

A SCENARIO OF ADOPTING BLOCKCHAIN TECHNOLOGY IN SUPPLY CHAIN: A STUDY OF E-COMMERCE IN BANGLADESH

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Abstract

Purpose– The prime objective of this article was to understand the real scenario of blockchain technology in Bangladesh by investigating its benefits and barrier while adopting this technology in respect of Bangladesh’s e-commerce industry.

Design/methodology/approach– This is a qualitative investigation of blockchain technology in Bangladesh and its benefits and barrier. This study conducted 40 in-depth interviews of top executives, sales executives, and e-commerce consumers in Rajshahi city of Bangladesh. The collected data were analyzed thematically.

Findings– This study finds positive responses from all of them though they have reproached Bangladesh’s government policy. In spite of some issues, we are very optimistic regarding blockchain-based supply chain management systems.

Research limitations- This is a conceptual paper that suffers to observe reality from the ground. The main issue is that there have not been enough publications about blockchain-based supply in the Bangladesh scenario. At the same time companies and consumers have not been enough knowledge about blockchain.

Practical implications– This paper makes a significant contribution to making supply chain implementation easier by utilizing blockchain technology, particularly in the Bangladesh e-commerce industry. This study also presented a practical framework as a future reference for conducting research on the impact and barriers of blockchain in the e-commerce supply chain.

Originality/value– We all know that Bangladesh is doing exceptionally well in terms of supply chain management, but it is truly unfortunate that there is an insufficient paper on blockchain technology in the supply chain management system. As a result, we believe our paper can play a vital role in e-commerce industry in Bangladesh.

Keywords

Blockchain, Supply Chain, E-commerce, Impact, Barriers, Bangladesh, Scenario

1. Introduction

With the improvement of lots of new technologies, the present world is now on the verge of an information-driven Fourth Industrial Revolution (4IR). For the last couple of decades, the economy of this world is moving forward so fast with the help of new technologies. Blockchain technology is one of them; this is a revolutionary technology in terms of supply chain management. This technology has been invented for many years but still, it is not possible to make sure of its usage in the supply chain. Though Bangladesh is an LDC (Least Developing Country) listed country, due to its rapid economic progress, it has been dubbed an ‘Asian tiger’ in past few years. World-leading e-commerce (electronic commerce) companies such as Alibaba, Walmart, Amazon, and E-bay have started using blockchain technology in their supply chain management and seeing its impact of it positively. The more time Bangladesh will take to get used to the new technology, the high possibility it has to lose control of the proper supply chain management system. Anything that can conceive of as a supply chain, blockchain can vastly improve its efficiency- it does not matter if it is people, numbers, data, or money (Ginni Rometty, CEO- IBM). Now Bangladesh has a strong e-commerce business but the blockchain is a newish theme in this country. Therefore, there is limited documentation regarding blockchain technology in Bangladesh. However, the real scenario of blockchain in the field-level management and higher management of leading e-commerce companies in Bangladesh is not well documented. The previous literature did not have a study embodying any well-accepted blockchain-based e-commerce theoretical framework. To fill this gap in the literature, this study intends to understand the real scenario of blockchain technology in Bangladesh by investigating its benefits and barrier while adopting this technology in respect of Bangladesh’s e-commerce industry. Moreover, this study will contribute to the field-level management and policy-level management of the leading e-commerce companies in

Bangladesh for preparing proper policy and executing the methods of blockchain technology in the country under study.

2. Literature Review

2.1 Blockchain

Blockchain was first introduced in 2008 by Satoshi Nakamoto. The blockchain is an immutable digital database of financial transactions that can be configured to register nearly anything of value, not only financial transactions. A blockchain is a decentralized information ledger that stores lists of unmodifiable records called blocks. It's comparable to a text document that can be accessed from multiple machines. Multiple versions of this document can be generated on a system, and the document can be updated frequently. Blockchain or Distributed ledger technology (DLT) can be used to store permanent and tamper-proof records of digital data (National Blockchain Strategy: Bangladesh 2020).

Blockchain technology is a peer-to-peer system that maintains data about digital assets and transactions in a decentralized database. To encrypt, store, and disseminate data, blockchain is employed in a new and novel method. A chain of blocks that are encryption keys linked together protects blockchain data. A blockchain-based business service platform has the features of distributed data storage, time series, tamperproof data, intelligent execution of smart contracts, security, and privacy protection (Xingxiong Zhu and Dong Wan, 2019). Blockchain technology has the potential to improve the integrity of financial transactions and enables to smooth data transformation system with high security. Concerned people with blockchain say that it is almost impossible to break the security system of blockchain. Technology experts are eye to eye with the view of them.

Already blockchain has ensured a high-security system regarding these programmers is working hard to make it stronger. Companies maintain their blockchain technology by private blockchain, which is also known as the managed blockchain. Another form of this technology is a public blockchain. In a public blockchain, anyone is allowed to get access to it. Taking into consideration the privacy and payment methods of the blockchain, the government of Bangladesh is examining blockchain as a viable option. If the Bangladesh government allows blockchain technology, it will be an epoch-making event on Bangladesh's e-commerce site. Following the government's

approach, some big e-commerce companies in Bangladesh are very optimistic about blockchain technology.

2.2 Supply chain management

The integration of "design, planning, execution, control, and supervising of supply-chain activities" is referred to as supply chain management. A supply chain is a relative, cross-company interdependence of two or more legally independent companies and institutions (Stadtler, 2015). It includes all parties involved, from the suppliers of the raw materials to the producers and intermediaries to the end customer (Neubert, Ouzrout & Bouras, 2018).

In the production cycle, efficient supply chain management solutions bring down costs, waste, and time. Supply chain management will be more than simply a method for cutting costs or a goal for increasing productivity improvements inside a firm. The demand for supply chain management is increasing, due to high automation and increased enterprise connection. Customer satisfaction has increased as a result of the supply chain's efficiency, and the company's success is based on continued performance.

2.3 E-commerce

Electronic Commerce (E-commerce) is a tremendous platform where customers buy and sell their products or services using the internet. More specifically, buying and selling products online is called e-commerce. According to Michael Aldrich back in 1979, was an English inventor, innovator, and entrepreneur is the person who invented online shopping. However, he did not use the payment method for his online purchasing. Since then, e-commerce has been growing at a rapid pace. Now, most of the orders of the world's giant companies are taking place through the e-commerce business. In e-commerce, a customer can directly deal with the business or company through the customer-to-business (C2B) approach which is one of the great advantages of e-commerce. E-commerce decreases costs by eliminating intermediaries, since customers may buy items or services directly from the company's website. Gradually the reliability of e-commerce is increasing because companies are providing a better and fast delivery strategy with a high-security system. As a consequence, cross-border trading is becoming highly popular across the world. Companies like DHL can deliver their commodities to their consumers so quickly because they

have direct arrangements with them. E-commerce is expected to be particularly important in Bangladesh's economy in the near future.

2.4 The Blockchain in the Supply Chain Management

Blockchain technology was introduced in this area with the promise of solving the main problems of the supply chain due to its capacity of tracking the flow of goods in real-time and, enhance the visibility and transparency of the operations (Azzi et al., 2019; Saberi et al., 2019; Kshetri, 2018). E-commerce, which now has established a standardized e-commerce infrastructure, has reformed the "middleman" trading mechanism. The third-party payment platform was developed in the traditional e-commerce mode to secure the rights as well as interests of both parties, which is a decentralized process with numerous limitations. The traditional e-commerce supply chain is currently challenged by several issues, such as the theory of supply chain management, inventory challenges, supply chain integration, supply chain parties' trust, intermediate linkages, and cost issues. E-Bay, Amazon, Alibaba, and other trading platforms have stringent restrictions and demand fees for the platform and transactions. Blockchain technology has the potential to increase supply chain transparency and establish confidence among participants.

The properties and application status of blockchain technology analyses the problems faced by e-commerce nowadays introduces the innovative application of block chaining technology, and probes into the influence of blockchain technology on e-commerce (Tong Zhang, Chunbo Tan ICASET 2018). Blockchain implementation has the potential to solve this problem with increased security and transparency through the implementation of cryptocurrency in payment and smart contracts. Exploring the usage of the blockchain, cryptocurrency, and smart contract in e-commerce for a secure and efficient transaction (Ismanto et al, 2019). The information anchoring technique, key distribution technique, data encryption algorithm, and anti-counterfeiting technique are among the basic approaches and algorithms created. The framework, principles, and approaches work together to create a complete and realistic solution that is evaluated in a range of real-world difficulties and offensive situations.

Top corporations are now developing blockchain technologies, while 16 are still in the research stage. The 27 firms are implementing blockchain operations include Microsoft, Amazon, Walmart, Alibaba, PayPal, Samsung, as well as the Bank of China and they are increasing their profit by

ensuring transparency day by day. This research paper showed that Bangladesh's perspective affects the e-commerce industry's adaptability to blockchain benefits and barriers which are limited in the literature on the blockchain, particularly in Bangladesh.

3. Methodology

3.1 Research Design

This paper attempts to present a qualitative investigation of the understanding of the real scenario of blockchain technology in Bangladesh by investigating its benefits and barrier while adopting this technology in respect of Bangladesh's e-commerce industry. The qualitative method has been used to have replies using questions relating to various aspects of blockchain technology from the participant's point of view (Goedeke et al., 2015). In qualitative research, there is hardly any answer to a question like how many respondents are asked to gather information on having a panoptic picture of the blockchain technology in Bangladesh based on thematic analyses (Robinson, 2014; Fugard & Potts, 2015). Face-to-face interviews were conducted for having a better understanding of the kind of technology based on the opinions, and experiences of participants using the interview schedule. The sample respondents of this study are selected purposefully and based on the convenience of the researcher. The interviews were conducted in Bangla and then recorded, transcribed, and translated into English.

3.2 Study Sites

Considering these issues the researchers selected Rajshahi city as the study site for this budding industry. The interview was arranged with 6 top executives and 14 sales executives of six leading-commerce (Daraz, Chaldal, Foodpanda, Hungrynaki, Rakomari.com, and Shazgoz.com) to receive information on the current operating status and the prospect of the e-commerce supply chain. Moreover, data are collected from 20 e-commerce consumers of different demographic groups in Bangladesh.

3.3 Sampling Technique

Convenience sampling was employed in this research. In both qualitative and quantitative research, the process of convenience sampling is valid. Personal contacts-based convenience sampling was applied. There is no computation or authority assessment that can be conducted to

define the number and forms of sample frame required a priori in qualitative research. Sample size adequacy in a qualitative study is related. For certain kinds of homogeneous or essential case sampling, a sample size of 10 might be considered sufficient, too small to achieve full variation of a complex phenomenon or to establish theory, or too large for certain kinds of narrative studies. According to Van Kaam (1959), the sample size of 10 to 50 is sufficient to discern its necessary constituents in qualitative research. In the existing research, 40 respondents were selected to be interviewed based on one to one contact.

3.4 Interview Questionnaire Development

A semi-structured interview methodology was used in the qualitative part of this research to share views and viewpoints between the investigator and the participants. The semi-structured questionnaire was designed and developed by considering a literature review. The production of interview questions were considered very critical because the qualitative approach was used to provide real-world perspectives. In the present research, the field study has been conducted with an in-depth interview with 40 interviews relating to the subject of the study.

3.5 Data Collection Procedure

A total of 40 in-depth interviews were carried out at the study site from January 2022 to March 2022. These interviews were conducted to understand the respondents' views on blockchain technology. Before taking interviews with the respondents, permission was taken from the respective interviewees. However, in the month of January 2022, the researchers visited the study site and tried to develop a relationship with the top executives, sales executives, and consumers of six leading e-commerce (Daraz, Chaldal, Foodpanda, Hungrynaki, Rakomari.com, Shazgoz.com). The researchers were able to conduct interviews as a pretest on an initial questionnaire which is designed on the basis of the research questions and objectives of this study. After returning from the field, a few modifications were done by following the comments and opinions of the respondents. After modifying the questionnaire, 40 interviews had been conducted until the information saturation stage was reached. The researchers have not used data from the incomplete interview in this study. During the interview, the participants were requested to allow recording their speech by using the mobile recorder. Most of the participants allowed us to record their

interviews apart from very few. In the case of the respondents who did not allow to use the recorder, key points were noted down. For data analysis, the verbatim transcriptions of all recorded interviews were completed to ensure accurate data from the discussions of participants, body language, and others.

3.6 Data Analysis

To analyze the in-depth interviews gathered from the field study using the thematic technique. This technique helps in transcribing the collected data, coding, and developing the central theme of the research (Shneidman, 2013). To analyze the data gathered from the field study, first, the interviews were transcribed by using verbatim mobile records and the notes written down during the interviews. Then, to examine and evaluate the collected data, the content analysis approach was used (Lune & Berg, 2017) to investigate the real scenario of blockchain technology in Bangladesh by investigating its benefits and barrier while adopting this technology in respect of Bangladesh's e-commerce industry. The data were collected from interviews was consolidated and subjected to open coding and inductive analysis, as recommended by Merriam (Merriam, 2002). Moreover, secondary data were collected from the published documents and websites for this research.

3.7 Results and Discussion

The in-depth interviews with top executives, sales executives, and consumers of six leading e-commerce provided insights into the investigation of the real scenario of blockchain technology in Bangladesh by investigating its benefits and barrier while adopting this technology in respect of Bangladesh's e-commerce industry. The main issues to investigate included perceptions of social exclusion, personal traits, social security, considerable efficiency, reliability, safety, and comfort as the areas where a nexus between blockchain technology and its present scenario are shown. The outcome of this study will have an important policy impact on the e-commerce world and a contribution to the literature on the studied field.

4. Impact of blockchain on the supply chain in the e-commerce industry

4.1 Traceability

Traditional e-commerce followed traceability systems which have major limitations to monitor in a proper way. It should facilitate product traceability by making information and origin more easily

accessible and thus improving product safety and quality (Saber et al., 2019). For example, it enables company goals to be achieved, as the origin of the raw materials can be traced right through to the product due to the complexity within a network, errors can occur resulting in incomplete or missing information, which in turn hinders traceability (Francisco & Swanson, 2018).

Electronic product codes, which are part of the GSI system, are used to track inventory. The inventory flow from one location to another is scanned using blockchain technology, which creates a history of all inventory goods as they move through the supply chain process from suppliers to end users. In a blockchain-integrated supply chain system, for example, when a product is manufactured in a factory, it is assigned a unique code, and when it reaches the warehouse, it is assigned a new unique code based on the previous code. It also has unique code at the distribution and retail levels to ensure that items are not tampered with and customers receive genuine products.

Respondents' Opinion: Daraz and Foodpanda stated that they used available best traceability systems, besides other respondents stated that they used traditional traceability systems. Besides, Daraz and Food panda have also stated that if blockchain technology becomes available, their traceability systems will be simplified.

4.2 Security

Security plays a vital role in consumer trust, which depends on data sharing traceability, software protocols are used to implement basic security mechanisms to hinder tampering and misuse of power (Robach, 2018) to create a new form of trust. Nevertheless, there are still security gaps as the technology is still in development (Babich & Hilary, 2019).

E-commerce merchants generally send invoice receipts and some other after-sale service conditions through email or paper copy. All of this information may now be protected and saved in a block of data. This will make it simple for a customer to request a service and for a shop to offer the requested service.

Respondents' Opinion: The majority of respondents were concerned about security systems, stating that in general technology, their customer's database and company information might be hacked at any time. As a result, the majority of respondents are very interested to welcome any new technology such as blockchain technology in their company.

4.3 Automatic execution of contracts

Blockchain enables contracts to be automatically performed according to predefined criteria and conditions. Blockchain technology allows for more efficient processes because it is integrated management methods.

When inventory levels fall below a predefined limit, the system alerts all parties involved, including warehouse managers, procurement managers, and suppliers. The refund procedure can be automated using blockchain technology, resulting in a quick reimbursement to the customer. If a customer changes their delivery address while the goods is in transit, this technology can automatically update the address and notify the appropriate parties; the same is true if a customer changes their delivery date.

Respondents' Opinion: Respondents' companies cannot properly monitor their warehouse, procurement, and supplies in general technology, so they stated that if blockchain technology is used, those activities would be automatically executed. Respondents expressed a positive attitude toward implementing blockchain technology in their supply chain system.

4.4 Cost-effective

One of the most evident advantages of blockchain is the ability to quickly reduce overhead costs. There are multiple instances of demonstrable improvements and cost savings that have resulted from corporate adoption of blockchain.

Blockchain technology may be used by supply chain companies to communicate and agree on critical information. In other words, businesses do not need to hire an intermediary to handle the intricate negotiations that accompany establishing regulations before handing over sensitive company information. Due to blockchain's ability to synchronize data throughout the network in a verifiable manner, complex contract discussions can be performed in a truly peer-to-peer fashion, trying to eliminate the need for costly central intermediaries to assist this function. Because transactions are allowed by contract by a system of countless individuals, the use of transaction facilitators like payment networks and payment systems will be minimized. By eliminating the requirement of third-party transaction management and record keeping could be easy. It has the potential to drastically lower transaction costs.

Respondents' Opinion: *Respondents concurred in positive way to adopt blockchain technology for their company after learning about its cost-effectiveness.*

4.5 Economical performance

The implementation of blockchain technology in the supply chain can have many economic effects. Petersen et al. (2018) The aspects of the blockchain, such as tracing items inside the supply chain, tracing back to the point of origin, and alternatives for funding deals, have been highlighted as having an impact on the economy. In addition, Kshetri (2018) states that blockchain technology within the supply chain is particularly visible through effects such as reduced costs and uncertainties and at the same time increased process speed, data security, and quality. This makes blockchain-based processes faster, more effective, and more cost-efficient than traditional supply chain management processes (Chod, Trichakis, Tsoukalas, Aspegren & Weber, 2019), and could change the way business is done by what, how, and where it is done (Allen et al., 2019). In particular, inter-organizational processes can be executed without an intermediary, trade financing can be facilitated (Chod et al., 2019) and processes with third parties that are not trusted can be more secure (Mendling et al., 2018). Therefore, the blockchain can contain data about the liquidity or the financial trustworthiness of the trading partner (Jahanbin et al., 2019).

Beyond these internal and inter-organizational processes, the usage of blockchain in the supply chain can have indirect economic effects. The blockchain offers the possibility to link physical objects with a digital identity, so that the authenticity of the products as well as their origin can be proven within the framework of traceability (Montecchi, 2019). As consumers become more aware of the sustainability of the products, they buy and their supply chains (Jahanbin et al., 2019), this could lead to competitive advantages or incentives to buy.

Respondents' Opinion: *From overall explanation, respondents were concerned and concurred that blockchain technology will provide better economic performance than general technology.*

5. Barrier of adopting blockchain technology in e-commerce

Blockchain technology is a totally new concept in Bangladesh so it has a plethora of limitations to be established. The biggest problem with introducing blockchain technology in Bangladesh is the

inadequacy of technical knowledge. Still, most individuals have no minimum knowledge regarding blockchain technology.

There is not enough research on blockchain as well as a training center that can help concerned people to develop a better blockchain system. For this reason, people do not know how to control this technology. Therefore, people are afraid of operating it.

Bangladesh's government is yet to recognize blockchain technology and has no proper policy which is another issue here. Although a few large corporations seek to integrate this technology into their supply chain management systems, the Bangladesh government is not properly supportive.

In developed countries, blockchain is a name of a huge business. We can see many blockchain companies are doing well in their position named ScienceSoft, Ripple Labs Inc, LeewayHertz, Blockchangers, and so on. However, blockchain companies are hard to find these days in Bangladesh. As a result, we are unable to develop this industry in our country.

Nowadays we can see the light of hope because our government is thinking about this technology in recent years. The ICT minister has said the government has been thinning in this regard. We are very optimistic that very soon we are going to overcome the discussed drawbacks to keep our data secure and make this sector profitable.

Blockchain offers a technological solution to all existing difficulties in the supply chain. Many businesses have started adopting it in order to have a competitive advantage.

The blockchain has the potential to work in theory, but supply chains are notoriously difficult to change and adapt to. Companies spend years establishing and improving supply chains. It is not easy to integrate new technologies into existing supply chain systems because the integration challenges are significant.

This study is issued due to the currently still young topic of the possible implementation of blockchain technologies in the supply chain. The increasing inexorable digitalization in industries is constantly revealing new insights and thus creates new gaps for further research. The introduction and use of blockchain technologies in supply chains are currently still at an early stage.

and require more time to achieve the full acceptance, application, and potential of this innovation (Philipp Manuel Block & Sophia Katharina Marcussen-2019)

5. Intra-organizational barrier

5.1.1 Financial restrictions

Initially, the implementation of blockchain technologies within companies can lead to financial restrictions. The implementation of blockchain technologies require high costs in order to successfully integrate the technology into the company. On the other hand, it provides possibilities to execute data transactions securely and at low rates, which leads to a cost-efficient and flexible supply chain. (Korpela et al., 2017)

Especially at the beginning, the costs for the acquisition and implementation of new technologies are high (Heilig, Lalla-Ruiz & Voß, 2017). Additionally, staff training to deal with these changes is costly but vital.

Respondents' Opinion: *Except for Daraz, the majority of company respondents expressed a negative opinion about financial issues, claiming that it is a major barrier to adopt blockchain technology because they are not financially stable enough.*

5.1.2 Obstacles in cultures and policies

When a company decides to employ new technology such as blockchain, the existing culture of the organization can be affected since new guidelines are required to use new technology. With the implementation of blockchain technology, there is a new distribution of roles as well as responsibilities and competencies shift (Mendling et al., 2018).

Respondents' opinion: *People in our country are very connected with cultural things and are habitual with a specific culture, so some consumer respondents said it is difficult to adopt Blockchain technology immediately, but this technology will be implemented and they will adopt Blockchain technology gradually.*

5.1.3 Absence of experienced workforce

Since there is no clear standardization, companies are unsure how to use technology effectively. However, the lack of knowledge about the long-term success of the implementation can be partly compensated by a stable environment (Sternberg & Baruffaldi, 2018).

Respondents' opinion: *According to company respondents, blockchain technology is a relatively new technology in our country, making it difficult to find experienced technicians to properly implement it in their organization.*

5.1.4 Long time for approval

In our culture, most of our young companies play a defensive role when it comes to adopting a new technology that is a little familiar in the industry. They tend to be the late mover and observe how another competitor is doing with that technology.

The implementation of technology can be rejected if this is accompanied by changes in the company structure (Jharkharia & Shankar 2005), which limits a far-reaching implementation process. As a result, diffusion with blockchain technologies is slow (Korpela et al., 2017).

Respondents' opinion: *The majority of company respondents were positive about adopting Blockchain technology, but they stated that it is a time-consuming process that will interfere with their regular operations.*

5.2 Inter-organizational barriers

5.2.1 Competitive disadvantages

Although the exchange of information and data via blockchain can make the supply chain more accurate and effective in terms of traceability, transparent data may create worries about mistakenly disclosed information being passed on to other players. The competitors can enjoy the benefits of the info that has been supplied.

Respondents' opinion: *According to company respondents, it would be preferable if all companies in the e-commerce industry could be collaborated, as this would pose the greatest threat to competitive advantage.*

5.2.2 Role reorganization

In addition to the cooperative effort hurdles, there is a new role allocation inside the blockchain along with supply chain players. Companies must take on new and unexpected tasks, particularly during the deployment phase of technology in the supply chain, which can be discouraging. However, if supply chain participants are compelled by some other parties, this transfer of duty may result in the formation of the blockchain.

Respondents' opinion: *No opinion from respondents.*

5.3 Technical barriers

5.3.1 Inadequate technological access

A lack of access to technology (Saber et al., 2019) is often a major problem within a supply chain. In order to add value from a digital supply chain, the necessary information must be transparent for all participants in the supply chain (Apte & Petrovsky, 2016) as well as all participants must use the same method or technology. However, this is not possible due to the different possibilities of several enterprises. For example, not all companies are able to afford the high establishment costs (Korpela et al., 2017).

Respondents' opinion: *Most of respondents expressed same opinion as blockchain is totally a newish thing in Bangladesh so how they can get access technological support that is one of the biggest barriers for adopting blockchain in e-commerce industry.*

5.3.2 Condition of infancy

Moreover, blockchain technology is in an immature stage of development (Tijan et al., 2019). Since the establishment in the supply chain is still at an early stage, problems may arise for which there are no yet solutions, as not all possible problems have been investigated (Kim & Laskowski, 2018).

Respondents' opinion: *Respondents asked if they will face any problems after adopting blockchain how they solve those problem. As the infancy condition of blockchain to face some difficulty to solve any problems.*

5.4 External barriers

5.4.1 Competition

In the context of a blockchain-centered technological trend, and in relation to the competition, even though these situations are incompatible with the current supply chain and do not add value, blockchain-based technology is being adopted.

Respondents' opinion: *No opinion from respondents.*

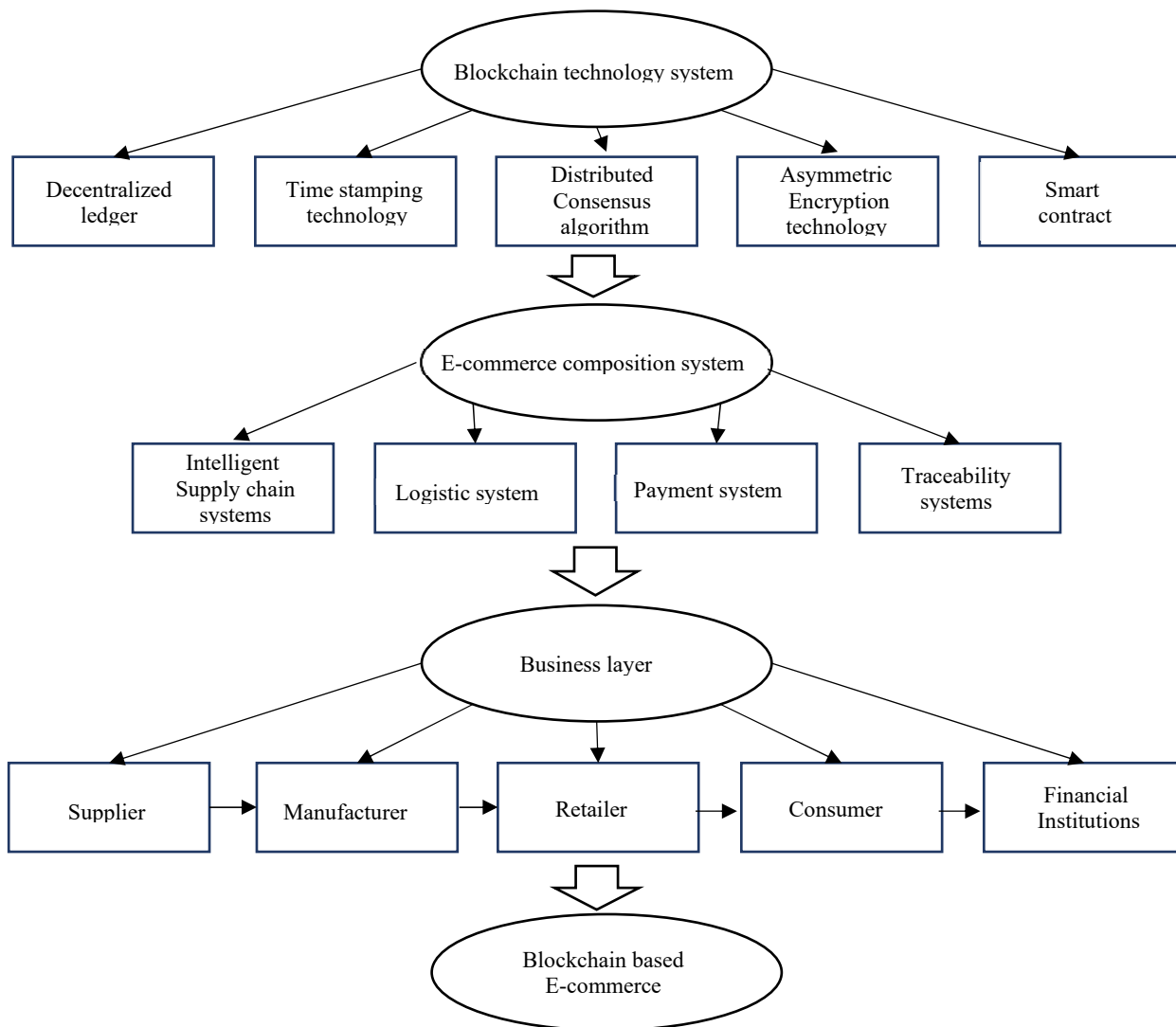
5.4.2 Laws and legal issues

In addition, legal aspects and laws can be a crucial hurdle in the introduction of blockchain technology into the supply chain. In times of globalization, supply chains are globally networked and goods traffic within them is a complex topic from a legal point of view due to a multitude of different actors and laws (Wang et al., 2019a). Moreover, it is aggravating that there is still no clear legal rule or act regarding the use of blockchain technology. Legal uncertainties can therefore constitute an external barrier and an obstacle to implementation (Poszler et al., 2019; Seebacher & Schüritz, 2019; Wang et al., 2019a).

Respondents' opinion: *Respondents said that govt. of Bangladesh legally issues all procedures on blockchain adaptation process we can easily access blockchain in our companies otherwise it will be quite difficult.*

6. A theoretical framework for e-commerce Supply chain based on blockchain

In our paper, we design a theoretical framework of e-commerce based on blockchain technology that includes e-commerce composition systems, blockchain technology systems, and an e-commerce business layer. In our research, we focus on four basic e-commerce composition systems namely intelligent supply chain system, logistic system, payment system, and traceability systems besides blockchain technology systems we focus on five systems namely decentralized ledger, time-stamping technology, and distributed consensus algorithm, asymmetric encryption technology, and smart contract. In the e-commerce business layer portion, we highlight the total supply chain part namely Suppliers, manufacturers, retailers, e-commerce financial institutions, and finally consumers. Now we design a blockchain-based e-commerce framework.



Source: Redesign by the author from various sources.

In our framework, blockchain technology systems consist of a decentralized ledger, time-stamping technology, distributed consensus algorithm, asymmetric encryption technology, and smart contract. The decentralized ledger can be defined as a computerized blockchain system that decentralizes the data storage network form that not only ensures the security systems but also provides efficient transactions. In time-stamping technology, we can easily reduce the tamper ability of data and trace the e-commerce supply chain. It also provides us time dimension of all

data security systems. In our framework, the blockchain technology system is distributed consensus algorithm that describes how blockchain technology works. The distributed consensus algorithm is made up of many types of nodes that are created using mathematics and programming techniques. Fourthly, asymmetric encryption systems are an important blockchain technology, which ensures data security by using various types of private and public keys. Finally, the smart contract is an automatic programming system at the same time assures intelligent logistic systems, transaction and reverse systems, smart warehousing, and delivery systems traceability, etc.

Intelligent supply chain systems, logistic systems, payment systems, and traceability systems provide the foundation of e-commerce composition systems. Our present e-commerce supply chain faces various types of obstacles such as a weak life cycle and a poor supply chain management system. By using blockchain-based intelligent supply chain systems, we can reduce those problems. An Intelligent supply chain system ensures a secure database, product standardization, tracking, traceability system, and collaboration of all parties of blockchain. According to our framework, the blockchain-based logistic systems make sure smart inventory management, reduce delivery time and logistic cost also decrease goods damage and difficulty of the product return policy. The payment system is the biggest barrier to the e-commerce supply chain but we can remove this barrier by using blockchain-based payment systems. In a blockchain-based payment system, digital currency will be used for the transaction. Finally blockchain-based traceability system track all parties who are involved with all part of the e-commerce supply chain process namely from suppliers to consumers.

After establishing blockchain technology and e-commerce composition systems, e-commerce can start its business activities. To run e-commerce business activities smoothly at first e-commerce needs to find out the parties namely suppliers, manufacturers, retailers, consumers, and financial institutions. Suppliers are the starting party of the e-commerce supply chain that supplies goods or services that usually provide that bulky value of a product. A manufacturer will be a person or company who produces finished goods for the e-commerce industry then the retailer collects the finished foods for consumers and displays them on an e-commerce website so that consumers can choose their product and order it. To order the consumers desire their need financial institution for

the paid price. A consumer can use various financial institutions such as banks, credit cards, Bkash, Nagad, rocket, M-cash, U-pay, U-cash, etc.

7. Implications

We have numerous supply chain issues in Bangladesh, as well as social issues in our society. If blockchain technology can be established effectively, we hope that this paper will help to alleviate some of the supply chain's issues while also benefiting society. Of course, blockchain technology has some limitations, despite its numerous benefits. We attempted to demonstrate some methods for overcoming some of the limitations of blockchain technology in this research paper. To accomplish this, the government must take some bold initiatives, and we must follow some rules and regulations. Employees face numerous challenges in the workplace, and when it comes to customers, they face additional challenges. This research paper has demonstrated some methods for meeting employee demands in the workplace while also meeting customer demands. We see a huge potential for blockchain, in supply chain management, to accelerate the e-commerce industry forward.

8. Limitation and Future Research Direction

While we are attempting to represent the appropriate scenario of a blockchain-based supply chain in the Bangladesh e-commerce industry, accurate information is required. However, the main issue is that there are few publications about blockchain-based supply in the Bangladesh scenario. This is one of the main reasons why there are few relevant literatures on blockchain-based e-commerce supply chains. The most important factor is that Bangladeshi people and businesses are not familiar with cryptocurrency-based payments, which creates skepticism about the blockchain system. Even some representatives of e-commerce companies refuse to share their information with researchers, despite the fact that the goal of this research paper is to assist their supply chain management. Though we obtained permission from many e-commerce authorities to visit and interview them for a few questions, we did not consider all interviewees because some of them do not conduct their operations properly. However, we are almost done with contracts with the leading e-commerce companies in Bangladesh (daraz, chaldal, hungrnaki, Foodpanda, Shazgoz, and so on) who want to use blockchain technology in their supply chain management.

9. Conclusion

In this research paper, we focus on the scenario of a blockchain-based supply chain. We have tried to show the impact of using a blockchain-based supply chain system through some evaluations. We have talked to some individuals about their thought centering on blockchain technology. According to them, they all are so keen on this blockchain-based technology.

We wanted to show how many beneficiaries Bangladesh's e-commerce can be by introducing a blockchain-based supply chain management system. In this industrial revolution century, Bangladeshi people should be eager to accept the new technology and idea to enhance our e-commerce industry. In fact, there is no substitute for embracing the new technology to compete with the other countries in the fourth industrial revolution. The more we will be flexible, the faster our e-commerce will get the benefit. Therefore, the time has come to cope with the new technology like blockchain-based supply chain system.

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