technology, blockchain is gradually disseminating across different industries, conceivably making processes more democratic and secure, as a key feature of it is the global ledger and the disintermediation that it advocates. Taking this into consideration, it seems that BT will continue to evolve and lead to transformation of existing processes based on a centralized ledger.

Despite the wide potential of BT and its developments, cryptocurrency-based applications are the most prevalent and popular in use until today, as they offer users a level of financial freedom outside the established banking system, while at the same time increased level of trust. Back in 2008, amidst the global financial crisis, BT was selected as the basis to build

the novel at that time model of cryptocurrencies, with bitcoin being the first one that has since then been rapidly and widely adopted [1]. Although, there is some vagueness related to the founder of bitcoin, the paper: termed "Bitcoin: A Peer-to-Peer Electronic Cash System", that was published online, is considered as the starting point of contemporary domain of cryptocurrencies that sets the scene for all subsequent developments [3]. Forms of electronic money in various schemes existed before bitcoin, but it was the technology behind bitcoin that made it become so popular compared to its counterparts, since BT enabled transactions to take place securely without the need for a third-party to guarantee trust or keep records. This disintermediation approach was one of the keys to its success. However, cryptocurrencies being a relatively new asset class are not under tight scrutiny from regulatory bodies, like banking systems, and they are not monitored or fully understood by relevant bodies and policy makers. So, research on the non-technological aspects of cryptocurrencies is quite important and beneficial for authorities to understand user perceptions and motivations, as well as behavioral patterns in order to adjust relevant policies. For example, how social media or word of mouth influences people to adopt the new technology, despite the risk of money loss. What we can see in the research domain, is that since the introduction of first cryptocurrencies in 2009, a large volume of research has been published focusing on technological aspects and BT utilization, as well as market and trading models. However, there is limited research on cryptocurrency investors and their motivations and cryptocurrency perceptions.

Following the above, the large extent of BT utilization in cryptocurrencies and the influence on markets and individuals, this work focuses on adoption aspects of BT technology applications, and especially cryptocurrencies and the factors that influence cryptocurrency adoption. It is exploratory research that focuses on two questions, namely the main factors that drive the adoption of cryptocurrencies, and the way that investors perceive the cryptocurrency market. The first question investigates motivations for cryptocurrency adoption among investors and the second question examines the explicit perceptions of cryptocurrency. As the study is exploratory, we employed qualitative techniques to get a thorough understanding of user motivations with focus on United Kingdom investors. The key findings from the study can be summarized in two dimensions. The first dimension is that a significant factor that influences cryptocurrency adoption is the perceived return on investment, while the second dimension is that peer and friend influence is a quite strong factor as well.

The structure of the work is as follows. Initially, some background on BT and relevant research is highlighted along with theoretical adoption models. In the subsequent sections the methodology and results are presented followed by discussion of the findings. Finally, the conclusion offers a summary along with some recommendations for policy makers.

II. BACKGROUND

Research and relevant literature in cryptocurrencies have become very extended in the past years, covering technological, market and behavioral aspects, and a thorough review, even in a subset, is challenging. Some fresh bibliographic studies, however, can assist the interested reader to view works on investor behavior in a systematic way [4], [5]. In terms of technology, BT implements, in essence, a form of a ledger that cannot be altered, providing all users a complete transaction archive. It uses cryptography to certify that each transaction in the ledger has not been altered, called the consensus protocol, and this ledger is then shared with all participants. BT uses a decentralized public database scheme, where identical copies of the database are distributed to several servers [6]. In order to corrupt or alter the database, a malignant user would have to attack at each distinct database, something not feasible as there could be thousands instances. This contrasts with a typical centralized database that is easy target for an attack. One key characteristic of blockchain technology is that there is no single point of failure, despite its public nature. So, it is a robust technology against attacks as they are less able to override the consensus protocol [1]. This feature of BT makes it very attractive for building applications that are decentralized, but at the same time protected by strong protocols that safeguard trust, something that cryptocurrencies utilized, as a key concern of cryptocurrency users is to ensure that all transactions and stored values are secure and there is no central authority that controls or monitors the system. Adopting BT allows a cryptocurrency to offer a disintermediated system of trust, a key component for adoption from users.

Cryptocurrency developments were not however driven only by technological advances, but also because of socio-economic factors. Maurer, Nelms and Swartz [7] discuss how the invention of Bitcoin was partially due to financial systems reactions to the 2007-2008 financial crisis. The authors offer a compelling philosophical account of what Bitcoin means for society, in terms of privacy among other things, highlight how we currently live in a world of big data, and draw attention to how Bitcoin enables its users to transfer or store assets and exchange value between users without being traced by institutions

and governments. Bohr and Bashir [8] use publicly available survey data of Bitcoin users to investigate how age, political orientation, geographic location, time of initial use and use of social media/ online forums affects Bitcoin wealth, optimism and attraction. They found that 47% of Bitcoin users were libertarian, and interestingly found that after controlling for confounding variables, the marginal effect of spending Bitcoins on illegal goods was a 25-45% increase in Bitcoin possession. Moreover, participating in Bitcoin-related online discussions was (significantly) positively correlated with owning more Bitcoins, specifically twice as many Bitcoins than users who did not use Bitcoin-specific online platforms. Inci and Lagasse [9] investigate the viability of cryptocurrencies as a legitimate and worthwhile investment opportunity using a mean-variance optimization technique. They find that as an isolated investment, the cryptocurrencies with the best return on investment (ROI) with mitigated risks are Ripple, Bitcoin and Litecoin in that order. Moreover, they argue that cryptocurrencies have a useful role in optimal investment profile composition besides the original purposes of cryptocurrencies, i.e., as digital currencies with which they can purchase goods and services. The stream of research is quite extended, but it is evident, in general, that the key aspects of cryptocurrency adoption are not the technological per se, but the perceptions of potential investors on a variety of dimensions related to trust, social influence, expectations for profit among others [10], [11], [12].

Other researchers focus on the information asymmetry aspects as a factor that affects investor decision in cryptocurrency investments and trading. Information asymmetry refers to a disparity in the quantity and veracity of information held by two or more investors. Park and Chai [13], draw special attention at the role of information asymmetry in determining investors behavior in cryptocurrency market. The two authors categorize traders into informed and uninformed ones. They postulate that the former have access to privileged information, that is, information that is generated by expert analysts, and the latter only have access to public information, that is, information that is known to all investors at the same time. Park and Chai compare the information asymmetry in cryptocurrency market and the traditional stock market and they aim to find out whether cryptocurrency investors decisions were related to this information asymmetry. Another factor that is examined for influencing investor decisions is the volatility of cryptocurrencies. Baur and Dimpfl [14] analyze volatility of cryptocurrencies using GARCH model to see if cryptocurrency markets exhibit a repeated correlation of returns, or whether there is no autocorrelation, with the former being indicative of uninformed investors and the latter being suggestive of informed investors. The authors find that volatility increases more in response to positive shocks, rather than in response to negative shocks. This is distinguished from traditional stock markets. The authors posit that the increased volatility in response to positive shocks is due to uninformed investors exhibiting herding investment behavior as a response to fear of missing out (FOMO) on increasing cryptocurrency prices. This is just one factor out of many which could potentially influence an investor's choices. Another stream of research focuses on the role of social media and the influence they have on investor decisions, as a means of peer-to-peer persuasion. Mai et al., [15] investigate the relationship between social media and bitcoin price. They find that social media can partially affect bitcoin price, and can often predict the valuation of bitcoin, although not all social media messages impact the price equitably. This particular research topic is very broad and complex, and it involves many different variables to consider. Trusov, Bodapati and Bucklin, [16] reveal that individuals vary in the amount, type, frequency and standard of online content that they create and consume, so it is not easy to apply a unique approach in studying peer influence.

In terms of adoption models that have been utilized, we can identify variances of the popular technology acceptance model (TAM). So, Gupta et al., [17] utilize the unified theory of acceptance and use of technology (UTAUT), the technology acceptance model (TAM) and a modified version of social support theory to prioritize the main objectives underlying investment in cryptocurrency. The authors outline eight aspects of investment intentions and motivations: performance expectancy, effort expectancy, social influence, facilitating conditions, financial literacy, perceived usefulness, perceived trust and social support. Each of these aspects were investigated to see which of them has the greatest influence on the intention to invest in cryptocurrency. Authors collected quantitative data from both public and private individual investors from across the globe with a sample size of 1,495. They found that the most important aspect was social influence followed by facilitating conditions and perceived usefulness. For social influence, there are three sub-criteria and their respective weights are: S1 "people who's opinions I value would like me to use cryptocurrencies" (16%), S2 "the people who are important to me will think that I should use cryptocurrencies" (58.8%) and S3 "the people who influence me will think that I should use cryptocurrencies" (25.2%). Here, the researchers find that S2 has the greatest impact on investment intentions, which suggests that someone's intention to invest in cryptocurrencies is heavily affected by their relationships with others and how other people perceive cryptocurrencies. For the next most influential aspect of investment intentions, facilitating conditions, there were four sub-criteria, with FC2 "I have the necessary resources to use cryptocurrencies" and FC3 "I have

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the necessary knowledge to use cryptocurrencies" being the most influential. These sub-criteria had an impact of 41.6 and 41.1% respectively. Finally, perceived usefulness was the third most prominent criteria with PU1 "I find that using cryptocurrency in electronic payments helps me to improve effectiveness, profitability and investment of my money" having the greatest impact out of all the sub-criteria at 46.4%. The aspect with the least influence on investment motivations was effort expectancy. This finding suggests that users were not concerned about whether learning how to use the technology would be easy or that it would be clearly comprehended. These findings suggest that intentions to invest in cryptocurrency are heavily influenced by their relationships. Being able to access the technology and have the right knowledge to invest in cryptocurrencies is also prominent, and finally the most significant sub-criteria of perceived usefulness is related to an individual's expected ROI. In a similar way, Arias-Oliva, Pelegrín-Borondo and Matías-Clavero [18] use principles based on TAM, and an extended version of the UTAUT in a quantitative study to measure the intention to use cryptocurrencies. They find overwhelming statistical evidence for 'performance expectancy', defined as the perceived usefulness to enhance someone's performance in terms of achieving goals and increase the user's standard of living.

From the above, we can see that there is evidence for the significance of peer influence and profit expectations as motivating factors for cryptocurrency investment decisions, something that was utilized in the present work to formulate the model and the methodology followed.

III. DATA AND METHODS

The key aim of this research is to explore why participants decide to invest into cryptocurrency, in relation to their perception of blockchain. The purpose is to ascertain and interpret factors that influence investment decisions and market perception for cryptocurrencies. To answer this, an exploratory approach was performed to uncover hidden patterns and implications. The research design was qualitative, and interview was selected as data collection instrument and the interview design was that of semi-structured interviews, as this approach enables interviewees to present their own ideas and reasoning, albeit in a systematic and measurable way. Thirteen interviews were conducted in total, where participants were selected by purposive sampling from a pool of one hundred potential participants by a preliminary public call thorough social media groups. Interviewee initial selection was based on three main criteria: demographics, residence, and a minimum investment. So, residence should be UK, a minimum of £100 should have been invested in cryptocurrencies, and for the demographics there was selection among all ages and financial status. Despite the limitations, that have to do with sampling, the exploratory nature of the study justifies the approach, as the focus is to explore patterns and behaviors.

A. Sample

In more detail, the sampling strategy to select participants was a combination of self-selection sampling and purposive sampling. In self-selection sampling participants volunteer to take part in the study. To achieve this, an online 'advertisement' was uploaded onto a popular social media platform, asking viewers if they would agree to take part in a research study regarding cryptocurrency. Via this method, most participants volunteered to be a part of this study. This method of selection reduces the amount of time needed to find participants that are eligible to take part in the study since they are already aware of the criteria. Moreover, these participants are often motivated to take part in the study, and this contributes to a great amount of information. A few participants were selected using purposive sampling, since they were eligible for the research study, but may not have seen the online advertisement. Purposive sampling relies on researcher evaluation of participants, such as typical case sampling, total population sampling and expert sampling, maximum variation sampling and homogeneous sampling. The purposive sampling technique used selected participants who had invested either very low or quite high amounts in cryptocurrencies deliberately to study a cross section of the sub-population of cryptocurrency investors. A maximum variation purposive sampling is ideal for exploratory research as it equips researcher with rationale to make generalisations from the selected representation [19].

B. Data and analysis

For data collection, face-to-face, over the phone and video-calling interview techniques were employed depending on availability and feasibility of face-to-face interviews, however a face-to-face method was preferred if possible, to ensure accurate and comprehensible communication. Interviews lasted between fifteen and forty minutes, with an average of twenty-five minutes. Each participant has been anonymized and is referred with the corresponding number. All interviews were recorded, and transcripts were formed during the analysis phase. The method of data analysis used for this research project is grounded theory, first introduced by Glaser and Strauss in their book "The Discovery of Grounded Theory" [20]. Grounded theory is a form of content analysis which has been described to "liberate" researchers in the social science

domain by making the case that researchers can legitimately forge their own path in terms of scientific theory, and not have to follow a regimented and established theory [21]. Grounded theory and interviews could be challenged in general as unreliable due to negligent interview strategies which could infuse bias into the data. To overcome this, the researcher must be vigilant to ensure that bias isn't present in the methodology in the form of leading questions. In this research extra care was taken to mitigate bias wherever possible.

C. Limitations

Some limitations of the study include sampling and generalization. Self-selective sampling includes the inability to generalize. Considering how research subjects volunteer to take part in the research, it is highly likely that self-selection bias may be present in the sample. The fact that each participant has offered to be part of the research may express how they have an intrinsic bias. This bias could cause the sample to be unrepresentative or overestimate a specific finding from the investigation. Moreover, every participant that took part in this study lives in the UK, at least at the time that the research was carried out. This is important to note, as the results of this study are not be generalizable to people living in other countries.

IV.   RESULTS

For the analysis of collected data thematic analysis was performed with NVivo software, following comprehensive grouping at the advanced coding level of the themes identified in the research. From the analysis, several investment motivations were identified, however, these motivations are hierarchical and not mutually exclusive. So, the main factors that drive the adoption of cryptocurrencies can be summarized to perceived ROI, perceived spending power, risk-taking personality type, social influence insert FOMO and previous investor experience or financial literacy. While, for the way investors perceive the cryptocurrency market, ethical consideration emerged as key theme. In the following, some key excerpts are presented for each theme.

A. Perceived ROI

Each participant stated that their primary motivation for investing in cryptocurrencies was to make money through speculation. Speculation works similarly to the traditional stock market in the sense that an investor will attempt to buy a certain amount of cryptocurrency when the price is low, and sell that cryptocurrency when the price is high, with the difference between these two prices to be the profit. Many cryptocurrency investors see cryptocurrency as an opportunity to make money, ranging from one-off payment to a part-time income, or even to help them retire early. Participant 6, indicated that she aims to use their investment profits to retire early: "I want to retire early, and this extra income will help me do that.", while every other participant also indicated making a profit to be a consideration when deciding to invest.

B. Previous Investor Experience/ financial literacy

Four participants said that they had previously invested in traditional stocks and shares. "I invest anyway into stocks so I thought I might as well try out cryptocurrencies." (Participant 7). Considering the similarities to traditional stock market trading, it is not surprising that some participants have this particular background. This indicates that being knowledgeable in stock market trading may equip someone with the confidence to invest in cryptocurrencies too.

C. Social influence

While participants in this study purported that they take online advice seriously, taking advice from trusted friends is also a running theme throughout the data. 12 out of 13 participants stated that they had at least one friend that invests in cryptocurrencies, with many stating that they have 5 or more friends that invest in cryptocurrency. Interestingly, 8 participants described their friends having a large impact on their investment decisions. When asked what a motivating factor was to decide to invest in cryptocurrencies, participant 11 commented "My friend was telling me that he's doing it and he's making decent money and I should look into it as well. So is my friends work which was the persuading factor."

D. Risk-taking personality type

Four participants expressed that they didn't expect to make money from their investments, instead they described how they invested for experimental purposes, or for little reason other than a slight inclination. Each participant was asked: "do you consider yourself to have an appetite for risk?" and clarified with a scale from 1-10, with 5 being risk-neutral, >5 being risk-seeking and <5 being risk-averse. A self-assessed risk-taking personality was prominent among all participants, with

just two participants saying that they don't have a risk-taking personality. One of these participants also invested the least amount of money into cryptocurrency. All other participants verified that they have moderate to high risk-taking tendencies. When asked if they consider themselves to have an appetite for risk participant 2 responded "I'd say so. I take risks in many areas of life, even when there is little reward".

E. Perceived spending power

While it is not required for UK businesses to accept cryptocurrencies, there are companies that choose to accept it. While it is entirely feasible to buy legal goods and services within the UK with cryptocurrencies, all participants explained that they had not bought anything legal with cryptocurrencies. "I started because I actually needed to use crypto, As a currency of itself" (participant 1). Participant 1 disclosed that they first adopted the technology to use cryptocurrency as a currency.

F. Ethical considerations

Two participants stated that they had purchased illicit goods with cryptocurrencies on the black market. Participant 2 discusses this: "I bought study drugs. I bought it on a website, all I can remember is that it was from Amsterdam. I paid in bitcoin with the equivalent of £10." Participant 1 contended that "Crypto basically started as a thing to buy drugs", alluding to cryptocurrencies' unsavoury beginnings. When participant 10 was asked about their perception of the cryptocurrency market, they commented on the fact that it's a form of money that's "not taxed and tracked."

V. DISCUSSION

As a theoretical context, this work proposes a framework where the identified influencing factors of cryptocurrency adoption, namely perceived ROI, risk tolerant personality, previous investment experience, ethical considerations and FOMO under personal characteristics and social influence under social norms are the key elements to consider. The data analysis suggests that each of these factors affect the adoption of cryptocurrencies to some degree. Albeit the study is qualitative and limited, findings suggest that these factors are not of equal weight, but some factors having a greater influence on an individual's propensity to invest than others. This is evident from other studies, even if the factors vary. In this work, the novel contribution is the that this model is among the first to make a distinction between "perceived ROI" and "perceived spending power". Typically, these motivations are grouped together, under the term "perceived usefulness" or "performance expectancy", where each user determines in what way they perceive cryptocurrency to be useful or achieve their goals.

This study can distinguish between what particular goals investors have which has implications for further research on the motivation for the uptake of cryptocurrencies. This is because if participants have varying "goals" then their motivation to achieve these goals will be different. This study suggests that motivations for UK investors include an emphasis on having risk-taking personal characteristics and having had previous investor experience, whereas these factors could be less prominent for adopters who have different end goals. The intention to use cryptocurrencies for speculative investment was the goal of 100% of participants, with 15% of participants saying that they have used cryptocurrencies for spending power. Therefore, the majority of the data collected was for speculative investment, and these motivations don't necessarily apply to someone using cryptocurrency for currency. It can be argued that financial incentive is the greatest persuading factor into why participants decide to invest in cryptocurrencies. These findings are contradictory to Gupta et al., [17], who found that social influence was the most influential factor for the behavioral intention to adopt cryptocurrency. Instead, this study agrees with Arias-Oliva, Pelegrín-Borondo and Matías-Clavero [18] who found that performance expectancy is the most influential factor for cryptocurrency adoption. This is not to say that social influence does not have a significant role in the intention to invest in cryptocurrency. The data from this study implies that the motivations under study are not mutually exclusive, and the opinions of peers have a precipitator role in the motivation to use cryptocurrency. In addition, results from this study suggests that a section of cryptocurrencies are used for the purchasing of illegitimate goods. While it is possible to buy legal goods and services with cryptocurrencies, all participants said they had not bought anything legitimate with cryptocurrencies, but two participants purported to have bought illegal items with cryptocurrencies. Since this was a small proportion of the results, with just 15% of participants, this research suggests that spending power is a marginal reason for investing in bitcoin in comparison to other factors described in the results. These results however are limited in terms of generalizability to UK investors.

The findings also show that participants could be heavily influenced by their friends and peers. It is important to note that social norms vary depending on the country and or culture that surrounds an individual. Social norms are defined as a

commonly accepted standard of acceptable behavior [22]. This study has shown empirical support for the influence of social norms and attitudes on the propensity for an individual to invest in cryptocurrency, whether that be from a direct group of peers or wider society. Furthermore, one participant commented on how they were first able to trust cryptocurrencies as a legitimate investment opportunity when they observed cryptocurrencies on a reputable news source. Finally, 31% of participants indicated that they had invested in stocks and shares. In the TAM, Davis, Bagozzi and Warshaw [23], define perceived ease of use as "the degree to which a person believes that using a system would be free of effort". The similarities between traditional stock market trading and cryptocurrency trading therefore increases the participants' knowledge in this area prior to their investments in cryptocurrency. The results of this study indicated that 40% of the participants were proponents of the cryptocurrency 'ideology', observing that cryptocurrencies will remain and continue to be an important and useful contribution. On the other hand, two participants expressed that they believe cryptocurrency is a fad and will subside over time. These perceptions can come under "perceived usefulness" in the TAM.

VI.   CONCLUSION

In this work the factors that influence cryptocurrency adoption were studied following an exploratory research. The focus was on exploring the main factors that drive cryptocurrency adoption, and the way that investors perceive the cryptocurrency market. A qualitative approach was followed with a number of semi-structured interviews with focus on United Kingdom investors. The key findings from the study can be summarized in two dimensions. The first dimension is that a significant factor that influences cryptocurrency adoption is the perceived return on investment, while the second dimension is that peer and friend influence is a quite strong factor as well. The study contributes to existing body of knowledge and promotes the agenda for future research in the domain. Results can be used for future studies or by policy makers to understand how cryptocurrencies are perceived by investors as alternative ways to established currencies for speculation or value storage and how word of mouth and peer to peer influence play an important role in cryptocurrency adoption.

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