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경영학 석사학위 논문

암호화폐 구매의도에 영향을 미치는 요인:
커뮤니티 영향 그리고 가격차트 의존도를 중심으로

**Investigating Key Factors Affecting Cryptocurrency Purchase
Intention: Community Influence and Reliance on Price Chart as
Key Determinants**

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초 록

비트코인 그리고 암호화폐는 사회의 다양한 양상에 급진적인 변화를 창출할 주요 이슈로 고려된다. 그러나, 이와 같은 신흥 컨텍스트의 구매의도를 담은 연구는 미비한 상황이다. 위에 대한 차이를 좁히기 위하여 본 연구는 인지된 용이성, 커뮤니티 참여도, 오피니언 리더, 대인 영향, 가격차트 의존도를 포함한 기존 그리고 신규 변수를 사용하여 암호화폐 구매의도 개념적 모형을 제시한다. 온라인 설문 그리고 PLS구조 방정식 모형을 사용하였다.

주요어 : 비트코인, 암호화폐, 구매의도, 커뮤니티 참여도, 가격차트 의존도

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Chapter 1. Motivation

Bitcoin and cryptocurrency have been a world-wide issue in recent years. The unique operation system of cryptocurrency that resembles the democratic system attracted public's interest and had come to create a remarkable phenomenon in 2017. There is a famous story about bitcoin, in which "In 2010, one bitcoin miner bought two pizzas for 10,000 bitcoins" In December 16, 2017, single bitcoin costed approximately 19,343 USD. 5,000 bitcoin that was worth one pizza in 2010 had come to apx \$95,171,500 or 95M value in the end of 2017. Assuming two pizzas costed \$30, its value increased by almost 644,766,566% within 7 years. Considering the growth rate and time, it is certainly an interesting phenomenon worth researching. Moving along with public's growing interest in cryptocurrency, formal academic research to interpret virtual currency's technical system, economic impact, purchase behavior, legal issue has been conducted. A focus of existing literature lies primarily in the area of technical aspect of bitcoin (Morisse 2015). The literature relevant to purchase behavior reveals a lack of understanding of members motivation to purchase virtual currency. Even through the literature relevant to bitcoin's economic impact predicts radical innovation in the world including banking system, financial structure (Bohme 2015, Raskin & Yermack 2016) contributing factors that members purchase and use virtual currency still remain unclear. Furthermore, given the extraordinary characteristics of bitcoin including severe price fluctuation, impractical value due to limited number of stores accepting bitcoin as a payment, bitcoin valuation easily exceeded 1 billion USD. Marketing theories associated with ordinary goods, behavioral finance theory focusing on financial assets may not stand for cryptocurrency purchase intention given the unique characteristic. Of special importance is the following question: "Given the limited usefulness of cryptocurrency, what affects the cryptocurrency purchase intention that exists only in computer systems; what causes such unreasonable decision?"

This study therefore aims at examining the members motivations to purchase virtual currency. Incorporating verified constructs used in prior research on virtual purchase behavior including perceived usefulness, community engagement, opinion leadership, normative interpersonal influence with new construct reliance on price chart, this study seeks to deliver business implication that community influence coming from people can be more significant than practicality.

Chapter 2. Literature Review

2.1 Prior research on cryptocurrency

Ciaian et al (2016) describes competing perspective on bitcoin's value as a currency. One is that as bitcoin does not fulfil the three criteria of a currency, it cannot function as an ordinary currency. It is more likely to be categorized as an investment. Another view puts emphasis on bitcoin's innovative aspect including low transaction costs, strong privacy, infinite divisibility and no inflationary pressures and shows a strong belief in it of being a globally-accepted virtual currency in the future. In line with a latter perspective, this research assumes cryptocurrency including bitcoin is a virtual currency. Bonneau et al (2015) also put emphasis on why bitcoin is worthy of research. In his paper, he presents several areas that researcher can dig into. First one is a technical part-focused area. Bonneau gives a technical overview including blockchain-based transaction system, consensus mechanism, block confirmation, mining detail, communication protocol, network topology. The following part is stability of bitcoin. This section contains stability of transaction validity rules, the consensus protocol, mining pools, the peer-to-peer layer. Last part including anonymity and privacy lists and explains deanonymization, anonymity improvement, p2p protocol, mix network. In Hobson's perspective (2013), bitcoin and cryptocurrency are a solution to personal data accumulation and utilization in financial institution. Combined with

proliferation of internet usage, personal data including transaction history, age, gender, salary, is being saved in large firm's data base and being used as an advertisement aid. Hobson emphasizes reality that there is no alternative to holding asset in a bank – which in turn buy, sell and profit from our personal data. In his work, bitcoin is described as a centralized money service disruptor with details of operation system behind bitcoin. The weakness of bitcoin includes non-refundable trait if going into incorrect wallet address, complexity for majority people to understand, practicality issues based on price volatility. Hileman and Rauchs (2017)' work with Visa in order to collect data in regards to global cryptocurrency provides the following statistics; a number of active users of cryptocurrency wallet between 2.9 to 5.8 million, 1,876 people are working full time in the cryptocurrency industry, 79% of cryptocurrency payment companies use a bank and more.

In reference to prior literature on virtual currency purchase, Khairuddin (2016) explores a motive among bitcoin user by interviewing 9 participants. The finding that lists the three main motives behind bitcoin usage: predicted role in a foreseeable monetary revolution, user's increased empowerment, perception of bitcoin's real value seems to yield a reasonable result yet given lacking in rigor in the study, credibility of the result is in question. Given the sample size, methodology, result analysis procedure, Khairuddin's work cannot claim that their result will hold equally well if there is a change in sample size and methodology. Kazerani (2017) extends Khairuddin's work by adding empirical experiment interpreting participants reaction to a use of CoinTip and representative cryptocurrency exchange Coinbase. The study seeks to examine how new cryptocurrency user perceives software design and it affect trust and risk toward the service. However, Kazerani's paper is solely based on observation of two participants without theoretical background. The record of two participants' reaction, feeling, words is the essence of the study. Given the limitations of prior literature, this paper aims at investigating an intention to purchase crypto-currency by

collecting adequate sample size and focusing on theoretical lens that prior research on virtual purchase behavior have adopted.

In Morisse (2015)'s systemic literature review on cryptocurrencies and bitcoin, 42 papers were summarized and examined in order to emphasize a potential of cryptocurrency research for the IS field. Morisse divided 42 papers into 3 division; protocol layer, network layer, ecosystem layer and assigned 7, 11, 24 papers respectively. Papers in the ecosystem layer are further divided into the three categories; technical, economical and behavioral. His paper shows that a big portion of cryptocurrency research focuses on a technical side of. The second biggest portion is the papers exploring economic impact of cryptocurrency such as Underwood (2016) that describes a prospective change in existing financial system and its application. Despite bitcoin's expected world-changing impact, research on intention to purchase bitcoin shows several limitations including absence of theory and limited sample.

Table 1
Prior literature on cryptocurrency

Name	Main Idea	Name	Main Idea
Bailis (2017)	Cryptocurrency research stream including privacy, smart contract, security,	Hobson (2013) CACM	It conducts SWOT analysis of bitcoin and cryptocurrency
Bonneau (2015)	Bitcoin is worth of IS research	Meiklejohn (2016) CACM	This paper explores characteristics of bitcoin and its network including technical detail mining, wallets, exchanges and etc.
Hileman & Rauchs (2017)	It provides cryptocurrency-related statistics from 100 organization across 38 countries	Nakamoto (2009)	Bitcoin White Paper
Morisse (2015)	Meta-analysis showing research's theme distribution (Apx 70% Tech, 20% Econ, 10% Beh)	Sholar (2016)	This paper defends negative views on digital currency and bitcoin
Kazerani et al (2017)	Software design has influence on usability of bitcoin	Sompolinsky & Zohar (2018)	It explains bitcoin mining decentralization, and the economics of VC and bitcoin
Khairuddin (2016)	Motives behind bitcoin usable are user's empowerment, predicted role, and real value	Zohar (2009) CACM	It explores bitcoin's operation rules and system including the protocol, challenges in several domains: privacy, anonymity, PoW, and blockchain

2.2 Prior research on virtual purchase behavior

Prior literature on virtual purchase behavior in the IS field provides a variety of

motives affecting virtual purchase behavior. With Yee's (2007) research that identified motivations in the context of online-gaming provides a research stream associated with motives behind purchase behavior. The constructs in Yee's work includes achievement, social, and immersion and they have been a foundation for further research to build on. Guo and Barnes (2011) offers a more robust account of the social dynamics that drive virtual purchase behavior and demonstrates how real-life behaviors are reflected in the virtual economy. They identified effort expectancy, performance expectancy, and the quality of the virtual world, social influence, personal real resources, and virtual item resources. Quantitatively, within the context of Second Life and WoW, they discovered that extrinsic motivators (effort expectancy, performance expectancy, and perceived value) as well as intrinsic motivators (perceived enjoyment and character customization) were significant. Notably, these authors found that social influence was not a significant motivator for the virtual purchase intention. Lu et al. (2010) reveals how interactions in online virtual community, through familiarity, perceived similarity, structural assurance, trust propensity build trust, in which influences consumer's purchase intention. Their theoretical contribution lies in the link establishment between virtual community and C2C websites. Also, trust is divided into two types; trust in virtual community members and trust in the vendor. In the context of virtual currency purchase intention, trust in virtual currency community members and trust in virtual currency exchange/website may play a significant role. In this research, the concept trust is embraced into community influence. Scholler (2003) examines how individual's mental simulation process with a product based on information presented through virtual interaction impact purchase intention. The key finding of that paper is that imagery processing plays a significant role in raising purchase intention because mental simulation of themselves performing certain behavior using a product will positively affect objective interactivity. According to scholler's research, how information presented about a product can significantly

affect consumer's purchase intention.

Kim (2011) investigates the intention to purchase virtual item in virtual networking communities through customer value theory. The theory looks at three values; functional, emotional, social. Each value has corresponding sub-value respectively; price utility, functional quality, playfulness, social self-image expression, social relationship support. The study test 5 constructs above and confirms that emotional and social value are the key dimension in determining virtual item purchase intention in SNC. In contrary to Guo and Barnes finding that social influence has no impact, Kim's research shows effect of social value on virtual purchase behavior. In Yoo & Kauffman's work (2014) examining value of participation and time spent in social game, the differential pricing model to encourage participation and players retainment based on a degree of participation is suggested. According to Yoo, the concept participation in their work affect player's time spent, willingness to pay information, involvement and vendor should use differential pricing strategy accordingly.

Shukla (2018) distinguishes intrinsic and extrinsic motivation at individual and group level to extend the research on virtual purchasing in MMORPG to address community influence, community identity and impact of both types of motivation. Its theoretical lens lies in social influence theory and Kohler's motivational gains effects theory. This paper aligns with Kim and Shukla's perspective on social impact including community influence in terms of virtual purchase decision. Based on this approach, in the following section, the paper introduces theoretical background behind conceptual model and hypotheses, containing (1) perceived usefulness, (2) community influence and (3) reliance on price chart

Table 2
Constructs from prior literature

Virtual Purchase Behavior (VPB)		Constructs
Drechsler et al (2011) JIM	It reveals significant effect that price chart has on online purchase behavior by affecting price expectation and timing	<ul style="list-style-type: none"> • Price Expectation • Effect on purchase timing • Effect on purchase decision
Guo & Barnes (2011) I & M	It explores VPB by adopting intrinsic/extrinsic motivation	<ul style="list-style-type: none"> • Intrinsic/Extrinsic Motivation (effort/performance expectancy, perceived value, enjoyment, Social Influence)
Meng (2016) IJSSST	It explores how opinion leaders influence the purchase intention of online consumers through e-WOM	<ul style="list-style-type: none"> • Opinion leader's characteristic • Opinion leader's information • Trust
Lu et al. (2010) ECRA	It reveals that interaction among virtual community members will enhance trust, in which positively affect purchase intention	<ul style="list-style-type: none"> • Trust in members • Trust in website • Intention to get more information
Schlosser (2003) JCR	It discusses a significance of imagery processing and a mental simulation of usage of product on purchase intention over product attribute	<ul style="list-style-type: none"> • Cognitive Elaboration • Mental Imagery • Attitude and Purchase Intention
Shukla et al (2018) I & M	Using social network theories, It examines correlation between community influence and VPB through normative interpersonal influence, community identity	<ul style="list-style-type: none"> • Community Influence • Community Identity • Intrinsic/Extrinsic Motivation
Wu et al. (2018) I & M	It investigates correlation between community engagement and online word of mouth	<ul style="list-style-type: none"> • Community engagement • Customer tenure (length of relationship) • Review generation

Chapter 3. Theoretical Background

3.1 Perceived Usefulness

Perceived usefulness is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989). The concept has been rigorously examined and validated through the theory of reasoned action (TRA) (Ajzen and Fishbein), the theory of planned behavior (TPB) (Ajzen, 1985) and the technology acceptance model (TAM). Davis et al (1992) slightly alters the definition as to ‘consumer’s perceptions regarding the outcome of the experience. David et al (1993) sees the usefulness as ‘the individual’s perception that using the new technology will enhance his/her performance.

Formal research using the perceived usefulness along with the TAM model to examine an intention to adopt emerging technology has been an important part of the IS field.

Various researches examining newly-developed technologies including smartphones, online banking, apps, and internet adaptation behavior have employed the TAM model to provide empirical results. In Davis (1989), he shows that perceived usefulness is twice more influential on actual use than the effect of attitude has on the actual use. Furthermore, compared to perceived ease of use, that usefulness shows four times stronger influence on attitude than ease of use. [David 1989]. Perceived usefulness plays a pivotal role in determining technology adaptation process. However, in a specific case of digital currency, given questionable perceived usefulness, the technology acceptance has been widely spread. Under certain circumstances, perceived usefulness may not be an actual use determinant. This paper aims at examining users' perception on perceived usefulness of cryptocurrency and its correlation with purchase decision and to confirm other variables affecting the usage decision.

3.2 Community Engagement

Online community is defined as “social aggregations that emerge from the internet when enough people carry on those public discussion long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace” [Wu et al 2018]. Members in the community gather around shared interest, unifying individuals who have never seen or talked in person. This shared interest is of particular interest in this paper given its link with virtual purchase decision. This research argues that the community resembling real-life interactions is an important exemplar for research on virtual purchase decision. Research social relationship based on online community addresses community engagement. There are varying perspectives on community engagement including (Wu et al. 2018) the sustainability of the online community enhancer (Ray et al. 2014), motivations to interact with a community (Baldus et al 2015), the intensity of consumer's participation and connection with community's objective (Vivek et al 2012), interaction experiences with other members of the

community (Brodie et al. 2015), contribution behavior (Doorn et al 2010). Given the differences in views on community engagement, one identical aspect is member's activity to make contribution to community such as sharing information, posting activities, sharing personal opinion, delivering expert's opinion, statistics. This paper uses a community engagement as a variable to measure community influence affecting the purchase decision.

Most research studies are descriptive and qualitative analyses, rather than quantitative (Wu et al. 2018). Community engagement research linking directly to purchase decision has insufficiently been conducted. In this study, the author tries to fill this research gaps via collecting a data set and empirically testing on how community engagement has effect on individual's virtual currency purchase intention.

3.3 Opinion Leadership

Consumer influence other consumers. They act as role models who inspire imitating among those who observe their purchase and consumption behavior. They spread information via word of mouth, as consumption is a major topic of social communication. They influence others directly by giving advice and verbal direction for search purchase, and use. Analogously, consumers are influenced by other consumers. They imitate purchase and consumption behavior they admire, gather information from other consumers in the process of social communication, and seek advice from others who has greater knowledge and experience. The latter influence is defined as opinion leadership, "Individuals who exert an unequal amount of influence on the decisions of others" (Rogers and Cartano 1962). Combined with emergence of social net work platform, influence that one consumer has one another has been amplified (Wang et al 2018). The topic of opinion leadership has been an interest of researcher because opinion leaders play an important role in models of consumer decision making (Goldsmith & Eastman 1996). Research areas on the topic including

motivation, measurement, and outcome of the opinion leadership (Dillon 1975, Flynn et al. 1994, Bloch 1986) had competing definition of the leadership. This paper takes Roger's definition and treat the opinion leadership as personal influence that one received from the leadership. A majority of studies related to the opinion leadership adopt Childers' version of King and Summers' instrument (Goldsmith & Eastman 1996). The instrument is designed for social communication engagement of the opinion leaders rather than influence the leader has on others (Flynn et al 1994). Given that opinion leaders' influence to others is important and central to the topic, there exist a gap in measurement scale. Therefore, this research adopts measurement direction shown from Goldsmith's work in order to focus on the influence of the opinion leadership and to modify it to relate in the context of virtual currency purchase intention.

3.4 Normative Interpersonal Influence

Social influence theory that contains compliance (social norms), identity, internalization (group norms) provides a sound basis for theoretical background for this research regarding community influence on cryptocurrency purchase intention. In Tang and Kim's paper to examine the effect of interpersonal influence on software quality evaluation and expected financial gains, the interpersonal influence is defined as the impact of friends and group pressure. In their work, the interaction of group pressure turns out to be significant software quality evaluation. In Shukla & Drennan, there exists inconsistent effect of interpersonal influence on virtual purchase behavior. Their motivation to investigate further in regards to the discrepancy in the interpersonal influence has come to show that the interpersonal influence has positive influence on virtual purchase intention. Given generally accepted effect of interpersonal influence in the marketing field, it is feasible to anticipate that the influence of group holds the identical effect in the context of virtual purchase

intention.

3.5 Reliance on price chart

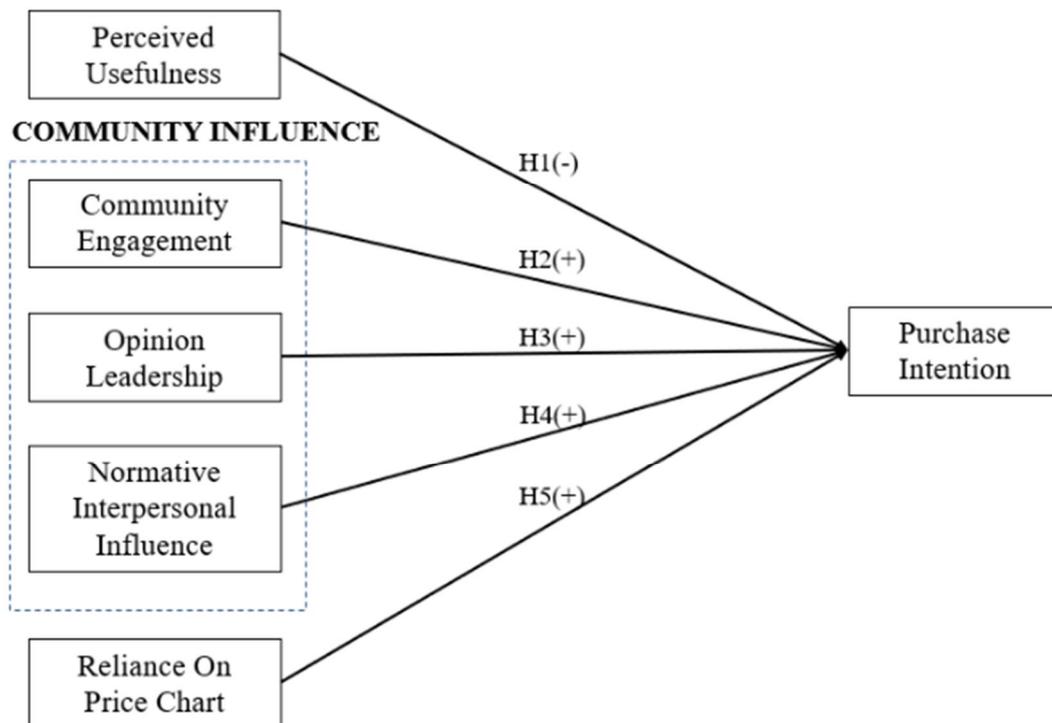
Many decisions are based on beliefs concerning the likelihood of uncertain events such as the outcome of an election, the future value of the dollar, the future value of financial assets including bond and funds. The driving force behind the belief formation is expected to be subject to individual's value judgement. People rely on a limited number of heuristics principle which reduce the complex tasks of assessing probabilities and predicting value to simpler judgmental operations (Tversky & Kahneman 1974). In particular, *misconception of chance* states, 'people expect that a sequence of events generated by a random process will represent the essential characteristics of that process even when the sequence is short.' Representative incident showing the concept is the coin toss H-T-H-T-H-? This expectation is not limited to this experiment. people expect that the essential characteristics of the process will be represented not only globally but also in the entire sequence, but also locally in each of its part (Tversky & Kahneman 1974). The extreme volatility of virtual currency price chart directing upward may have set price expectation in viewer's perspective. The perceivable pattern that virtual currency price goes up and down just like the coin toss H, T, H, T potentially lead viewers to belief in price increase or decrease depending on prior pattern.

A belief-based account of decision under uncertainty reveals that 'the particular descriptions of events may affect a person's willingness to act and belief' (Fox and Tversky 1998). This theory shows consistency even in an online community context shown by Wang et al (2018) that critical drivers of user's responses toward highly-uncertain event is the logic of the event, rather than the event itself. Given this logic, linking to the H, T, H, T, what is more important than actual price change can the logic or event behind the price fluctuation, in which mostly conveyed through virtual currency online communities.

Drechsler and Natter (2011) shows correlation among price chart, price expectations and purchase timing decisions. In their paper, through empirical experiment using ‘NextTag.com’ (website displaying a product’s full price history), Drechsler and Natter demonstrate that ‘the provision of past prices leads to strong adjustments of price expectations depending on price chart characteristics’. Combined with bitcoin community opinion leader’s influence on historical value pattern of bitcoin, it is feasible to hypothesize, along with Fox’s work that a certain description of past history of bitcoin affect belief-based account of decision maker.

Chapter 4. Research Model and Hypotheses:

Figure 1
Research model for drivers of cryptocurrency purchase intention



4.1 Perceived Usefulness:

In general, a degree of judged usefulness plays a pivotal role in forming purchase decision. In technology acceptance model (TAM), perceived usefulness refers to the extend

which an individual believes that using a particular system would enhance his/her job performance or productivity (Davis 1989). The expected benefit from using system significantly impact purchase decision. In the cryptocurrency purchase intention, perceived usefulness is in controversy. First, due to the absence of intrinsic value, the value of cryptocurrency mostly depends on developers, a size of users. An increase in number of bitcoin buyer will further increase overall price, following by the law of supply and demand. Its usefulness, however, does not go along with increase in value. Hileman and Rauch (2017) study with Visa demonstrates imbalance in growth rate of the buyers and the stores accepting bitcoin as a payment. Rapidly-changing value is also negatively correlated with perceived usefulness. Second, a number of stores accepting bitcoin or cryptocurrency as a payment is limited (Hileman and Rauch 2017). Plus, it takes a while to complete bitcoin transaction and transfer procedure. Who paid in bitcoin has to wait up to 30 minutes to confirm that the merchant received exact amount of bitcoin. Involving technical, security, legal issues, it seems It is a bit too early to purchase bitcoin. Which brings the hypothesis below,

H1: Perceived Usefulness will negatively influence the purchase intention

4.2 Community Engagement

When acquiring information about new or unfamiliar technology, one option is to visit online community that consists of members sharing similar interest, professional knowledge and information. In the information-seeking stage, the influence of other members in the community plays a pivotal role and that consumer's purchase decision is influenced by their social environment and interpersonal influence (Wang et al 2018). In this aspect, this paper focuses on community engagement, opinion leadership and normative interpersonal influence in order to measure community influence. Community engagement, an intensity of consumer's participation and contributing behavior including registration, sharing posts,

comments, like, knowledge, information, is interpreted as to a member's frequency to visit the community. It is likely that the stronger community engagement signals higher frequency to use the community, wide exposure to information about virtual currency issues and total time spent on the community. Align with Lu's work on correlation between interaction among virtual community member and trust enhancement, it is hypothesized,

H2: Community engagement will positively influence the purchase intention

4.3 Opinion Leadership

Furthermore, information provided by expert or opinion leaders in the virtual currency community plays an important role in the decision making-process (Flynn & Eastman 1996). On top of postings or activities that ordinary members of a virtual community contribute, the activities done by the opinion leaders including virtual currency co-founder, top corporation CEO, top journal and media firms and etc gives stronger credibility and persuasion that comes with the leaders' reputation. In reference to Meng's view on opinion leadership, 'people with high game and professional degree whose generally accepted, familiar, and recognized by the public', this study anticipates that opinion leaders such as JP Morgan CEO and Starbucks CEO can significantly affect cryptocurrency purchase intention. In the same light with Meng's research that opinion leader boosts a level of trust and ultimately increase purchase intention, this study hypothesizes that,

H3: Opinion leadership will positively influence the purchase intention

4.4 Normative Interpersonal Influence

Shukla and Drennan (2018) embraced normative interpersonal to incorporate social influence in their study. Normative interpersonal influence is described to be the tendency to conform to others' expectations and can be separated into two types of influence: value expressiveness and utilitarian influences. Value expressiveness is motivated by an individual's desire to

enhance or increase their self-concept through referent identification, while utilitarian influence is reflected by an individual's compliance with the expectations of others to achieve rewards or avoid punishment and also operates through compliance. In the same light with utilitarian influence, one may feel strong motives to purchase cryptocurrency that other members of the community selected in order to comply with the expectation of others.

H4: Normative interpersonal influence will positively influence the purchase intention

4.5 Reliance on Price Chart

Purchasing cryptocurrency contains high uncertainty as it is in early stage signaling extreme price volatility. If interpreting 'what forms the purchase intention?' differently, then it would be 'what suffices the associated risks and uncertainties?' Tversky's work on judgement under uncertainty shows numerous biases and heuristics that trigger certain decisions facing uncertainty. It is also known as the Monte Carlo Fallacy referring to the assumption that past independent events have an effect on future outcomes. In particular, bitcoin's value has been constantly increasing since 2008 even though there has been remarkable downturn over 70% of depreciation within a short period of time. Its stable growth with extreme fluctuation may cause buyers to believe that the past price pattern will be continuous in the future. It is a price chart that show past price history pattern to buyers and leads them to assume future pattern based on past history. In Fox and Tversky (1998)'s work on a belief-based account for decision under uncertainty reveals that the particular descriptions of events on which outcomes depend may affect a person's willingness to act and belief. Combined with bitcoin community opinion leader's influence on historical value pattern of bitcoin, it is feasible to hypothesize, along with Fox's work that a certain

description of past history of bitcoin affect belief-based account of decision makers. One common characteristic of virtual currency communities is to have real-time price chart in the main page. High visiting frequency to the community is directly linked to high exposure to the price chart. Plus, in certain communities, the price chart can be manipulated at viewer's convenience. For example, the chart presentation scheme can be standardized in days, weeks, and months and it depends on the viewer's choice. Looking at the virtual currency price years ago, in which almost 20 times lower on average, it is attempting enough to mislead viewer's expectation. It closely ties with Tversky's decision under uncertainty, in particular misconceptions of chance, stating that people have tendency think to prior event affect future events. Based on past price pattern of virtual currency, people make judgement under uncertainty that the price chart will show upward. This formed belief by heuristic from the price chart is hypothesized to encourage bitcoin purchase decision.

H5: Reliance on price chart will positively influence on the intention to purchase

In sum, key determinants that are expected to be significant in forming individual's cryptocurrency purchase intention were developed into five theoretical constructs including: perceived usefulness, community engagement, opinion leadership, normative interpersonal influence and reliance on price chart. The three constructs, community engagement, opinion leadership, normative interpersonal influence were put together to measure community influence. Prior literatures on virtual purchase behavior in the context of virtual game world and virtual community had constructs such as enjoyment, customization, advancement (Guo & Barne 2010, Shukla & Drennen 2018). Due to specificity of the context of cryptocurrency purchase intention, this study did not use the constructs specific to the virtual game context.

Chapter 5. Methodology

5.1 Measures

A quantitative methodology employing a structured questionnaire was used to measure and verify the hypothesized correlations. The measured items from prior literatures on virtual purchase were adapted and modified to reflect the context of cryptocurrency purchase intention. In particular, perceived usefulness is adopted from (Davis 1989). Each item was measured using a seven-point Likert-type scale, with “strongly disagree” to “strongly agree” as anchors. It applies to all the other scale. Community engagement scale was adapted from (Wu et al. 2018). Opinion leadership items were adapted from (Goldsmith & Eastman 1996). Normative interpersonal influence was captured from (Shukla & Drennan 2018). Reliance on price chart scale was adapted from (Drechsler 2011). Lastly purchase intention scale items were adapted from (Shukla & Drennan 2018) This instrument was reviewed by a focus of three members who have virtual currency purchase experience to find any wording, format, framing issues in order to enhance objectivity. The initial questionnaire was conducted in English and then translated into Korean to minimize any issues from misinterpretation as samples’ first language is mostly Korean. The details about measurement model is summarized in the Table 3 and Appendix 4.

Table 3
Measurement model.

Construct and items	Factor loadings	AVE	CR	Cronbach's Alpha
Perceived Usefulness (Fred D Davis)				
1. Using virtual currency improves the quality of the work I do	0.85	0.75	0.94	0.92
2. Using virtual currency gives me greater control over my work	0.87			
3. I use virtual currency as a means of offline payment	0.85			
4. I use virtual currency as a means of online payment	0.85			
5. Overall, I find the virtual currency useful in my job	0.91			
Community Engagement (Wu et al.)				
1. I benefit from community's information	0.91	0.85	0.95	0.95
2. I am motivated to participate in the community's activities because I feel safe afterwards	0.94			
3. I am motivated to participate in the community's activities because other members support me	0.94			
4. I am motivated to participate in communities activities because I can get more information	0.93			
Opinion Leadership (Goldsmith & Eastman)				
1. When I consider buying virtual currency, I look for expert's opinion	0.93	0.82	0.97	0.97
2. Experts influence my choice of virtual currency	0.89			
3. I would not choose virtual currency without following expert's choice	0.89			
4. I like to get influential people's opinions before I buy virtual currency	0.89			
5. I feel more comfortable buying virtual currency when I have gotten other influential people's opinion	0.90			
Normative interpersonal influences (Shukla & Drennan)				
1. I intend to purchase virtual currency until I am sure my friends approve of them	0.83	0.71	0.95	0.96
2. If other people can see me using virtual currency, I often intend to purchase the type they expect me to buy	0.90			
3. I like to know what virtual currency make good impressions on others	0.92			
4. I will achieve a sense of belonging by purchasing the same virtual currency that others purchase	0.87			
5. I often identify with other members by having the intention of purchasing the same virtual currency they purchase	0.87			
Reliance on Price Chart (W. Drechsler)				
1. The information provided by the chart was relevant for the purchase timing task.	0.95	0.90	0.98	0.98
2. The information that was provided by the chart would help me in making purchase timing decisions	0.94			
3. The information provided by the chart aided me in completing the purchase timing task	0.93			
4. The information provided by the chart set price expectation	0.96			
5. The information provided by the chart affected purchase decision	0.97			
Purchase Intentions (Shukla & Drennan)				
1. I intend to purchase virtual currency	0.76	0.75	0.94	0.91
2. My willingness to buy virtual currency is high	0.82			
3. The likelihood that I would purchase virtual currency is high	0.85			

5.2 Validity and Reliability

In order to measure validity, discriminant and convergent validity has been measured. In reference to discriminant validity, it was done through Fornell and Larcker way. The diagonal with the square root of the AVE had been placed and found that the square-root of AVE for each construct were higher than the elements off the diagonal. The result shown in the table 3 shows details about discriminant validity. To measure convergent reliability, average variance extracted (AVE) was used along with factor loadings with all numbers were greater 0.7. Both validity numbers were assessed from PLS. In regards to internal consistency reliability, both composite reliability and the Cronbach's alpha value were used. The items used to measure the latent constructs in the model show values above the recommended level (greater than 0.7) for both composite reliability and the Cronbach's alpha value, suggesting high reliability of the constructs. All the corresponding numbers are organized in the table 3. To avoid response format bias, different question formatting will be used. To reduce method bias, the respondents participating in the study will be guaranteed anonymity and will be asked to answer the questions as honestly as possible without thinking of any answer as wrong

Table 4
Discriminant Validity

	Perceived usefulness (PI)	Community Engagement (CE)	Opinion Leadership (OL)	Normative Interpersonal Influence(NII)	Reliance on Price chart (RPC)	Purchase Intention (PI)
PU	0.87					
CE	0.74	0.92				
OL	0.84	0.86	0.90			
NII	0.82	0.88	0.83	0.84		
RPC	0.72	0.73	0.77	0.62	0.95	
PI	0.82	0.80	0.87	0.73	0.67	0.87

5.3 Data Collection and Samples

The data collection was done through a professional survey website. Each participant received online link to the survey and was instructed to complete the survey. In the introduction part, the measurement scale explained brief overview and purpose of research, and gave explanation regarding use of data for academic purpose only and guaranteed anonymity. Then, participant's age, gender and virtual currency purchase experience were questioned. Respondents were categorized on the basis of their previous experience of bitcoin purchase. In the main part, with brief explanation on each construct (for example: perceived usefulness can be interpreted as practicality, opinion leaders include famous CEO, cryptocurrency founder, influential journalist and more). Total sample of 112 participated in the study over a period of three weeks. Of 112 responds, 14 responds including non-responses and the all in one number answer were deleted. The total number of usable samples thus was 98. Of 98 participants, 69 of them were aged between 20 to 29. In terms of percentage, 71% of the sample were 20s. 13% samples were on 30s, 12% samples were on 40s and 5% samples were above 50s. 68% of the sample were male and the rest 32% were female. 80% of the sample have experienced cryptocurrency purchase and 20 out of 98 people do not have virtual currency purchase experience. The respondent profile is summarized in the Table 5

Table 5
Respondent profile.

	Frequency	Percentage
Age		
Below 20	0	0
20~29	69	71%
30~39	12	13%
40~49	11	11%
Above 50	6	5%
Gender		
Male	67	68%
Female	31	32%
VC Purchase Experience?		
Yes	78	80%
No	20	20%

Chapter 6. Result

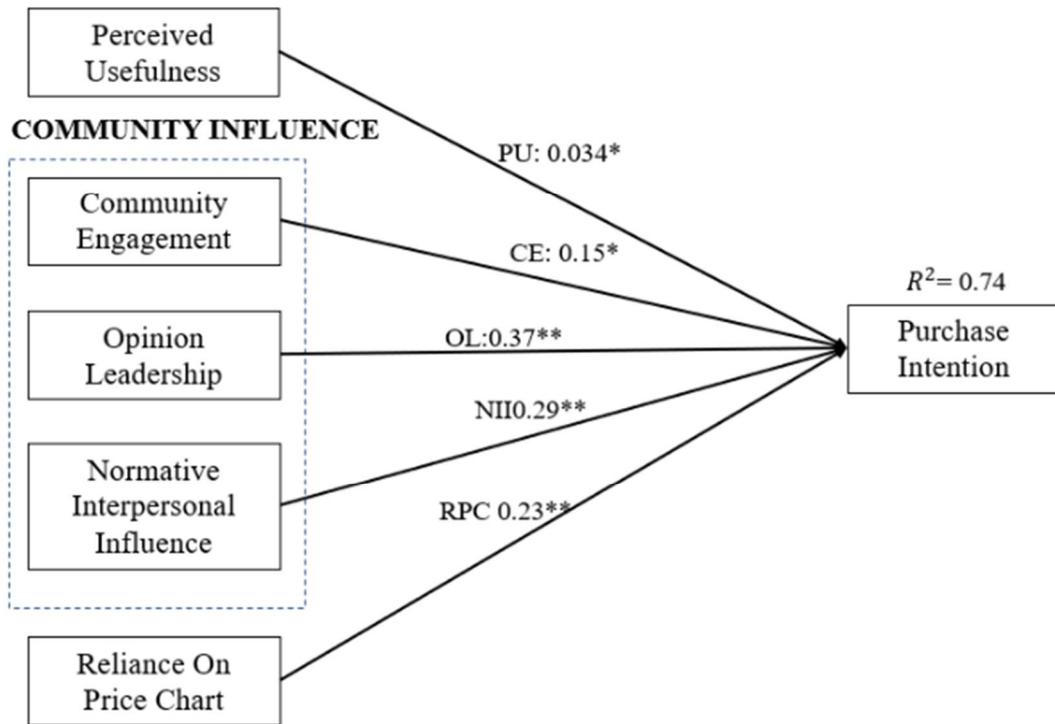
t-statistics and path significant levels for each hypothesis using the bootstrapping method were employed. Path coefficient and R square value were computed from the PLS algorithms. The construct for purchase intention had an R^2 value of 0.43 indicating that the model accounted for 43% of the variance in individual's cryptocurrency purchase intention. Path coefficients, t-value, and p-value for each corresponding hypothesis were summarized in Table 6. In particular, it was shown that perceived usefulness (PU) has the non-significant influence on the purchase intention of virtual cryptocurrency, thus supporting H1 ($\beta=0.034$, $t=1.98$). H2 was supported, with community engagement (CE) having a significant influence on the intention ($\beta=0.15$, $t=2.46$). Opinion leadership (OL) was also supported ($\beta=0.37$, $t=4.9$). The normative interpersonal influence (NII) was particularly significant influence on purchase intention ($\beta=0.29$, $t=6.90$). Lastly, as hypothesized, the reliance on price chart (RPC) was supported ($\beta=0.23$, $t=5.57$). Notably, it seems that the influence of community including virtual community, friends, experts and reliance on price chart are all strong determinants of purchase intention

Table 6
Path coefficients.

	Path Coefficients	T-value	p-value	Results
H1: PU	0.034	1.98	0.048*	Supported
H2: CE	0.15	2.46	0.014*	Supported
H3: OL	0.37	4.9	0.00**	Supported
H4: NII	0.29	6.90	0.00**	Supported
H5: RPC	0.23	5.57	0.00**	Supported

$p^*>0.05$, $**p>0.01$

Figure 2
Result of Hypotheses Tests



6.1 Discussion

This study attempted to investigate the factors affecting cryptocurrency purchase intention. It hypothesized that what forms the purchase intention given limited practicality of cryptocurrency are community influence and reliance on price chart. In order for hypothesis validation, this study introduced a model for the measurement of purchase intention by using questionnaires previously examined and some modified specifically for the cryptocurrency context. Overall finding of this study signals that 43% of the variance in the virtual currency purchase intention can be explained through the model. The statistical tests provide adequate support for the study's conceptual model. In the following section, theoretical implications and business implications are discussed in detail.

6.2 Theoretical Implication

Purchasing cryptocurrency requires high-risk taking given its extreme price fluctuation, undefined regulation, uncertain origin, complexity of operating system. Even software, infrastructure, network in order to make virtual currency as conventional money are not sufficiently established up to a level where it can be used so. Purchasing virtual currency can be seen as buying nothing at risk. This paper addresses several calls for research in understanding the motives behind the cryptocurrency purchase intention, the need to understand community influence research in individual's perspective, and the effect that price chart has on the purchase intention. This research provides several interesting findings in regards to community influence and reliance on price chart. In reference to perceived usefulness (PU), a key finding was that PU has no influence on purchase intention. In general information technology acceptance researches, PU has been playing an important role in the acceptance determination process and positively linked to the technology acceptance intention. It is almost feasible to state strong PU means higher probability of new information system adaptation based on prior literatures in the field. One interpretation to this result is that there is something more than shown practicality. In real life, virtual currency is not at a level where it can be used as ordinary payment means. Nevertheless, people purchased the cryptocurrency. What goes beyond their view on practical value of the virtual currency is a hedonic value formed from community influence.

Information plays a pivotal role in the decision-making process (Meng 2016). When acquiring information about emerging or unfamiliar technology, one option available is to find online community where other members with shared interest and professional knowledge gather. In the information-seeking stage, the influence of other members in the community yields a significant effect (Goldsmith & Eastman 1996). As defined earlier, community engagement is an intensity of community participation. It is that the stronger community engagement signals higher frequency to use the community, wide exposure to

information about virtual currency issues and total time spent on the community. This research aligns with (Shukla & Drennan 2018).

Furthermore, information provided by expert or opinion leaders in the virtual currency community plays an important role in the decision making-process (Flynn & Eastman 1996). The influence of opinion leaders including virtual currency co-founder, top corporation CEO, top journal and media firms and etc gives stronger credibility and persuasion that comes with the leaders' reputation. Combined with ordinary online community members who deliver opinion leader's statements and investment decision to the community's board, opinion leader has significant influence in virtual currency purchase intention. Following influential person's decision is commonly witnessed in stock market. The virtual currency buyer's behavior that resembles stock market pattern should not only reviewed by IS researcher but also be researched by behavioral finance researcher. If financial point of view is well blended with perspective of the IS field, there will be a strong chance of generating meaningful research finding in the context of cryptocurrency purchase behavior.

Normative interpersonal influence is simply influence of others. Social interaction among a myriad of community members is the notable factor affecting purchase intention. One possible explanation is closely tied with the system behind virtual currency. The blockchain system that consists of computer programs demands professional knowledge, expertise and early-innovator mindset. A number of populations meeting the three criteria is anticipated to be limited. To ordinary people without expertise in computer science, as understanding the system on their own costs too high in terms of time and mental effort, they naturally find one who can reduce the associated costs. They rely on experts or acquaintance who knows a lot of virtual currency. The difficulty to understand certain technology's concept, principles, mechanism and the influence of others may also correlate. Prior

literatures show that the interpersonal influence enhances a level of trust on certain object, strengthening purchase intention. The correlation between trust and associated risk from cryptocurrency purchase can further be investigated academically.

Lastly, in reference to the price chart, one key aspect of purchase intention is price. In cryptocurrency, price is not a fixed concept. the price of virtual currency varies every moment. In the virtual currency price chart that can found on online community, virtual currency exchange, cryptocurrency websites, the price changes are summarized in graphical illustrations by time and transaction volume for each currency. Depending on anchor, a percentage in price change can also be different. The chart shows past price pattern, and experts in the community gives logical and reasonable analysis result and explanation-based information shown on the chart. Combined with a belief-based account from community influence (Fox & Tversky), the price chart can lead viewers to image and predict future pattern, solidifying cryptocurrency purchase intention. It is also closely tied with Tversky's prior probability theory, signaling people's tendency to judge uncertainty based on prior data. The past data shown from the chart played an important role in buyer's decision-making process under uncertainty.

6.3 Business Implication

The key business implication stems from the findings is that the ultimate purpose of technology matters. On the contrary to a variety of emerging technologies targeting at expense reduction, process simplification, convenience enhancement, cryptocurrency has special vision called 'decentralization'. In public's eyes, virtual currency can be seen and interpreted as a new technology that can make the world more democratic, empowering individual's influence to institutions in power. Community influence coming from public's interest and support is key determinants of cryptocurrency purchase intention and what forms public's interest is anticipated to be the vision of cryptocurrency. Thus, technology developer

should know that if the value he/she is trying to convey through the invention is something that a lot of people can feel bond and interest the technology will have a good chance to take a place in the mainstream market regardless of practicality. This implication can also put emphasis on ongoing business trends based on exponential growth and re-written history by platform-based businesses.

6.4 Limitations and Conclusion

It is necessary to recognize the limitations of this study. First of all, we cannot claim that the result holds equally well if there is a change in sample size. The most participants in the study are mostly aged between 20~29 and have Korean cultural background. The differences coming from age and culture may have certain influence on the result. Secondly, the study adopted self-reported measure of purchase intention. We cannot guarantee that all participants gave 100% honest response. Lastly, although this study adapted measurement items from prior studies, this is the first that these items were used in the context of virtual currency purchase intention. The ability of items to reflect the complexities in the purchase intention has not previously been fully explored and thus the measures for the model should be considered as preliminary.

We discussed a number of limitations, including sample size, measure, preliminary application. Nevertheless, this study is notable for the progress made in developing new conceptual and theoretical knowledge for the virtual currency purchase intention from the individual's standpoint and elucidating how this knowledge can be used as foundational information for further research.

Appendix 1 – Price Chart Example 1



(Cited from CoinGecko)

Y axis = Price

X axis = Date

Volume data is shown through the graph under the price chart

On the top right, depending on where a viewer sets a date standard, the price grape varies

24h = Date is based on 24h. (example attached below)

07d = Date is based on 7 days

14d = Date is based on 14 days

30d = Date is based on 30 days

60d = Date is based on 60 days
 90d = Date is based on 90 days
 Max = All past date

Appendix 2 – Price Chart Example 2

The price chart also provides the data in the following form.

Currency in USD 📅 Oct 28, 2018 - Nov 27, 2018 ▾

Date	Open*	High	Low	Close**	Volume	Market Cap
Nov 26, 2018	4,015.07	4,107.14	3,643.92	3,779.13	6,476,900,000	65,739,289,046
Nov 25, 2018	3,880.78	4,120.87	3,585.06	4,009.97	6,825,640,000	69,749,265,801
Nov 24, 2018	4,347.69	4,413.09	3,795.16	3,880.76	4,679,500,000	67,495,633,205
Nov 23, 2018	4,360.70	4,396.42	4,195.68	4,347.11	4,871,490,000	75,598,851,166
Nov 22, 2018	4,611.57	4,629.64	4,365.64	4,365.94	4,569,370,000	75,919,439,809
Nov 21, 2018	4,465.54	4,675.73	4,343.98	4,602.17	6,120,120,000	80,020,171,047
Nov 20, 2018	4,863.93	4,951.61	4,272.11	4,451.87	8,428,290,000	77,401,044,320
Nov 19, 2018	5,620.78	5,620.78	4,842.91	4,871.49	7,039,560,000	84,688,539,692
Nov 18, 2018	5,559.74	5,653.61	5,559.74	5,623.54	4,159,680,000	97,753,714,643
Nov 17, 2018	5,578.58	5,578.58	5,519.56	5,554.33	4,303,150,000	96,542,098,114
Nov 16, 2018	5,645.32	5,657.02	5,498.94	5,575.55	5,279,320,000	96,900,828,780
Nov 15, 2018	5,736.15	5,774.82	5,358.38	5,648.03	7,032,140,000	98,151,606,541
Nov 14, 2018	6,351.24	6,371.55	5,544.09	5,738.35	7,398,940,000	99,712,077,259
Nov 13, 2018	6,373.19	6,395.27	6,342.67	6,359.49	4,503,800,000	110,494,466,204
Nov 12, 2018	6,411.76	6,434.21	6,360.47	6,371.27	4,295,770,000	110,689,666,528
Nov 11, 2018	6,413.63	6,423.25	6,350.17	6,411.27	3,939,060,000	111,373,453,740
Nov 10, 2018	6,386.13	6,437.28	6,385.31	6,409.22	3,705,320,000	111,326,145,314
Nov 09, 2018	6,442.60	6,456.46	6,373.37	6,385.62	4,346,820,000	110,905,767,441

Example of price history chart based on 24h

If choosing 90d, each section under ‘Date’ will be 90 differences.

For example, assuming 90d is 3 months

Nov 26, 2018

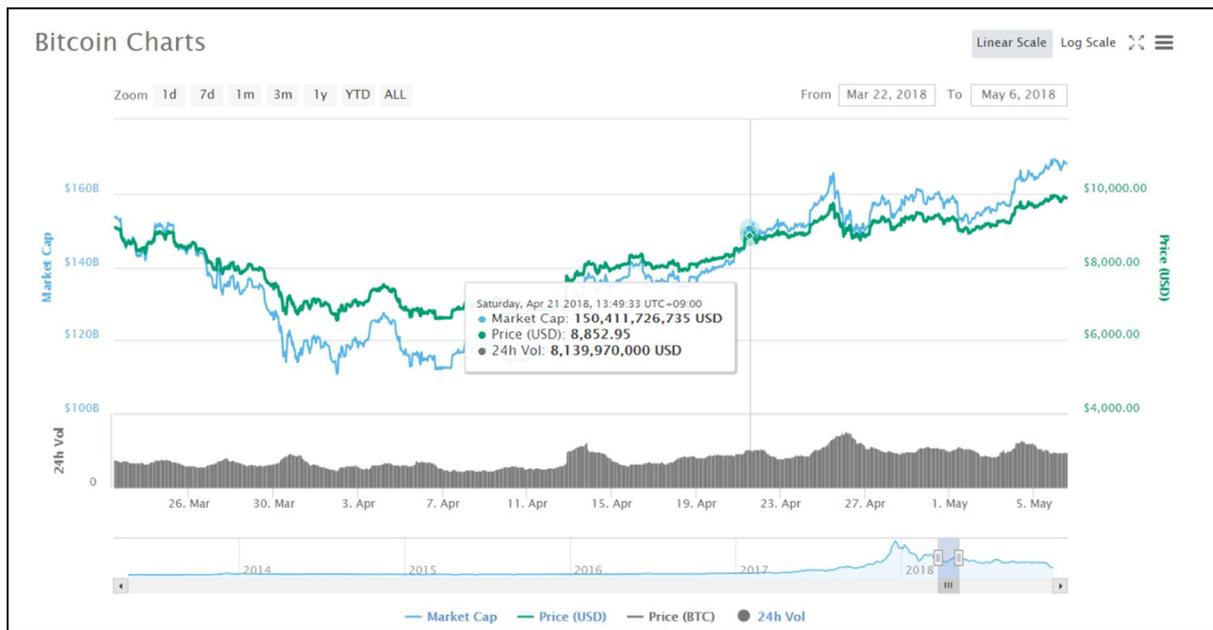
Sep 26, 2018

July 26, 2018

...

This spreadsheet form of data presentation shows how much data is being delivered through the price chart.

Appendix 3 – Price Chart Example 3



With same features illustrated in Appendix 1, the price chart can also specifically set date from X to Y

Appendix 4 - Construct Operationalization

		What is it?	Sources	Item Examples
Community Influence	Perceived Usefulness	Usefulness	(Fred. D Davis 1989) 7 point Likert Scale	Using virtual currency improves the quality of the work
	Community Engagement	The intensity of participation	(Wu et al. 2018) 7 point Likert Scale	I benefit from community's information
	Opinion Leadership	The influence of experts	(Goldsmith & Eastman 1996) 7 point Likert Scale	Experts influence my choice of virtual currency
	Normative Interpersonal Influence	The influence of others	(Shukla & Drennan 2018) 7 point Likert Scale	I will achieve a sense of belonging by purchase the same VC that others purchase
	Reliance on Price Chart	The influence of price chart	(Drechsler 2011) 7 point Likert Scale	The information provided by the chart was relevant for the purchase timing

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