The Diffusion and Adoption of Bitcoin: A Practical Survey for Business

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Abstract: As an emerging form of cryptocurrency, Bitcoin has become increasingly prevalent in today's financial marketplace. As a new technological instrument, this study examines Bitcoin by utilizing the technology adoption model and innovation diffusion theory. By utilizing such a framework, this study examines the factors that are associated with a decision to adopt Bitcoin as a means of financial exchange. By employing structural equation modeling and the partial least squares method, a research model was developed and tested using an international study that surveyed 121 global cryptocurrency community members. From our analysis we found that relative advantage and ease of use had a significant positive effect on bitcoin use intention while visibility and compatibility were also found to have a statistically positive impact. The results from this study have important implications to the finance and business sectors.

Key words: Cryptocurrency, Bitcoin, Technology Adoption Model (TAM), Innovation Diffusion Theory (IDT), international business application, analysis

INTRODUCTION

Introduction to Bitcoin: Since, it was originally launched in 2008, Bitcoin has grown to be the preeminent form of cryptocurrency. However, its emergence has not been without its fair share of mystery and controversy (Roth, 2015). Introduced by a group of programmers, under the pseudonym Satoshi Nakamoto, Bitcoin is a cryptocurrency or virtual money derived from a mathematical cryptographic protocol and conceived as an alternative to government-backed currencies (Cheah and Fry, 2015). The protocol creates unique pieces of digital property that can be transferred from one person to another. The use of such a protocol also makes it impossible to spend the same Bitcoin twice.

The Bitcoins themselves are generated using an open-source computer program to solve complex math problems in a process known as mining. A public address and a private key is also used to make sure each Bitcoin has its own specific identity. This means that Bitcoin is not only a token of value but also a method for transferring that value. In addition to having a unique digital fingerprint, Bitcoins are also characterized by their position in a decentralized public ledger of all Bitcoin transactions known as the "blockchain" which provides a means of recording your purchase publicly and permanently. In this instance, Bitcoin transactions are transmitted to every node in the network, creating a database of all approved transactions to date. At intervals of roughly 10 min all of the transactions during the preceding period are bundled together into a "block"; these blocks are then linked to form a chain. Within each block is a cryptographic puzzle which when solved, validates the chain as a whole (Maurer *et al.*, 2013).

Unlike earlier systems of digital money such as e-Money or other virtual currencies, Bitcoin's block chain transactions make it the first ever fully decentralized digital currency. Despite being a virtual currency its use of Peer-to-Peer (P2P) networks and cybersecurity has seen a new sub-category created (Fig. 1) called cyptocurrency (Bradbury, 2013). In addition to this, it should also be mentioned that in contrast to electronic money, Bitcoin does not represent a pre-existing legal tender (such as dollars or euros) as it has its own value

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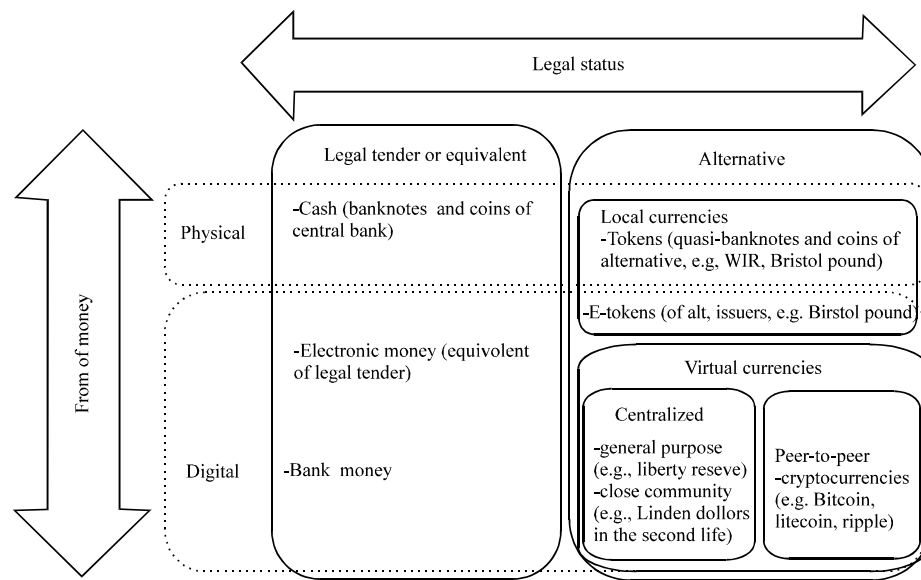The University of Waikato, Hamilton, New Zealand

Fig. 1: The classification of money

units (Polasik *et al.*, 2015). In this regard one can say that Bitcoin is similar to that of other alternative currencies, however, it differs significantly from other 'local currencie's such as the Bristol pound which are valued in accordance to the rate of their countries own official currency. Bitcoin's use of a decentralized ledger system, also helps to differentiate itself from other earlier forms of virtual currency such as the linden dollar from the game second life (ECB, 2015; Jin and Bolebruch, 2009). Finally, as a cryptocurrency, Bitcoin uses cryptographic controls to eliminate the need for a central authority's involvement in transactions which removes the risk that they might manipulate the supply of currency or feel compelled to mediate on disputes (Roth, 2015).

An important feature of Bitcoin which helps to distinguish itself from many of its peers has been its ability to encourage both individuals and businesses to use the technology during its initial period of development, there by overcoming the usual problems faced by other innovations (Rogers, 1962; Zhang and Li, 2006; Weber and Kauffman, 2011; Committee on Payment and Settlement Systems, 2012; Hoehle *et al.*, 2012; Polasik *et al.*, 2015; ECB, 2015). The problems associated with new payment system technologies, reflect the strong indirect network effects that exist in a so-called two-sided market (Rochet and Tirole, 2003, 2006; Stango, 2004; Church *et al.*, 2008; Schuh and Stavins, 2013; Polasik *et al.*, 2015; ECB, 2015). The two-sided nature of Bitcoin means that simultaneous adoption is required by two groups of users in the network, namely customers making payments and merchants accepting them (Polasik *et al.*, 2015).

When first developed, interest in Bitcoin was very low. However, over the last 9 years, the size of its marketplace has skyrocketed to the extent that Bitcoin now has the highest market capitalization of any cryptocurrency with an estimated value of $14.5 billion USD (Appendix Table A1). The corresponding number of wallets, estimated the number to be 12.7 million at the end of the 4th quarter of 2015 (Information regarding the statistical components of Bitcoin were obtained from the CoinDesk Report for 2016 and were retrieved online at: http://www.coindesk.com/research/state-bitcoin-blockchain-2016/) has also increased significantly with studies showing a >100% increase from figures released in June 2014. In conjunction with this growth has been strong demand in Bitcoin itself with the value of Bitcoin increasing significantly in 2016 from $432 on January 1st 2016 to $968 at year end (Bitcoin price levels were obtained from the CoinDesk website: http://www.coindesk.com/price). As it possesses its own unit of value and is tradeable there exists a real present opportunity for people to speculate over its potential price level. This has undoubtedly helped to stimulate intense interest, particularly amongst early adopters a factor which is necessary for any new innovation to take off (Rogers, 1962).

Given the tremendous growth in demand and surges in the value of the Bitcoin it is obvious that an increasing number of consumers are now choosing to use this new technological form of currency. From a business perspective, many leading organizations now accept Bitcoins including Subway, Microsoft, Reddit, Virgin,
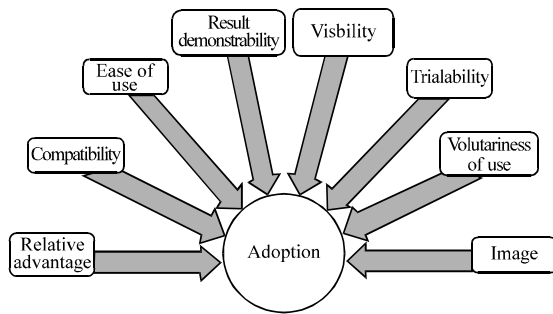
Fig. 2: Proposed research model

Dell, Home Depot, GAP, JC Penny and CheapAir.com amongst many others. (Information regarding an organization's acceptance of Bitcoin was confirmed via it respective website). Their willingness to adopt Bitcoin as a means of not only purchasing goods and services but also as a way of investment draws upon two important areas of enquiry, the technology adoption model (Davis, 1989) and the innovation diffusion theory (Rogers, 1962). As a consequence of this our study attempts to ascertain the constructs to influences a consumer's intention to use it. Using a model developed from these theoretical foundations, our study marks a significant step forward in understanding the characteristics of Bitcoin adopters (Fig. 2).

Theoretical background and research model: In early 2009, someone under the pseudonym Satoshi Nakamoto announced the release of a new form of open-source system of online currency called Bitcoin. Nakamoto emphasized that the currency by using a P2P system, would be able to directly connects holders of the currency in a decentralized way that required no third party (Maurer *et al.*, 2013). In the years that followed, excitement grew about the ability for Bitcoin's to offer a means of payment that evades the managerial oversight of banks, centralized payment systems and governments. From this excitement emerged a flurry of new highly engaged internet forums, currency exchange websites, marketplaces and experimental applications for Bitcoin. As Maurer *et al.* (2013) notes, it was during this time that Bitcoin experienced what resembled to some a speculative bubble of both value and attention (Fig. 3 and 4).

As consumer interest around Bitcoin has taken off so has the level of scholastic enquiry into the working of Bitcoin. Initial studies on Bitcoin focused primarily on developing an appropriate definition of Grinber (2011), Maurer and Swartz (2013) and Plasaras (2013). However, with the rise of Bitcoin, scholars made a conscious effort to better understand this new form of cryptocurrency.
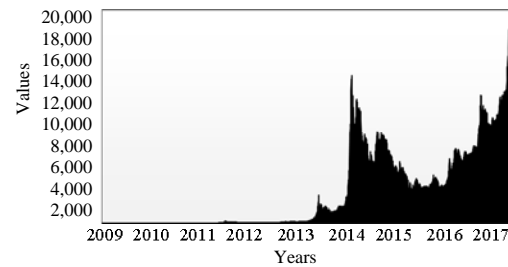

Fig. 3: Bitcoin market capitalization (in millions of US$) (Data was extracted from the CoinDesk website, http://www.coindesk.com/data/bitcoin-market-capitalization)
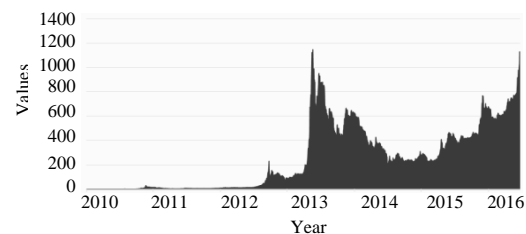

Fig. 4: Bitcoin price index (per Bitcoin in US$) (Data was extracted from the CoinDesk website, http://www.coindesk.com/price)

Research on Bitcoin has examined a number of important areas. The first of which deals specifically with technological issues and areas of potential weakness such as cryptographic problems, security vulnerabilities and potential areas of attack (Eyal and Sirer, 2014; Feld *et al.*, 2014).

The second line of enquiry, examines public and legal issues. In this regard, scholars have sought to interpret Bitcoin across various legal jurisdictions including the treatment of tax liabilities arising from trades and investments and anti-money laundering regulations (Christopher, 2014; Tropina, 2014; Polasik *et al.*, 2015; ECB, 2015). The legal issues are obviously an important consideration both private individuals and businesses when deciding whether or not to use Bitcoin. The issues of tax and investment liabilities also draws the attention of many central banks and other public institutions (ECB, 2015). Furthermore, the pseudo-anonymous and decentralized nature of Bitcoin means that it may be exposed to involvement in illegal activities such as tax evasion (Bohme *et al.*, 2015) which may dissuade people from using the currency. The third field of research endeavor related to a wide range of areas including politics (Karlstrom, 2014), sociological issues (Maurer *et al.*, 2013) and ethical concerns (Angel and

McCabe, 2014). In particular as Polasik *et al.* (2015) note libertarians have attempted to take advantage of Bitcoin's decentralized structure in order to remove themselves from surveillance by governments or financial institutions. Furthermore, for its supporters, Bitcoin provides an alternative means of payment to the likes PayPal where government institutions monitor one's commercial dealings and when necessary manipulate the value of money (Maurer *et al.*, 2013). Finally, the area of economic concerns has proven to be an increasingly popular area of focus. In this instance, theoretical efforts have focused on its monetary characteristics such as its investment potential (Yermack, 2013).

This study attempts to build on the third stream of Bitcoin research by examining the sociological component. Moreover, it seeks to better understand the constructs that influence a decision to adopt or intend to use a product or in this case the cryptocurrency Bitcoin. This kind of interaction between humans and technology is influenced by a number of social and psychological factors and characteristics (Taiwo and Downe, 2013). Because of the complexities involved in predicting human behaviour, research has generated a variety of theories and models to explain patterns of adoption and use of new technologies. Technology acceptance research is a mature field and has now been active for several decade as new technologies have continued to invade every aspect of human life. Several theoretical models have been developed to explain the acceptance behaviour of end users. Therefore, the study of technological innovation acceptance requires psychological models and theories to explain and rationalise whether users benefit from new devices. Through this evolution of scholastic endeavour, many theories and/or models have emerged including the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975); Social Cognitive Theory (SCT) (Bandura, 1986); the Technology Acceptance Model (TAM) (Davis *et al.*, 1989); the Theory of Planned Behaviour (TPB) (Ajzen, 1991); the Model of Pc Utilization (PCU) (Thompson *et al.*, 1991); the Motivation Model (MM) (Davis *et al.*, 1998); combined TAM and TPB (Taylor and Todd, 1995); the Innovation Diffusion Theory (IDT) (Rogers, 1962); TAM 2.0 (Venkatesh and Davis, 1996); Unified Theory of Accpetance and Use of Technology (UTAUT); TAM 3.0 (Venkatesh and Bala, 2008); extended Unified Theory of Acceptance and Use of Technology (UTAUT2) (Venkatesh *et al.*, 2012). While this study could potentially draw on many of these theories for the purpose of this Bitcoin diffusion and adoption study our study will base its assumptions on the theoretical

dispositions of firstly the Technology Acceptance Model (TAM) (Davis, 1989) and its subsequent extension by Venkatesh and Davis (1996) and secondly the Innovation Diffusion Theory (IDT) (Rogers, 1962).

Grounded in the field of psychology, the various technology adoption theories attempt to understand the perceived behavioral characteristics by examining the individual and the choices an individual makes to accept or reject a particular innovation. They provide a micro-perspective on change, focusing not on the whole but rather the pieces that make up the whole. The TAM (Davis, 1989) originated more as an adaption of the TRA however, it has since been developed to identify the factors which lead to a user's acceptance or rejection of a technology by integrating technological aspects with the psychological characteristics of individuals. Two important factors are perceived usefulness and perceived ease of use. Shroff *et al.* (2011) reported that by manipulating these two determinants, system developers can have better control over user's beliefs about the system and so can predict their behavioural intention and actual usage of the system. In its extension TAM 2.0 (Venkatesh and Davis, 1996) added two more determinants to the original TAM: social influences and cognitive instrumental processes. The social influences include subjective norms and images. On the other hand, the cognitive instrumental processes include job relevance, output quality, result demonstrability and perceived ease of use. In addition to this two moderating variables were added to this model which are experience and voluntariness.

In contrast, the IDT developed by Rogers (1962) endeavors to explain how an innovation is able to spread through a population. In doing so, it considers a range of factors such as time and social pressures to explain the exact ways in which a population adopts, adapts to or rejects a particular innovation. In this instance, one may argue that diffusion theory provides more of a macro-perspective view on the spread of an innovation across time (Straub, 2009). This theory is considered to be the permanent theory of acceptance of innovation and is appropriate in both an individual or organizational context (Agarwal and Prasad, 1998). Measuring potential adopter's perceptions of innovations has been deemed to be a critically important issue in innovation literature and a key component behind integrating various findings within diffusion research (Tornatzky and Klein, 1982). In Rogers's initial study of several thousand-innovation studies, he identified 5 characteristics of an innovation (relative advantage, compatibility, complexity,

observability and trialability) which affect the rate of diffusion of an innovation. According to Rogers, the constructs are defined accordingly relative advantage: the degree to which an innovation is perceived as being better than its precursor; compatibility: the degree to which an innovation is perceived as being consistent with the existing values, needs and past experiences of potential adopters; observability: the degree to which the results of an innovation are visible to others. The easier it is for individuals to see the results of an innovation, the more likely they are to adopt. Such visibility stimulates peer discussion of a new idea as friends and neighbours of an adopter ask him or her for innovation-evaluation information about it; complexity: the degree to which an innovation is perceived as being difficult to understand and use. Some innovations are readily understood by most members of a society while others are more complicated and will be adopted more slowly; trialability is the degree to which an innovation may be experimented with on a limited basis. New ideas that can be tried in a gradual or divisible manner will generally be adopted more quickly than innovations that are not divisible (Rogers, 1962). These characteristics, first identified by Rogers (1962) were further expanded by Moore and Benbasat (1991). In this instance, the constructs of image and voluntariness of use were incorporated and defined as follows: image, the degree to which use of an innovation is perceived to enhance one's image or status in one's social system and voluntariness of use as the degree to which the use of the innovation is perceived as being voluntary or of one's own free will (Moore and Benbasat, 1991). Using the constructs initially identified by Rogers (1962) (IDT); Davis (1989) (TAM); Venkatesh and Davis (1998) (TAM 2.0) and then extended by Moore and Benbasat (1991) this research represents an attempt to understand the factors that affect an individual's decision to adopt Bitcoin a rapidly emerging form of cryptocurrency.

MATERIALS AND METHDOS

Instrument development and procedure: By using the TAM and IDT as its theoretical base, this study uses a range of constructs examine the factors that affect an individual's decision to use Bitcoin. As such, this study includes the constructs of: relative advantage, compatibility, ease of use, result demonstrability, visibility, trialibility, voluntariness of use and image. Using these eight particular variables a series of relevant hypotheses have been drawn and empirically tested using Structural Equation Modelling (SEM):

- H_1: the relative advantages of Bitcoin will positively affect your intention to use it
- H_2: the compatibility of Bitcoin will positively affect your intention to use it
- H_3: the ease of use of Bitcoin will positively affect your intention to use it
- H_4: the result demonstrability of Bitcoin will positively affect your intention to use it
- H_5: the visibility of Bitcoin will positively affect your intention to use it
- H_6: the trialability of Bitcoin will positively affect your intention to use it
- H_7: the voluntariness of Bitcoin will positively affect your intention to use it
- H_8: the image of Bitcoin will positively affect your intention to use it

To empirically test the proposed research model, a survey instrument consisting of 8 constructs and 44 items was developed (Appendix 2). The study was conducted using a questionnaire that was created using the GoogleDocs online survey tool. All the items were measured on a 7-point Likert-type scale in which 1 was "very strongly agree" and 7 was "very strongly disagree". The 121 subjects included in the study were either members of global online cryptocurrency communities or attended international Bitcoin conferences in South Korea and were selected through a non-probability convenient sampling method. All responses were received over a 6 months period from April to September 2015 (Selgin, 2015).

RESULTS

Descriptive statistics: An analysis of the demographic component of the study shows us that in our sample 97.5% of respondents were male and 2.5% were female a finding that is not surprising at all given the nature of interest in Bitcoin. Of these more than half (52.9%) were aged between 26 and 38 years of age, 9.9% were aged 39 years of age and older while 24% of respondents were aged 19-25 years and 5% were 18 or below. Of those that completed the study 37.9% identified themselves as being a Bitcoin expert, 44% an intermediate and 18.1% a beginner level. The vast majority of those that participated in the sample were well educated with 54.5% holding an undergraduate degree, 27.3% completed master's studies while a further 3.3% had doctorate level qualifications. In terms of their primary purpose for using Bitcoin the 3 most prominent reasons were as a means of investment 50% for micro payments 20.7% and as a means of money transfer 12.9%. Finally, when it came to how long they had been using Bitcoin 43.8% said they has been using it for 1-2 years, 27.3% for 3-4 years and 24.8% for <1 year.

Table 1: Construct reliability statistics

Variables	AVE	Composite reliability	Cronbach's alpha
Compatibility (CP)	0.83	0.95	0.93
Ease of Use (EOU)	0.58	0.89	0.86
Image (IM)	0.77	0.94	0.93
Relative Advantage (RA)	0.64	0.93	0.91
Result demonstrability (RD)	0.69	0.87	0.79
Trialability (TR)	0.84	0.91	0.81
Use	0.86	0.96	0.95
Visibility (VB)	0.70	0.87	0.79

Assessment of measurement model: The reliability and validity of the scale was tested using the Structural Equation Modeling (SEM) technique. Since, the constructs in the study were latent in nature, the WrapPLS (Partial Least Square) software package was used to carry out these tests. PLS analysis was performed in 2 steps. The first step involved a test of the measurement model which includes an estimation of composite reliability and testing of convergent and discriminant validity of the instrument. The second step includes assessing the structural model through SEM.

Reliability and validity test: The results are shown in Table 1. All the reliability and validity results are within the recommended thresholds (Nunnally, 1978; Fornell and Larcker, 1981). The Average Variance Extracted (AVE) values were also well above the accepted level of 0.50. The discriminant validity is satisfactory as the square roots of the AVEs are greater than the off-diagonal elements in their corresponding row and column in all cases when the AVE of the construct is greater than the variance shared between the construct and other constructs in the model. Similarly, all the items were highly loaded (Loading>0.50) with their associated constructs thus satisfying the convergent validity of the scale (Appendix 3: Table A2). Two items of the visibility and one item of the result demonstrability constructs were not able to be properly loaded on their associated construct so they were eliminated from the analysis.

Assessment of the structural model: Similarly, the structural model was tested through SEM when the independent variables were regressed on the dependent variables. Out of the eight constructs entered in the regression model four had significant positive effect on Bitcoin use (Fig. 5). Relative advantage had a significant positive effect on Bitcoin use intention ($\beta = 0.35$; $p<0.05$; supporting the H_1. This implies that as the relative advantage of Bitcoin increase over the other currencies, the intention to use it also increases proportionally. Similarly, ease of use had a moderately significant positive effect on Bitcoin use with $\beta = 0.17$ and was significant at the $p<0.05$. This supports the H_3 and implies that as
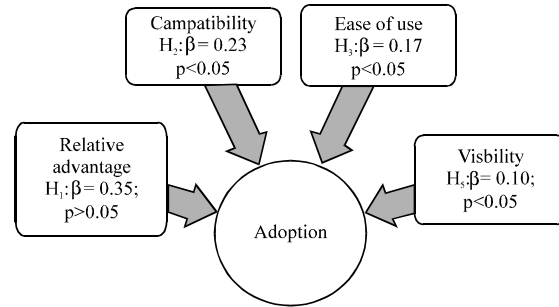

Fig. 5: Updated model

the ease associate with the operating Bitcoin increases, the intention to use Bitcoin increases proportionally. As predicted, visibility had a statistically significant positive effect on Bitcoin use intention ($\beta = 0.10$; $p<0.05$) thus accepting the H_5. This implies that as visibility of the Bitcoin increases, the Bitcoin use intention increases proportionally. Compatibility also had a statistically significant positive effect on Bitcoin use intention ($\beta = 0.23$; $p<0.05$).

Finally, the constructs voluntariness of use, image, trialability and the results demonstrability were found to not have a statistically significant effect on Bitcoin use intention. Overall, the constructs accounted for 47% of the variance in Bitcoin use intention.

DISCUSSION

In this research, by using the TAM and IDT as a theoretical base we endeavored to empirically state which factors help to explain one's intention to use Bitcoin. From our initial study we found that relative advantage and ease of use had a significant positive effect on Bitcoin use intention while visibility and compatibility was also found to have a minor statistically positive impact. These findings are in align with the vision that early developers shared when they first established the Bitcoin payment protocol. Although, our survey shows that a significant proportion of Bitcoin adopters view Bitcoin as an asset, there is a commonly held belief in the Bitcoin community that its real strength is its ease of use as a currency for money transfer and micropayments. This belief was quite evident in our research findings with 33.6% of respondents stating this as being their primary reason of use.

From a business perspective, Bitcoin offers retailers a wide range of new opportunities. For a business to remain relevant in today's increasingly competitive global environment, it must keep up with the latest technology and tools. As we enter the so-called era of 'fintech' (financial technology), the financial aspects of a business enterprise need to be thoroughly reviewed (Kim *et al.*, 2015). As such many global business leaders such as

Microsoft, Dell and Subway have chosen to offer Bitcoin payment options. A decision that has reaped positive rewards for these organizations with Microsoft in particular recording 110% growth in its sales volume associated with Bitcoin payments (information obtained from Microsoft's Bitcoin processor Bitpay.com). At present Bitcoins can be used by customers in America to buy content such as games and videos on Xbox game consoles, add apps and services to Windows phones or to buy Microsoft software). While Microsoft only accepts customers from the US, Dell began to biggest company to accept Bitcoins internationally in February of 2015. In the case of Dell, company CIO Paul Walsh stated that "bitcoin's ability to provide consumers with added choice and flexibility was key to Dell's decision to expand the payments program". Moreover, since accepting the program, Bitcoin had become a popular purchasing tool for both consumers as well as Dell's business customers, with "purchases being made across our full product spectrum" (The comments were made by Dell CIO Paul Walsh in an interview with CoinDesk and were published at http://www.coindesk.com/dell-bitcoin-uk-canada). Despite these sentiments it is important to bear in mind that in case of both microsoft and dell, payments are made through a third party dealer called Bitpay. However, while the use a middleman at this stage may not necessarily be a positive thing at the very least it provides a means of increasing its exposure making it a more viable means of exchange.

The growing popularity of Bitcoin with leading global retailers reflect a number issues which warrant further discussion. While many businesses use PayPal and other payment methods such as credit card services there are several issues associated with these offerings that Bitcoin can offer positive solutions to. Firstly, despite being relatively solid payment options, chargeback claims have often caused significant problems for retailers. In contrast, Bitcoin transactions are final with little opportunity for scammers to claim chargebacks. Moreover, it can create additional PR and the generate interest and business from the existing Bitcoin community an aspect which is in line with this study's assertion that visibility is an important component of adoption. For businesses with overseas vendors, offering Bitcoin transactions may be something that many businesses ought to consider offering. Wire transfers when replaced with bitcoin transactions can be highly addictive because of how improved they are over the current international funds transfer system. In general, Bitcoin transactions have lower fees are faster and work during and after bank hours, weekends and public holidays. Also from an accounting perspective, Bitcoin's use of the blockchain means that recorded data cannot be amended, edited or deleted. For business owners, this greater degree of transparency is great on two fronts. Firstly, consumers are better protected from the actions of

fraudsters. Secondly for vendors, the time, amount and other details of the transaction are recorded permanently, stored on the internet. Furthermore, by using Bitcoin, businesses can easily expand to new markets where credit cards and PayPal are not available or fraud rates are unacceptably high. At a time where leaked documents can break a business beyond repair, having a business model that provides a greater transparency is a solid business strategy and something that may make a company more appealing in the eyes of an increasingly consumer savvy marketplace.

Despite these advantages for business, it is important to remember that the value of Bitcoins have also proved highly volatile. With many investors predicting that the level of uncertainty would decline with more and more transactions taking place the fact that this has not occurred has created some unease amongst the business community. Although, as the results of our study show about half of the respondents were interested in Bitcoin as a means of investment and not to make regular payments with. Another concern of Bitcoin is its legitimacy. Another potential issue for businesses to consider is the classification of Bitcoin itself. For US Federal Tax purposes, the US Internal Revenue Service (IRS) has stated as part of its virtual currency provisions, that Bitcoin will be classified as property and not money. This means that when you sell Bitcoin, you may have a gain or a loss depending on your tax basis. It is also interesting to note that the perception of image does not have any real influence on Bitcoin use intention. This could be because digital currencies are often seen as being reasonably controversial with significant security flaws that make it illegal to use in a number of countries. It is also important to note that ATMs, credit cards, Paypal and other successful transaction technology innovations were once uncertain, progressive electronic methods to move money and now they are universally trusted digital protocols. Assuming that the cryptographic protocols underpinning Bitcoin are secure, there is no reason why Bitcoin cannot succeed in the same way. The development of the blockchain, the public ledger on which Bitcoin works has helped to alleviate many of the security flaws that have dogged other digital currencies. Given its design, the blockchain is able to verify the validity of transactions in a manner that not only provides an indisputable record of events but the technology protocol behind Bitcoin solves problems present in today's payment ecosystem. This can potentially provide online businesses with the type of payment platform they need to manage increasingly high transaction volumes. The blockchain ledger is also versatile with innovators exploring opportunities to use it as an escrow service for the exchange of high-value items, such as art or blueprints (Khan, 2015). In addition to this, it is important to note that there is also a restricted number

of Bitcoins. As it currently stands only 21 million bitcoins will ever exist (At present there, are approximately 16.1 million Bitcoins in circulation (CPSS, 2012). In all only 21 million will be generated through until the years 2140 (Entrepreneur.com)); this number is hard-coded into the software and cannot be changed without consent from the network majority. Bitcoins aren't printed like dollars or euros-they exist digitally and are distributed by the Bitcoin software at a predetermined rate. This basic structure is determined by the fact that Bitcoin is not a company, it is a decentralized network that operates on consensus. As the Bitcoin network has no central authority, it is virtually impossible to shut down, outside of shutting down the entire internet. Because Bitcoins cannot be artificially created; the bitcoin supply is mathematically regulated by the protocol which also helps to mitigate against the potential risk of fraud.

From a political policy point of view much can be done to address some of the concerns businesses may have with Bitcoin. Firstly, in order to address Bitcoin's perceived illegitimacy and provide better protection to consumers more needs to be done to better define Bitcoin from a legal point of view. In recent times, the US has made significant strides in this regard with the Senate homeland security and government affairs committee taking steps to work more closely with the Justice department, the federal reserve, the treasury department, the securities and exchange commission, the commodity futures trading commission and the office of management and budget. From this discussion, it is imperative that thoughtful, nimble and sensible federal policies are developed that protect the public without stifling innovation and economic growth. Moreover, a specific set of laws should be created to categorize and clearly define the legal standing of Bitcoin and its users, businesses, miners and exchanges. At present, there are a range of analogous laws that exist in which credit and debit card users are regulated. As Bitcoin wallets and exchanges are a clear substitute for credit card companies such as Visa or MasterCard these well understood credit and debit card laws would serve as an ideal foundation for practical Bitcoin regulation. Another concern facing Bitcoin usage is the lack of legislation to clarify whether businesses which maintain exchanges or allow consumers to pay with Bitcoins are operating within the confines of the law. In order for innovation in virtual currencies to flourish governments need to better define the type of information that must be collected and maintained in transaction records. Finally, in some of the largest commercial marketplaces such as that of the US and Europe companies which maintain online Bitcoin wallets for their users operate within a legal grey zone under current law. In this case, value is being stored on the company's servers in the form of text files. If a user's wallet becomes compromised and its contents are lost or stolen, the question of who is liable and what the appropriate legal chain of action is for both the user and the company is unclear. Should the company be required by law to issue the user a refund for the lost value and if so what form should the refund take? Bitcoins? An amount based on the relevant US or Euro exchange rate at the time the compromise became known to the company? Or an exchange rate based on the time in which the user filed a complaint? In order for businesses to adopt Bitcoin a legal mechanism must be put in place that clearly answers these questions and as such providing a greater degree of confidence to both the vendor and consumer.

The results from the study are encouraging and suggest that Bitcoin has real growth potential as a form of digital currency. It has already endured periods of uncertainty such as the bankruptcy of a prominent Bitcoin exchange called Mt. Gox which particularly shocked the emerging sociotechnical field. However, despite this setback most would argue it has bounced back reasonably well. Its resilience to a range of security threats and marketplace uncertainties is testament to solidity of the digital platform itself. It has also in recent times, made gains in its tradable value, bouncing back from the lows of 2014/2015. This study has helped to show that there is still a community devoted to helping make Bitcoin a long-term global success. It has helped to identify both the factors that drive the use of Bitcoin and provide a basis from which future academic discussion can take place. It is hoped that further studies can investigate not only how its important "decentralization" quality effects the spread of Bitcoin protocol in various countries but also how the political and economic environment of a country influences Bitcoin adoption.

CONCLUSION

In its short lifetime, Bitcoin has already demonstrated a great deal of promise as a technology capable of reshaping how we view and use money. Despite, its rocky beginnings in black markets, the currency holds many legitimate functions and strengths over conventional legal tender, especially in the realm of online transactions. And while it is very much in its infancy in terms of a means of currency exchange, Bitcoin has still been adopted as a form of payment by many leading global retailers including Dell and Microsoft amongst others.

In order to better understand its future and ways in which Bitcoin can continue to grow from both a consumer and business perspective, this study has developed a research model, utilizing the theoretical constructs identified in Rogers (1962) Innovation Diffusion Theory (IDT) and the Technology Adoption Model (TAM) developed by Davis (1989). By examining the factors that impact Bitcoin adoption, our study found that relative advantage and ease of use had a significant positive

effect on bitcoin use intention while visibility and compatibility was also found to have a minor positive influence. These findings have a number of implications for business. Given the importance of relative advantage from our research, businesses can utilize Bitcoin's superiority as a currency technology to overcome some of the weaknesses that cash and other payment methods present. Moreover, Bitcoin's lower transaction fees use of the blockchain means that recorded data cannot be amended, edited or deleted. For business owners, this greater degree of transparency provides not only greater protection against fraudsters but it also sees its transactional details recorded and permanently stored on the internet. Furthermore, by using Bitcoin, businesses can easily expand to new markets where provisions such as credit card and PayPal are not available or where fraud rates are unacceptably high. Nevertheless, there are a number of concerns that still need to be addressed including worries over its legitimacy and volatility. Therefore, it is imperative for Bitcoin to thrive, governments need to implement policy initiatives that provide greater clarity for users and business operators.

Despite offering a set of interesting findings there are some issues that do require a mention. One limitation of study stems from the sampling method employed. The sample was chosen using a non-probability convenience sampling method thus generalizing the research beyond this study maybe a problem. Second, the sample size was not optimal; however, the SEM tool we employed in the study places less of a demand on sample size and as a result of this one can still achieve significant results. Still, a larger randomly selected sample may produce significantly different results. Second, the data was collected through a convenience sampling approach which may restrict the generalizability of the study results. To obtain more precise results and increase generalizability of the study findings, the stratified sampling or the random sampling method is recommended. In addition as this research was conducted predominately within the Asian context, future research could be replicated to examine the current research model in various settings (such as Western or European countries) and explore whether any similarities and differences may exist between the research findings from this current study and those from other settings.

Nevertheless, we believe that the study makes an important contribution by taking the first step to creating a comprehensive research instrument that is able to measure the adoption and diffusion of Bitcoin. Furthermore, we believe that this research also has important implications for the IT community, business entrepreneurs and for researchers interested in the concept of cryptocurrencies and Bitcoin in particular.

APPENDIX

Appendix 1: Table A1: Active cryptocurrencies with market capitalization of over $10 Million (USD)

Names	Market Capitalization	Price	Available supply
Bitcoin	14,508,038,688	900.6	16,109,303
Ethereum	914,236,697	10.39	87,991,982
Ripple	245,548,597	0.006678	36,769,780,922
Litecoin	192,162,318	3.89	49,399,053
Monero	169,085,040	12.28	13,769,140
Ethereum classic	105,658,798	1.2	88,048,998
Dash	98,380,251	13.99	7,032,184
Maid safe coin	52,554,007	0.116128	452,552,416
Augur	47,319,580	4.3	11,004,553
Steem	37,575,649	0.162656	231,012,991
Iconomi	32,733,837	0.376251	87,000,000
NEM	31,748,760	0.003528	8,999,081,633
Factom	26,856,714	3.07	8,748,115
Waves	24,949,800	0.249498	100,000,000
Dogecoin	22,968,299	0.000213	107,832,389,671
Zcash	20,600,951	44.18	466,296
Digix DAO	18,328,220	9.16	2,000,897
Stellar Lumens	17,130,866	0.002475	6,921,562,020
Lisk	16,820,524	0.164938	101,980,890
Tether	14,951,720	1	14,951,720
Ardor	12,665,216	0.012678	998,991,639
Golem	12,329,191	0.018104	681,020,272
Shadowcash	10,430,953	1.58	6,601,869
Gamecredits	10,382,804	0.172884	60,056,477
Bitshares	10,062,496	0.003901	2,579,465,778

*All statistics were obtained January 18th, 2017 from https://coinmarketcap.com/

Appendix 2: Constructs used in the study:

Relative advantage:
- Using Bitcoin gives me greater autonomy with my monetary transactions
- Overall, I find Bitcoin more secure
- Monetary transactions using Bitcoin are anonymous
- Using Bitcoin gives me greater control over my life
- Using Bitcoin allows me to accomplish my monetary transactions more quickly
- Using Bitcoin improves the quality of my life
- Using Bitcoin makes my life easier
- Using Bitcoin increases my productivity

Compatibility:
- Using Bitcoin is compatible with all aspects of my life
- Using Bitcoin is completely compatible with my current situation
- I think that using bit Bitcoin well with the way I like to live
- Using Bitcoin fits into my lifestyle

Ease of use:
- I believe that Bitcoin is difficult to use
- My using of Bitcoin requires a lot of mental effort
- Using Bitcoin is often frustrating
- I believe it is easy to get Bitcoin to do what I want it to do
- Overall, I think Bitcoin is easy to use
- Learning to operate Bitcoin easy for me

Result demonstrability:
- I would have no difficulty telling others about the results of using Bitcoin
- I believe I could communicate to others the consequences of using Bitcoin
- The results of using Bitcoin are apparent to me
- I would have difficulty explaining why using Bitcoin may or may not be beneficial

Visibility:
- I have seen what others do using Bitcoin
- I have seen Bitcoin in use outside my community

- It is easy for me to observe other using Bitcoin in my community
- Bitcoin is not very visible in my community
- I have not seen many others using Bitcoin around me

Trialability:
- I have many opportunities to try various Bitcoin applications
- I know where I can go to satisfactorily try out various uses of Bitcoin

Voluntariness:
- My peers expect me to use Bitcoin
- My use of Bitcoin is voluntary
- My peers do not require me to use Bitcoin
- Although it might be helpful using Bitcoin is certainly not compulsory in my life

Image:
- Using Bitcoin improves my image within the community
- Because of my use of Bitcoin, others in my community see me as a more important person
- People in my community who use Bitcoin have more prestige than those who do not
- People in my community who use Bitcoin have a high profile
- Having Bitcoin is a status sample in my community

Personal innovativeness:
- I generally like to experiment with new crypto-currencies
- I am usually hesitant to try new and unproven crypto-currencies
- I prefer to let other people work out the bugs and problems with new crypto-currencies before I use them

Intention to use:
- I intend to use Bitcoin in the next twelve months
- I predict that I will use Bitcoin in the next twelve months
- I plan to use Bitcoin in the next twelve months
- I would rather use Bitcoin than any other form of currency when carrying out monetary transactions

Appendix 3: Table A2: Loadings and cross loadings

Codes	CP	EOU	IM	RA	RD	TR	Use	VB
CP1	0.89	0.31	0.38	0.66	0.41	0.44	0.46	0.30
CP2	0.92	0.28	0.39	0.64	0.45	0.43	0.48	0.33
CP3	0.90	0.38	0.35	0.76	0.48	0.58	0.58	0.28
CP4	0.93	0.34	0.41	0.73	0.42	0.48	0.57	0.28
EOU1	0.20	0.74	-0.02	0.39	0.12	0.21	0.27	0.24
EOU2	0.26	0.71	-0.21	0.40	0.23	0.29	0.22	0.04
EOU3	0.19	0.76	-0.23	0.32	0.30	0.13	0.23	0.12
EOU4	0.31	0.85	0.14	0.45	0.34	0.37	0.39	0.25
EOU5	0.36	0.78	0.22	0.48	0.49	0.38	0.38	0.27
EOU6	0.28	0.73	0.04	0.37	0.41	0.36	0.32	0.22
IM1	0.47	0.14	0.89	0.40	0.43	0.37	0.33	0.35
IM2	0.35	0.10	0.87	0.29	0.35	0.23	0.24	0.24
IM3	0.38	0.02	0.92	0.33	0.21	0.31	0.26	0.35
IM4	0.34	0.01	0.84	0.29	0.21	0.25	0.29	0.28
IM5	0.27	-0.14	0.87	0.19	0.18	0.20	0.25	0.24
RA1	0.48	0.35	0.06	0.68	0.26	0.31	0.45	0.12
RA2	0.55	0.62	0.11	0.80	0.43	0.40	0.54	0.25
RA4	0.69	0.35	0.35	0.85	0.35	0.48	0.60	0.33
RA5	0.53	0.56	0.17	0.77	0.45	0.45	0.38	0.21
RA6	0.68	0.36	0.43	0.85	0.45	0.42	0.48	0.18
RA7	0.71	0.46	0.33	0.84	0.43	0.48	0.48	0.29
RA8	0.66	0.35	0.46	0.82	0.36	0.41	0.55	0.35
RD1	0.39	0.35	0.26	0.35	0.81	0.12	0.29	0.17
RD2	0.33	0.26	0.23	0.24	0.80	0.21	0.14	0.20
RD3	0.45	0.41	0.29	0.51	0.88	0.39	0.38	0.39
TRI1	0.50	0.44	0.27	0.56	0.29	0.93	0.35	0.39
TRI2	0.48	0.28	0.31	0.39	0.28	0.90	0.31	0.38
USE1	0.53	0.34	0.28	0.58	0.33	0.33	0.96	0.27
USE2	0.54	0.35	0.27	0.58	0.34	0.31	0.97	0.28
USE3	0.54	0.38	0.28	0.60	0.34	0.33	0.97	0.31
USE4	0.53	0.45	0.33	0.57	0.33	0.38	0.81	0.37
VB1	0.32	0.19	0.27	0.29	0.31	0.45	0.35	0.87
VB2	0.22	0.24	0.19	0.20	0.23	0.22	0.22	0.82
VB3	0.25	0.24	0.38	0.29	0.28	0.33	0.25	0.82

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