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Application of Blockchain Technology on Consumer to Consumer E-Commerce Business

1. Introduction

The report is an exploration of the use of Blockchain as a technological framework for consumer to consumer business (C2C) models. The report will correlate the concepts by means of interrelating the components and create a application framework where adoption and performance of the technology will be evaluated from a technology adoption perspective. Moreover, existing practices or research outcomes of the technology will be considered to measure its feasibility of use and post performance measurement will be outlined by the end of the report.

Blockchain is a real time phenomenon and it is being researched due to its cost effective, integrated and increasing potentiality of use. The idea of blockchain emerged in 2008 in the cryptocurrency industry as a technology which has been studied as a methodological framework in knowledge and supply chain management in multidisciplinary sectors (Yli-Huumo et al., 2016). Although the notion is mostly used as a technological term, it contains some conceptual attributes derived from its technological components used in the cryptocurrency market. The research will identify and structure the underlying concepts of the term and create a hypothetical conceptual framework in order to assess its applicability within a C2C context. The research will also draw upon the similarities between the technology and business model in order to justify its usage. The research will focus on the online based C2C business models where consumers from one end captures value from the other end consumer using online platforms. Value is co-created by the consumers within the business with very less involvement of the intermediaries.

The rationale behind selecting this business model is its consumer base nature where a third party creates an online platform to connect buyers and sellers from both ends. The process can be linked with blockchain process where user, usually known as miners,

connect with each other through a direct interface without any involvement of middle management. In essence, the nature of both business have been considered to complement each other which is why the research was conducted. Moreover, the popularity of both the systems also was considered during the selection procedure of the topic.

The report is initiated with conceptual clarification of blockchain and C2C business in the next two sections within which components, attributes and models of both notions has been illustrated as a building block of the framework. Therefore, a conceptual framework of technology applicability has been drawn in section 4 which assists the analysis in the next section. Applicability has been assessed from three perspectives found in the Technology Adoption Framework (TAF) and with the support of relevant research the feasibility of blockchain was measured. Eventually, findings, limitations and recommendations are listed in the final section.

2. Blockchain Technology Overview

Blockchain is a technology that is used for exchanging cryptocurrency and it was initiated through the Bitcoin exchange. The concept was first introduced by an anonymous individual or a group called Satoshi Nakamoto in a white paper 'Bitcoin: A peer to peer electronic cash system' published in 2008 (Crosby et al., 2016). Afterwards, it has been established as a foundation technology for secure and encrypted transaction of cryptocurrency and it is also being researched for further development in order to expand usage in other industries. The technology is still considered to be in its' initial stage and due to its cost effective and integrated nature it is offered to be researched in government service, health, security, IOT and entertainment industries (Yli-Huumo et al., 2016; Crosby et al., 2016; Iansiti & Lakhani, 2017). The rationale behind its potential usage lies in its' core attributes of providing data integrity, security and anonymity (Yli-Huumo et al., 2016) which will be analysed accordingly.

2.1. Components and Attributes:

It is important to comprehend the system and process of blockchain in line with extracting its central attributes which will be used to design a technological framework for the C2C E-commerce business models in this report. The core components of the technology consists of a public ledger, a number of blocks, miners and nodes connecting the blocks which is why it is named blockchain (Yli-Huumo et al., 2016; Crosby et al., 2016; Iansiti & Lakhani, 2017).

The functionality of the blocks is to work as a storage containing information of each transaction ever happened which is not changeable and makes it a transparent system for the users. For example, a buyer can access every single purchase details of the coins they are purchasing. Thus, the concept of **transforming ownership** comes into context where the blockchain system promotes transferable rather than permanent ownership of an asset as stated in Crosby et al. (2016), ‘the fingerprint of asset is being owned rather than the real asset itself’. Thus, it also creates a series of **distributed database** which reflects a sense of **decentralisation**. As a consequence, there will be no central authority controlling the system but it will be the users who will be co-creating value for each other. However, there will be a public ledger which stores all the verified and authenticated payment details.

According to the five principles of blockchain outlined by Iansiti & Lakhani (2017), the system also creates a **peer to peer network** which eliminates any third-party requirement since, it is the users or miners completing the transactions which is verified by the system that makes it a decentralised and peer connected platform. The attribute reflects a cost effective and agile process in case of transaction and ownership exchange where **no intermediaries** will be required but the system will operate itself as a middle line service. In addition, it provides data integrity and security since any information that is once uploaded can not be changed or deleted afterwards (Yli-Huumo et al., 2016).

2.2. Blockchain Applications:

There are a number of suggested applications of blockchain due to its innate attributes as extracted above ranging from financial to non-financial use. It has been suggested as a medium of transactions similar to Visa and Mastercard applications due to its data integrity by means of being researched to develop technologically (Crosby et al., 2016). It has been proposed as an alternative of conducting internal transactions of businesses to reduce costs of middle management (Ibid.). It has also been in trial in the Nigerian market by Stellar to assess its functionality in transaction processing (Iansithi & Lakhani, 2017).

In terms of non-financial applicability, to ensure digital rights of virtual and physical database, considering its nature of anonymity, data integrity and security, it can be used in data sharing, venture funding and also in music or digital content industry (Yli-Huumo et al., 2016; Crosby et al., 2016). According to the literatures, due to its distributed and peer to peer network, it reflects similarity with intellectual property management in any form. For instance, writers or performers can directly connect with their client base without any intermediary and receive royalty for their piece of art or educational paper respectively. Therefore, the concept of blockchain can be used in knowledge and content management. According to some literature, (Crosby et al., 2016; Sun, Yan & Zhang, 2016), the system can also be used in legal documents, health record sharing network similar to one drive and dropbox. In addition, temporary ownerships details of car and property can also be suggested to be stored since the information are not changeable, consumers will be able to check every details of their purchase.

In line with the financial and non-financial usage, the system has been considered to be applied in the consumer to consumer e-commerce business platform management in this report due to its' peer to peer network and distributed database features.

3. Consumer to Consumer E-Commerce

An online business model that connects consumers and retains value from the interaction can be called a consumer to consumer (C2C) e-commerce. The concept of consumer to consumer business model is considered to be traditional, however, the emergence of electronic media or virtual communities have created a new online business model which was first found in online auction sites (Dan, 2014). The business model worth a market of \$104 Billion in 2014 (Ibid.). The consumer segment of the business functions as both buyer and seller at different points (Dan, 2014; Pathak, 2009). Therefore, it can be said that consumers hold a two way functionality and co-creates value together in a C2C business. There are a number of popular e-commerce platforms that are considered to be based on C2C network which are Ebay, Taobao, Craigslist and Etsy. In addition, social media platforms (e.g. Facebook marketplace), Gumtree and local applications (e.g. Shpock) also work as mediums or channels of C2C sales (Leeraphong & Papasratorn, 2018). The intermediary platform used in C2C businesses can also be addressed as a modern middleman service created by the e-commerce revolution. One of the values, but not limited to, that is offered on this C2C channels is often considered to be used or second hand products (Dan, 2014). Moreover, the value offered by the sellers are usually categorised by their nature specific categories provided by the e-commerce website. Values offered can vary from property to products and services as well.

3.1. Components of C2C E-Commerce Business:

The business structure of C2C E-commerce differs itself from Business to Business (B2B) and Business to Consumers (B2C) e-commerce networks by means of its medium of communication with consumers since they can communicate with each other directly by an online platform provided by the third party (Dan, 2014). In addition, a decentralised supply chain owned by one end of consumers acting as sellers, having authority of distribution and consumers at the other end who can also function as a distributor or seller at some point are the core features of the business. The transaction method might not be applicable in Social Media interfaces also referred as S-commerce where most of the transactions happen offline or personally without any third party involvement and it

highlights the security issue of the system (Leeraphong & Papasratorn, 2018). The value of C2C business's middleman service is captured by means of advertisement listing fees, transactions, external advertisement or website traffic by the consumers. A business model of C2C has been drawn considering the existing literatures on it followed by the components in order to illustrate a clear picture of the business in Figure 1 and 2 respectively.

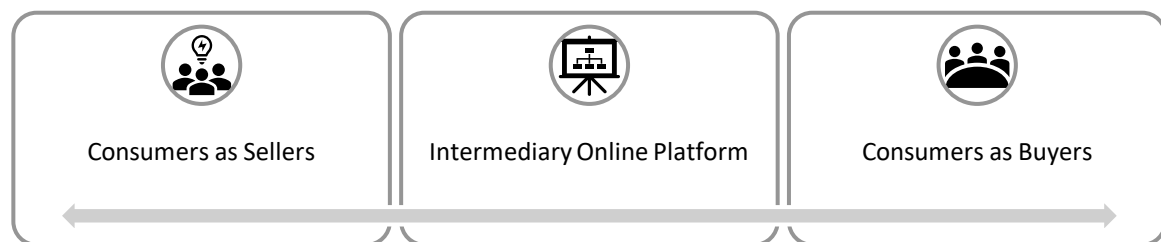


Figure 1: C2C Business Components (Author, 2019).

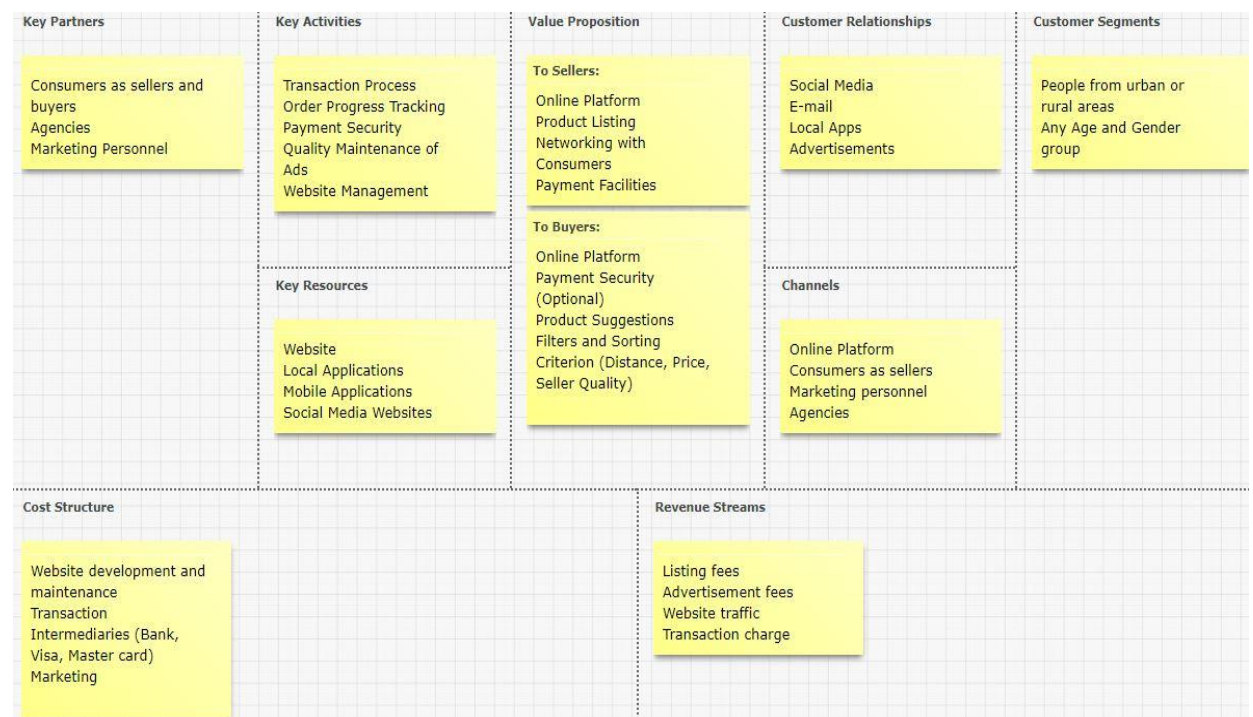


Figure 2: C2C Business Canvas Model (Author, 2019).

According to the business model of C2C e-commerce, the key partners of the business is the consumers themselves. Agencies and marketing personnel are also included who create website traffic and provide payment and logistic support. Within key activities, transaction process, website management and communicating with customers are the core responsibilities taken by the c2c platform provider which also reflects on their cost structure by means of admin cost, transaction fees and maintenance cost. Since, the business model only proposes interactive networking value between the consumers, it does not usually provide any logistic support, hence, sellers need to arrange their own procurement service. Revenue stream is an indifferent part of the business but in a c2c model, it comes from transaction cost saving, listing fees and advertisement fees. However, in recent social commerce websites, transaction options are not provided by the platform and it is managed by third parties or consumers deal with personal payments. Lastly, the key resources of the business consists of its technological platforms which reflects on their cost structure as a maintenance expense.

3.2. C2C E-Commerce Limitations:

The nature of supply chain in the C2C business model can be considered as decentralised and distributed since, consumers acting as sellers store the products or value to be sold and there is generally no central storage offered by the business platform. Due to the nature of its' supply chain, the middle management of the business holds little control on the quality of the products sold. The online platform limits its value proposition within its reach to the consumers, security from scams and in some cases the transaction approach as well (Dan, 2014). As a consequence, **trust issues** in relation to product, seller and value quality have been identified to deteriorate C2C business performance and it also affects consumer network (Ibid.). According to Sabou et al. (2017), consumers encounter fraudulent, damaged product and long waiting time in e-commerce which sheds light on complaint management or customer service section of the business.

In addition, another component within this trust issue is the **transaction** process for the buyers which is not standardised in local applications, social media and some of the C2C networks. As a result, offline transactions are not tracked and hence, it does not contribute

to the business and affects revenue stream of the C2C business (Niranjanamurthy et al., 2013; Dan, 2014). In addition, the issue of consumer information security comes into play here. Since, consumers interact directly with each other in a C2C context, they are exposed to more vulnerability of security breach of personal information including bank details and identity. The security issues of the business are also included within the Information Security Framework according to Niranjanamurthy et al. (2013). The issues has been considered to be addressed during the application of blockchain technology.

4. Research Framework

The applicability of blockchain on the C2C business can be assessed by implying a conceptual framework and assess transformations on each segment of the model. The conceptual framework can be designed considering the attributes derived from the blockchain components which will be used in a way to deduct the limitations of C2C business model. As a theoretical base, the technology applicability framework (TAF) has been selected to analyse the usability and scalability of the framework from three key perspectives as stated in Olschewsky and Casey (2015), firstly, the system usability by the consumers from both sellers and buyers side is considered as a simple interface design is required in order to be used by the consumers. Secondly, the third party which will be providing the system to be used by the consumers, value proposition offered by the system will be assessed in terms of cost management, usability by consumers, transaction and communication process. Evidences from existing usage of the application will be used to examine its scalability by the business. Finally, the third perspective is considered to be the stakeholders in the TAF that has been replaced with external factors in which case the transaction providers and legal aspects can be taken into account. As a consequence, a hypothetical conceptual framework of the application has been illustrated in Figure 3.

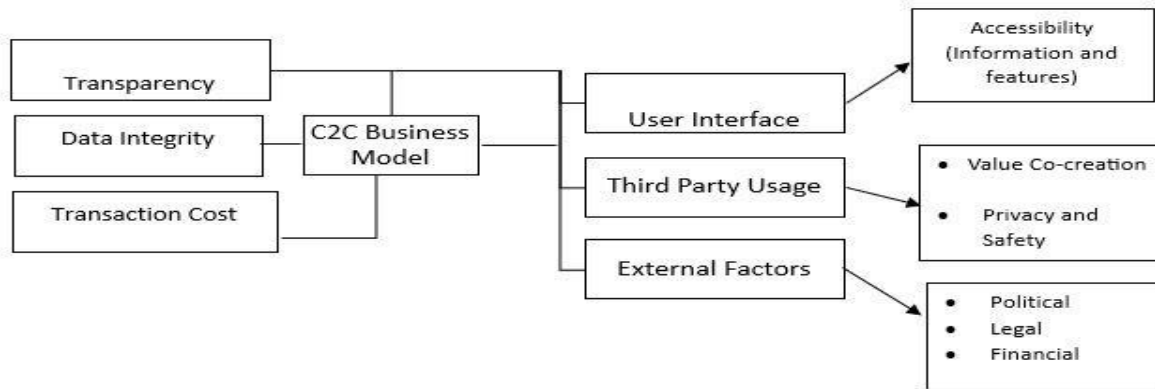


Figure 3: A hypothetical conceptual framework of Blockchain Technology Application within C2C Business Model (Author, 2019).

In the framework, the first three components have been derived from Blockchain which will be applied on the C2C business model in the middle in relation to the user interface, third party usability and external factors. The measurable scales of these components are stated next to the elements. For instance, for user interface- accessibility of features and information on seller and product will be considered. In case of third party usage, value co-creation from website and the system can be measured as well as the transaction safety and user privacy by the application of blockchain. Ultimately, the external factors will be measured by means of legal, political and financial influences regarding the system.

5. Blockchain Application on C2C

In this section of the report, the conceptual framework will be implicated on the considered business model in relation to reducing the business limitations and existing evidential practice of the technology will be used to measure its' applicability.

5.1. Applicability on User Interface:

The user interfaces used in the C2C models can be categorised in three types based on the domain usage purpose: (i) **Traditional E-commerce website**: the interfaces used in this category is similar to the Business to consumer model interfaces like Amazon and Alibaba. E-bay can be used as a classic example of this category, it was first initiated in auction sales but it is now used partially as a b2c platform as well ((ii) **Mobile commerce (M-Commerce)**: user interfaces of local applications based on specific operating areas can be included in this section, second hand or used products, properties for rent and jobs are the most popular categories included in this platform and (iii) **Social commerce (S-commerce)**: c2c interfaces developed in social networking websites are included in this section, it consists of the similar categories as mobile commerce and additionally personalised services designed by consumers are also listed in this category (Leeraphong & Papasratorn, 2018; Niranjnamurthy et al., 2013).

The application of blockchain on C2C user interfaces can be justified due to its peer to peer network and decentralise database feature similar as C2C network with a consumer to consumer interaction system and a distributed storage system accordingly. The systems reflect each other in terms of interaction approach between the users which does not require any third parties. In terms of accessibility of information, the blockchain system is known for its transparent nature and data integrity as any information regarding the transaction and product that will be stored in the blocks are automatically updated in the whole system and can not be changed or deleted. Thus, consumers will be able to check every detail of the product and sellers before making any decision and any new decision will be updated in the system automatically which brings in the question of technological flexibility and time issue of the framework.

The level of success of using blockchain method in user interface can be measured by the novelty-complexity framework designed by Iansiti and Lakhani (2017) in Figure 4. The model consists of four stages where the first two stages reflect more novelty and less complexity in initial stages. For instance, in single use examples, use of TCP or e-mail is noteworthy which then moved towards creating networking interfaces in localization stage. In the third stage where complexity increases, substitute of the application emerges from different sites as happened with the C2C business. Since, the business does not manage distribution of products or payment in S-commerce, third parties like Paypal and delivery companies took this opportunity to fill up the void. Finally, the last stage where a business transform from medium to high complexity and novelty at the same time, they are considered to be flexible to issue their own substitution components as happened by Amazon, although they are a B2C model, their integration towards logistics and branding provides a bigger picture of future of C2C.

In relation to the framework, the application of blockchain technology is being experimented on single use transactions at coffee shop payments apart from bitcoin purchase (Risius & Spohrer, 2017). Therefore, it can now be experimented by means of localization on local mobile applications among users to measure its acceptance and data integrity then can be used to develop it further by substituting smart contracts (Ibid.). The localization effort can be developed in a limited area where a number of private networks connected through distributed ledgers (Iansiti & Lakhani, 2017).



Figure 4: Technology Adoption Framework of Novelty-Complexity (Iansiti & Lakhani, 2017).

5.2. Blockchain on Third-Party Domain:

Although the concept of blockchain is used to eliminate any intermediary service within the financial sector, it can also be used as a modern middleman service where the domain provider will act as a third party and challenge traditional intermediaries in the financial industry (Risius & Spohrer, 2017). According to Glaser (2017), smart contracts is a suitable measure that can be taken in account for transaction and data safety by blockchain. As a result, the system will co-create value for both the intermediary and user since the third parties will retain a cost-effective transaction approach while users will also benefit from a secure and integrated system.

The measurement will also gap the limitation of existing C2C e-commerce where payment uncertainty and offline transactions disadvantages both user and the value stream of the third party (Niranjanamurthy et al., 2013). A potential approach by Facebook marketplace, a platform of Social E-commerce, can be exemplified here as they are said to be launching their own version of coins for inside dealings within the platform (Gil-Pulgar, 2019) although it will not be a decentralize approach and facebook will control the transactions. In essence, it can be seen that, blockchain can be integrated to existing systems by means of transaction and security approach or a distinguished individual platform can also be developed (Gil-Pulgar, 2019).

5.3. External Factors:

The external factors that can affect the adoption of blockchain system is social acceptance, financial and legal authorisation identified by Crosby et al. (2016). The issue of social acceptance can be measured through the novelty and complexity framework provided in the user interfaces (Ibid.) however, suitability of the technology on the context of financial and legal sector is still under investigation (Risius & Sphorer, 2017).

Blockchain technology can challenge the existing intermediaries in the financial industry (Risius & Sphorer, 2017) by means of capturing the market provided by credit companies and notary. Since, smart contracts can automate the transaction system and thus making it cost free or less costly. According to Glaser (2017) ‘even if financial intermediaries provide smart contracts and charge for that, it will be challenging for them to survive’. Therefore, obtaining

operating permit from financial authority will be a time-consuming process for the technology application. Moreover, economic considerations and legal approval is also key factors in order to apply the technology in transactional sector. However, in security aspects, it might be easier to get authorisation as that outruns financial drawbacks.

6. Discussion of Findings

Implementation of the technology within the business context can cause some changes within c2c business model by means of being cost effective and increasing value propositions. The first change can be identified in the key partner list where smart contractors will be included as they will be accountable to provide transaction and data security. As a consequence, the model will propose more value towards its users by means of securing their trust. There will not be any significant changes on consumer relationship management and channels, however, the business can be predicted to reach more consumers due to their trustworthy features. In terms of the cost structure, intermediary costs reduction will be noteworthy but smart contractor fees will be included in the cost segment. In addition, order tracking will also be automated as it will be updated by the users acting as sellers, hence, key activity will reduce. Thus, the technology will leave its impact on the business model which can be considered to be positive in most cases, however, since the system has not been applied in a broader scale, localization will be an initiative approach to experiment its applicability.

7. Conclusion

Blockchain is a relatively new phenomenon in the research arena and it has been researched in multidisciplinary sectors. In terms of assessing its' applicability in any sector requires empirical research and experimentation which can establish its' suitability in the considered sectors. Moreover, there are some technological limitations it need to overcome before applying in a broader scale. Bandwidth management of user traffic, updating system in shorter time and flexibility to operate large number of transactions are considered to be the improvements that need to be done before taking it public (Crosby et al., 2016).

The system can be seen to create a new line of middle management but with more transparency and no hidden charges for its' users. It will also create opportunities for smart contractors and new security infrastructure if implemented. Moreover, it can also revive the revenue stream by providing internal transaction method in less cost to the c2c businesses. By offering more transparent system it can integrate or create a new customer segment of startup businesses which will result in an innovative C2B business model. In essence, the technology is full of potentiality that can be achieved with more research on the user, data, society and technological improvements.

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