

Consumer Trust in Digital Currency Enabled Transactions

Alex Zarifis¹, Leonidas Efthymiou¹, Xusen Cheng², and Salomi Demetriou¹

¹ University of Nicosia, UNIC Online, Makedonitisa 46, Egomi, 1700 Nicosia, Cyprus

a.zarifis@unic-online.com

² Department of E-Business, School of Information Technology and Management, University of International Business and Economics, Beijing, China

Abstract. This research applies theories of trust from e-commerce to digital currencies. In particular trust in business to consumer transactions carried out using digital currencies such as Bitcoin is explored. A model of online trust is considered to be valid in this different transaction context but the significance of each construct changes and some extensions are necessary. In particular the role of institutional trust in transactions has differences that are explored, and new constructs are suggested. These are incorporated into a new digital currency enabled transactions trust model.

Keywords: Digital currency, Trust, Bitcoin, E-commerce, Business to consumer

1 Introduction

Digital currencies have been with us for decades in various forms. They can act as an online exchange medium allowing transfers of value [1] or a store of value without requiring the traditional banking channels. A number of other terms are used to describe them such as virtual currencies [2] and cryptocurrencies [3]. Each of these terms indicates a different perspective on the same theme. The term digital currencies suggest these currencies share many characteristics and functions of a government-backed currency such as the U.S. dollar. The term virtual currency originally referred to transaction methods used in virtual or online communities and suggests these currencies can fulfil some functions of a national currency but do not have intrinsic value. Lastly the term cryptocurrencies expresses the technical underpinnings of these currencies rather than their application.

Digital currencies have become more prominent in recent years primarily due to the capabilities and popularity of Bitcoin. It is considered by many, including the chairman of the Federal Reserve Ben Bernanke to have the potential to profoundly impact payment systems in the long run [4]. Bitcoin, which was created in 2009, is a peer-to-peer math-based open-source digital currency operated by nongovernmental entities [5]. Litecoin and Ripple share similar characteristics to Bitcoin while other digital currencies such as Anything Point, Facebook Credits, Amazon Coin and Linden dollars

are significantly different for a number of reasons including that they are controlled centrally and they are not based on peer-to-peer technology. This research focuses on Bitcoin. The potential of digital currencies and Bitcoin especially are a topic of research in many areas including management, computer science, economics and law. The level of maturity of this area has parallels to research in e-commerce at the start of the century. While there has been extensive progress in all aspects there is still a significant degree of ambiguity.

One of the parallels to e-commerce is the role of trust in digital currencies. There are some aspects of trust that are related to the fundamental nature of digital currencies and the payment method and others that are related to the current legal grey area. This grey area is due to digital currencies not being regulated as a currency but at the same time not outlawed in most countries. The dimensions of trust based on the fundamental nature of digital currencies are expected to be more consistent over time as the process and experience the consumer is exposed to while carrying out a transaction in this way is not expected to fundamentally change. The influence of the legal status however may change fundamentally, and this would cause a significant change in consumer trust. Currently it is considered taxable property in the USA [6], Germany [7] and many other countries [8]. The legal and regulatory particularities of digital currencies come from their internet birth. Unlike most financial institutions that were created in a specific country, with a specific regulatory framework and then expanded onto the internet taking those regulations onto their online operations digital currencies exist almost entirely online. Trust is different in the many different aspects of digital currencies. For example, it is different for someone speculating, a business making a payment to another business or a consumer making a purchase. This research explores the later, consumer trust in digital currency mediated transactions. In this context the consumer does not necessarily own Bitcoin before making the transaction but may use a government-backed currency that is turned into Bitcoin by an intermediary.

2 Digital Currency Enabled Transactions

Bitcoin is a currency and a payment system [5]. It is considered by many including the chairman of the Federal Reserve as mentioned above, that the most enticing aspect of Bitcoin may not be the currency and speculating its value but the payment system [6]. A number of factors such as the ubiquitous, in many countries, smartphones suggest suitable network effects exist currently for this payment system to flourish [7, 8]. While some may see two possible scenarios, one where Bitcoin replaces government-backed currencies and one where it fails, this need not be the case with the payment system as many organizations accept a number of payment systems alongside each other. For example, United Airlines can accept eleven different payment methods [9]. As with digital currencies there are a number of alternative terms or classifications referring to the payment process. They can be considered under the broad classification of informal money transfers [1] that are often anonymous. This broad classification includes all transactions apart from those mediated by banks and other financial institutions such as Western Union and Money Gram. Under this classification digital currency enabled transactions are in competition with Paypal, e-gold, GoldMoney, BankServ and cashU [1].

Unlike some of those informal methods digital currencies such as Bitcoin keep a permanent log of all transactions which makes them more secure and traceable. This is due to the peer-to-peer technology enabling it.

From the consumers perspective they need to download Bitcoin management software usually referred to as the Bitcoin wallet that allows them to be part of the peer-to-peer network. With this wallet the consumer can send Bitcoins to a retailer or any other Bitcoin user by adding a hash, an amount for the transfer and the public key of the wallet receiving the payment. If the consumer and the retailer want to avoid possible problems caused by the fluctuations in the Bitcoin value they can use a government-based currency such as the Euro to represent the value. The amount transferred can be pegged to the Euro by an intermediary, an escrow mechanism, ensuring the retailer receives the agreed amount from the consumer.

In terms of the breadth of transactions possible with digital currencies there are three schemes 'closed-flow', 'open-flow' and 'hybrid-flow' [12]. The first is limited to a virtual environment such as a game while the second allows government-backed currencies to be used to purchase them or be bought by them and can be used broadly outside of a specific virtual community. The third has all the characteristics of 'open-flow' apart from the ability to transfer the digital currency back to government-backed currency. Bitcoin falls into the 'open-flow' category. There are a number of transactions enabled by Bitcoin starting from how the Bitcoins are attained. This can happen in three typical ways: The first way is to mine them using specialized software and increasingly, specialized hardware. The second way is to receive a payment in Bitcoin. The third is to purchase Bitcoin from an individual that owns them with another currency [12].

While there are many advantages and disadvantages the primary advantages that could be considered its 'Unique Selling Points' is firstly the minimal or no transaction cost and secondly the immediacy of the transaction. The low transaction cost is especially useful to retailers that receive micropayments where the transaction costs are often proportionally larger. Many retailers use an intermediary that receives the Bitcoin payment from the customer and sends them the equivalent in a government-backed currency.

2.1 Trust in Transactions

Trust is necessary in our daily lives. Little can be achieved without trusting people and collaborating. This is especially important in business to consumer e-commerce where there are additional aspects of the collaboration that require trust [13–15]. The consumer is not physically in a shop, they cannot see the person who will process their purchase, they cannot touch the product they will receive, and they will not receive the product immediately after they have paid. The absence of these reassuring characteristics reduces trust. The regulation however of transaction online is very similar to the regulations of transactions offline. Financial transfers by formal, traditional methods have a number of similar requirements. These vary from country to country but they usually include keeping customer records, reporting suspicious activities, reporting transfers over a certain amount, such as \$10000 for the USA and a requirement to know who the customer is [1]. A useful definition of trust [16] states: 'trust is an individual's general willingness to trust others,

and actual trust or trusting behaviours'. There is therefore willingness and behaviour. These two constituent parts are also identified in models made especially for online transactions where they are referred to as 'trusting beliefs' and 'trusting intention' [14] or similarly 'trust-worthiness' and 'trusting behaviour' [18]. Trust has also been linked to the Technology Acceptance Model in order to explain online consumer behaviour [19–21].

Institution based trust is a more sociological aspect of trust as it is the beliefs of an individual in relation to an institution not a particular retailer. Its basis in sociology is unlike most constructs of trust that have their basis in psychology. It has been used to assess the individuals trust in the institutions of offline retail, 2D website online retail and retail in Collaborative Virtual Environments [21]. As a sociological construct it expects that certain social structural conditions such as legal structures and technological safeguards enhance trust. It is considered to have two dimensions structural assurance and situational normality. Structural assurance refers to guarantees, laws, regulations and other processes in place. Situational normality refers to an environment where there is competence, benevolence and integrity [14, 22, 23]. The sociological and psychological dimension of trust can be used alongside each other [14]. This model shows how disposition to trust and institution-based trust lead to trusting belief which in turn leads to trusting intentions which finally result in trust related behaviours [14]. Disposition to trust is the general propensity to trust others in general. This model follows the theory of reasoned action [24] where beliefs lead to actions thus trusting beliefs lead to trusting intentions and finally trust related behaviours.

2.2 Trust in Digital Currency Enabled Transactions

Trust in this form of transaction can be considered to combine trust in a number of constituent dimensions. Some of these dimensions have a positive influence on trust while others have a negative influence. As there is a high degree of variation between digital currencies and the technology and processes that enable them there is also variation in the consumer trust. For example, in terms of regulation some Bitcoin Exchanges made extensive efforts to self-regulate in order to enhance trust [25] while other Exchanges do not seem to consider trustworthiness as a priority. The latter appear to consider convenience more important, and that self-regulation would decrease the level of convenience and should therefore be avoided [25].

In addition to self-regulation another factor that influences trust positively is the absolute limit in the number of Bitcoins that can ever exist at 21 million. This is related to it not being controlled by a central authority such as a national bank that would have the power to debase its value for short term national interests that may not however be in the interest of a particular saver. The perfect public ledger that offers a perfect record of source and destination wallets and wallet balance can be checked by anyone gives a high degree of transparency that encourage the consumer to believe they understand the transaction process they are involved in. An additional benefit of the ledger is that it limits the ability to make transactions anonymously a characteristic of many digital currencies that made them untrustworthy. Furthermore, despite the volatility, the price of Bitcoin has a long-term positive trend. This shows that Bitcoin has resilience and this

has a positive influence on trust. These factors encourage consumers to believe in a scenario where Bitcoin becomes a 'true currency' over the negative scenario that it collapses and ceases to exist [26].

The characteristics of Bitcoin that reduce consumer trust have had extensive coverage by research, industry press and the broader press in general. Firstly, drawing from the innovation literature and the technology adoption lifecycle [27], the short lifespan of this form of transaction so far suggests only innovators who tend to be more risk orientated and a small minority have adopted this. The short-term volatility further attracts the minority of risk takers and repulses the larger risk averse majority. Furthermore, the possibility of a critical flaw in the core technology underpinning Bitcoin that may emerge in the future is a deterrent [26]. Beyond the technology a possible vulnerability is that the decentralized, peer-to-peer structure requires a majority of honest users or nodes, at least 51 % to block malicious actions. There are a number of organizations that could achieve this percentage either on their own or by collaborating as a cartel. Once a majority is achieved it could be used to the detriment of the rest of the Bitcoin users. An additional negative influence is the lack of a government or precious metal to support the currency. This can be perceived as a drawback as there are neither of these safety nets. Lastly the disruptive and lucrative prospects of Bitcoin make it a potential target for governments and hackers. Mt. Gox had several difficulties with governments and was attacked by hackers numerous times before its apparent demise [28].

Institutional trust is influenced by a number of factors as mentioned in Sect. 2.1. For Bitcoin in particular in addition to the legal and regulatory framework there is also the degree of adoption from organizations. As more organizations, particularly more reputable and trustworthy organizations, adopt digital currencies the institutional trust may increase. An example of this is the adoption by Virgin Galactic, Wordpress, Overstock.com and Tigerdirect.com. Furthermore Bitcoin-related projects such as the Bitcoin Investment Trust and BitPremier are beneficial in this respect. At the same time whenever an organization exits either voluntarily or due to failing such as Mt. Gox and Flexcoin the digital currency ecosystem is weakened.

With three peer-to-peer math-based open-source nongovernmental digital currencies Bitcoin, Litecoin and Ripple sharing a significant degree of success and the possibility of more joining them an ecosystem of such currencies can emerge [4]. Common properties including common regulation would be necessary for this. While Bitcoin and Bitcoin Exchanges are seen as alternatives to banks and traditional financial institutions one scenario sees them evolving into similarly regulated and trusted institutions. There have been some steps in this direction. For example, Mt. Gox partnered with an organization that was regulated by the financial regulator related to the U.S. Department of Treasury FinCEN [28].

2.3 Proposed Model

The model of trust developed where disposition to trust and institution-based trust lead to trusting belief which in turn leads to trusting intentions and finally trust related behaviours [14] has been widely used and validated [21, 29, 30]. The constituent construct of institutional trust has also been widely used and validated in the typical

e-commerce context but also in e-commerce contexts with particular characteristics such as Collaborative Virtual Environments [21]. Institutional trust is a social construct used alongside psychological constructs in order to utilize both of these complementary perspectives.

The social context of a consumer making a purchase using digital currencies has some differences to using traditional payment methods. If a VISA or MasterCard are used for the purchase, they are constituent institutions that make up the institutional trust. Other constituent parts can be their regulators, technologies implementing the transaction and the government-backed currency being used. When Bitcoin is being used by the consumer the card used is replaced by the Bitcoin wallet and possibly a third-party Bitcoin payment platform such as BitPay. This third-party may also offer escrow services to absorb the Bitcoin volatility. The regulators will also be different. They vary from country to country; they depend on the nature of the transaction and particular arrangement made by the payment platform to self-regulate. In terms of technology, in addition to the payment method and the particular organization involved, the underlying technological foundation is also important. Lastly, we have the broader context of digital currencies, the level of their adoption and reputation. These additional parameters were added to the web trust model [14] to create a model of consumer trust in digital currency enabled transactions. The broader digital currency context can be considered part of the situational normality construct of institutional trust while the others would fall under structural assurance.

3 Methodology

The model developed in section two is based on the literature review. The related issues were further explored using qualitative methods before the final model was tested and validated using quantitative methods. The qualitative data collection and analysis are covered in the research presented here in sections four and five while the quantitative data collection and analysis will be presented in subsequent research.

The qualitative data was collected in two stages, firstly by focus group and secondly by interview. This approach was used in order to start the data collection with little structure with the focus groups in order to allow beliefs to emerge on any aspect the participants wanted to raise and then to add more structure and focus with the interview in order to explore the beliefs that emerged in the focus groups in more detail. In addition to the lower level of structure suitable for the exploratory stage focus groups are considered to be a more natural setting that elicit more natural conversations that help participants engage with the issues and provide deeper insights than alternative methods. The weaknesses of focus groups centre on the influence of the participants on each other that can cause groupthink and social desirability bias [31].

The second stage of the qualitative research the interviews were also exploratory but there was a narrower and more in-depth focus achieved firstly from the insight gained from the previous stage and secondly from the direction given by the interviewer. In addition to this the interviews mitigated the weaknesses of the focus group that emanated from participants influencing each other as that social dynamic was no longer present.

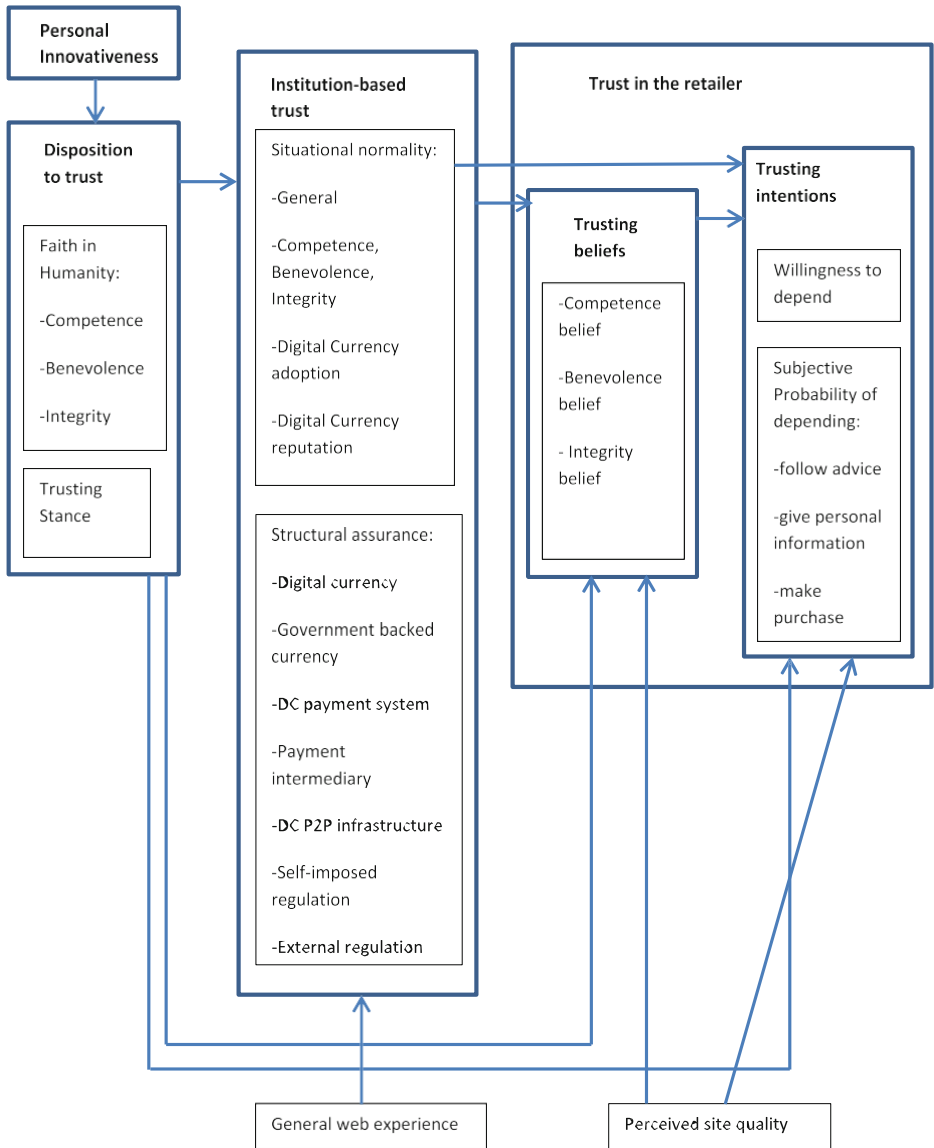


Fig. 1. Digital currency enabled transactions trust model, an extension of the web trust model [9]

4 Data Collection

The focus groups were carried out by an experienced moderator in a computer lab on the grounds of the University of Nicosia. There were four groups of nine to thirteen participants. In total there were 41 participants who were paid five euro for their

participation. There were 23 male and 18 female participants. From the participants 26 had a higher education qualification. The ages were 18 to 36. Experience with digital currencies was not requested as the sample should represent the broader population as far as possible where most people have not used digital currencies. As most participants did not have experience a five-minute demonstration was given before the focus group. The demonstration involved making a purchase using Bitcoin. While this research attempts to explore trust in transactions enabled by digital currencies in general a specific currency was needed to illustrate the topics and to give the participant something specific, they can think about and discuss. The moderator had twelve prompts based on the proposed digital currency enabled trust model illustrated in Fig. 1 with most of them focused on the institution-based trust. The duration was between forty and fifty minutes and the responses were recorded and later transcribed.

The interviews were carried out in a meeting room on the grounds of the University of Nicosia. There were twelve participants, six male and six female. The participants were paid twenty euro for their time. Five participants had higher education qualifications. The ages were 23 to 34. Experience with digital currencies was requested at this stage so that participants could add a deeper understanding to the issues identified in the focus groups. The experience of the participants was with Bitcoin. There were fifteen prepared questions after which the interviewees were encouraged to add something that had not been covered. The interviews took 25 to 40 min.

5 Data Analysis

The focus group data was entered to QSR NVivo 9 and template analysis was used [31]. The templates were based on the proposed model developed from the literature review. The interviews were analysed in the same way but the templates had been refined by the focus groups and some new issues were added. The qualitative findings from the focus groups will be summarized first followed by the interviews. The data collection was primarily centred on institution-based trust. The first issues were related to situational normality while the second group were related to structural assurance.

The first issue in situational normality included competence, benevolence and integrity. There was an extensive discussion on these topics and their role in trusting digital currency enabled transactions. A large part of the discussion linked this topic to the level of maturity of the Bitcoin which is the second issue of situational normality. While these issues are identified separately in order to explore them further, they appear to be interrelated. In terms of competence one participant commented 'I heard there was a big problem and people lost their money', male 18. Another added 'it has happened a few times, these Bitcoin banks close shop and people lose their Bitcoins', male 31. Typical comments related to benevolence and integrity were 'what I hear about Bitcoin is that it is used for money laundering, I don't know if that is true but it makes you think twice' male, 23 and 'I am sure there are many legitimate companies but there seem to be some people that want to use this new thing to trick people', female, 22. The second issue of situational normality was the digital currency adoption. The purpose here was to explore the influence the degree of adoption had on trust. The participants comments suggested the relatively low level of adoption and market

saturation was a factor. One participant commented 'none of my friends use it so I don't think it is something I need' female, 28, and another similar comment was 'I haven't seen the option to pay with Bitcoin anywhere, so I haven't even thought about paying with it', female, 23. The third issue in situational normality was the digital currency reputation. Here those that used Bitcoin seemed to be more positive 'you can lose your money if you have lots of money in Bitcoin but you would have to be pretty unlucky to lose it if you were just buying something' male, 28 and a more negative perspective from those that have not used Bitcoin 'I think the reputation is not that good at the moment, it might change in the future', male, 24. There were some comments about the lack of a strong brand that consumers can trust 'if Google or Apple were behind it I would be more inclined to use it because I have used many things from them and they are usually good', female 19. The fourth and last aspect of situational normality were the more general issues that were not included in the three previous categories. While on the one hand a model must accurately and concisely explain what is being modelled there needs to be an acknowledgement in this case that a wide range of factors may influence the level of situational normality for a consumer and that an exhaustive list of all scenarios would be difficult. The focus group participants considered the situation in the banking sector as a factor. One comment to this effect was 'when there was the banking crisis lots of people used Bitcoin because they did not know if the banks would survive', female 22. Another comment was more focused on the condition of the consumers personal computer 'apart from Bitcoin sometimes I do not want to use my computer to pay for something because I get pop ups, it freezes, it is slow and I think I might have a virus', male 31.

In terms of the second group of institution-based trust, structural assurance the first issue was related to the digital currency itself. On this topic there seemed to be three camps, those positive, those negative and those that would like to reserve their judgements until they have more evidence and a longer track record to scrutinize. A positive comment which was once more from someone who has used Bitcoin was 'it is really clever, they have thought of everything' male, 21, the more negative 'I use my Visa and sometimes I use Paypal so I don't need this', male 28 and 'I do not like the idea that my money would be a bit of code on my computer', female, 21. A typical comment from those on the fence was 'I have not used it yet so I don't know', male 26. The second dimension of structural assurance was the government backed currency. This issue was raised as a question whether a government backing or not backing a currency would influence their decision. Most of the comments suggested it was an advantage. The opinion held by some that it is an advantage not to have government involved because it will reduce the value of the currency on purpose in order to deter saving was not held by anyone in the focus group. This is an example of how some issues that may have merit are not relevant to the majority of consumers. A typical comment on this issue was 'if you have the euro or the pound and you have a whole government protecting that currency it must help that currency', female 28. The third part of structural assurance was the digital currency payment system. Here the difference between saving in Bitcoin and making a transaction in Bitcoin emerged again. One comment to this effect in addition to the similar one mentioned earlier was 'if you are just paying for something and you pay with euro and Bitcoin is just used to pay the shop then you would have to be pretty unlucky for something to lose your money

because there was a problem with the Bitcoin', female, 26. The fourth part of structural assurance was the payment intermediary. This was linked to the previous issue as the previous quote illustrates. Overall, the participants were positive about the intermediary both because it limits the risk due to the process followed as the previous quote illustrated but also because the concept of a payment intermediary such as Mastercard, VISA, Western Union and Paypal is common in transactions. An example given was 'I don't know who these intermediaries are but if I used one and everything went smoothly then I would use them again. It is like Ebay one time I had a problem they sorted it out so I keep using them', female 28. The fifth part of structural assurance was the digital currency peer to peer infrastructure. While this is an integral part of this transaction method and thus important to cover most participants were not clear on this issue and requested further explanation from the moderator. This extensive explanation from the moderator may have influenced the beliefs put forward by the participants. Most participants were not sure about the implications of this and how it would influence their trust in the transaction. This illustrates how trust is not based on a technology or process but consumer perceptions of a technology or process. One participant commented 'it sounds clever but is it safe', male 28. The sixth part of structural assurance was the self-imposed regulation. This was appreciated by most participants although for some it was not enough, and they felt more regulation should be in place. One participant's comment was 'if they are regulating themselves that sounds good, but it will not stop someone who wants to steal money someone else should check them', female 23. The seventh part of structural assurance was the external regulation. The discussion on self-regulation moved to external regulation in all cases without the moderator's intervention. All participants that expressed a belief on the matter were positive towards more regulation. One participant's comments summed up the sentiment: 'they should have the same laws as banks', female 23.

The data from the interviews illustrated similar beliefs on most topics. There was one significant difference with the beliefs being more positive towards Bitcoin. The focus groups showed that participants that have already used Bitcoin are more favourable towards it. This could be considered logical as the methodologies used here and in other research assume beliefs are an accurate predicate of action, but action is also a good 'predicate' of beliefs. As the sample used in the interview all had experience with Bitcoin and the views were more positive on many issues the interviews benefited from the deeper understanding of the participants but they are considered less representative of the broader population than the focus groups. There will be subsequent research using a large sample and a survey to assess the representativeness and generalizability of the model and its constructs, so this is not the purpose of the interviews.

The first issue in situational normality included competence, benevolence and integrity. The beliefs here were similar to the focus groups but more favourable. There seemed to be a belief that Bitcoin was a force for good that had some challenges rather than an enabler of fraud. One participant stated in relation to all three of these issues 'if banks were perfect then we would not use Bitcoin but the charges they make and the time it takes you to do something make me use Bitcoin. Bitcoin has very low charges; they are not greedy like banks' male, 28. Another comment more specifically on the issue of benevolence and integrity was 'if you were a thief there are probably easier ways to rob someone than to get involved with Bitcoin' female, 31. The second issue of

situational normality was the digital currency adoption. The knowledge these participants had on Bitcoin made this less important: 'I haven't had a problem so far...I think more people will use it and when they do it will be better because you will be able to use it for anything you want', female 31. The third issue in situational normality was the digital currency reputation. As with the other issues the role this played was evident but the beliefs were more positive: 'it has had good and bad coverage in the press, it depends how you look at it', male 28. The fourth and last aspect of situational normality were the more general issues that were not included in the three previous categories. In addition to the situation in the banking sector that was also mentioned in the focus groups an additional factor mentioned was the seller's website and how the seller portrayed the Bitcoin payment option: 'if I go to a website and it is not clear if they accept Bitcoin or if it is hidden in some menu, I don't want to use it. I want some encouragement from the shop, so I know they like me giving them the money in Bitcoin', male 28.

In terms of the second group of institution-based trust, structural assurance the first issue was related to the digital currency itself. Here the participants were far more positive in general. Most participants understood and appreciated some of the functionalities and advantages of digital currencies. A characteristic statement was 'Bitcoin allows me to move money very easily and quickly', male 28. The second dimension of structural assurance was the government backed currency. As with the focus groups most saw the positive side, and few saw the drawbacks. One participant said 'governments are responsible for law and order so I would trust their currency. I can trust Bitcoin too, but it needs to earn my trust' female, 23. The third part of structural assurance was the digital currency payment system. This was highly valued 'the way you can make your payments without any hassle, is what attracted me to it', male 24 and 'I think it is as safe as a bank, I trust it', male 28. The fourth part of structural assurance was the payment intermediary. This was considered a positive influence for trust as was the case with the focus groups. This was again linked with other online intermediaries that increase trust. 'I think you need someone online someone independent that you and the person you are dealing with, trust. The other person might be on the other side of the world' female, 31. The fifth part of structural assurance was the digital currency peer to peer infrastructure. More participants understood the fundamental nature of this technology but more explanation was still necessary. Participants mostly agreed that this would influence how much they would trust Bitcoin but they were not sure if it would have a positive or negative influence. One participant said 'it sounds a little strange why not have everything in one place like a bank', female 23, another was also cautious 'there is a record in many places so if one has a problem the others should be OK but viruses hit lots of computers spread all-over the world, I do not see how it is better' female, 28. The sixth part of structural assurance was the self-imposed regulation. The interviewees mostly considered that this was positive and would increase their trust. One interviewee stated 'it has to be a good thing that these Bitcoin companies are going and asking from regulators to be regulated. But how would I know which ones are doing this? Would it be on their websites. Some websites have these little signs that mean they are accredited by someone...' female 31. This participant also further emphasises that the features of the technology or the business need to be communicated in order to increase trust. The seventh part of structural

assurance was the external regulation. This was again considered a positive influence on trust. One interviewee stated 'it would be good if they were checked by a government. If I have a problem now, who could I go to? Could I take them to court or is there some loophole?', female, 28 and another added 'you might have some good companies and others that are rubbish but they should all be reliable, so you are not scared to use it' male, 23.

6 Conclusion

This research has explored the different dimensions of consumer trust in digital currency enabled transactions and related theory from the area of e-commerce identifying where it is similar and where these theories may need to be extended. A model is proposed that is an adaptation of a widely used existing model [14] to cover the different constituent parts of institutional trust. Institutional trust is posited to be significantly different to traditional transactions in e-commerce while the other constructs are posited to be the same or with marginal differences. Qualitative, exploratory research was carried out in order to confirm the relevance of the issues identified from the literature, to find any other possible issues related to institutional trust in this context and lastly to broaden our understanding of these issues. The findings from the qualitative stage offered insight into the consumers perspective on digital currency enabled transactions such as which aspects reinforce trust, which decrease trust and why. Participants that understood the technological innovations appreciated them more and considered them to positively influence trust. Participants that were less clear about the technologies were less clear about what influenced their trust and focused more on the level of adoption and preferred to wait until the situation is clear. Some aspects of the technology such as the peer-to-peer infrastructure were not widely known even by the digital currency users and had limited influence on trust. Government involvement and regulation were considered positive towards enhancing institutional trust. Retailers and the broader community of digital currencies can use the findings to increase the degree of trust consumers harbour for this transaction method.

References

1. Hett, W.: Digital currencies and the financing of terrorism. *Richmond J. Law Technol.* 15(2) (2008). <http://law.richmond.edu/jolt/v15i2/article4.pdf>
2. European Central Bank: Virtual Currency Schemes. Frankfurt am Main: European Central Bank (2012)
3. Moore, T., Christin, N.: Beware the middleman: empirical analysis of bitcoin-exchange risk. In: Sadeghi, A.-R. (ed.) *FC 2013. LNCS*, vol. 7859, pp. 25–33. Springer, Heidelberg (2013)
4. Iwamura, M., Kitamura, Y., Tsutomu, M.: Is bitcoin the only cryptocurrency in the town? *Economics of Cryptocurrency and Friedrich A. Hayek* (2014). <http://ssrn.com/abstract=2405790> or <http://dx.doi.org/10.2139/ssrn.2405790>
5. Nakamoto, S.: Bitcoin: a peer-to-peer electronic cash system (2009). <http://bitcoin.org/bitcoin.pdf>

6. Internal Revenue Service: Notice 2014-21 (2014). http://www.irs.gov/pub/irs-drop/n-14-21.pdf?utm_source=3.31.2014+Tax+Alert&utm_campaign=3.31.14+Tax+Alert&utm_medium=email
7. Gotthold, V.K., Eckert, D.: Germany recognizes Bitcoin as 'private money' (2013). <http://www.welt.de/finanzen/geldanlage/article119086297/Deutschland-erkennt-Bitcoin-als-privates-Geld-an.html>
8. Wikipedia: Legality of Bitcoins by country (2014). http://en.wikipedia.org/wiki/Legality_of_Bitcoins_by_country
9. Trautman, L.J.: Virtual currencies: bitcoin & what now after Liberty Reserve, Silk Road, and Mt. Gox? *Richmond J. Law Technol.* 20(4) (2014) <http://ssrn.com/abstract=2393537> or <http://dx.doi.org/10.2139/ssrn.2393537>
10. Garon, J.: Mortgaging the meme: lessons for financing disruptive innovation. *10 Nw. J. Tech. Intell. Prop.*, 441–442 (2012). <http://ssrn.com/abstract=1929530>
11. Bourreau, M., Marianne, V.: Cooperation for Innovation in Payment Systems: The Case of Mobile Payments, 79 *Communications and Strategies*, vol. 95 (2010). <http://ssrn.com/abstract=1810892>
12. Akins, B.W., Chapman, J.L., Gordon, J.M.: A Whole New World: Income Tax Considerations of the Bitcoin Economy, *Pittsburgh Tax Review* (2013). <http://ssrn.com/abstract=2394738>
13. Jarvenpaa, S., Knoll, K., Leidner, D.: Is anybody out there? Antecedents of trust in global virtual teams. *J. Manag. Inf. Syst.* 14, 29–64 (1998)
14. McKnight, D.H., Chervany, N.L.: What trust means in e-commerce customer relationships: an interdisciplinary conceptual typology. *Int. J. Electron. Commer.* 6, 35–59 (2002)
15. Gefen, D.: Reflections on the dimensions of trust and trustworthiness among online consumers. *ACM Sigmis Database* 33, 38–53 (2002)
16. Mayer, R.C., Davis, J.H., Schoorman, F.D.: An integrative model of organizational trust. *Acad. Manag. Rev.* 20, 709–734 (1995)
17. McKnight, D.H., Cummings, L.L., Chervany, N.L.: Initial trust in new organizational relationships. *Acad. Manag. Rev.* 23, 473–490 (1998)
18. Pearce, W.B.: Trust in interpersonal relationships. *Speech monographs*, pp. 832–835 (2007)
19. Gefen, D., Karahanna, E., Straub, D.W.: Trust and TAM in online shopping: an integrated model. *Manage. Inf. Syst. Q.* 27(1), 51–90 (2003)
20. Guo, Y., Barnes, S.: Virtual item behaviour in virtual worlds: an exploratory investigation. *Electron. Commer. Res.* 9, 77–96 (2009)
21. Zarifis, A.: *The Relative Advantage of Collaborative Virtual Environments in Multichannel Retail A thesis submitted to The University of Manchester for the degree of Doctor of Philosophy in the Faculty of Humanities* (2014)
22. Shapiro, S.P.: The social control of impersonal trust. *Am. J. Sociol.* 93(3), 623–658 (1987)
23. Zucker, L.G.: Production of trust: institutional sources of economic structure, 1840–1920. In: Staw, B.M., Cummings, L.L. (eds.) *Research in Organizational Behavior*, vol. 8, pp. 53–111. JAI Press, Greenwich (1986)
24. Fishbein, M., Ajzen, I.: *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Addison-Wesley, Reading (1975)
25. Gruber, S.M.: Trust, Identity, and Disclosure: Are Bitcoin Exchanges the Next Virtual Havens for Money Laundering and Tax Evasion? (November 13, 2013). Sarah Gruber, Note, Trust, Identity, and Disclosure: Are Bitcoin Exchanges the Next Virtual Havens for Money Laundering and Tax Evasion?, 32 *Quinnipiac L. Rev.*, 135 (2013). <http://ssrn.com/abstract=2312110>

26. Vitt, D.C.: Breaking Bitcoin: Does Cryptocurrency Exchange Activity Lead to Increased Real Activity Outside Cryptocurrency Exchanges? (2013). The Pittsburgh Tax Review, <http://ssrn.com/abstract=2371343> or <http://dx.doi.org/10.2139/ssrn.2371343>
27. Bohlen, J.M., Beal, G.M.: The Diffusion Process", Special Report No. 18 (Agriculture Extension Service, Iowa State College) vol. 1, pp. 56–77 (1957). <http://www.soc.iastate.edu/extension/pub/comm/SP18.pdf>
28. Jeong, S.: The Bitcoin Protocol as Law, and the Politics of a Stateless Currency (2013). SSRN: <http://ssrn.com/abstract=2294124> or <http://dx.doi.org/10.2139/ssrn.2294124>
29. Pavlou, P.A., Fygenson, M.: Understanding and predicting electronic commerce adoption: an extension of the theory of planned behavior. *Manag. Inf. Syst. Q.* 30(1), 115–143 (2006)
30. Choudhury, V., Karahanna, E.: The relative advantage of electronic channels: a multidimensional view. *Manag. Inf. Syst. Q.* 32, 179–200 (2008)
31. Denzin, N.K., Yvonna, S.L.: *Collecting and Interpreting Qualitative Materials*. Sage, Thousand Oaks (2003)