

# **Gordon Institute of Business Science**

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## **The motivation and factors driving crypto-currency adoption in SMEs**

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## ABSTRACT

Businesses should not only focus on their current environment and challenges. In order to survive in a world that is faced with constant change organisations need to not only be adept at exploiting their current environment but also need to allocate a fair portion of their resources and time at exploring the future. Organisations that managed to balance their exploitative and explorative activities are referred to as ambidextrous organisations. Ambidextrous organisations have not only proved to be more capable at pioneering new innovations but have also demonstrated that they are more adaptive to disruptive change.

Cryptocurrencies are seen as a potential disruptive megatrend with questionable consequences to financial institutions, regulating authorities, businesses and government. The purpose of this research study was to provide small to medium sized businesses (SMEs) with a model/lens with which to examine the cryptocurrency megatrend. The study utilised the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model to examine the factors that drive cryptocurrency adoption in SMEs.

The research study found that the following UTAUT2 constructs: performance expectancy, price value and habit are all significant drivers on the behaviour intention to use Bitcoin. The research study also demonstrated that the trust construct, a construct that does not form part of the original UTAUT2 model, is also a considerable driver on the behaviour intention to use Bitcoin.

The findings of the research study can be used by organisations as an input for constructive discourse to anticipate the potential impact or opportunities brought by the cryptocurrencies megatrend. Armed with this knowledge, managers can make more informed decisions, implement targeted interventions and channel resources more effectively to streamline the change process.

## KEYWORDS

- Cryptocurrencies
- Bitcoin
- UTAUT2

## DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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Signature

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9 November 2015

Date

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# **CHAPTER:1 INTRODUCTION TO THE RESEARCH PROBLEM**

## **1.1 Research Title**

The motivation and factors driving cryptocurrency adoption in SMEs

## **1.2 Background to the problem**

Cryptocurrencies have the potential to transform and disrupt the existing global financial infrastructure (Raymaekers, 2015). Peterson (2013) described cryptocurrencies as a new and unquestionable threat to the global banking environment. William Blaire partner Brian Singer stated that cryptocurrencies and their underlying technology have the ability to bring a large portion of the world's population out of poverty (Forbes, 2015). The September 15, 2015 launch of the first academic peer reviewed journal devoted to cryptocurrencies funded by the University of Pittsburg and MIT Media Lab emphasises the growing interest in the cryptocurrency research space (Perez, 2015).

Cryptocurrencies are currently a hot topic and their strategic implications on businesses are unknown. Bitcoin the largest and most popular cryptocurrency with a market capitalization of \$3.5 billion (Coinmarketcap, 2015) has gone from an obscure computer algorithm to an internationally recognised form of payment (Luther, 2015). Cryptocurrency adoption has rapidly grown with the quantity of Bitcoin transactions increasing from 1700 per hour to over 3000 per hour from June 2013 to December 2013 (Raiborn & Sivitanides, 2015). The current daily transaction volume is approximately 200 000 Bitcoins, which equates to approximately 8 333 transactions per hour (Böhme, Christin, Edelman, & Moore, 2015).

Despite the rapid uptake and proliferation of cryptocurrencies many academics and business professionals remain skeptical about the future of the new digital currency. This includes Luther (2015) who stated that the long-term probability of wide-spread cryptocurrency adoption is unlikely. He further argued that

cryptocurrencies will primarily function as a niche currency, predominantly in countries with weak economies.

Research by Cheah and Fry (2015) provided a bleak outlook for the long-term viability of cryptocurrencies, specifically Bitcoin. Their findings emphasised the presence of bubbles in Bitcoin markets, which contribute up to 48.7% of Bitcoin's observed price. A study by Cheung, Roca, and Su (2015) supported the above-mentioned hypothesis. Their research employed an econometric technique by Phillips, Wu, and Yu (2011) which has proven to be highly effective in detecting bubbles. Their findings confirmed the presence of both short- and long-lived bubbles with several bubbles lasting between 66 and 106 days.

A recent article in the Wall Street Journal offered a more positive orientation on the future of cryptocurrencies. The article delineated that the U.S. Commodities Futures Trading Commission recently approved Tera Group Inc.'s platform for Bitcoin derivatives (Casey, 2015a). Tera Group Inc., a US based company, was founded in 2010 and is headquartered in New Jersey. The company's platform uses the proprietary TeraBit Index for facilitating swap contract executions. Since the platform's introduction the company has received more than a million "indications of interest". Swaps will allow a Bitcoin holder for example a small business owner who accepts Bitcoin as a method of payment, to protect themselves from fluctuations in the digital currency's value. While this may seem insignificant, it is believed that this is a major step towards the stabilisation of the volatile price behaviour experienced by many cryptocurrencies (Casey, 2015a).

A recent Financial Times article states that institutions and banks are becoming increasingly interested in the block-chain technology utilised by cryptocurrencies (Stafford, 2015). The article further emphasised that the underlying technology will become the future of the financial services infrastructure.

Despite the great amount of uncertainty, security issues and risk reported around cryptocurrencies many brick-and-mortar retailers and online businesses ranging from small to large have adopted cryptocurrencies as a method of transacting (Brito & Castillo, 2013; Lee, Long, McRae, Steiner, & Handler, 2015). Cryptocurrencies are now accepted by more than 10 000 merchants worldwide, these include global icons such as Virgin Group Ltd. and Overstock.com. Overstock.com is a multimillion-dollar

U.S. online retailer with reported Bitcoin sales exceeding \$3 million for the period dating January 2014 to January 2015. Overstock.com is also considering offering their employees the option of being remunerated in Bitcoin (Geier, 2015).

The cryptocurrency research community to date has primarily focused on four main pillars (Polasik, Piotrowska, Wisniewski, Kotkowski, & Lightfoot, 2015). The first research stream has concentrated on the technological aspects; studies here predominantly focused on the underlying block-chain composition and functionality and have also assessed the privacy, weaknesses and vulnerability to attack. The second pillar of research has analysed the legal and public dimensions, examining how cryptocurrencies are treated in different legal jurisdictions, the tax implications and anti-money laundering regulations. The third pillar has investigated the social, political and ethical implications of cryptocurrencies. The final pillar has examined the economic issues and studies in this area have focused on aspects such as the investment potential, money supply and whether cryptocurrencies perform the functions of money. The three basic functions of money include a unit of account, a store of value and a medium of exchange (Davidson, 1972).

Limited studies have been conducted that have analysed cryptocurrencies from a user's perspective, and even less from the perspective of merchants, especially in the small to medium sized business space. Studies from a user perspective have included work by Van Hout and Bingham (2013), which considered a single user's purchasing experience on a Darknet-based drug marketplace called 'Silk Road' and a study by Androulaki, Karame, Roeschlin, Scherer, and Capkun (2013) which evaluated user privacy by analysing the default security provided by Bitcoin.

It is within this paradox or grey space where businesses need to be strategically ambidextrous to determine which actions need to be taken when the information becomes available. Ansoff (1975) calls this approach the "response to weak signals".



### **1.3 Research Scope**

The scope contains the motivation and factors that contribute to cryptocurrency adoption in small to medium sized businesses. Technology acceptance theory, discourse theory and the element of trust were central to the study.

### **1.4 Research Motivation**

A report by Goldman Sachs labelled cryptocurrencies as a megatrend (Schneider & Borra, 2015). Von Groddeck and Schwarz (2013) stated that megatrends are perceived as empty signifiers that convey little meaning to management. They further added that by solely focusing on megatrends companies lose focus on the strategic implication of these phenomena and therefore undermine their strategic foresight.

Organisations that fail to take advantage of opportunities brought by megatrends run the risk of becoming obsolete to a large portion of society (PwC, 2014). It is simply not enough for business owners to merely understand trends. Organisations need to analyse trends with a strategic lens and adapt their management, company structure and strategy to emerging challenges and demands (Bughin, Chui, & Manyika, 2010).

To effectively determine the strategic implications of the cryptocurrency megatrend, organisational members need to engage in deeper levels of discourse to arrive at the nodal points. Nodal points are the privileged discursive points that partially fix elements into a chain of meaningful relations (Laclau & Mouffe, 2001). It is around the nodal points that potential emerging weak signals are identified. Ansoff (1975) and Rossel (2012) described weak signals as “features of incipient changes that can help managers avoid strategic surprises”

The research will sought to provide insight into the motivation and factors that drive cryptocurrency adoption in SMEs. The study utilised an adapted and simplified version of the ‘Unified Theory of Acceptance and Use of Technology 2’ (UTAUT2) model. UTAUT2 builds on the original UTAUT model which was constructed through the synthesis of eight theories and models of technology use. UTAUT2 includes three new constructs namely hedonic motivation, price value and habit (Venkatesh, Thong, & Xu, 2012).

The researcher viewed the UTAUT2 model as a lens or “strategic foresight tool” which organisations can use to identify and interpret the weak signals brought on by the cryptocurrency megatrend (see Annexure A).

The insight gained from the research can be used by the relevant stakeholders both internal and external to the organisation for example business owners, third party developers and legislative bodies, as a potential starting point when engaging in deeper levels of discourse. This can potentially facilitate the organisations’ abilities to strategically anticipate the potential impact or opportunity brought by cryptocurrencies.

The findings are also relevant to future cryptocurrency merchants, and will indicate the factors that could potentially facilitate the adoption of cryptocurrency within their organisations.

## **CHAPTER:2      THEORY AND LITERATURE REVIEW**

Money has become an integral part of people's and societies' lives. The role of money is manifold; it is central to organised living, it shapes foreign and economic policies and it is synonymous with authority (Davies, 2010). Many people worship money, and some will even go so far as to kill for it. Today the wealthiest 10% of the population in the countries that belong to the Organisation for Economic Co-operation and Development (OECD) earn 9.5 times more than the poorest 10% (OECD, 2014).

This huge disparity has polarised global society and resulted in a system where the isolated elite control the global financial system, often to the detriment of the vulnerable masses to whose fate they are indifferent (Hart, 2000).

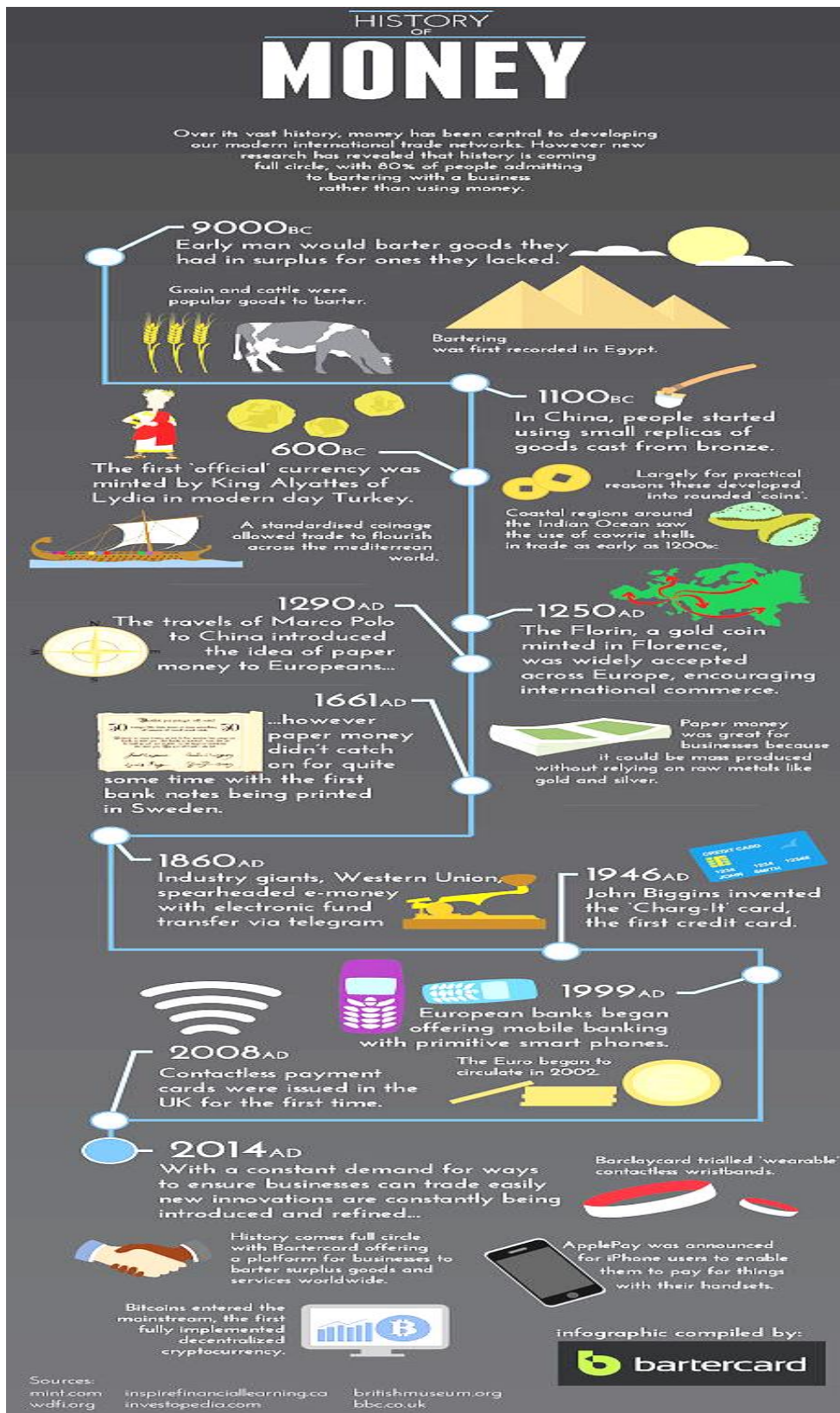
To better understand the research problem, it is important to analyse the evolution of payment systems, the function of money and the basic roles of governments and banks. By doing so, attention is given to the small subtleties between the various systems and will create awareness of the factors that have contributed to the modern monetary systems that are present today.

After discussing the evolution of payment systems, technology acceptance models are examined, specifically the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model which was utilised to answer the research question.

### **2.1              Evolution of payment systems**

The evolution of money is illustrated in Figure 2.1 on the following page. From the image we can see that the monetary system has experienced significant changes in the past 15 years. These changes have predominantly been facilitated by advances in current technology and the introduction of new technologies.

Figure 2.1: Evolution of money



Source: <http://www.telegraph.co.uk/finance/businessclub/money/11174013/The-history-of-money-from-barter-to-bitcoin.html>

The following section discusses several of the main development stages of the monetary system and explains how the monetary system has evolved into the system present today.

### **2.1.1 Bartering**

The first recorded mode of exchange was known as bartering and dates back to 9000BC where Mesopotamian tribes directly traded goods and services (Davies & Bank, 2002). These items included spices, salt, food, animal hides and weapons, to name but a few. The bartering system had several limitations. The blacksmith who wanted to trade one of his swords for a bag of apples had the onerous task of finding an individual who firstly had apples in his/her possession and secondly has to determine whether the individual was willing to exchange their goods for a sword.

For a barter system to therefore function optimally, a double coincidence of wants is required, which was often costly, difficult and impossible to achieve (Prendergast & Stole, 1999). The inefficiency of the bartering system also hampered specialisation, which in turn had its toll on the living standards of the parties involved. According to Zhang (2015) the element of trust was an essential component in a bartering system because parties had to make a pre-commitment that the goods that would be exchanged were of suitable quality.

### **2.1.2 Commodity-Money**

The traditional bartering system soon evolved into a two-stage process where an individual would first exchange his/her goods for a more tradable item. These more tradeable items became known as commodity-money and included items such as peppercorns, cattle, salt and cowrie shells. When the commodity-money system is applied to the previous bartering example, the blacksmith can first exchange his sword for a commodity-money item, for example a bag of salt. Even though he does not personally want the salt the blacksmith knows that he will be able to easily trade it for the bag of apples he requires. Commodity-money separates the paradox brought by the traditional bartering system by separating the exchange into buying and selling side, therefor un-necessitating the double coincidence of wants.

According to L. H. White (2002) a commodity item's marketability was not only determined by its popularity but also from facilitating factors such as the product's divisibility, transportability and durability (Menger, 1892; L. H. White, 2002). The sheer size, un-transportability, non-uniformity and in most cases non divisibility of commodity money items such as cattle made these ill-suited as a medium of exchange (Selgin & White, 1987). This led to a transition to precious metals as the main standard of value which was traded in different forms.

### **2.1.3 Coinage**

The first coins resembling modern coins emerged in 700BC (M. E. White, 1961). These coins were usually made from precious metals such as gold and silver due to their high value, durability, scarcity and beauty. The value of these coins was determined by the trade value of the metals used in their production. According to Schumpeter (1954) and Bell (2001) the coins were stamped purely for convenience, to avoid the annoyance of being weighed every time.

Precious metal coins were eventually replaced by non-pure metal coins due to the difficulty and effort involved in obtaining the precious metals. The "non-pure" coins are known as representative money or commodity backed money since they have no intrinsic value on their own but they can be exchanged for commodity items with intrinsic value such as gold or silver. With precious metal coins trust was placed in the intrinsic value of the coin and with non-precious the trust shifted from the coin to the third party holding the precious commodity as surety. The maintenance of the convertibility between gold and money at a fixed ratio is referred to as the gold standard (Barsky & Summers, 1988).

### **2.1.4 Paper-Money**

Similar to non-pure metal coins, the first state- or bank- issued paper currencies were also supported by precious commodities. A system in which the value of the currency is backed by gold is known as a gold standard monetary system.

The first paper currency known as 'flying cash' or Feiquan emerged between 806-820AD in China during the Tang dynasty (Horesh, 2013). These paper scripts could be carried into neighbouring provinces and cashed at flying cash depots as the need

arose. The Feiquan currency gained rapid momentum and continued to be used throughout the Five Dynasties era (907-960AD).

The concept of paper money was introduced to the western world by Marco Polo when he returned from his travels in China (Tullock, 1957). Polo was appointed to a high administrative position in the 'City of the Khan' where he spent 17 years (1275-92) under the auspices of emperor Kublai Khan and it was here where he was introduced to many marvels such as coal and paper money made from the bark of the mulberry tree. Paper money production soon became mechanised and the Mongols could print as many notes as they required. This practice led to rapid inflation and the devaluation of the currency.

Historical writer and encyclopaedist Mǎ Duānlín chronicled the consequences of the Song dynasty. The Song people reverted to the printing of paper money during the 12<sup>th</sup> century to finance their war against the Tartars (Boorstin, 2011). The excessive printing of notes led to the rapid onset of inflation. He claimed that people were disheartened and no longer had confidence in paper money and that the soldiers and inferior officials throughout the region were anxious that they would no longer be able to procure basic necessities.

The classical gold standard slowly started eroding in 1914 and by 1920 it was abandoned by most countries. Prior to this, the system functioned well for more than 30 years but the underlying foundations started weakening during the First World War due to governments resorting to inflationary finance. By 1925 it was briefly reinstated for a period of six years as the Gold Exchange Standard but this system broke down with Britain's departure from the gold standard. Many researchers have argued that the gold standard played a large role in the development of the great depression which started in 1929 and lasted until the late 1930s. Research by Bernanke and James (1990) demonstrated a high correlation between countries that adhered to the gold standard and the severity of both deflation and depression.

Subsequent to the short-lived gold exchange standard, the Bretton Woods monetary system was introduced which was a fully negotiated monetary mandate to regulate monetary relations between participating independent nation-states. The nations' respective currencies had to be linked at fixed exchange rates to the dollar, with the

dollar in turn linked to gold (Bordo, 1993). The system ended when President Nixon suspended gold convertibility of the dollar on 15 August 1971.

Since the collapse of Bretton Woods, countries belonging to the International Monetary Fund (IMF) have been free to select any form of exchange arrangement for example free float, pegging to another currency, adopting another currency or forming part of a monetary union (International Monetary Fund, 2015) .

### **2.1.5 Post-Bretton Woods**

The post-Bretton Woods System involved a managed market-led system with currency prices predominately determined by market forces. In this hybrid exchange rate system the majority of developed countries' floated their currencies against one another with developing countries' pegging their currencies to another major currency, most often to the dollar.

### **2.1.6 Cryptocurrencies**

With the global financial crisis of 2008 and 2009 the confidence and trust in the traditional banking system and governments' abilities to regulate the financial industry rapidly eroded (see Annexure B). The following extracts from OECD Secretary-General José Ángel Gurría's response to the 2009 global economic crisis encapsulate the general sentiment of market at the time:

*"The global banking system is still intoxicated by complex financial instruments in the balance sheets of banks in major financial markets...The global financial and economic crisis has done a lot of harm to the public trust in the institutions, the principles and the concept itself of the market economy...trust is the spinal cord of economics. It is a crucial ingredient for finance, successful business, growth, development."* (OECD, 2009).

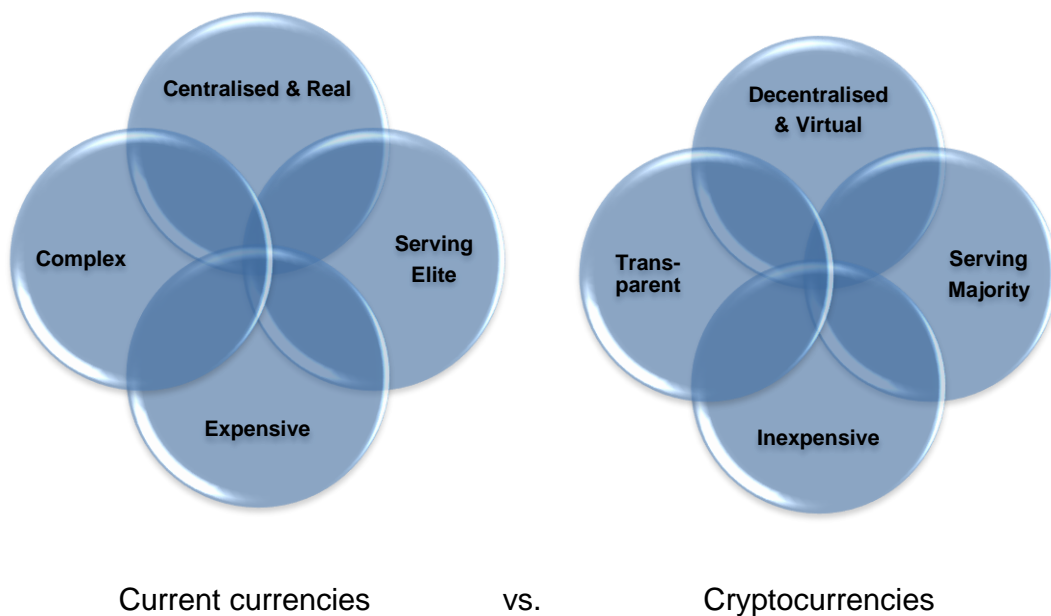
It was during this turbulent economic period that the first cryptocurrency was born. Luther (2013) defined cryptocurrencies as an electronic alternative to traditional fiat-issued money, as both currencies share the same fundamental characteristics of being intrinsically useless and inconvertible. Intrinsically useless means that both Bitcoin and fiat currencies are not wanted for their own sake but instead for the belief of their future exchangeability. Elements that differentiate



cryptocurrencies from traditional fiat-issued monies are that they are not issued, controlled or backed by central government. It is these characteristics that have sparked the tremendous interest in the new technology.

It can be said that cryptocurrencies offer an inverse version of the current fiat-based currencies with decentralisation, transparency, cost efficiency and flexibility as the cryptocurrency's key attributes. Key characteristics are illustrated in Figure 2.2 below.

**Figure 2.2: Main differences between current fiat-based currencies and cryptocurrencies**



#### 2.1.6.1 *From Centralised to Decentralised*

Hobson (2013) argued that despite living in an age where individuals can rely on the strength of distributed technologies brought about by modern information technology, infrastructure and solutions; people still entrust their personal details to few centralised third-party organisations for example a bank. He further argued that from a privacy perspective individuals have relinquished control and have allowed these organisations to gather large quantities of personal information including who is paid, why they are paid and when they are paid, to name a few.

This information is often aggregated with other data sets obtained (often illegitimately) from third-parties for the purpose of mining for new customer insights.

With the increasing trend of consumers sharing their personal information on Social Network Sites (SNSs) such as Facebook and Google+, coupled with the SNSs ability to formulate and maintain social capital, data miners now have access to a treasure trove of personal information (Ellison, Steinfield, & Lampe, 2007; Liu, Gummadi, Krishnamurthy, & Mislove, 2011). Sadly this has resulted in several cases where extremely sensitive information has been mined or researched, such as the identity of rape and AIDS victims (Martinez, 2014).

The majority of cryptocurrencies is decentralised and these utilise cryptographic algorithms to provide a more secure transacting environment between two parties. The transactions are peer-to-peer in nature which eliminates the need for any intermediary or central authority to process the transaction. The nodes in the network collectively fulfill the duty of the intermediary and verify each of the transaction through a distributed block chain or public transaction ledger. Cryptocurrencies create benefits for users that include greater levels of anonymity compared to users of traditional electronic payment services for example PayPal, who must provide detailed personal information to these facilitating intermediaries (Brito & Castillo, 2013).

#### 2.1.6.2 *From Complex to Transparent*

Financial fraud is becoming increasingly sophisticated and poses a serious risk to the global financial system. A recent example includes HSBC's Swiss banking division who aided international drug lords, arms dealers and celebrities to hide millions of dollars to evade taxes (Arnold & Barrett, 2015). If these actions were not brought to light by whistleblower and HSBC ex-employee Hervé Falciani, it is probable that these illegal practices would have remained undetected.

Proponents for cryptocurrencies, like Levin, O'Brien, and Osterman (2014) argued that cryptocurrencies like Bitcoin can facilitate a more transparent and trustful way of conducting business through a decentralised ledger. The ledger keeps a trail of all transactions that have ever occurred and does not permit previous transactions to be altered or deleted. It is therefore argued that the ledger technology could dramatically reduce the occurrences of financial fraud in today's payment ecosystem.

With both the International Financial Reporting Standards (IFRS) and Generally Accepted Accounting Principles (GAAP) riddled with loopholes and with companies resorting to creative accounting practices, accountants and auditors often find it difficult if not impossible to spot anomalies. The verbatim recording of each transaction in the block-chain combined with a detailed time stamp can lead to serious breakthroughs in the accounting and auditing fraternities.

#### 2.1.6.3 *From Expensive to Inexpensive*

The costs associated with creating money and processing transactions have grown exponentially. The United States alone have budgeted \$717.9 million for 2015 for the production of notes and coins (The Federal Reserve, 2015). A MasterCard report indicated that the cost of cash ranges between 0,5% and 1,5% of a country's GDP (MasterCard, 2015).

Coupled with these challenges, consumers face exorbitant and mounting transaction fees. MasterCard is currently facing antitrust charges by the European Commission for artificially increasing their transaction fees (Robinson, 2015). If found guilty, MasterCard could face penalties as large as \$ 1 billion USD. The British government is also currently investigating unfair debit and credit card fees charged by British financial institutions. It is estimated that the unfair duties charged by these institutions costs British businesses approximately £480 million a year (Dunkley, 2015).

Cryptocurrencies have the ability to leapfrog intermediaries, which could result in substantial transaction fee savings for both merchants and consumers. Due to their digital nature it also eliminates the need for printing money, which is a serious threat to organisations such as De La Rue, the world's largest commercial banknote producer.

#### 2.1.6.4 *From Serving the Elite to Serving All*

The high costs associated with banking and transacting has left a large portion of society excluded from the fruits of economic growth. For many years companies have focused their offerings at the middle and upper tiers of the economic pyramid. The concept of generating substantial profits at the bottom of the pyramid (BOP) was introduced by Prahalad and Hart in 1999 (Prahalad & Hart, 1999). This

strategy of focusing on the Bottom of the Pyramid (BOP) has been very rewarding for the handful of organisations that have capitalised on the opportunity.

A good example of this is the M-Pesa, a mobile money payment system that was launched in Kenya in 2007. M-Pesa allows users to transfer funds with their mobile phones, thereby greatly reducing the risk and cost associated with handling cash. M-Pesa now has 19.9 million active users and has expanded to other geographic markets such as Congo, Lesotho, Tanzania, Romania, India and Egypt (Vodafone, 2015). Statistics released by the World Bank indicated that approximately two billion adults remain unbanked globally (Demirguc-Kunt, Klapper, Singer, & Van Oudheusden, 2015). The collective purchasing power of this relatively unexplored group of customers is tremendous.

Brito and Castillo (2013) argued that cryptocurrencies have the potential to improve the quality of life of those at the base of the pyramid. They further delineated that providing and enabling these individuals with basic financial services is a step towards emancipating them from the poverty trap. Brian Singer, head of the Dynamic Allocation Strategies team at William Blair argued that Bitcoin and its underlying block-chain combined with Hernando de Soto's theory of property rights have the ability to bring more of the world's population out of poverty than any other economic practice witnessed to date (Forbes, 2015).

Cryptocurrencies can be used for many purposes including the buying and selling of goods, extending credit and sending funds to individuals or organisations. Due to the virtual nature of cryptocurrencies, cross-border transacting can be done with relative ease.

Since the creation of Bitcoin many alternative cryptocurrencies have emerged. The alternative currencies are collectively referred to as "altcoins" which is an abbreviation for the term: alternative coins. Kristoufek (2013) listed that a few of the popular altcoins such as Litecoin, Ripple, Ven, NameCoin and PPCoin. He further stated that unlike regular currencies which values are determined by macroeconomic variables such as interest rates, GDP, unemployment, and economic variables, cryptocurrencies are not influenced by these variables and are instead driven by short-term investors, speculators and trend chasers.

The researcher elected to use Bitcoin as the basis for this research project due to its wide adoption relative to other cryptocurrencies in the market, and also because the majority of cryptocurrency research to date has focussed mainly on Bitcoin. It is believed that the findings of this study are relevant to the majority of the other cryptocurrencies on the market as these are predominantly derivatives of Bitcoin and utilise either exactly the same or very similar technology.

### **2.1.7 Brief summary of Bitcoin**

Satoshi Nakamoto created the first fully-decentralised cryptocurrency called Bitcoin in 2008 (Nakamoto, 2008). The smallest denomination of Bitcoin, known as a Satoshi, is one hundred-millionth of a Bitcoin: 1 Satoshi = 0.000 000 01 ₿

Unlike previous electronic payment systems where all transactions were verified by a trusted financial intermediary, Bitcoin uses a public ledger which makes all transactions visible. The public ledger resides on a distributed peer-to-peer network consisting of multiple computers which are run by individuals known as “miners”. The purpose of the miners is to verify the validity of each transaction that is run through the ledger. Validated transactions are assessed by other mining nodes to guard against double spending and potential fraud. Once the miner successfully resolves a block (which consists of multiple unresolved transactions) the miner is rewarded with Bitcoins for their effort.

The system was designed to have an eventual total maximum number of 21 million Bitcoins. Beyond that point no new Bitcoins will be allowed to be generated. Once the 21 million limit has been reached mining nodes will no longer be rewarded for their mining efforts. Currently, the hope is that the adoption will be more wide spread and that nodes will be rewarded through the transaction fees that are determined by the paying party.

The Bitcoin currency has demonstrated extreme price volatility since its introduction. As shown in Figure 2, Bitcoin has witnessed exponential growth since 2013. The currency sharply increased from \$13 USD in January 2013 to a record high of \$1242 USD on 29 November 2013, only to decline again to below the \$400 level four months later.

**Figure 2.3: Bitcoin value: USD per 1 BTC**



### 2.1.7.1 Bitcoin - Recent media coverage

Bitcoin has received much publicity recently, primarily concerning the economic woes of Greece. As Greece faces strong economic headwinds together with the rumors of a possible Grexit (Greece exiting the Eurozone), some Greek citizens and investors are now turning to gold and Bitcoin as a potential safe-haven (Casey, 2015b). BTCGreece the sole Bitcoin Exchange in Greece has shown unprecedented growth in the past few weeks with new customer registrations increasing by nearly 600% (Sanderson, 2015).

The U.S. Commodity Futures Trading Commission (CFTC) whose primary function is to supervise the trading of grains, metals and energy on US exchanges, announced on September 17, 2015, that Bitcoin and other cryptocurrencies are defined as commodities (Commodity Futures Trading Commission, 2015a). This was announced in a CFTC order filed against Coinflip Inc. and its CEO Francisco Riordan for not complying with CFTC and the Commodity Exchange Act regulations (Commodity Futures Trading Commission, 2015b). The increased regulation of cryptocurrencies is seen by some as a “necessary evil” which could ultimately contribute to the legitimisation of cryptocurrencies. Others have argued that increased regulation translates into a large financial burden on organisations and a subsequent increased dependency on the bank, the latter being directly opposed to cryptocurrencies with decentralization at its heart (Sheppard, 2015).

### **2.1.8 Dark side of Bitcoin**

In February 2011 the world's first Darknet-based illegal drug marketplace called Silk Road was launched. Items offered in the online market place included illegal substances such as marijuana, MDMA (ecstasy), heroin, steroids and cocaine to name a few (Christin, 2013). The only form of payment accepted on the platform was Bitcoin.

Silk Road was shut down by the FBI in 2013 and the market founder Ross William Ulbricht was convicted on seven charges and sentenced to life imprisonment on the 29<sup>th</sup> of May 2015. According to the US Attorney's Office, Silk Road generated approximately \$200 million worth of sales in its nearly three years of operation (Flitter, 2015). Since Silk Road's cessation subsequent versions of the site have emerged namely Silk Road 2.0 and Silk Road 3.0.

Other Darknet-based marketplaces that only accept Bitcoin include Black Market Reloaded (BMR), Dream Market and Outlaw Market to name a few. These marketplaces offer a wide variety of products and services ranging from hiring an assassin to purchasing C4 explosives.

### **2.1.9 Disadvantages of Cryptocurrencies**

The failure of Mt. Gox the largest Bitcoin Exchange on the 28<sup>th</sup> of February 2014 sent shockwaves through the cryptocurrency community and jeopardised the sustainability of the currency. Independent investigators found that cyber criminals were routinely stealing Bitcoins from the exchange long before they filed for bankruptcy (McLannahan, 2015). A total of 850 000 Bitcoins, valued at approximately \$500 million, were unaccounted for. Mt. Gox since recovered 200 000 of the coins which were allegedly located in a "forgotten" wallet (Knight, 2014). The security breach of the Mt. Gox Exchange did not just bring reputational and financial risk to Bitcoin but existential risk as well. Since the Mt. Gox Exchange is not regarded as a bank or registered financial institution its users are not protected by third party agencies like the Federal Deposit Insurance Corporation (FDIC). This has resulted in Mt. Gox users being unprotected, with zero compensation for their losses.

Another factor that could slow down the widespread adoption of cryptocurrencies is the proliferation of cyber-attacks. It is estimated that the amount of connected devices will exceed 50 billion by the year 2020. This massive growth will be partly fueled by the emergence of the Internet of Things (IoT) era which means networks will no longer only consists of computers, mobile devices and network nodes but will increasingly include items such as network enabled refrigerators, washing machines, home entertainment systems and human wearables such as fitness and health monitoring devices. As humans' dependence on information technology increases, cyber-attacks become more attractive and potentially more devastating (Jang-Jaccard & Nepal, 2014).

A third potential impediment to widespread cryptocurrency adoption is the legislative grey area surrounding cryptocurrencies. Various regulators are grappling with the classification of cryptocurrencies. An example of this is the Internal Revenue Service (IRS) that classified cryptocurrencies as property, compared to the Federal Judge Amos Mazzant who defined it as real currency, or compared to the Commodity Futures Trading Commission who declared it a commodity (Commodity Futures Trading Commission, 2015a; IRS, 2014; Ramasastry, 2014).

It is evident from the brief discussion concerning payment systems above that the money paradigm has almost gone full circle, first moving from commodity money to fiat money and now there is again a new form of commodity money. It is also apparent that during each phase of the monetary systems, whether bartering, coinage, fiat currencies or cryptocurrencies are considered, trust plays an essential role. This hypothesis is supported by Selgin (1994) and Simmel and Frisby (2004) who emphasised that the basis of any monetary system is trust.

The transition from each monetary system to the next brought about a great amount of uncertainty, resistance and in some cases significant economic consequences. These changes have had a dramatic impact on all parties involved, including peasants, kings, queens, businesses, regulatory bodies, customers and governments to name a few. With this notion in mind, the intention is to introduce the Technology Acceptance theories and models in the next section, as a strategic compass or lens to help businesses navigate through the uncertainties experienced due to cryptocurrencies.



## 2.2 Technology Acceptance Studies

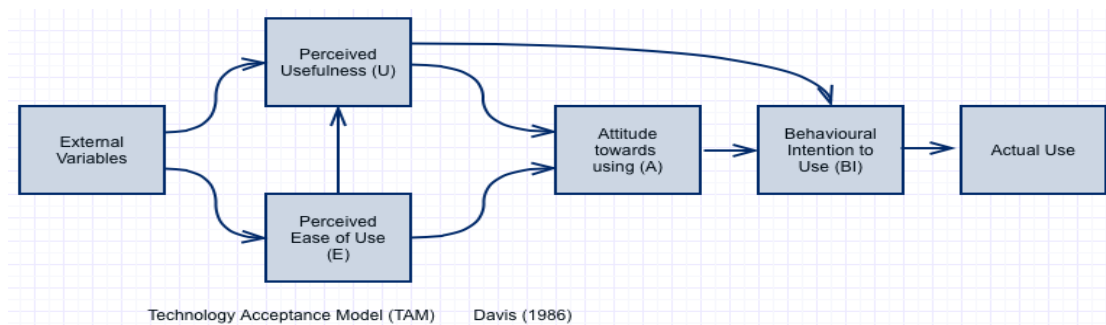
The following section presents a brief summary of the evolution of Technology Acceptance studies to illustrate the foundational elements upon which the UTAUT2 model has been built.

### 2.2.1 Technology acceptance model (TAM)

The original Technology Acceptance Model (TAM) was founded by Davis (1986) and uses the Theory of Reasoned Action (TRA), initially proposed by Ajzen and Fishbein (1980) as its theoretical basis. The model was developed to investigate the impact of external variables on the internal beliefs, actions and intentions of users (Marchewka, Liu, & Kostiwa, 2007).

TAM consists of two main constructs namely perceived usefulness and perceived ease of use. Perceived usefulness refers to the degree a user believes the technology will improve their performance whereas perceived ease of use refers to the degree users believe that using the technology will be free of mental and physical effort. A diagrammatic representation of the TAM model is illustrated in Figure 3 below.

**Figure 2.4: Technology Acceptance Model (TAM)**



Since the introduction of TAM in 1986, many researchers such as Davis and Venkatesh have extended the model to incorporate different acceptance determinants such as social influences, age, gender and voluntariness of use. Many researchers have also used the different technology acceptance models in conjunction with other models such as the Task-Technology Fit (TTF) Model in an attempt to improve its predictive capabilities (Dishaw & Strong, 1999).

## 2.2.2 The evolution of TAM

### 2.2.2.1 *Unified Theory of Acceptance and Use of Technology theory (UTAUT)*

The UTAUT model was developed through the synthesis of eight prominent technology user acceptance models and theories (Ajzen, 1991; Venkatesh, Morris, Davis, & Davis, 2003). These include the technology acceptance model (TAM), the Theory of Reasoned Action (TRA), the Motivation Model, the Theory of Planned Behavior (TPB), a model combining TPB and TAM, the Model of Personal Computer Utilisation, the Innovation Diffusion Theory, and the Social Cognitive Theory. Independently these models explain between 17% and 53% of user intentions to use information technology compared to the UTAUT model which explains 69% of users' intentions. UTAUT has proved to be a successful tool for predicting the success of new technology introduction in a business and it also provides valuable insights with regards to the salient factors that drive technology acceptance.

Armed with this knowledge, managers can make more informed decisions, implement targeted interventions and channel resources more effectively to streamline the change process. By streamlining change organisation become more nimble in a business environment. Kotter (2012) and Hamel and Prahalad (2013) argued that change management in businesses is imperative as change occurs at a more rapid pace than ever before.

### 2.2.2.2 *Unified Theory of Acceptance and Use of Technology 2 model (UTAUT2)*

The most recent iteration of the UTAUT model is the Unified Theory of Acceptance and Use of Technology 2 model (UTAUT2). UTAUT2 builds on UTAUT by including three additional constructs namely hedonic motivation, price value and habit (Venkatesh, Thong & Xu, 2012).

The UTAUT2 model (see Annexure C) was used in this research study to examine the motivation and factors behind cryptocurrency adoption in small to medium sized businesses.

The UTUAT2 model and the majority of its predecessors were mainly used to measure the adoption of information technology systems. The model consists of the following constructs: Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation and Habit.

## 2.3 Definitions of UTAUT2 constructs

**Performance Expectancy (PE):** The degree to which a person believes that a particular system will help him/her to attain advances in job performance (Venkatesh et al., 2012).

**Effort Expectancy (EE):** Reflects the user's perception of how difficult it is to use the technology (Venkatesh et al., 2012).

**Social Influence (SI):** The degree to which an individual perceives how people of significant importance (e.g. friends and family) believe that he/she should use the technology (Venkatesh et al., 2012).

**Facilitating conditions (FC):** The degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system (Venkatesh et al., 2012).

**Hedonic Motivation (HM):** A new construct that has been added to the UTAUT2 model. Hedonic motivation is defined as the pleasure derived from using a technology (Venkatesh et al., 2012).

**Habit (H):** The degree to which people tend to perform behaviour automatically because of learning (Venkatesh et al., 2012).

## 2.4 New construct

The researcher decided to add an additional construct namely trust to the UTAUT2 model. The addition of a new construct to the UTAUT2 model is aligned with Bagozzi (2007) and Venkatesh et al.'s (2007) requests to build and expand on the original model and to use it in different contexts. Rousseau, Sitkin, Burt and Camerer (1998) defined trust as a person's willingness to depend on another individual or party based on their characteristics. The renowned sociologist

Georg Simmel stressed that the basis of any monetary order is trust (Altmann, 1903). Skaggs (1998) stated that under a fiat-backed currency system the element of trust has grown in importance since the value of money is no longer backed by gold but now hinges on political decisions.

The researcher agrees with these statements, and has emphasised the role that trust has played in the evolution of monetary systems. The researcher therefore believed that the addition of trust to the UTAUT2 model was imperative to measure the adoption of cryptocurrencies.

## **2.5 UTAUT literature**

The following section analyses the literature on technology acceptance and adoption. The section also assesses several existing UTAUT studies for the purpose of formulating the research propositions. Specific focus was placed on UTAUT studies that were conducted in the electronic payment and internet banking fields.

Several studies have indicated that the performance expectancy (PE) construct is a strong predictor for the intention to use a technology. These include a study by Kijisanayotin, Pannarunothai and Speedie (2009) that analysed the adoption of health information technology in Thailand's community health centres. The authors' study found that performance expectancy was the strongest predicting factor ( $r = 0.539$ ,  $p < 0,001$ ) of all the constructs. Another study by Foon and Fah (2011) examined internet banking adoption in Kuala Lumpur found that performance expectancy was positively correlated ( $r = 0.51$ ,  $p < 0,01$ ) to behaviour intention among respondents.

As was defined previously, effort expectancy refers to the degree of ease that is associated with using a new technology (Venkatesh et al., 2003). Ease of use is in general regarded as an important factor in consumer technology adoption (Liao & Cheung, 2002). Davis, Bagozzi and Warshaw (1989) stated that ease of use refers to the degree to which prospective users expect technology to be free of effort. A study by C. Kim, Mirusmonov and Lee (2010) which examined the factors that influence to use mobile payment systems found that ease of use was a significant antecedent ( $r = 0.343$ ,  $p < 0,01$ ) to the adoption of mobile payment technology. The

research also showed that ease of use had an indirect effect on the perceived usefulness of the technology.

A study by Carlsson, Carlsson, Hyvonen, Puhakainen and Walden (2006) examined the adoption of mobile devices and services in Finland and found that both performance expectancy and effort expectancy have a relatively strong influence on the behaviour intention of users. The performance expectancy and effort expectancy constructs' respective  $r$  values were 0.782 and 0.619. In the same study, social influence had a significantly lower influence ( $r = 0.178$ ,  $p < 0,01$ ) on the behaviour intention.

Research by Zhou, Lu and Wang (2010) demonstrated that social influence played a significant role in the adoption of mobile banking services. The findings of the study indicated that SI had a significant but relatively smaller influence ( $r=0.22$ ,  $p < 0,01$ ) on behaviour intention (BI) compared to other constructs such as the PE construct.

Raman and Don (2013) analysed the adoption of a Web-based Learning Management Software (LMS) solution at the University Itara Malaysia (UUM). Their study used the UTUAT2 model and a data was collected from 288 undergraduate students using a Google Forms online questionnaire. The study measured the following constructs: Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Habit, Use Behaviour and Behaviour Intention. Their study found that the facilitating conditions construct had a positive impact on behaviour intention ( $r = 0.38$ ,  $p < 0,01$ ) to adopt the web-based LMS solution.

The trust construct is not part of the UTAUT2 model and has been included to determine the effect on the behaviour intension dimension of the model. As outlined in the brief evolution of payment systems, it is believed that trust plays a central role in any monetary system which makes it a suitable construct for the model. A study by Slade, Williams and Dwivdei (2013) assessed consumer adoption of mobile payment systems. Their study used an adapted version of the UTUAT2 model which incorporated two new variables, namely trust and perceived risk. The researchers argued that trust and perceived risk are both critical factors in the adoption of payment systems. Zhou (2012b) argued that the spatial divide, anonymity and decentralised nature of online transactions contribute to an increase in the perceived risk and uncertainty amongst users. It is

for these reasons that the researcher argued that trust plays an essential role to alleviate the uncertainty and risk associated with online transactions.

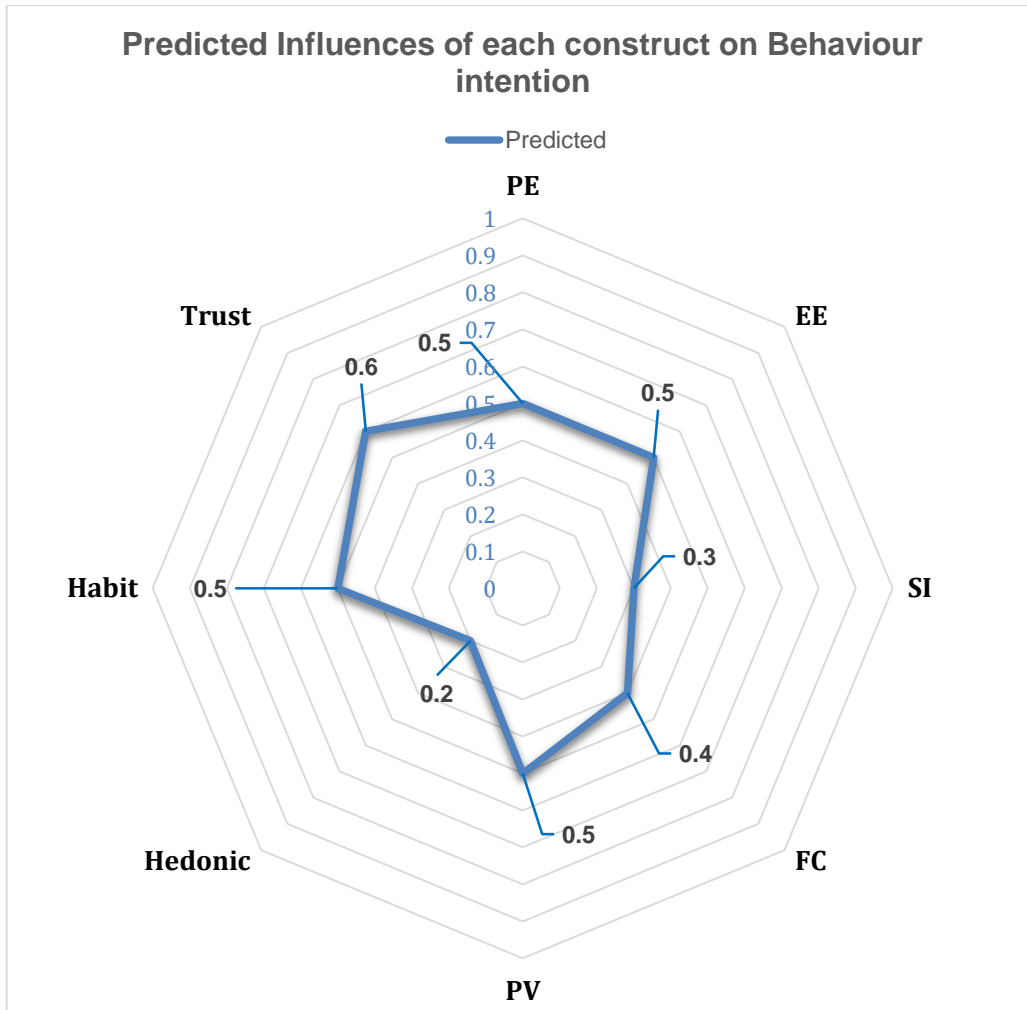
Habit is a new addition to UTAUT2 model. Habit is viewed in two distinct ways: first, by prior behaviour and second, the extent to which people believe the behaviour to be automatic (S. S. Kim & Malhotra, 2005). Pahlila, Siponen and Zheng (2011) argued that the role of habit should not be taken lightly when attempting to increase the adoption of technology. The authors further emphasised that habit is a complex psychological construct consisting of multiple facets, rather than the simplistic view of habit as past behavioural frequency.

Venkatesh et al. (2012) argued that age and gender both play a significant role in how individuals process information, which in turn can influence the individuals' reliance on habit to guide behaviour. In reviewing the literature related to habit, it was found that older people tend to rely on automatic information processing (Jennings & Jacoby, 1993; Lustig, Konkel, & Jacoby, 2004). Lustig et al. (2004) described automatic information processing as a quick and unconscious mental process, which consumes little attentional capacity and is initiated by stimuli, rather than intention. Aging reduces an individual's conscious controlled processes but leaves automatic information processing intact (Jennings & Jacoby, 1993). Venkatesh et al. (2012) argued that the reduced cognitive function in aging individuals will lead to a greater reliance on established habit to guide their behaviour.

Hedonic motivation has been included in many information systems and consumer behavior studies and is viewed as an important predictor in consumer technology use (Brown & Venkatesh, 2005). Technology is often acquired for hedonic purposes, for example an individual who purchased a computer to play games or to communicate with friends and family. Brown and Venkatesh (2005) argued that in an organisational context the element of fun is often downplayed.

Figure 2.5 below demonstrates the predicted influence of each of the constructs on the behaviour intention to use Bitcoin. The predicted values are based on existing UTAUT and UTAUT2 studies that have been conducted in the financial and banking industries and are also based on the literature review above.

**Figure 2.5: Predicted influence of respective constructs on the behaviour intention to use Bitcoin**



## **CHAPTER:3 RESEARCH PROPOSITIONS**

This chapter delineates the proposed propositions for the study. The propositions have been formulated based on the literature review in the previous chapter. Due to legitimately large number of constructs in the UTAUT2 model the research propositions were categorised under their own respective headings.

### **3.1 Performance Expectancy (PE)**

#### Proposition 1:

Performance expectancy (PE) has a relatively strong influence on the behavioral intention to use Bitcoin.

### **3.2 Effort Expectancy (EE)**

#### Proposition 2:

Effort expectancy (EE) has a moderate to strong influence on the behavioral intention to use Bitcoin.

### **3.3 Social Influence (SI)**

#### Proposition 3:

Social influence (SI) has an influence on the behavioral intention to use Bitcoin.

### **3.4 Facilitating Conditions (FC)**

#### Proposition 4:

Facilitating conditions (FC) has a relatively strong influence on the behavioral intention to use Bitcoin.



### **3.5 Hedonic Motivation (HM)**

Proposition 5:

Hedonic motivation (HV) has a low to moderate influence on the behavioral intention to use Bitcoin.

### **3.6 Price Value (PV)**

Proposition 6:

Price value (PV) has a relatively strong influence on the behavioral intention to use Bitcoin.

### **3.7 Habit**

Proposition 7:

Habit has a relatively strong influence on the behavioral intention to use Bitcoin.

### **3.8 Trust**

Proposition 8:

Trust has a relatively strong influence on the behavioral intention to use Bitcoin.

### **3.9 Moderating influence of age and gender on Habit and BI relationship**

Proposition 9:

The effect of habit on the behaviour intention is higher amongst older participants compared to their younger counterparts.

Proposition 10:

The effect of habit on the behaviour intention is higher amongst male participants compared to their female counterparts.

## **CHAPTER:4 RESEARCH METHODOLOGY**

This chapter outlines the proposed research methodology of the research study. The chapter is divided into five sections, namely: research universe, research population, research sample, questionnaire design and data gathering.

### **4.1 Research Universe**

In the past three years, the world has witnessed a large proliferation of new cryptocurrencies. A total of 619 cryptocurrencies exist with a total market capitalization of US\$ 3,777,407,647 (Coinmarketcap, 2015). The research universe therefore included all organisations that currently accept cryptocurrencies as a form of payment. According to Schneider and Borra (2015) the number of businesses who currently accept cryptocurrencies exceeds 100 000.

### **4.2 Research Population**

Of the registered cryptocurrencies, Bitcoin is by far the largest, accounting for 87.82% of total crypto-market capitalisation (Coinmarketcap, 2015). The majority of cryptocurrency research to date has focused primarily on Bitcoin because of its popularity amongst other cryptocurrencies and due the availability of data. Bitcoin is accepted by a wide range of businesses including physical and online merchants. The range of products and services that can be acquired using Bitcoin is vast, ranging from legal services to martial arts lessons.

The researcher's initial intention was to use a list of merchants listed on an online Bitcoin directory called coinmap.org as the research population (See Annexure D and E). As such thirty randomly selected merchants were selected from the online-directory to confirm if they accept Bitcoin. However, it was found that the list was not reliable and was contaminated with several merchants who had never accepted Bitcoin before and also several that have never heard of the digital currency before. Many of these merchants were not even aware that their businesses were registered on the coinmap.org directory and mentioned that the erroneous listings of their businesses were most probably due to external web developers who flagged their businesses as Bitcoin merchants in an effort to increase web traffic and visibility.

The researcher then decided to use an alternative online directory called Airbitz.co (see Annexure F). Before businesses are registered on the Airbitz.co directory, the businesses undergo a verification process to confirm whether they are active Bitcoin merchants. Thirty randomly selected businesses were selected from the Airbitz directory to again confirm validity of the data source. It was found that approximately 87% of merchants listed on this directory were active Bitcoin merchants. It was decided to proceed with the airbitz.co directory as the research population for this research study.

### **4.3 Research Sample**

Based on the research question, which investigates the factors and motivation behind bitcoin adoption among SMEs, random participants were required to be selected from the group to ensure that the data would be representative of the larger population.

A total of 3 011 businesses are listed on the Airbitz.co directory. An online JavaScript extractor tool obtained from [www.webtoolhub.com](http://www.webtoolhub.com) was utilised to extract the names of all the businesses listed on the directory.

### **4.4 Questionnaire design**

The digital questionnaire (see Annexure G) that was utilised for this research study was designed using Google Forms. The questionnaire contained 40 questions with each question being measured using a 7-point Likert scale. Each question had seven possible responses ranging from 'Strongly Disagree' to 'Strongly Agree' with a neutral category in the middle. According to (Dawes, 2008) simulation and empirical studies indicate that the use of five or a seven-point scale improves the reliability and validity compared to more finely or coarsely graded scales.

Research has also suggested that the selection of an electronic survey platform is important when collecting data. Fan and Yan (2010) stated that variables such as different web browsers, different computer configurations, different internet services and different internet transmission capabilities could all potentially influence an individual's ability to participate and successfully submit a digital survey.

The Google Forms questionnaire was tested on multiple web browsers including Safari, Google Chrome, Microsoft Internet Explorer and Mozilla Firefox. These tests were conducted on both desktop and mobile devices (including smart phones) running Microsoft Windows and Apple OS X operating systems. Although these tests did not cover every possible configuration, they did demonstrate that Google Forms was a suitable survey tool across the multiple platforms. Google Inc.'s "Drive help pages" also confirmed the compatibility of their survey tool across all major operating systems and browsers (Google, 2015).

Compared to traditional questionnaires and data gathering techniques web-based questionnaires have several advantages that include rapid delivery time, less data entry time, multiple design options and lower delivery costs (Fan & Yan, 2010). However, digital questionnaires also face various hurdles such as the exclusion of participants who do not have internet access, and "low response rates that could lead to biased results" (Couper, 2000; Fricker & Schonlau, 2002; Groves, 2004; Fan & Yan, 2010).

According to Fan and Yan (2010) several variables affect whether an individual will participate in a web survey. These variables can be categorised into three categories namely: society-related factors, respondent related factors and design-related factors. Society-related factors refer to the social characteristics that could influence a society's willingness to participate in a survey and includes factors such as survey fatigue, attitude towards the survey industry and the degree of social cohesion. Respondent-related factors refer to individual characteristics such as socio-demographic factors and personality type. Design-related factors include variables such as questionnaire content, wording, question ordering and visual presentation. All these characteristics directly or indirectly affect the response rate and it is therefore imperative to comprehensively test the questionnaire before commencing the survey.

The questionnaire was designed by using construct items from previous UTAUT studies. Only small changes were made to fit the Bitcoin context. An example of two of the constructs that were utilised in this study is demonstrated in Table 4.1 below:

**Table 4.1: Construct item formulation based on previous UTAUT studies**

	Cronbach's $\alpha$
<b>Social Influence construct (Boontarig et al., 2012)</b>	
SN1: People who influence my behavior think that I should use a smartphone for e-health service	<b>0.8</b>
SN2: People who are important to me think that I should use a smartphone for e-health service.	
SN3: The senior management of this business has been helpful in the use of a smartphone for e-health service.	
SN4: In general, the organization has supported the use of a smartphone for e-health service.	
<b>Social Influence construct (Zhou, 2012a)</b>	
SN1: People who influence my behavior think that I should use LBS.	<b>0.77</b>
SN2: People who are important to me think that I should use LBS	
<b>Social Influence construct questions used in this research study</b>	
SN1: People who influence my behavior think that I should use Bitcoin	
SN2: People who are important to me think that I should use Bitcoin	
SN3: Senior management of this business have been supportive in the use of Bitcoin	
SN4: In general, the organisation has supported the use of Bitcoin	
<b>Facilitating conditions construct (Boontarig et al., 2012)</b>	
FC1: I have the resources necessary to use a smartphone for e-health service.	<b>0.75</b>
FC2: I have the knowledge necessary to use a smartphone for e-health service.	
FC3: A smartphone for e-health service is not compatible with other systems I use.	
FC4: A specific person (or group) is available for assistance with a smartphone for e-health service difficulties.	
<b>Facilitating conditions construct (Zhou, 2012a)</b>	
FC1: I have the resources necessary to use LBS.	<b>0.81</b>
FC2: I have the knowledge necessary to use LBS.	
FC3: A specific person (or group) is available for assistance with LBS system difficulties.	
<b>Facilitating conditions construct questions used in this study</b>	
FC1: I have the resources necessary to use Bitcoin	
FC2: I have the knowledge necessary to use Bitcoin	
FC3: When I have experienced issues with Bitcoin it was resolved easily and timeously	

From Table 4.1 it is observed that the wording and meaning of the questions used in this study are almost identical to those used by Boontarig, Chutimaskul, Chongsuphajaisiddhi and Papasratorn (2012) and Zhou (2012a). It must be noted that the majority of technology acceptance research studies that are based on UTAUT or UTAUT2, followed a similar approach when constructing their construct questions. The same approach as outlined in Table 4.1 was followed for each of the other constructs used in this study. This was done to preserve the accuracy, integrity and reliability of the constructs.

Before publishing the survey online a pilot study was performed to ensure that it achieves the desired results and that the respondents clearly understand the questions. The researcher requested the input from a few of his Canadian and American professional acquaintances on LinkedIn to receive feedback on the questionnaire content and design. Participants were also requested to complete and submit the pilot questionnaire to confirm that the data is correctly populated and stored.

The pilot questionnaire was also presented to students enrolled in an undergraduate programme at the University of Manitoba to establish the validity and comprehensibility of the items. Several questions were amended based on their input. The revised questionnaire was published on Google Forms with a cover letter explaining the purpose of the study. See Annexure G for the final version of the questionnaire that was utilised in the study.

The final questionnaire contained 40 mandatory questions. Cottrill et al. (2013) stated that designing a questionnaire with too many mandatory questions could potentially make the participant feel that their privacy is being invaded. Feedback received from respondents as well as from and pilot participants indicated that the questionnaire contained a suitable amount of questions and did not overstep the boundary, as suggested by the researchers above.

## **4.5 Data gathering**

The research was exploratory in nature and used quantitative analysis. According to Saunders and Lewis (2011) a questionnaire is a useful and economical tool to use in exploratory research. The company names extracted from the airbitz.co directory were populated into a Microsoft Excel spreadsheet. This was done so that Excel's random functionality could be utilised to select random merchants from the list.

Airbitz.co lists the merchants' name and in most instances the contact details and physical location of the merchant is also provided. In a few instances the merchant's e-mail addresses were not present and in such cases a search was conducted using the Google search engine to obtain the company's e-mail address. To confirm that the correct businesses were located on the search engine

cross-checks were conducted to verify that the business's physical address and/or telephone numbers corresponded with the information on the Airbitz.co directory. The standardised electronic questionnaire was initially forwarded via e-mail to 30 randomly selected businesses.

The response rate from our initial batch was extremely low. Out of 30 requests only one respondent replied and agreed to participate in the questionnaire. The low response confirmed previous findings by Couper (2000) and Fricker and Schonlau (2002) and Groves (2004) and Fan and Yan (2010) regarding the low response rates of digital questionnaires.

An alternative method was adopted by contacting the participants using Facebook messenger (an instant messaging platform), which then yielded a higher response rate. The successful participation in surveys is facilitated through a tailored negotiated process of social exchange (Valdez et al., 2014). Nardi, Whittaker and Bradner (2000) further argued that instant messaging platforms support flexible and expressive communication, which tends to be more visible compared to traditional e-mail messages. They further argued that the use of instant messaging also enable individuals to "negotiate the availability" of others to engage in communication. The increased flexibility combined with the fact that social media messaging is frequently accessed from the participants' mobile devices allows for a more effective method of communication, which in turn yielded a higher response rate. The researcher believes that the transparency of his Facebook profile combined with ability to customise responses aided in establishing legitimacy amongst the respondents.



## CHAPTER:5 RESULTS

### 5.1 Descriptive Analysis

The following section analyses the descriptive statistical analysis of the data to provide a more profound understanding of the Bitcoin merchants' perceptions.

As outlined in the previous chapter, the constructs and construct items of this research study were all designed and formulated based on the constructs and construct items of existing UTAUT and UTAUT2 studies. In all cases constructs were used which yielded a Cronbach's Alpha reliability index greater than 0.7, which is above the recommended minimum of 0.7 (Hair, Black, Babin, Anderson, & Tatham, 2006). The Cronbach's Alpha measure is commonly used to test the internal validity of constructs.

The statistical output in this research study was generated with JMP® a statistical discovery software package from SAS. The descriptive analysis of the Likert data was done using Microsoft Excel.

Due to legitimately large amount of constructs in the UTAUT2 model the statistical output, diagrams and tables for each of these constructs were categorised in their own respective headings. The statistical output, diagrams and tables in this section describes the nature of the constructs.

When interpreting these scores the Likert-scale's categories of agreement should be kept in mind:

1= Strongly disagree

2= Disagree

3= Slightly disagree

4= Neither agree nor disagree

5= Slightly agree

6= Agree

7= Strongly agree

### 5.1.1 Performance expectancy

**Table 5.1: Performance expectancy construct – Descriptive statistics**

Performance Expectancy	1 <u>Strongly Disagree</u>		2 <u>Disagree</u>		3 <u>Slightly Disagree</u>		4 <u>Neither Agree or Disagree</u>		5 <u>Slightly Agree</u>		6 <u>Agree</u>		7 <u>Strongly Agree</u>	
	Question 1 I find Bitcoin useful in my business	2	(5.4%)	3	(8.1%)	2	(5.4%)	14	(37.8%)	8	(21.6%)	4	(10.8%)	4
Question 2 Bitcoin enables faster transaction processing in my business	1	(2.7%)	6	(16.2%)	6	(16.2%)	11	(29.7%)	3	(8.1%)	8	(21.6%)	2	(5.4%)
Question 3 I am able to process more transactions through using Bitcoin	2	(5.4%)	6	(16.2%)	3	(8.1%)	18	(48.6%)	5	(13.5%)	3	(8.1%)	0	(0.0%)
Question 4 If I use Bitcoin, I will increase my business profitability	2	(5.4%)	3	(8.1%)	3	(8.1%)	8	(21.6%)	11	(29.7%)	7	(18.9%)	3	(8.1%)

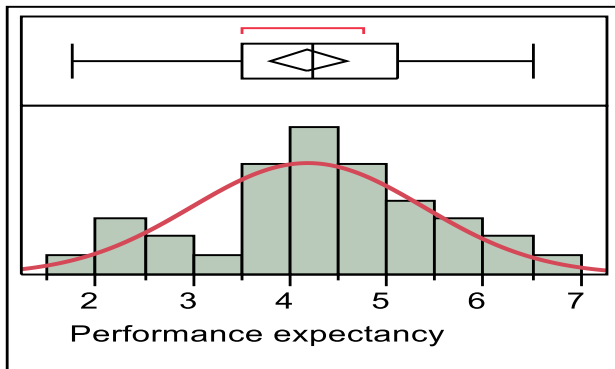
**Table 5.2: Summary statistics of performance expectancy**

Summary statistics	
Mean	4.18
SD	1.197
N	37

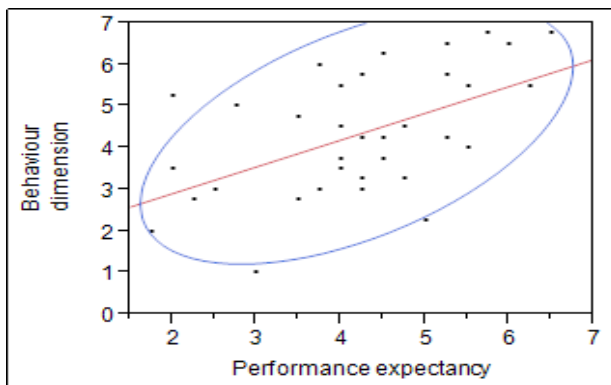
**Table 5.3: Quantile measures for the performance expectancy construct**

Percentile	Statistic	Value
100.00%	maximum	6.5
99.50%		6.5
97.50%		6.5
90.00%		5.8
75.00%	quartile	5.12
50.00%	median	4.25
25.00%	quartile	3.5
10.00%		2.2
2.50%		1.75
0.50%		1.75
0.00%	minimum	1.75

**Figure 5.1: Distribution and box-plot graph of the performance expectancy construct**



**Figure 5.2: Linear regression plot depicting the relationship between the behaviour intention and performance expectancy constructs**



The measure of centrality (mean and median), are 4.18 and 4.25 respectively and the two measures of dispersion are (namely standard deviation (SD) and inter-quartile range) are 1.2 and 1.62 respectively. The dispersion indicates the extent of variation in views about the average view.

From Table 5.3 we observe that 50% of the scores are contained in the interval 3.5 to 5.12, and 25% of the scores are greater than 5.12 and 25% of scores are less than 3.5.

The distribution and box-plot in Figure 5.1 indicate a reasonably uniform distribution.

The average correlation can be observed in the plot between performance expectancy and the behaviour intention constructs in Figure 5.2. Note the least squares line is the best fit and the ellipse contains 90% of the data.

## 5.1.2 Effort expectancy

**Table 5.4: Effort expectancy construct – Descriptive statistics**

Effort Expectancy	1 Strongly Disagree		2 Disagree		3 Slightly Disagree		4 Neither Agree or Disagree		5 Slightly Agree		6 Agree		7 Strongly Agree	
	Question 5 Using Bitcoin as a method of payment is clear and understandable to me	0	(0.0%)	3	(8.1%)	4	(10.8%)	3	(8.1%)	3	(8.1%)	17	(45.9%)	7
Question 6 It is easy for me to become skillful at using Bitcoin	1	(2.7%)	2	(5.4%)	3	(8.1%)	4	(10.8%)	12	(32.4%)	11	(29.7%)	4	(10.8%)
Question 7 I find Bitcoin easy to use	1	(2.7%)	5	(13.5%)	5	(13.5%)	5	(13.5%)	10	(27.0%)	7	(18.9%)	4	(10.8%)
Question 8 Learning to use Bitcoin is easy for me	1	(2.7%)	3	(8.1%)	3	(8.1%)	5	(13.5%)	11	(29.7%)	8	(21.6%)	6	(16.2%)
Question 9 My customers find Bitcoin easy to use	1	(2.7%)	6	(16.2%)	4	(10.8%)	17	(45.9%)	8	(21.6%)	1	(2.7%)	0	(0.0%)

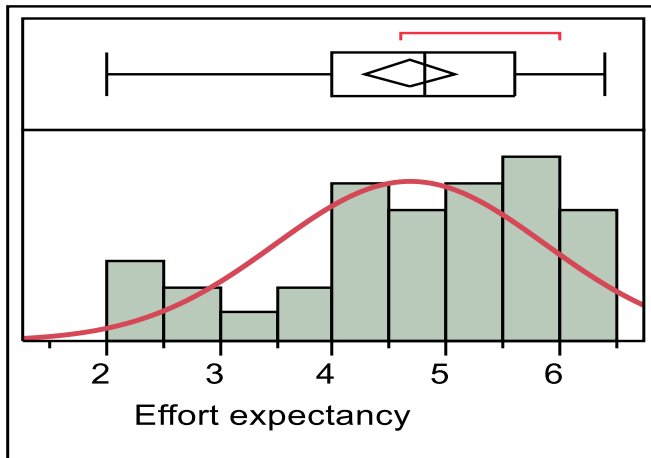
**Table 5.5: Summary statistics of the effort expectancy construct**

Summary statistics	
Mean	4.68
SD	1.193
N	37

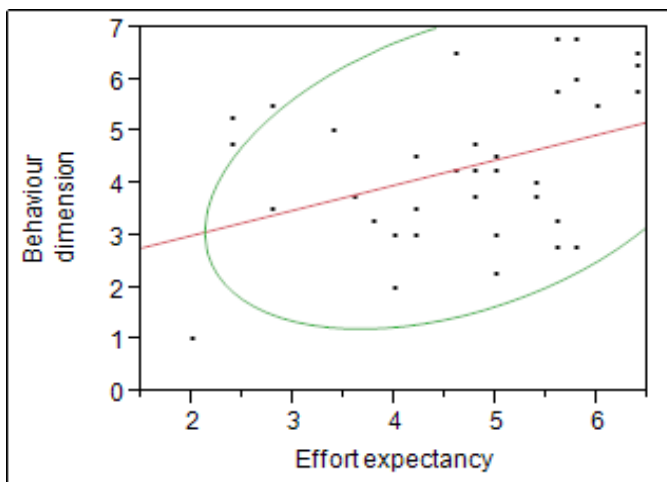
**Table 5.6: Quantile measures of the effort expectancy construct**

Percentile	Statistic	Value
100.00%	maximum	6.4
99.50%		6.4
97.50%		6.4
90.00%		6.08
75.00%	quartile	5.6
50.00%	median	4.8
25.00%	quartile	4
10.00%		2.72
2.50%		2
0.50%		2
0.00%	minimum	2

**Figure 5.3: Distribution and box-plot graph of the effort expectancy construct**



**Figure 5.4: Linear regression plot depicting the relationship between the behaviour intention and effort expectancy constructs**



The distribution and box-plot in Figure 5.3 indicate a somewhat negatively skewed response to the left distribution with no outliers present.

From Table 5.6 above it is can observed that 50% of the scores are contained in the interval 4 to 5.6 and 25% of the scores are greater than 5.6 and 25% of scores are less than 4.

The average correlation can be observed in the plot between effort expectancy and behaviour dimension in Figure 5.4.

### 5.1.3 Social influence

**Table 5.7: Social influence construct – Descriptive statistics**

Social Influence	1 Strongly Disagree		2 Disagree		3 Slightly Disagree		4 Neither Agree or Disagree		5 Slightly Agree		6 Agree		7 Strongly Agree	
	Question 10 My customers have asked me to include Bitcoin as a payment method	4	(10.8%)	12	(32.4%)	1	(2.7%)	5	(13.5%)	9	(24.3%)	4	(10.8%)	2
Question 13 People who influence my behavior think that I should use Bitcoin	4	(10.8%)	8	(21.6%)	3	(8.1%)	14	(37.8%)	7	(18.9%)	1	(2.7%)	0	(0.0%)
Question 14 People who are important to me think that I should use Bitcoin	4	(10.8%)	7	(18.9%)	2	(5.4%)	16	(43.2%)	5	(13.5%)	3	(8.1%)	0	(0.0%)
Question 15 Senior management of this business have been supportive in the use of Bitcoin	1	(2.7%)	2	(5.4%)	0	(0.0%)	13	(35.1%)	4	(10.8%)	9	(24.3%)	8	(21.6%)
Question 16 In general, the organisation has supported the use of Bitcoin	0	(0.0%)	1	(2.7%)	1	(2.7%)	4	(10.8%)	6	(16.2%)	17	(45.9%)	8	(21.6%)

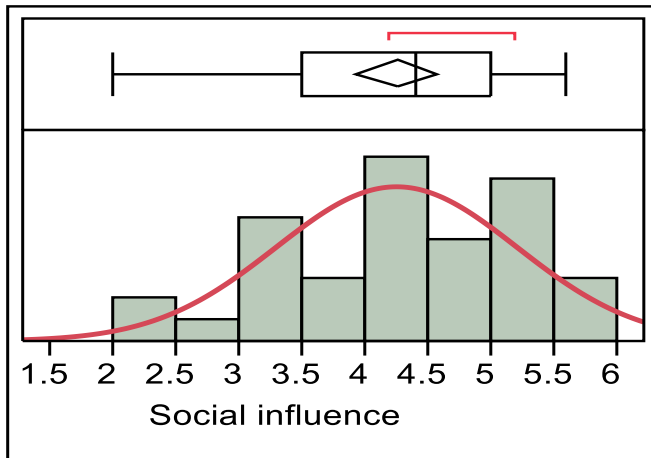
**Table 5.8: Summary statistics of the social influence construct**

Summary statistics	
Mean	4.25
SD	0.961
N	37

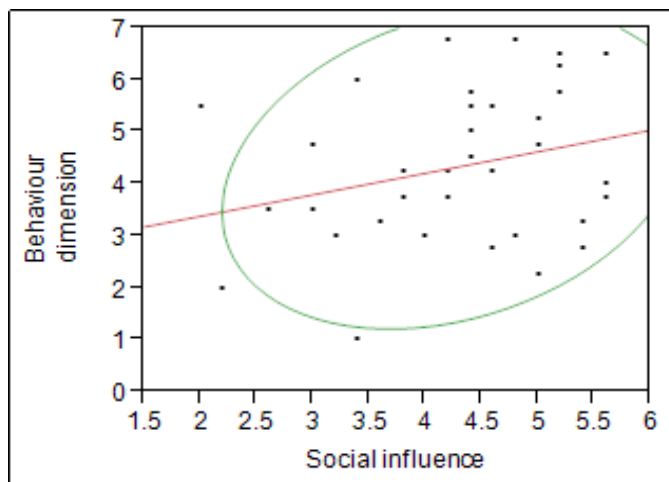
**Table 5.9: Quantile measures of the social influence construct**

Percentile	Statistic	Value
100.00%	maximum	5.6
99.50%		5.6
97.50%		5.6
90.00%		5.44
75.00%	quartile	5
50.00%	median	4.4
25.00%	quartile	3.5
10.00%		2.92
2.50%		2
0.50%		2
0.00%	minimum	2

**Figure 5.5: Distribution and box-plot graph of the social influence construct**



**Figure 5.6: Linear regression plot depicting the relationship between the behaviour intention and social influence constructs**



The distribution and box-plot in Figure 5.5 indicate a somewhat negatively skewed response from respondents to the left distribution with zero outliers.

From Table 5.9 above it is can observed that 50% of the scores are contained in the interval 3.5 to 4 and 25% of the scores are greater than 4 and 25% of scores are less than 3.5.

A somewhat weak correlation can be observed in the plot between social influence and the behaviour dimension in Figure 5.6.



### 5.1.4 Facilitating conditions

**Table 5.10: Facilitating conditions construct – Descriptive statistics**

Facilitating Conditions	1 Strongly Disagree		2 Disagree		3 Slightly Disagree		4 Neither Agree or Disagree		5 Slightly Agree		6 Agree		7 Strongly Agree	
	Question 17 I have the resources necessary to use Bitcoin	0	(0.0%)	0	(0.0%)	0	(0.0%)	1	(2.7%)	4	(10.8%)	23	(62.2%)	9
Question 18 I have the knowledge necessary to use Bitcoin	0	(0.0%)	1	(2.7%)	0	(0.0%)	0	(0.0%)	10	(27.0%)	18	(48.6%)	8	(21.6%)
Question 19 Bitcoin is compatible with other payment systems I use	0	(0.0%)	10	(27.0%)	5	(13.5%)	6	(16.2%)	4	(10.8%)	10	(27.0%)	2	(5.4%)
Question 20 When I have experienced issues with Bitcoin it was resolved easily and timeously	1	(2.7%)	1	(2.7%)	0	(0.0%)	22	(59.5%)	6	(16.2%)	5	(13.5%)	2	(5.4%)

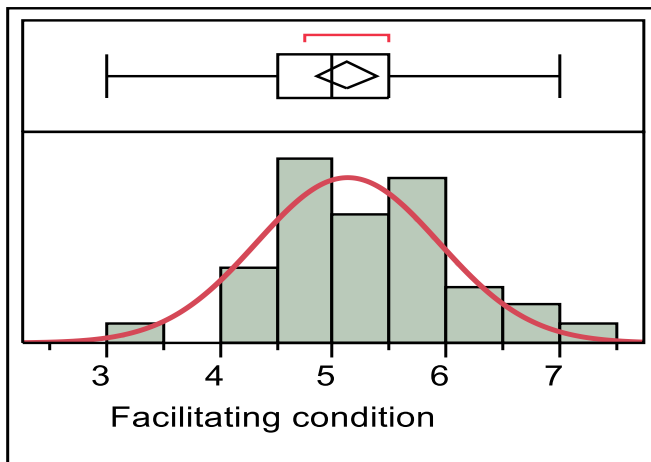
**Table 5.11: Summary statistics of the facilitating conditions construct**

Summary statistics	
Mean	5.13
SD	0.807
N	37

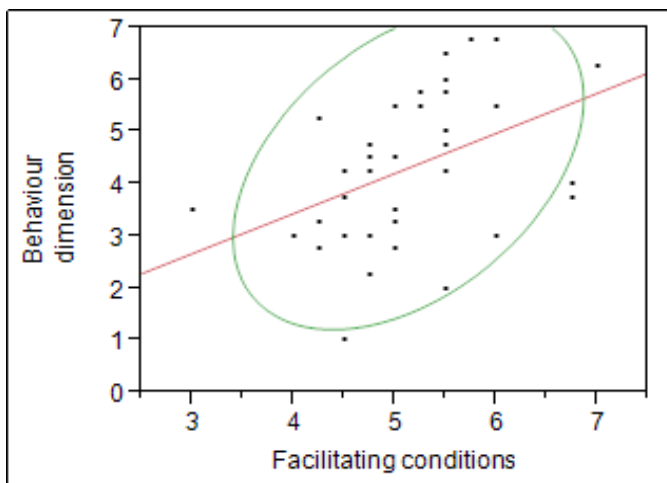
**Table 5.12: Quantile measures of the facilitating conditions construct**

Percentile	Statistic	Value
100.00%	maximum	7
99.50%		7
97.50%		7
90.00%		6.15
75.00%	quartile	5.5
50.00%	median	5
25.00%	quartile	4.5
10.00%		4.25
2.50%		3
0.50%		3
0.00%	minimum	3

**Figure 5.7: Distribution and box-plot graph of the facilitating conditions construct**



**Figure 5.8: Linear regression plot depicting the relationship between the behaviour intention and facilitating conditions constructs**



The distribution and box-plot, as outline in Figure 5.7, indicate a reasonably constant distribution with no outliers present.

An average positive correlation can be observed in the linear regression plot between facilitating conditions and the behaviour dimension in Figure 5.8.

### 5.1.5 Price value

**Table 5.13: Price value construct – Descriptive statistics**

Price Value	1 Strongly Disagree		2 Disagree		3 Slightly Disagree		4 Neither Agree or Disagree		5 Slightly Agree		6 Agree		7 Strongly Agree	
	Question 21 Bitcoin transaction charges/fees are reasonably priced	0	(0.0%)	0	(0.0%)	0	(0.0%)	8	(21.6%)	2	(5.4%)	13	(35.1%)	14
Question 22 The use of Bitcoin provides significant savings in transactions fees	0	(0.0%)	1	(2.7%)	2	(5.4%)	10	(27.0%)	4	(10.8%)	11	(29.7%)	9	(24.3%)
Question 23 At the current transaction cost, Bitcoin provides good value	0	(0.0%)	0	(0.0%)	0	(0.0%)	10	(27.0%)	3	(8.1%)	11	(29.7%)	13	(35.1%)
Question 24 The Bitcoin transaction costs beared by customers are reasonable	0	(0.0%)	0	(0.0%)	0	(0.0%)	11	(29.7%)	5	(13.5%)	11	(29.7%)	10	(27.0%)
Question 25 For the customer the cost of using Bitcoin is comparable to other forms of payment	1	(2.7%)	2	(5.4%)	3	(8.1%)	9	(24.3%)	6	(16.2%)	14	(37.8%)	2	(5.4%)

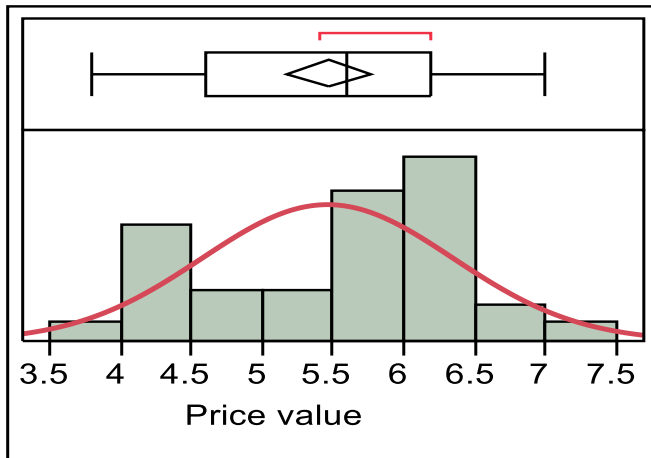
**Table 5.14: Summary statistics of the price value construct**

Summary statistics	
Mean	5.46
SD	0.889
N	37

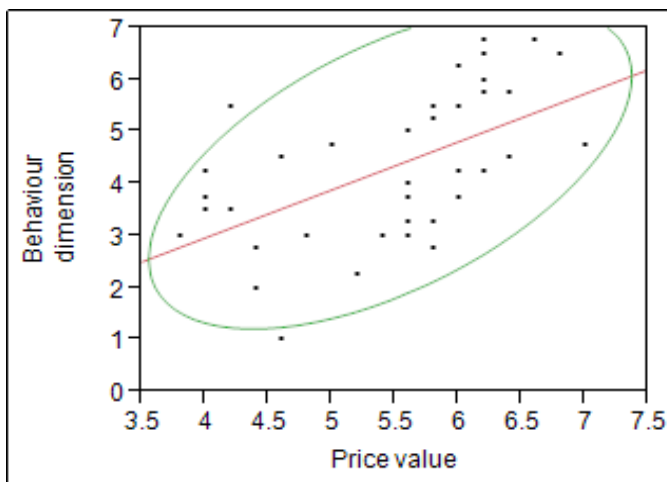
**Table 5.15: Quantile measures of the price value construct**

Percentile	Statistic	Value
100.00%	maximum	7
99.50%		7
97.50%		7
90.00%		6.44
75.00%	quartile	6.2
50.00%	median	5.6
25.00%	quartile	4.6
10.00%		4
2.50%		3.8
0.50%		3.8
0.00%	minimum	3.8

**Figure 5.9: Distribution and box-plot graph of the price value construct**



**Figure 5.10: Linear regression plot depicting the relationship between the behaviour intention and price value constructs**



The distribution and box-plot in Figure 5.9, indicate a reasonably constant distribution with no outliers present.

A fairly average positive correlation can be observed in the plot between price value and the behavioural dimension in Figure 5.10.

### 5.1.6 Behavior Intension

**Table 5.16: Behavior intention construct – Descriptive statistics**

Behaviour Intension	1 Strongly Disagree		2 Disagree		3 Slightly Disagree		4 Neither Agree or Disagree		5 Slightly Agree		6 Agree		7 Strongly Agree	
Question 26 I want to use Bitcoin instead of traditional money	1	(2.7%)	5	(13.5%)	3	(8.1%)	6	(16.2%)	7	(18.9%)	9	(24.3%)	6	(16.2%)
Question 27 I plan to use Bitcoin in the next 6 to 12 months	1	(2.7%)	3	(8.1%)	2	(5.4%)	4	(10.8%)	4	(10.8%)	13	(35.1%)	10	(27.0%)
Question 28 I prefer to use Bitcoin for payments	1	(2.7%)	9	(24.3%)	4	(10.8%)	11	(29.7%)	1	(2.7%)	5	(13.5%)	6	(16.2%)
Question 29 If Bitcoin is not available as a payment method at suppliers and external vendors, I will request it	4	(10.8%)	15	(40.5%)	4	(10.8%)	6	(16.2%)	4	(10.8%)	3	(8.1%)	1	(2.7%)

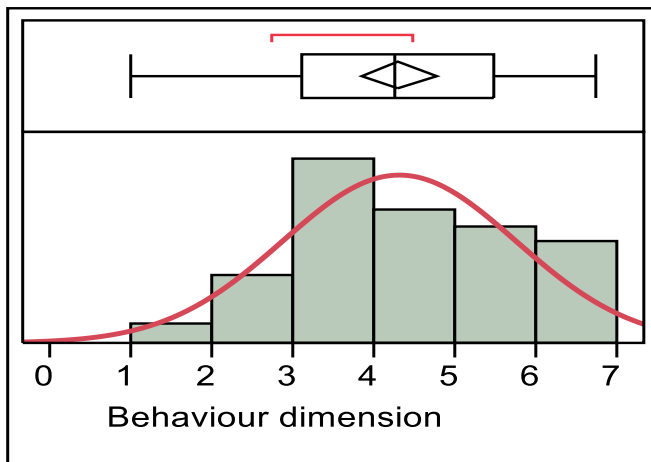
**Table 5.17: Summary statistics of the behavior intention construct**

Summary statistics	
Mean	4.32
SD	1.445
N	37

**Table 5.18: Quantile measures of the behavior intention construct**

Percentile	Statistic	Value
100.00%	maximum	6.75
99.50%		6.75
97.50%		6.75
90.00%		6.5
75.00%	quartile	5.5
50.00%	median	4.25
25.00%	quartile	3.125
10.00%		2.65
2.50%		1
0.50%		1
0.00%	minimum	1

**Figure 5.11: Distribution and box-plot graph of the behaviour dimension construct**



The distribution and box-plot in Figure 5.11 indicate a somewhat negatively skewed response to the left distribution.

### 5.1.7 Hedonic Motivation

**Table 5.19: Hedonic motivation construct – Descriptive statistics**

Hedonic Motivation	1 Strongly Disagree	2 Disagree	3 Slightly Disagree	4 Neither Agree or Disagree	5 Slightly Agree	6 Agree	7 Strongly Agree
Question 30 Customers derive great pleasure when transacting in Bitcoin	0 (0.0%)	1 (2.7%)	1 (2.7%)	16 (43.2%)	10 (27.0%)	4 (10.8%)	5 (13.5%)
Question 31 Customers find using Bitcoin enjoyable	0 (0.0%)	1 (2.7%)	1 (2.7%)	14 (37.8%)	12 (32.4%)	4 (10.8%)	5 (13.5%)
Question 32 I have had positive feedback from customers being able to use Bitcoin	0 (0.0%)	3 (8.1%)	0 (0.0%)	9 (24.3%)	14 (37.8%)	6 (16.2%)	5 (13.5%)
Question 33 I have had positive feedback on the ease of use of Bitcoin in my business	1 (2.7%)	5 (13.5%)	0 (0.0%)	13 (35.1%)	6 (16.2%)	7 (18.9%)	5 (13.5%)

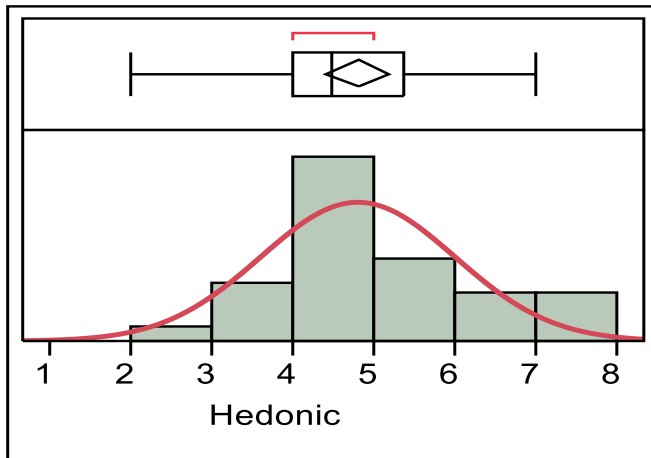
**Table 5.20: Summary statistics of the hedonic motivation construct**

Summary statistics	
Mean	4.8
SD	1.2
N	37

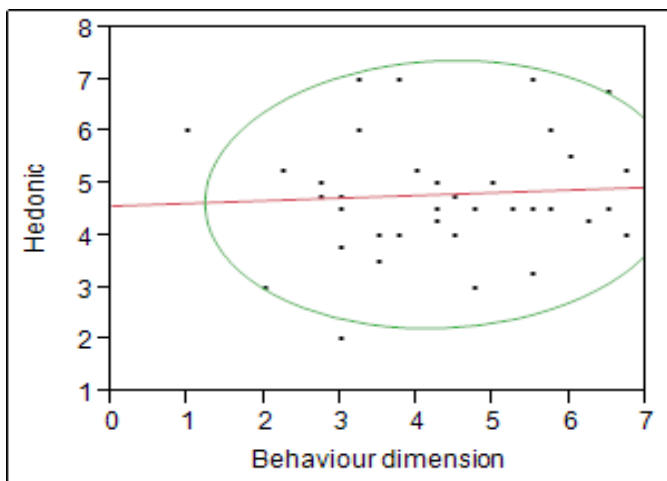
**Table 5.21: Quantile measures of the hedonic motivation construct**

Percentile	Statistic	Value
100.00%	maximum	7
99.50%		7
97.50%		7
90.00%		7
75.00%	quartile	5.375
50.00%	median	4.5
25.00%	quartile	4
10.00%		3.2
2.50%		2
0.50%		2
0.00%	minimum	2

**Figure 5.12: Distribution and box-plot graph of the hedonic motivation construct**



**Figure 5.13: Linear regression plot depicting the relationship between the behaviour intention and hedonic motivation constructs**



The distribution and box-plot in Figure 5.12 indicate a reasonably uniform distribution.

Virtually no correlation can be observed in the plot between hedonic motivation and the behaviour dimension in Figure 5.13. The random scattering of points on the Cartesian plane confirms the lack of any linear relationship.



### 5.1.8 Habit

**Table 5.22: Habit construct – Descriptive statistics**

Habit	1 Strongly Disagree	2 Disagree	3 Slightly Disagree	4 Neither Agree or Disagree	5 Slightly Agree	6 Agree	7 Strongly Agree
Question 34 The use of Bitcoin has become a habit for me	5 (13.5%)	15 (40.5%)	3 (8.1%)	3 (8.1%)	5 (13.5%)	1 (2.7%)	1 (2.7%)
Question 35 I am addicted to using Bitcoin	16 (43.2%)	9 (24.3%)	3 (8.1%)	3 (8.1%)	2 (5.4%)	2 (5.4%)	1 (2.7%)
Question 36 I must use Bitcoin	16 (43.2%)	9 (24.3%)	2 (5.4%)	2 (5.4%)	2 (5.4%)	0 (0.0%)	1 (2.7%)

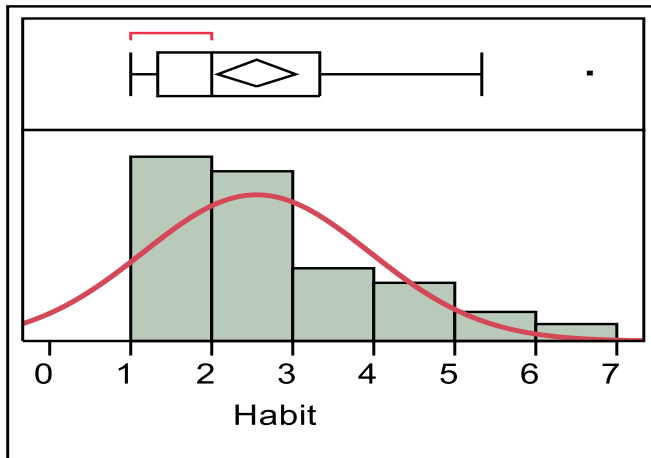
**Table 5.23: Summary statistics of the habit construct**

Summary statistics	
Mean	2.55
SD	1.404
N	37

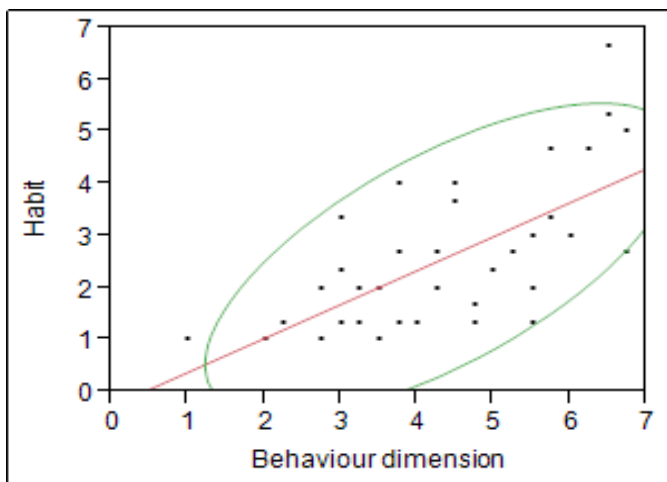
**Table 5.24: Quantile measures of the habit construct**

Percentile	Statistic	Value
100.00%	maximum	6.67
99.50%		6.67
97.50%		6.67
90.00%		4.73
75.00%	quartile	3.33
50.00%	median	2.00
25.00%	quartile	1.33
10.00%		1.00
2.50%		1.00
0.50%		1.00
0.00%	minimum	1.00

**Figure 5.14: Distribution and box-plot graph of the habit construct**



**Figure 5.15: Linear regression plot depicting the relationship between the behaviour intention and habit constructs**



The distribution and box-plot in Figure 5.14 above indicate a positively skewed to the right distribution. The box-plot also indicates the presence of an outlier in the construct.

An above average correlation can be observed in the plot between habit and the behaviour dimension in Figure 5.15.

## 5.1.9 Trust

**Table 5.25: Trust construct – Descriptive statistics**

Trust	1 Strongly Disagree		2 Disagree		3 Slightly Disagree		4 Neither Agree or Disagree		5 Slightly Agree		6 Agree		7 Strongly Agree	
	Question 37 Bitcoin has high integrity	1	(2.7%)	3	(8.1%)	6	(16.2%)	9	(24.3%)	6	(16.2%)	11	(29.7%)	1
Question 38 Bitcoin can be trusted completely	1	(2.7%)	4	(10.8%)	9	(24.3%)	8	(21.6%)	6	(16.2%)	7	(18.9%)	2	(5.4%)
Question 39 The Bitcoin platform is perfectly honest and truthful	0	(0.0%)	4	(10.8%)	2	(5.4%)	14	(37.8%)	6	(16.2%)	9	(24.3%)	2	(5.4%)
Question 40 Bitcoin transactions are more secure than credit card transactions	0	(0.0%)	0	(0.0%)	3	(8.1%)	13	(35.1%)	6	(16.2%)	7	(18.9%)	8	(21.6%)

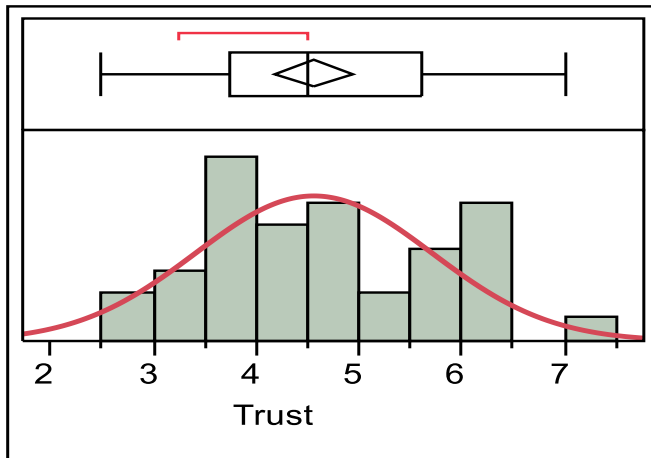
**Table 5.26: Summary statistics of the trust construct**

Summary statistics	
Mean	4.56
SD	1.149
N	37

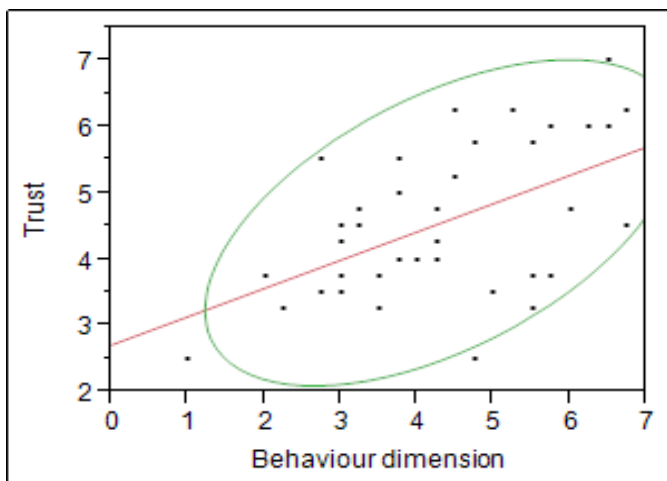
**Table 5.27: Quantile measures of the trust construct**

Percentile	Statistic	Value
100.00%	maximum	7
99.50%		7
97.50%		7
90.00%		6.25
75.00%	quartile	5.62
50.00%	median	4.5
25.00%	quartile	3.75
10.00%		3.25
2.50%		2.5
0.50%		2.5
0.00%	minimum	2.5

**Figure 5.16: Distribution and box-plot graph of the trust construct**



**Figure 5.17: Linear regression plot depicting the relationship between the behaviour intention and trust constructs**



The distribution and box-plot in Figure 5.16 indicate a reasonably uniform distribution.

An average positive correlation can be observed in the plot between trust and the behaviour dimension in Figure 5.17.

## 5.2 Correlations between constructs

A bivariate correlation analysis as measured by the correlation coefficient, is the strength of the linear relationship between two variables. This value varies from -1 to +1 where -1 indicates a perfect negative linear relationship and +1 a perfect positive relationship. A coefficient of zero indicates a total lack of any linear relationship.

The following is an approximate guide for interpreting the extent of linear relationships:

- ±1.0 Perfect correlation
- ±0.8 Strong correlation
- ±0.5 Average strength correlation
- ±0.2 Weak correlation
- ±0.0 No correlation

A positive correlation indicates that an increase in the value of one variable is related to an increase in an associated variable.

A negative correlation indicates that an increase in one variable is related to a decrease in an associated variable.

The following table presents the correlation coefficients between pairs of constructs:

**Table 5.28: Correlation coefficients between pairs of constructs**

Construct	Performance expectancy	Effort expectancy	Social influence	Facilitating conditions	Price value	Behaviour dimension	Hedonic	Habit	Trust
<b>Performance expectancy</b>	1	0.5938	0.4741	0.5214	0.5297	0.5336	0.4334	0.4787	0.3198
<b>Effort expectancy</b>	0.5938	1	0.5035	0.5496	0.4328	0.4000	0.3511	0.4423	0.4073
<b>Social influence</b>	0.4741	0.5035	1	0.3919	0.5617	0.2753	0.5120	0.4070	0.4735
<b>Facilitating conditions</b>	0.5214	0.5496	0.3919	1	0.4651	0.4299	0.1859	0.3896	0.2290
<b>Price value</b>	0.5297	0.4328	0.5617	0.4651	1	0.5684	0.4621	0.4137	0.5250
<b>Behaviour dimension</b>	0.5336	0.4000	0.2753	0.4299	0.5684	1	0.0618	0.6726	0.5378
<b>Hedonic</b>	0.4334	0.3511	0.5120	0.1859	0.4621	0.0618	1	0.1973	0.2414
<b>Habit</b>	0.4787	0.4423	0.4070	0.3896	0.4137	0.6726	0.1973	1	0.6014
<b>Trust</b>	0.3198	0.4073	0.4735	0.2290	0.5250	0.5378	0.2414	0.6014	1

### 5.3 Moderating effect of Age and Gender on the Habit construct

The following section assesses the moderating effect of gender and age on the influence of the habit construct on the behavioural dimension.

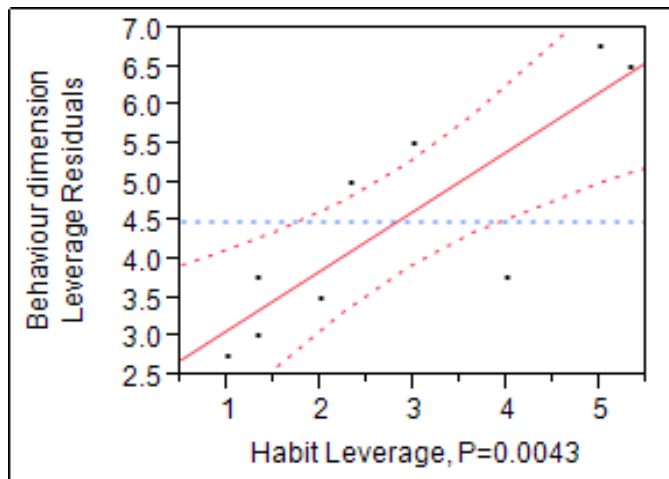
Due to the lack of sufficient data, the age groups were collapsed into the following categories: younger than (<) 33 years of age, 33-42 years and older than (>) 42 years of age.

#### 5.3.1 Moderating effect of Age and Gender on the Habit and Behavioural Intention Relationship

##### 5.3.1.1 *Moderating effect of age category on the habit and behavioural intention relationship*

#### Age = <33 years

Figure 5.18: Leverage plot indicating the moderating effect of control variable (age= <33 years) on the bivariate relationship between the Behavioural Intention and Habit constructs



$$R^2 = 0.711$$

The relationship for this age group is presented in the following table and equation:

**Table 5.29: Parameter estimates of the behaviour intention and habit constructs relationship for the age category < 33 years of age**

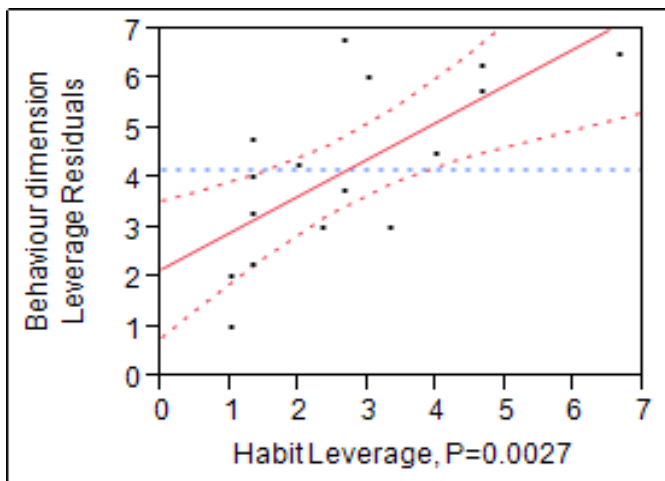
Term	Estimate	SE	t Ratio	Prob> t
Intercept	2.325	0.597	3.9	0.0059
Habit	0.773	0.186	4.15	0.0043

$$\text{Behaviour dimension} = 2.325 + 0.773 * (\text{Habit measurement})$$

Approximately 71% of the variation in the data is explained by this significant linear model.

### Age = 33-42 years

**Figure 5.19: Leverage plot indicating the moderating effect of control variable (age= 33-42 years) on the bivariate relationship between the Behavioural Intention and Habit constructs**



$$R^2 = 0.486$$

The relationship for this age group is presented in the following table and equation:

**Table 5.30: Parameter estimates of the behaviour intention and habit constructs relationship for the age category 33 to 42 years of age**

Term	Estimate	SE	t Ratio	Prob> t
Intercept	2.175	0.64	3.4	0.0043
Habit	0.743	0.204	3.64	0.0027

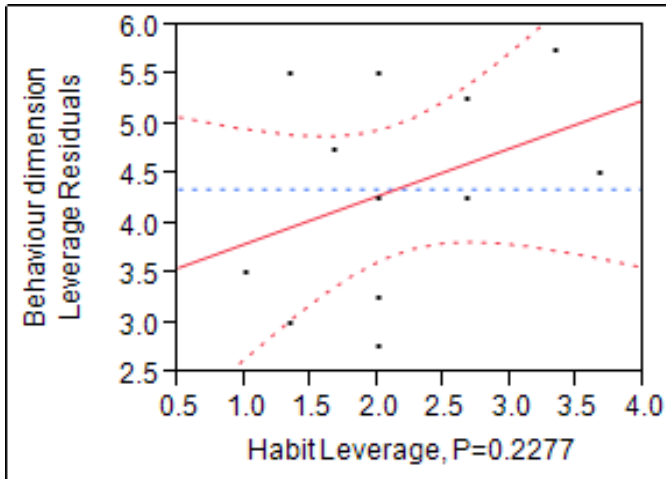
$$\text{Behaviour dimension} = 2.175 + 0.743 * (\text{Habit measurement})$$



Approximately 49% of the variation in the data is explained by this significant linear model.

**Age = >42years**

**Figure 5.20: Leverage plot indicating the moderating effect of control variable (age= >42 years) on the bivariate relationship between the Behavioural Intention and Habit constructs**



$R^2 = 0.142$

The relationship for this age group is presented in the following table and equation:

**Table 5.31: Parameter estimates of the behaviour intention and habit constructs relationship for the age category > 42 years of age**

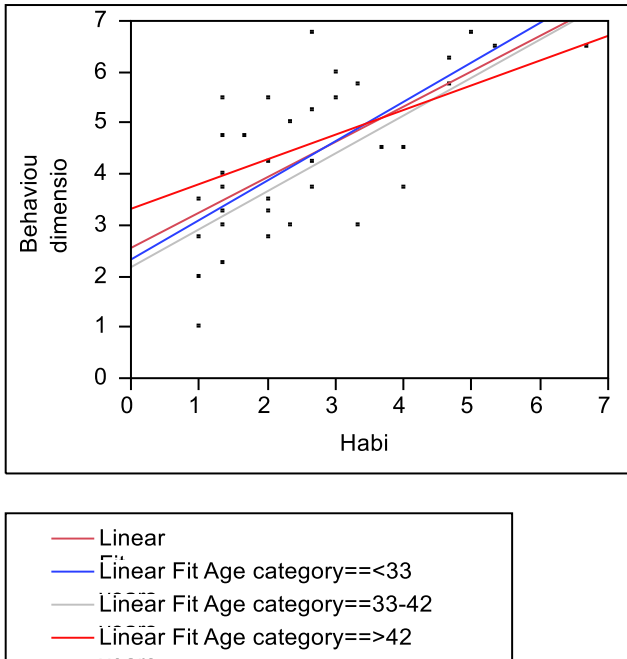
Term	Estimate	SE	t Ratio	Prob> t
Intercept	3.318	0.857	3.87	0.0031
Habit	0.484	0.3768	1.29	0.2277

Only 14% of the variation can be explained by this non-significant linear model.

### Summary of the effect of age

These results are reflected in the following linear relationships:

**Figure 5.21: Bivariate Fit of Behaviour Intention for each age category by Habit**

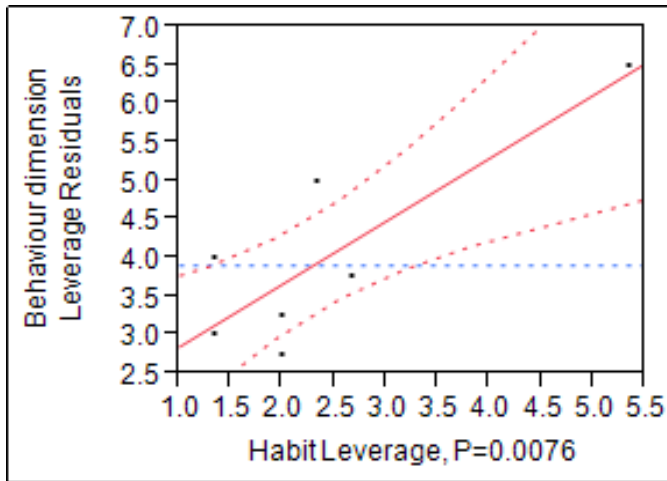


The age category of respondents who are older than 42 years of age, reduces the influence of habit upon the behaviour dimension as depicted by the bright red line in Figure 5.27.

5.3.1.2 Moderating effect of gender on the habit and behavioural relationship

**Gender = female**

**Figure 5.22: Leverage plot indicating the moderating effect of control variable (gender=female) on the bivariate relationship between the Behavioural Intention and Habit constructs**



$$R^2 = 0.721$$

The following table provides parameter estimates and their significance:

**Figure 5.23: Parameter estimates of the behaviour intention and habit construct relationship for female respondents**

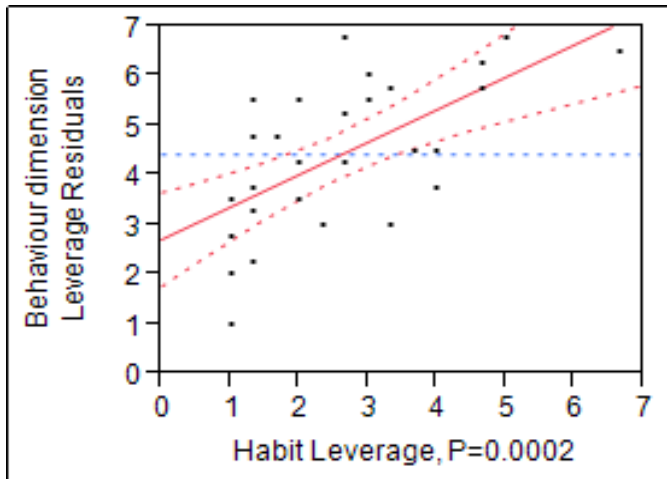
Term	Estimate	SE	t Ratio	Prob> t
Intercept	2.036	0.539	3.78	0.0092
Habit	0.816	0.207	3.94	0.0076

$$\text{Behaviour dimension} = 2.036 + 0.816 * (\text{Habit measurement})$$

Approximately 72% of the variation in this data is explained by a significant linear model. Both intercept and gradient are significantly different from zero.

Gender = male

Figure 5.24: Leverage plot indicating the moderating effect of control variable (gender=male) on the bivariate relationship between the Behavioural Intention and Habit constructs



$$R^2 = 0.401$$

The following table provides parameter estimates and their significance:

Table 5.32: Parameter estimates of the behaviour intention and habit construct relationship for male respondents

Term	Estimate	SE	t Ratio	Prob> t
Intercept	2.713	0.459	5.91	<.0001
Habit	0.656	0.154	4.25	0.0002

$$\text{Behaviour dimension} = 2.713 + 0.656 * (\text{Habit measurement})$$

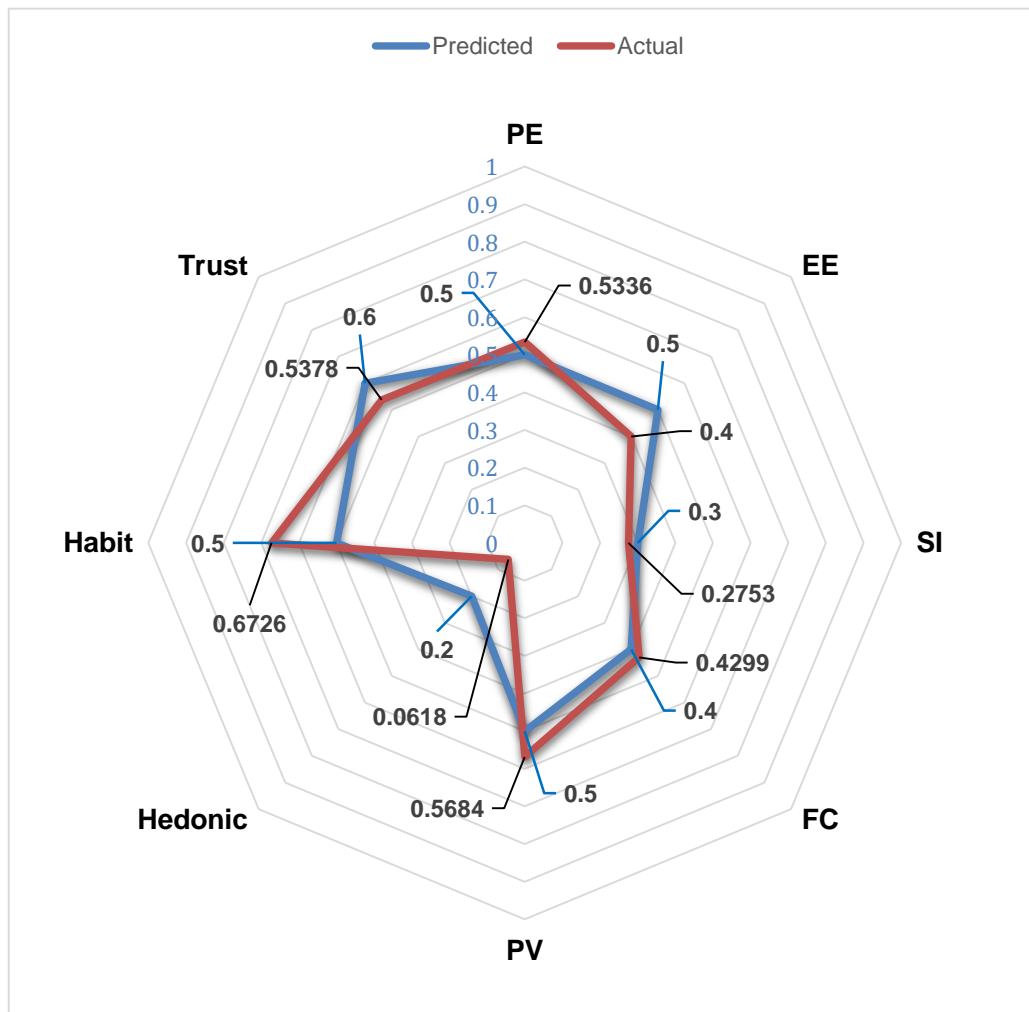
Approximately 40% of the variation in the data is explained by this highly significant linear model.

## CHAPTER:6 DISCUSSION OF RESULTS

This chapter presents the findings of this research study in light of the literature review of Chapter 2 and the statistical analysis conducted in Chapter 5.

Figure 6.1 demonstrates the actual findings of the study compared to the predicted values from Chapter 2.

**Figure 6.1: Actual vs Predicted Values of Constructs**



## **Proposition 1: Performance expectancy (PE) has a relatively strong influence on the behavioral intention to use Bitcoin**

Table 5.28 indicates an average correlation (0.5336) between performance expectancy and behaviour intention. Therefore an increase in performance expectancy would probably be associated with an increase in the behaviour intention to use cryptocurrencies.

The correlation confirmed Venkatesh et al.'s (2012) claim that PE has consistently been a strong predictor to behavioural intention. Several studies have demonstrated PE's influence on BI; these include studies by Foon and Fah (2011) and Kijisanayotin et al. (2009). In both the aforementioned research studies, and in the majority of UTAUT studies to date, PE has consistently demonstrated generating a correlation value in excess of 0.5 with the behaviour intention to adopt technology.

A sub-determinant of PE is perceived usefulness from the original TAM model as illustrated in Figure 2.4. In reviewing the literature related to perceived usefulness, it was found that perceived usefulness consists of three dimensions (Thompson, Higgins, & Howell, 1991). The first two dimensions namely complexity and job fit are near term in nature, while the third dimension termed consequences is more future orientated.

A study by Snead and Harrell (1994) found that the behaviour intention to use technology is strengthened by two linkages: first, through the linkage between the use of technology and the perceived potential outcome and second, the linkage between use and job fit. The authors further suggested that managers should focus on increased user involvement and training to increase the strength of the linkages in the user's mind.

Based on the data that was collected and presented in Table 5.1, Bitcoin merchants appear to be fairly neutral regarding the usefulness, improved transaction processing times, and transaction throughput of Bitcoin. These neutral responses could be a result of insufficient training and user involvement within the organisations.

## **Proposition 2: Effort expectancy (EE) has a moderate to strong influence on the behavioral intention to use Bitcoin**

Table 2.1 indicates that most (45.9%) merchants who were surveyed agreed that using Bitcoin is clear and understandable to them. Merchants however only somewhat agree that Bitcoin is easy to use, easy to learn and easy to become proficient at. Merchants appeared to be neutral regarding the ease of use of Bitcoin for customers.

From the table of correlation coefficients (see Table 5.28) it was observed that a moderate (0.400) positive correlation exists between Effort Expectancy and the Behaviour Dimension. The findings suggest that it is probable that an increase in effort expectancy will be associated with an increase in the behaviour dimension.

Venkatesh, Thong, Chan, Hu and Brown (2011) argued that an individual's perceptions about ease of use prior to using a system could serve as an anchor for post-usage beliefs. They further added that only through hands on experience the users' preconception of ease of use could be adjusted. Through this process of disconfirmation, users start to realise the expected benefits from using the system (Brown, Venkatesh, & Goyal, 2014). The researcher believes that the realisation of benefits will also have a positive interaction effect on two of performance expectancy's sub-determinants namely job fit and consequences, therefore increasing the constructs influence on the behaviour intention.

Businesses therefore need to create an environment which encourages hands-on experimentation with cryptocurrencies as this could neutralise any potential preconceived negative beliefs about the technology.

## **Proposition 3: Social influence (SI) has an influence on the behavioral intention to use Bitcoin**

Table 3.1 suggests that Bitcoin merchants mostly disagreed about being approached by customers requesting the addition of Bitcoin as a method of payment. It also appeared that merchants were neutral regarding the social influence of others on them to adopt Bitcoin. However, 45.9% of the surveyed merchants agreed that their organisations have supported the use of Bitcoin.

There is a rather weak correlation (0.2753) between Social Influence and the Behaviour Dimension. This is a weak positive linear relationship between these two variables. The findings suggest that an increase in social influence has a weak probability of being associated with an increase in the behaviour dimension.

The researcher believes that the influence of social influence on behaviour intention is lower than what was initially proposed due to the study being conducted in an organisational setting. Studies in the consumer context have demonstrated that social influence has a significantly larger impact on the behaviour intention to use technology (Hsu & Lin, 2008). The larger social influence in the consumer context can also be observed with the growing number of Bitcoin social clubs being established (Eha, 2014).

#### **Proposition 4: Facilitating conditions (FC) has an influence on the behavioral intention to use Bitcoin**

Table 5.10 demonstrated that merchants agreed that they have the resources and required knowledge to use Bitcoin. It is however interesting to see that the amount of merchants who do not agree that Bitcoin is compatible with other payments is equivalent to the amount of merchants who agree that Bitcoin is compatible. The majority of merchants seemed neutral regarding the support to resolve bitcoin related issues.

From the table of correlation coefficients (see Table 5.28) it was observed that a fairly average (0.4299) positive linear relationship exists between facilitating conditions and the behavioural dimension. The findings suggest that an increase in the facilitating conditions is fairly probable to be associated with an increase in the behavioural dimension.

J. Chen (2011) defined facilitating conditions as the degree to which a user believes that the technical infrastructure and environment is supportive of using the technology. K. Chen and Chan (2014) emphasised that facilitating conditions can greatly reduce the amount of frustration and apprehension associated with new technology and that adequate support can lead to higher levels of self-efficacy. J. Chen (2011) argued that technical support is important especially for users that are



less-experienced, as users with higher levels of experience tend to be more able to independently acquire support or resources.

It is therefore imperative for managers to create an environment which is conducive to learning. K. Chen and Chan (2014) argued that learning should go further than just teaching users the operational tasks required to use technology, but should instead focus on developing an environment that builds confidence and encourages self-learning.

### **Proposition 5: Price value (PV) has an influence on the behavioural intention to use Bitcoin**

Table 5.28 demonstrates that there is fairly average (0.5684) positive linear relationship between price value and the behavioural dimension. The findings suggest that an increase in the price value is fairly likely to be associated with an increase in the behavioural dimension.

The addition of the PV construct to the UTAUT2 model was to extend the scalability of the model to the consumer context (Venkatesh et al., 2012). Venkatesh et al. (2012) argued that from a consumer's perspective PV is an important predictor of behaviour intention, because in a consumer context the monetary cost of technology is most frequently carried by the consumer himself. Despite Venkatesh et al. (2012) referring to price value as a consumer construct which refers to the consumer's cognitive tradeoff between the perceived benefits of the technology and the financial cost for using the technology, price value also demonstrated to be a significant determining factor in an organisational context.

Ali, Barrdear, Clews and Southgate (2014) argued that a significant feature of cryptocurrencies has been the promise of lower transaction fees. These researchers further added that the lower transaction fees associated with cryptocurrencies have been a strong driver of interest from retailers in accepting them as a form of payment.

When considering the literature review in Section 2.1.6.3, which discussed the exorbitant transaction fees charged by modern day financial institutions it is evident that cryptocurrencies offer an attractive value proposition by providing merchants and customers with an affordable means of transacting.

### **Proposition 6: Hedonic motivation (HM) has an influence on the behavioral intention to use Bitcoin**

Table 5.28 demonstrates that there is no correlation (0.0618) between hedonic motivation and behavioural intention. It was therefore concluded that hedonic motivation does not influence the behavioural intention to adopt Bitcoin. The very low correlation found in this study is well below the predicted value of 0.3. In reviewing the literature related to hedonic motivation, it was found that the intended purpose for the addition of the hedonic motivation construct to the UTUAT2 model was to extend the models scope to the consumer use context (Venkatesh et al., 2012).

Several studies from a consumer perspective were found which demonstrated that HM was an important determinant of behavioural intention (Van der Heijden, 2004; Nysveen, Pedersen, & Thorbjørnsen, 2005; Raman & Don, 2013). Regrettably, no UTAUT2 studies were found that analysed the influence that HM has on BI in an organisational context. Such studies would have been helpful for comparative purposes to assess whether the HM construct's influence on BI in an organisational setting is significantly different to that in a consumer setting.

### **Proposition 7: Habit has an influence on the behavioral intention to use Bitcoin**

From Table 5.28, there is an above average (0.6726) positive linear relationship between habit and the behavioural dimension. The findings suggest that an increase in the habit value has a good probability of being associated with an increase in the behavioural intention to use Bitcoin.

### **Proposition 8: Trust has an influence on the behavioural intention to use Bitcoin**

From Table 5.28, there is an average (0.5378) positive linear relationship between trust and the behavioural dimension. An increase in the trust value has a good probability of being associated with an increase in the behavioural intention to use Bitcoin.

The positive correlation indicates that the trust construct, a construct that does not form part of the original UTAUT2 model, is a considerable driver on the behaviour intention to use Bitcoin.

Of all the constructs trust demonstrated to be the construct that had the highest influence on the behaviour intention to use Bitcoin. The results therefore confirms Selgin's (1994), Simmel and Frisby's (2004), Zhou's (2012b) and Slade et al.'s (2013) hypothesis as delineated in the literature review about the role trust plays in any monetary system.

**Proposition 9: The effect of habit on behaviour intention is higher amongst older participants compared to their younger counterparts**

**Table 6.1:** Summary of parameter estimates of the behaviour intention and habit constructs relationship for all age categories

Gender group		Intercept	Habit
<33 years	Parameter	2.325	0.773
	p-value	0.0059	0.0043
33-42 years	Parameter	2.175	0.743
	p-value	0.0043	0.0027
>42 years	Parameter	3.318	0.484
	p-value	0.0031	0.2277

From Table 6.1 above it can be observed that the age categories of respondents younger than 33 years of age and those that are between 33 and 42 years of age delivered significant parameter coefficients ( $p < 0.05$ ). The age category of respondent older than 42 years of age however did not deliver a significant model ( $p = 0.2277$ ).

Figure 5.27 demonstrates each age category's respective regression line on a grouped bivariate plot. From Figure 5.27 it can be observed that the age category of respondents older than 42 years of age has a significantly lower gradient compared to the other two age categories. It therefore appears that older respondents have a diminishing effect on the habit and behaviour intention relationship. This can however not be confirmed due to the model not being significant.

The other two age categories did not produce a significant moderating effect on the habit and behaviour intention relationship.

The researcher therefore believes that age does not play a significant role in the habit and behaviour intention relationship. The proposition will however have to be tested with a larger sample size.

**Proposition 10: The effect of habit on behaviour intention is higher amongst male participants compared to their female counterparts**

**Table 6.2: Summary parameter estimates of the behaviour intention and habit constructs relationship for all gender categories**

Gender group		Intercept	Habit
Female	Parameter	2.036	0.816
	p-value	0.0092	0.0076
Male	Parameter	2.713	0.656
	p-value	<0.0001	0.0002

From Table 6.2 above it can be observed that both gender categories delivered significant parameter estimates ( $p < 0.05$ ). Both categories' intercepts and gradients are significantly different from zero.

It is concluded that the effect of female respondents enhances the influence of habit upon the behaviour dimension. The effect of the male respondents diminishes the influence of habit upon the behaviour dimension.

## CHAPTER:7 CONCLUSION

This research study examined the factors that influence Bitcoin adoption in small to medium sized businesses using an adapted version of UTAUT2 model. A trust construct was added to the standard model, which is in line with Venkatesh et al.'s (2012) recommendation of testing the model with additional mechanisms to increase its predicative capability. The findings of the study indicate that trust, price value, performance expectancy, and habit all played a significant role in the behavior intention to adopt Bitcoin.

Allio (2005) argued that one of the most effective management tools is simplicity. The researcher therefore recommends that SMEs only focus on the four key determinants identified in this study, namely performance expectancy, price value, habit and trust, as these constructs have demonstrated the most significant influence on the behaviour intention to use cryptocurrencies.

The following section will demonstrate how managers can use performance expectancy to improve the behaviour intention to use Bitcoin in their organisations. It is imperative for managers to recognise that each of the UTAUT2 constructs consists of sub-determinants, for example the performance expectancy construct consists of three determinants (Thompson et al., 1991). The first determinant namely job fit refers to a technology's ability to assist the user in improving his/her job work performance. The second determinant termed complexity refers to the degree to which technology is perceived as being complicated to use and understand. The final determinant, namely consequences refers to the future consequences and potential "pay-off" associated with introducing the technology.

When considering payment systems, several studies emphasised that transaction speed is an important determining factor when it comes to selecting payment channels and partners. These include a study by Liao and Cheung (2002) which examined consumer attitudes towards internet based e-banking system. The study found that transaction speed was an important attribute of e-banking systems and that participants valued fast real-time processing. Liao and Cheung (2002) further emphasised that in advanced societies, speed of service has become a non-negotiable order winner with disqualifying potential. Another study by L. Chen and Nath (2008) emphasised that payment processing service providers and consumers

both agreed that transaction speed is a determining factor in the adoption of mobile payment systems.

Although managers have limited control over the actual functioning of the Bitcoin payment system, they do have choice over the cryptocurrency wallet to use. A cryptocurrency wallet is a third-party software-based “virtual container” where cryptocurrency users can store information pertaining to their cryptocurrencies in (Bryans, 2014). A wide range of cryptocurrency wallets are currently available, each conferring a particular combination of features and functionality. Wallet features range from basic, such as the payment of beneficiaries, to more advanced services such as the integration with other payment platforms. Selecting the appropriate Bitcoin wallet provider can therefore facilitate the behaviour intention to use cryptocurrencies by enhancing job fit and reducing the complexity for the user.

Like the PE construct, the trust construct also consists of multiple sub-determinants. Peters, Covello and McCallum (1997) argued that sub-determinants for trust are knowledge, expertise, openness, honesty, concern and care. Clarifying each of the constructs and understanding the underlying determinants provides business leaders with valuable insights with regard to the salient factors that drive technology acceptance. With this knowledge, managers can make more informed decisions, implement targeted interventions and channel resources more effectively to streamline the adoption of cryptocurrencies in their organisations.

Sun and Bhattacharjee (2011) argued that the UTAUT models and studies exclude organisational factors therefore hindering its explanatory ability in an organisational context. Although the researcher agrees with this statement, the researcher believes that the UTAUT models and theories continue to provide valuable insight, and should not be used in isolation, but as strategic foresight lenses to navigate through the uncertainties brought about by the cryptocurrency megatrend.

## **7.1 Limitations of the study**

This section details the limitations of this study:

- The largest limitation to this research study was the small sample size. Due to the large number of constructs in the UTAUT2 model, and with each construct consisting of a subset of multiple questions, a much larger sample

size was required to accurately test the predictive capability of the UTAUT2 model and to make any inferential conclusions about the larger population.

- Despite the UTAUT2 model's flexibility and consisting of many different constructs to test

## **7.2 Suggestions for future research**

Based on the research study and the limitations experienced, the following areas for future research are suggested:

- The study demonstrated that the trust construct had significant explanatory power in the behavior intention to use Bitcoin. It is therefore recommended that future studies continue to explore and test new constructs in order to improve the overall predictive capability of the model.
- The research study sample consisted primarily of small to medium sized businesses located in developed economies (United States and Canada). An interesting research area would be to conduct the study in developing economies for example South Africa, India and Kenya and compare it to the findings of this study.

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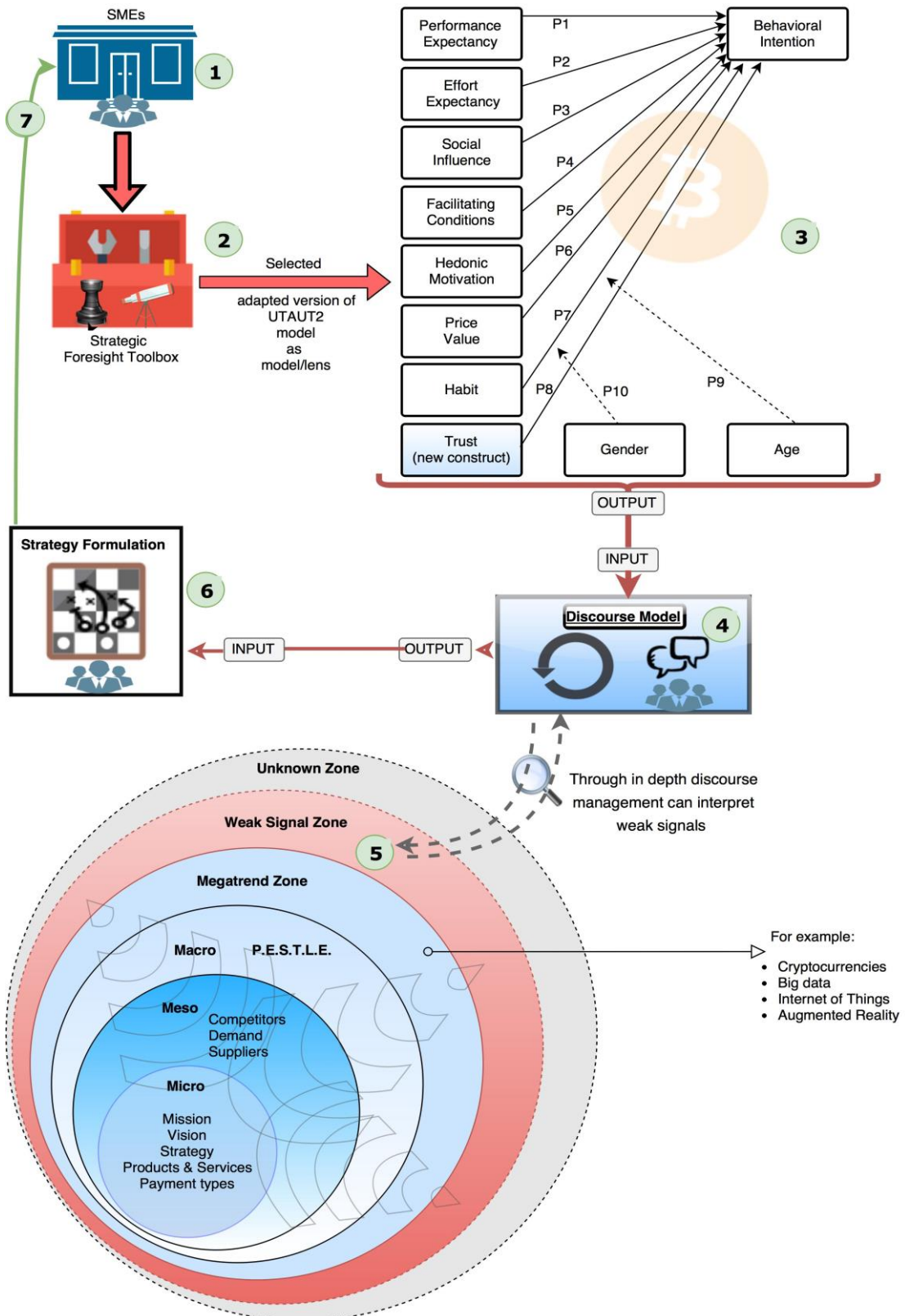
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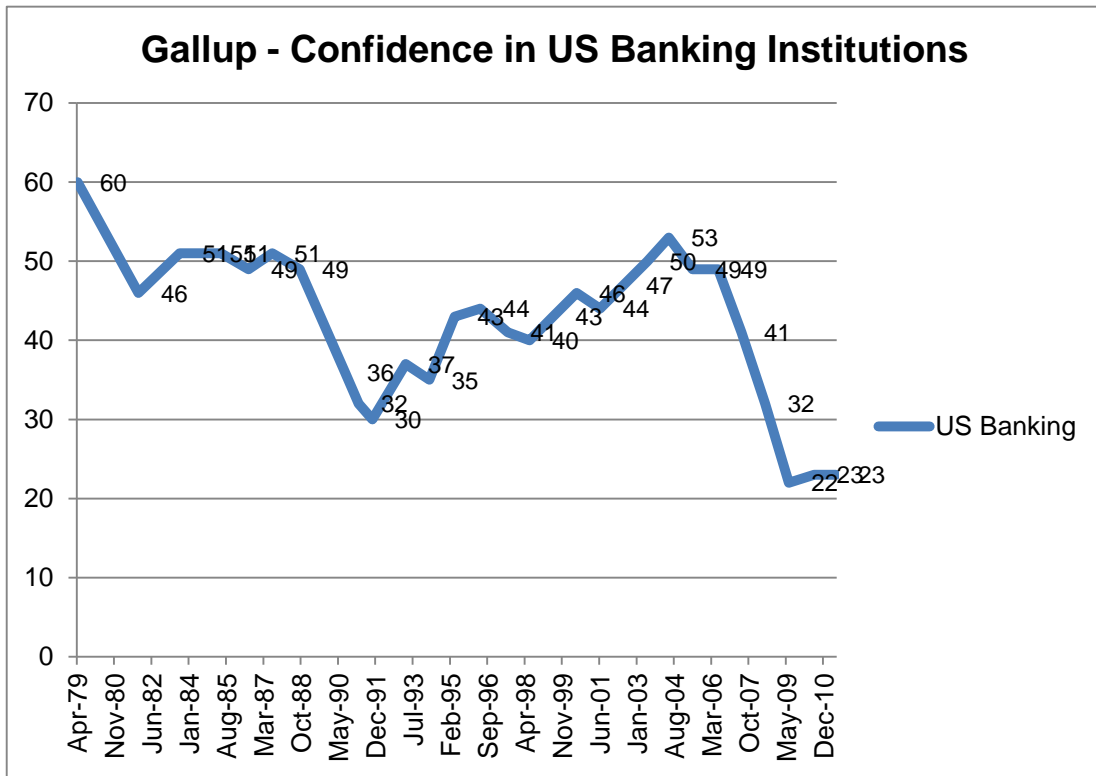


# APPENDICES

## Annexure A: Using UTAUT2 as a strategic planning tool

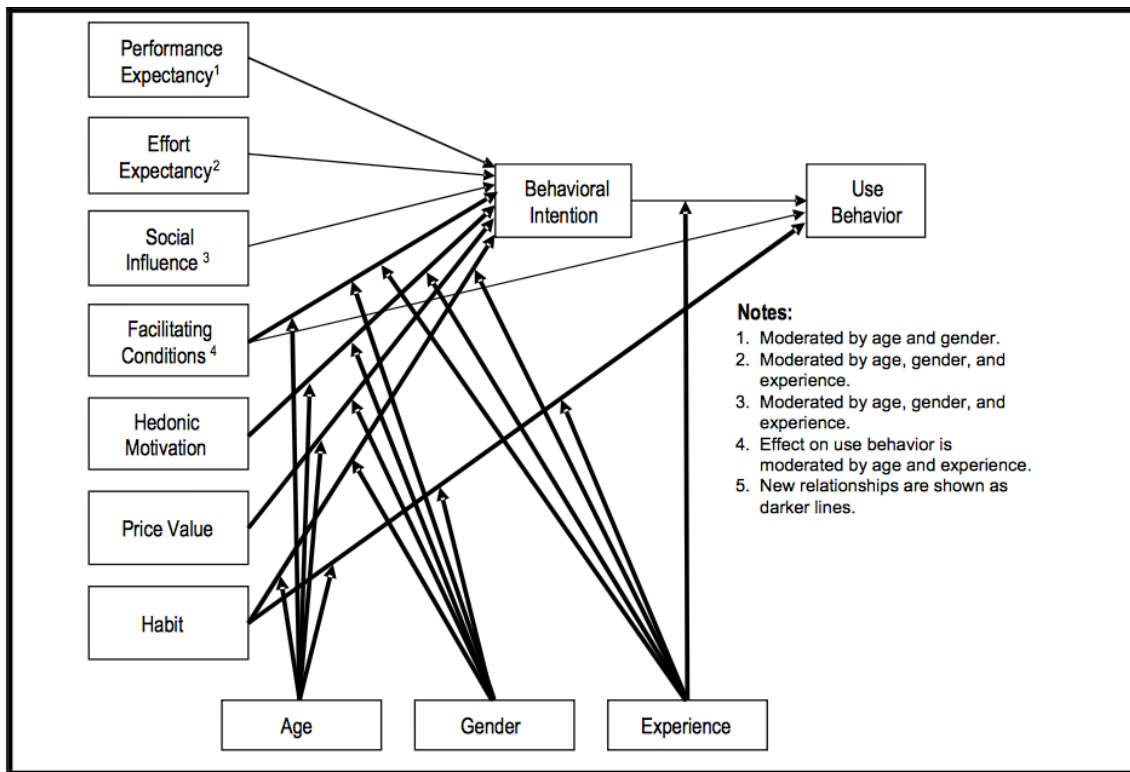


## Annexure B: Gallup Chart illustrating confidence in US Banking Institutions

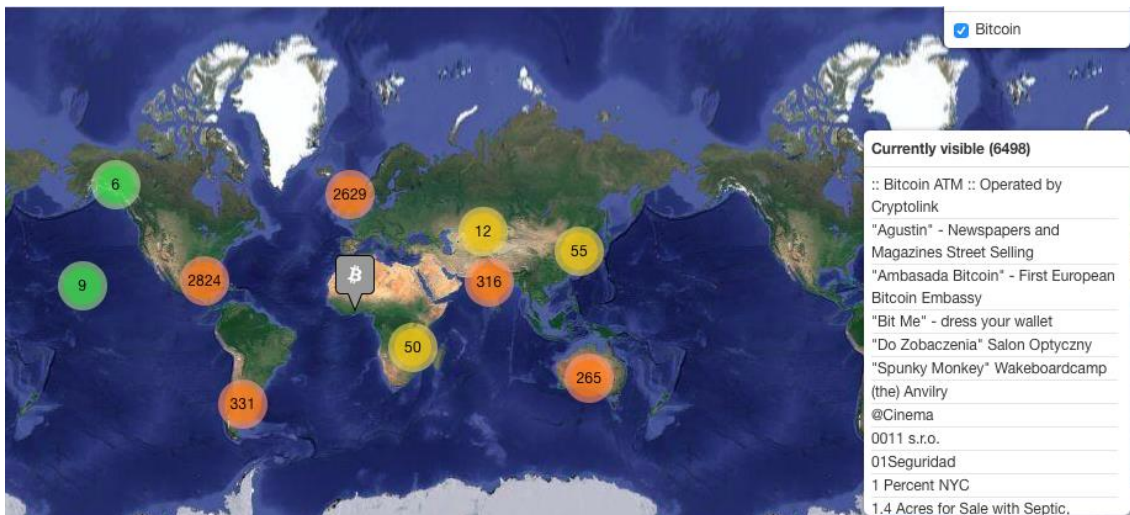


Source: <http://www.gallup.com/>

## Annexure C: UTAUT2 model

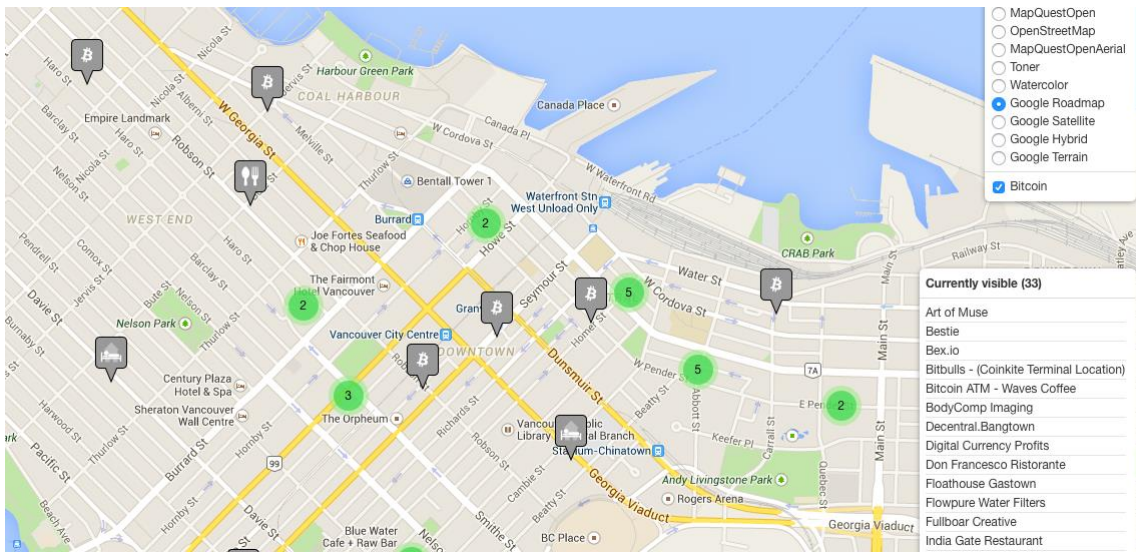


## Annexure D - Global view of Bitcoin merchants



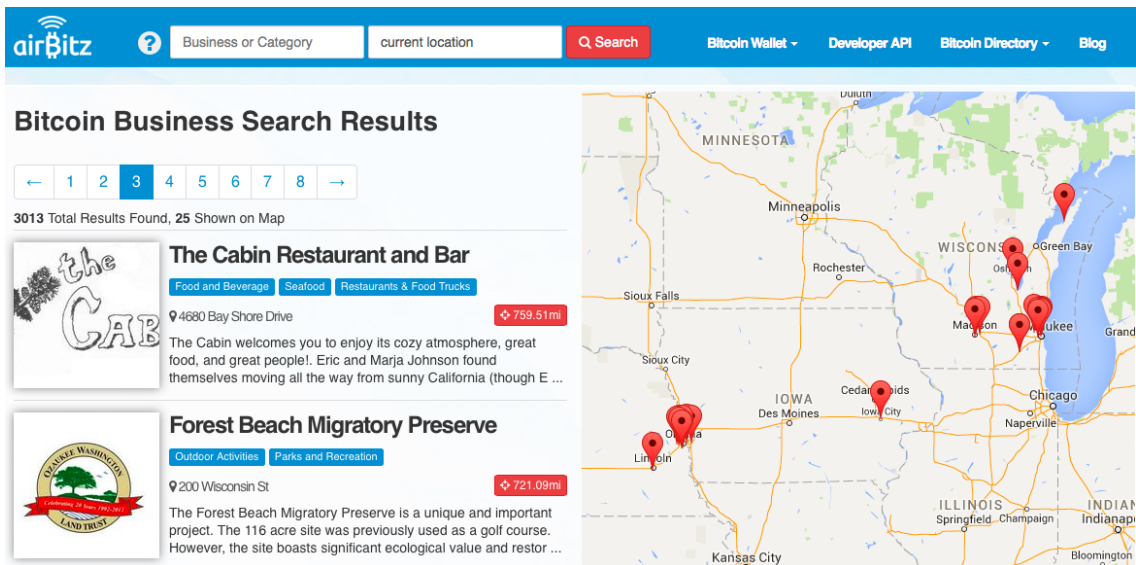
Source: Coinmap.org

## Annexure E: Street level view of merchants that accept Bitcoin



Source: Coinmap.org

## Annexure F: Airbitz.co's Bitcoin directory



Source: Airbitz.co

## Annexure G: Final Google Forms Questionnaire

### Google Forms Questionnaire:

Gender:

Age:

Does your businesses currently use Bitcoin?

Question 11: The amount of regular customers using Bitcoin has increased over the last 12 months

Question 12: The amount of new customers using Bitcoin has increased over the last 12 months

### Performance Expectancy

Question 1 - I find Bitcoin useful in my business

Question 2: Bitcoin enables faster transaction processing in my business

Question 3: I am able to process more transactions through using Bitcoin

Question 4: If I use Bitcoin, I will increase my business profitability

### Effort Expectancy

Question 5: Using Bitcoin as a method of payment is clear and understandable to me

Question 6: It is easy for me to become skillful at using Bitcoin

Question 7: I find Bitcoin easy to use

Question 8: Learning to use Bitcoin is easy for me

Question 9: My customers find Bitcoin easy to use

### **Social Influence**

Question 10: My customers have asked me to include Bitcoin as a payment method

Question 13 People who influence my behavior think that I should use Bitcoin

Question 14: People who are important to me think that I should use Bitcoin

Question 15: Senior management of this business have been supportive in the use of Bitcoin

Question 16: In general, the organisation has supported the use of Bitcoin

### **Facilitating Conditions**

Question 17: I have the resources necessary to use Bitcoin

Question 18: I have the knowledge necessary to use Bitcoin

Question 19: Bitcoin is compatible with other payment systems I use

Question 20: When I have experienced issues with Bitcoin it was resolved easily and timeously

### **Price Value**

Question 21: Bitcoin transaction charges/fees are reasonably priced

Question 22: The use of Bitcoin provides significant savings in transactions fees

Question 23: At the current transaction cost, Bitcoin provides good value

Question 24 : The Bitcoin transaction costs beared by customers are reasonable

Question 25 : For the customer the cost of using Bitcoin is comparable to other forms of payment

### **Behavior Intention**

Question 26 : I want to use Bitcoin instead of traditional money

Question 27 : I plan to use Bitcoin in the next 6 to 12 months

Question 28 : I prefer to use Bitcoin for payments

Question 29 : If Bitcoin is not available as a payment method at suppliers and external vendors, I will request it

### **Hedonic**

Question 30 : Customers derive great pleasure when transacting in Bitcoin

Question 31 : Customers find using Bitcoin enjoyable

Question 32 : I have had positive feedback from customers being able to use Bitcoin

Question 33 : I have had positive feedback on the ease of use of Bitcoin in my business

### **Habit**

Question 34 : The use of Bitcoin has become a habit for me

Question 35 : I am addicted to using Bitcoin

Question 36 : I must use Bitcoin

### **Trust**

Question 37 : Bitcoin has high integrity



Question 38 : Bitcoin can be trusted completely

Question 39 : The Bitcoin platform is perfectly honest and truthful

Question 40 : Bitcoin transactions are more secure than credit card transactions

