

The Role of Blockchain in Reducing the Cost of Financial Transactions in the Retail Industry

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Abstract

Blockchain is viewed as a game-changing technology by many researchers and consultants. The anticipated benefits of blockchain in several sectors opened the door for many trials, use-cases, and even live implementation across many sectors, including finance, real estate, supply chain, and retail. This paper presented a brief about the basic functionalities of blockchain and how the technology can reduce the cost of financial transactions in different ways. In addition, this paper gave an overview of all use-cases and implementation schemes done in different market sectors. The aim of this paper was to assess the role of blockchain in reducing the cost of financial transactions in the retail industry. To achieve the aim of this paper, a thorough literature review was conducted on the subject at hand, and six interviewees were conducted with matter experts. The analysis revealed that blockchain might have a direct and indirect reduction in transaction costs incurred in the retail sector.

Keywords 1

Blockchain, Transaction costs, Retail, Financial Operations, Public Blockchain, Private Blockchain.

1. Introduction

Trading activities and financial transactions are key elements of the national and global economy [1]. The global financial scheme serves billions of customers and handles transactions that are worth trillions of dollars [2]. However, those transactions come at a price paid on both ends, i.e., the customers and the suppliers due to the existence of intermediaries that facilitate those payments [3]. According to a report published by Mckinsey [4], the global payment industry earned USD 1.8 trillion in revenues in 2015. Starting from here, several firms started looking into new technologies not only to avoid transaction costs, but also to minimize the time needed for transaction settlement [5]. The latter authors stated that international financial transactions require around three to five days to get settled. One of those technologies that were considered is blockchain. Several authors [2, 6, 7, 5, 8, 1] highlighted the impact of blockchain on financial transactions in several industries including real estate, supply chain, food security, banking, and financial sectors. Tapscott and Tapscott [2] mentioned that blockchain is a technology that allows companies to eliminate transaction costs and provides efficient use of resources both on the inside and the outside.

The idea of blockchain was introduced by Nakamoto [9] to eliminate the role of middlemen in financial transactions. To create this idea, Nakamoto suggested constructing a ledger between a chain of people, where the payer and the payee can exchange money over an encrypted network using consensus, without external interference. Eichkorn [10] stated that the blockchain technology started gaining traction with the launch of the Bitcoin cryptocurrency in 2008. The latter described blockchain as a combination of three technologies involving cryptography, a shared ledger, and an accounting system to settle transactions over the internet. Nakamoto [9] stated that this chained ledger makes it tamper-free as it is protected by all the users joining the network, and any modification to a previous

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ledger cannot be done without the consensus of involved parties [11, 2]. Furthermore, Rooney, Aiken, and Rooney [12] mentioned that blockchain has three important characteristics that differentiate this technology from any online ledger, which are: security, immutability, no centralized ownership, and consensus-based rules. Similar to any new technology, blockchain has evolved a lot since its launching in 2008. As mentioned by Henten and Windekilde [8] the first phase was mainly going around cryptocurrencies and in specific Bitcoin, while the second phase involved the Ethereum platform, which allows the building of more complex distributed applications. Finally, the third generation is designed to deal with issues similar to scalability, interoperability, and governance [8].

As mentioned earlier, blockchain technology has potential quantitative and qualitative benefits if utilized in the correct direction. The technology was tested and implemented across several industries, including some pilot projects in the retail sector. Since the retail industry is one of the largest users of financial transactions worldwide, especially with the existence of e-commerce, this paper aims to investigate the role of blockchain in reducing transaction costs in the retail sector and how will this paradigm shift make a difference for the consumer and the producer.

2. Literature Review

During the launch of blockchain technology in 2008, many individuals and companies were hesitant to join the flow. The concept of virtual money that is controlled by strangers crippled investment activities and individuals from joining. However, a couple of years later hedge funds, banks, and other business stakeholders started exploring the technology and using cryptocurrencies to get their work done. Therefore, this study will analyze three themes, how do blockchain works, how this technology can reduce transaction costs and case studies about the applicability of the technology in different sectors.

2.1. How Does Blockchain Work

As discussed earlier, blockchain technology was applied and/or tested in many industries. The application of blockchain comes in different phases as argued by Workie and Jain [13], (1) launching phase, where the client is granted access to a blockchain network to engage in financial transactions, (2) verification of financial assets listed on the blockchain ledger, (3) recording and retaining information in the blockchain ledger. On another front, Casinova et al., [14] mentioned that blockchain is considered as a “distributed append-only timestamped data structure.” The technology provides users with the ability to have a peer-to-peer network and depicts the verification process of any transaction in the hand of complete strangers [15]. Blockchain can be illustrated as an interconnected mechanism adding special features to an existing network [14]. At the first level of the scheme exists signed transactions between different parties [14]. The transaction is an illustration of an agreement between two sides, which may include the transfer of physical and/or digital assets, the completion of a mining task, etc. After the transaction is signed by at least one participant it is then distributed to the remaining participants. Those participants can be considered as nodes, where those nodes collect the transactions in the form of blocks, validate those transactions, and decide whether those transactions need to remain in the blockchain or dumped [15].

In blockchain, a transaction is deemed valid when “A” receives a payment from “B”, using any type of cryptocurrency available in the blockchain. Also, the blockchain network allows “B” to transfer its digital assets to “C”. Consequently, existing nodes agree which transactions are to be kept in the blockchain network to avoid any discrepancies and divergences [16]. This reflects the second layer of blockchain which is consensus. Several consensus mechanisms can be used depending on the type of the blockchain network and the most common mechanism is the proof-of-work (PoW) [14]. In PoW, every participant involved in a transaction needs to solve a computational process like finding hashes or defined patterns, to authenticate and verify the transaction [15]. Another approach is using the proof-of-stake (PoS) protocol to ensure that wealthy miners do not get access to all the opportunities [17]. According to Dannen [18], different types of blockchain networks, such as Ethereum are going towards

using PoS to limit power consumption and improve scalability. Another consensus method is the “Byzantine Fault Tolerance” (BFT) mentioned by Castro and Liskov [19]. This method allows more functionalities, where the blockchain network stores all transactions performed by each user and calculates their balance to give a fair chance to all miners within the chain. In blockchain, several people provide inputs and protocols to improve and fix the network. Therefore, in order to manage human interactions of this network, a blockchain requires a governance layer [14]. Blockchain governance deals with the various inputs provided by all the miners to produce, maintain, or change the inputs that build up a blockchain [15].

There exist four different types of blockchain network, yet this paper will only discuss the most used, which are the private and public blockchains. Several scholars [20, 15, 21, 22] classified blockchain as public or private. Public blockchains embrace anonymous new users or node miners, where all users can perform all types of operations, while private blockchains include a set of predefined users that have particular characteristics and permissions over the network operations [14]. Private and public blockchains have similar scalability and protection, yet private blockchains do not use PoW mechanisms as the risk of sybil attacks is almost negligible. Instead, a private blockchain network use other consensus protocols [23]. Moreover, private blockchains require a set of leader nodes that can trigger, assign, and govern transactions, which becomes more like a centralized enterprise resource planning system, which requires some infrastructural investment [14].

On the other hand, public blockchains are decentralized networks. There are several well-known examples of public blockchain existing implementations such as Bitcoin, Ethereum, Litecoin and, in general, most cryptocurrencies [9]. The main advantages of public blockchains are, the network is repaired and protected by itself, do not require infrastructure investment, and reduces management overhead costs [16].

The below table summarizes all the main characteristics of each blockchain network:

Table 1: Main Characteristics of Public and Private Blockchain Networks

Aspects	Public	Private
Consensus Scheme	Costly PoW	Minimal PoW cost
Identity of users	All miners	Centralized (leader node)
Privacy	Anonymous	Predefined users
Efficiency	Sometimes Malicious	Trusted users
Consumption	Low	High
Immutability	High power	Low power
Ownership	Impossible	Collusion attacks
Governance	Public	Private
Transaction approval time	Permission-less	Need for approval
	Minutes	Milliseconds

Source: [14]

All literature articles reviewed came to an agreement that the implementation of blockchain is not an impossible task. However, it requires several considerations, including but not limited to what type of blockchain should a company use here this aspect is determined according to the objectives of the company. The second aspect is allocating the necessary resources for implementation and what is the return on investment. The final aspect to be considered is the scalability and interoperability with the current business model of the company.

2.2. Blockchain and Transaction Cost

Without denial, the launch of digital payments in 1999 made people's life easier. On one hand, firms and banks were able to minimize their overhead costs by moving some of their transactions from the traditional retail branch to the internet, and on the other, customers benefited from the ease of use. Moreover, the financial sector kept on investing in new technologies to meet the changes in consumer preferences, lower transaction costs, and ensure business continuity [5, 16]. One of those technologies is blockchain. According to Peters and Panayi [24], blockchain is the new era of financial operations such as clearing and settlement, payments, trading, and insurance. In the current financial scheme, payments need to pass through different layers of intermediaries, including clearinghouses, banks, and other financial institutes, where they are examined through a complicated, time-consuming, and expensive process [5]. As de Meijer [25] mentioned, blockchain might reduce transaction costs, and accelerate the money transfer process in business to business, and peer-to-peer transactions. Moreover, using blockchain might also bring down the cost of securities used by exchange markets and banks [25]. However, Workie and Jain [13] mentioned that blockchain advocates prefer to focus the implementation process on touchpoints that are causing headaches for the consumer or the business itself rather than a widescale implementation, of course with a vision of a widescale deployment for the future.

Since some companies will be using a private blockchain that will integrate all the related stakeholders and users, some investment is needed to develop a blockchain infrastructure. According to Kiviat [26], USD 5.4 billion were invested in the payments sector on the deployment of blockchain innovations. On the same front, Workie and Jain cited that total investments incurred to explore blockchain technology reached USD 1.5 billion in 2016. De Meijer [25] explained that those investments were done believing that the technology will reshape the payment industry and create new business models that will reduce operational costs and add value to the business. Moreover, Guo and Liang [5] mentioned that blockchain can reduce transaction costs related to credit and information. Besides, Tapscott and Tapscott [2] cited that blockchain reduces the settlement time needed for payments due to its decentralized consensus mechanism, which could make transactions take seconds instead of days. Mori [27] highlighted that moving the current financial settlement system for lending and borrowing securities and financial trading needs to be done while the market is closed, which is a complicated task by itself. However, as complicated as it seems, de Meijer [25] mentioned that moving to financial operations to blockchain might bring autonomy to back-office operations and decrease financial costs associated with checking the legitimacy of financial transactions, which in return improves transparency as all records of transactions will be available to all parties.

According to a study done by McKinsey [28], using blockchain in the financial sector could reduce the operational cost of international transactions from USD 26 to 15 and lower annual operational costs for companies by an average of USD 15 billion, and the investment risks by around USD 1.6 billion. Moreover, based on several FinTech reports [27, 29] blockchain technology might trigger around USD 20 billion of savings in areas of international payments, securities trading, and regulatory compliance. A study conducted by Tilooby [1] interviewed several top executives from different companies and asked them about their opinion regarding using blockchain in the payment settlement process. The head of retail at Walmart stated that visa takes around 3% of transaction fees if a customer pays at Walmart, in which Walmart by default transfers this cost to the customer. Another participant in the study stated that clearinghouses trade trillions of dollars per day, and they charge a commission for every transaction. The latter also mentioned that banks pay enormous amounts of money for clearinghouses processing their transactions. Furthermore, the participant stated that blockchain architecture could significantly reduce those costs by connecting everything in one place. Another participant mentioned that blockchain also would be useful to support international transactions.

On the other hand, Guo and Liang [5] argued that the use of blockchain technology in financial operations is not expected to assert notable reductions in transaction costs. This issue was supported by Mori [27] stating that business models in the financial industry represent 80% of the operational challenges, while only 20% of the challenges are attributed to the use of technology. Consequently,

investing in blockchain without introducing a change to the current business models will not lead to any significant change in operational cost scheme. On the same front, Wang, Chen, and Xu [30] mentioned that deploying blockchain in the financial sector will bring benefit for all stakeholders, yet the implementation needs to be focused on one matter at time instead of an all-in approach. This aspect was also confirmed by Tsai, Blower, Zhu, and Yu [31] mentioning that “*deploying blockchain features in modular and insular forms, with each module targeting a specific functionality such as accounting, or trading, but not both.*”

Based on the above literature, we can conclude that blockchain might cause a reduction in the cost of financial transactions by bringing autonomy, limit the intervention of intermediaries, and lower the cost of transaction authentication. In addition, the use of blockchain brings more transparency and authenticity to the financial system. However, some authors mentioned that investing in blockchain requires changes in the current business model, which in this research’s opinion is deemed necessary to cope with the notable change in the new norm of operations after the application of blockchain.

2.3. Applicability of Blockchain in Different Sectors

As discussed in earlier parts of this paper, businesses invest in technology either to adapt to new market norms or respond to changes in consumer preferences. One of the potential technologies that would reduce fraud, transactions costs, and ensure transparency of transactions is blockchain. This chapter will discuss several initiatives and projects that support the implementation of blockchain across different sectors including the financial, real estate, supply chain and logistics, and the retail sector.

2.3.1. Application in the Financial Sector

De Meijer [25] stated that using blockchain technology in the financial industry reduces cost and payments settlement time for exchange processes, transactions, and the securities industry is one of the major sectors interested in blockchain [25]. Therefore, since its launch in 2008, blockchain was embraced by the financial sector like no other. According to Guo and Liang [5] several international institutions, including the IMF and the World Bank, started looking into the possibility of applying blockchain. In addition, several nations such as the United States, the United Kingdom, Japan, China, Russia, India, and South Africa, started investigating the technology. Moreover, several other entities such as the Nasdaq stock exchange, the USA Depository Trust & Clearing Corporation, and the People’s Bank of China have launched their blockchain research and development process [5]. According to the latter authors, most financial companies around the world now have blockchain programs that cover several financial activities, such as bond-buying, securities, stocks, financial derivatives, and investment businesses. In 2018, the World Bank [32] launched a new project to create a blockchain-based bond. This project was launched in collaboration with Australia’s Commonwealth Bank (CBA). The project will use a private Ethereum-based blockchain. According to the World Bank [32], the project “bond-I” will be the first bond that is fully operated and managed using a blockchain network. Another example is the collaboration between ING and Credit Suisse Bank that completed the first trial for lending securities using blockchain [33]. Furthermore, a report published by NullTX [34] mentioned that blockchain can be used in different types of financial transactions like insurance (automated claim processing), fraud prevention, mortgage lending, and venture capitals.

Finally, this paper would like to discuss the findings of a McKinsey [28] survey conducted in 2016 and distributed across the financial industry in different areas of the world. Results revealed that 50% of the C-level executives in the financial industry think that blockchain will be heavily utilized in the financial industry by 2020. Similarly, an analysis conducted by IBM shows that 66% of the banking industry will have their dedicated blockchain networks by 2020 [5, 16]. As Kiviat [26] argued, the change is imminent, and it is a matter of time that financial operations will be done solely using blockchain. Based on the above discussion, this paper believes that Kiviat [26] is right and the financial industry is moving forward in adopting blockchain. However, a recent study conducted by Osmani et

al. [35] highlighted that in 2020, there was a limited application of blockchain in the banking and finance sectors when compared with other sectors. Since there are no concrete numbers about the level of implementation in 2020, this study believes that the expectations mentioned earlier by McKinsey [28] and Guo & Liang [5] and Zhu and Zhu [16] are questionable and the utilization of blockchain in the financial industry must be reassessed to provide updated insights. This paper also believes that the adoption of blockchain is not easy, since it requires notable changes with the current operational scheme, which need some time. Therefore, projections for implementation need to be realistic and take into account all the possible operational challenges.

2.3.2. Application in the Real State Sector

As for the real state sector, blockchain applicability demonstrated the effectiveness of the current processes, especially using smart contracts. Real estate firms are using smart contracts to perform the transfer of property and verification of documentation of a property. Using smart contracts in blockchain eliminates fraud, reduce cost, and risk. Using blockchain in the retail sector will minimize the paperwork and simplifies investment and ownership transfers [7]. The real state sector is still taking baby steps when it comes to the applicability of blockchain, yet different initiatives are currently in place. One initiative was launched by Velox.RE [36], which has developed an open real estate platform that facilitates property transfer, recording, and payments. Velox.Re uses blockchain Bitcoin public ledger, and offers legal and financial services for its clients, with more transparency and legitimacy. Another initiative was launched by Elea Labs [37]. The platform developed by Elea Labs provides a holistic approach to the real estate chain, based on Bitcoin smart contracts. The project involves a peer-to-peer network, where users can control and manage their real estate data. According to Elea Labs [37], the platform will minimize complexity, reduce costs associated with real estate transactions, and reduce settlement time. Those initiatives are paving the way for more investment in blockchain in the real estate sector to identify the real benefits of the technology.

2.3.3. Application in the Supply Chain and Logistics

Supply chain and logistics is a challenging business. Shippers, forwarders, airlines, and all people associated with the delivery process always had problems with record-keeping, traceability of units, fraud, procurement visibility, and high costs [8]. The application of smart contracts in supply chain and logistics will foster collaboration and communication between all concerned parties, bringing better provisioning, fewer costs, more monitoring, and control, which in return will reduce operating costs [38]. Applying blockchain in supply chain and logistics will allow businesses to control physical and digital information, which will minimize data redundancy and offer more transparent information to all involved stakeholders. Also, using smart contracts in supply chain and logistics will provide all trading partners with timely inventory updates, which will reduce pressure on employees. Besides, using blockchain allow companies to integrate delivery and payment systems together [8]. Famous companies such as Maersk, IBM, Walmart, DHL, Unilever, UPS, Alibaba, and Amazon started using blockchain technology for delivery, tracking, provisioning, and payment processes. Maersk and IBM invested in a technology called TradeLens, which is a blockchain platform that provides every user with an option to view to track the movement of goods from the main source, see the status of customs, check related documents, and view the shipment manifest [39]. Since its launch, the system processes 224 million records for a total of 90 organizations. The platform brings together all business stakeholders including global container carriers, customs, port operators, and logistics companies [40]. Maersk and IBM are planning to make TradeLens an open industry platform when the market is ready to adapt this technology. Similarly, Walmart and IBM jointly launched an initiative for food traceability using IBM's current blockchain platform [41]. The initiative requires all suppliers to apply "one-step" back traceability. The second step in the process of the IBM Food Trust blockchain, is to ask suppliers to enable end-to-end traceability back to the raw material suppliers. [42].

Blockchain solutions are also implemented in freight transport and other related industries. Several initiatives are implemented in tracking Unit Load Devices (ULDs), maintenance parts, and training. In

2018, an association called the Blockchain in Transport Alliance (BiTA) was created and has more than 450 members in 25 countries [6]. The objective of the association is to create universal standards for applying blockchain in the freight transport and logistics sector (BiTA, 2018). To achieve their objective, the association held several studies to prove that the application of blockchain holds benefits for the business including lowering risks and costs for operators and handlers, speed up the transport process, and increase trust between all business stakeholders (BiTA, 2018).

2.3.4. Trials Conducted in the Retail Sector

The potential of applying blockchain in the Retail and Consumer Packed Goods (CPGs) was considered by different reports [7, 43, 40]. The rationale behind using blockchain was discussed in a report issued by Deloitte [7]. The report mentioned that the technology can be used in the flow of supply. In a more digitalized world, an end-to-end flow of information about products, services, and money is needed amongst all concerned stakeholders to ensure business continuity [7]. According to the report published by Deloitte [7], *“the way these components are managed has a fundamental influence over an organization’s competitiveness positioning in areas such as product, cost, working capital requirements, speed-to-market, and service perception.”* Experts at Deloitte also found four main areas that a retail business can utilize by applying blockchain technology, namely traceability, compliance, flexibility, and data management. In addition, the report included a dedicated section discussing practical application of blockchain in retail. The technology was applied at different business functions including the consumer, supply chain, and payments [7]. The use case concerning payments included trials aspects in areas such as consumer payments, Business-to-Business payments, digital advertising, and consumer protection.

On another note, Anwar [43] mentioned that the pandemic disrupted the supply chain, and affected retail operations. The latter mentioned that blockchain can be the solution to such problems, as the technology offers a reliable, sustainable, and consistent flow of information. Anwar [43] also related the application of blockchain to minimizing the impact of price inflation on goods. The latter stated that companies are failing to keep their running costs down due to improper planning, and blockchain can be the solution. Anwar [43] also suggested several areas where can blockchain be applied in the retail industry, including, inventory management, payments using cryptocurrencies, loyalty management, streamline taxes, and prevent fraud. Anwar [43] cited that Walmart, Alibaba, IKEA, and Amazon are all investing in the technology at different levels which is taking customer experience to the next level.

3. Methodology

In order to achieve the aim of this study, interviews were used to obtain the feedback of experts in the field on the applicability of blockchain in the retail industry and to consider if the technology might reduce transaction costs. According to Zikmund et al. [44], interviews are important for every research as they promote transparency and mutual acceptance of the researcher and the interviewee. Also, the latter authors mentioned that interviews are quick, reliable, and give useful insights for researchers as they can gain immediate feedback and clarify ambiguous responses. Moreover, Valentine [45] cited that interviews can vary between structured, unstructured, and semi-structured, which can assist the researcher in gaining more insight into the vision of the interviewee. Therefore, this research used a mix of structured and semi-structured interviews, including questions that are open-ended and close-ended. In order to gain an expert opinion on the subject at hand, 20 targeted interviewees were invited to submit their responses, and seven of them accepted and submitted their feedback. Based on the some of the interviewees' request, their identities will remain confidential and will be designated by an interviewee number (I#). Three of the interviewees allowed us to mention their company names, which are Sooq.com, Al Tamimi & Co., and Brands for Less. Two interviewees accepted mentioning their names and affiliations, namely Mr. Walid Elhoss (interviewee 6), Manager, Economics and IT at the Arab Air Carriers Organization and Mr. Alan Doughouz (interviewee 7), Senior Support Engineer at ProgressSoft Corp. Respondents on average have a minimum of 7 years' experience at well reputable Retail and/or Tech firms, which launched several initiatives to invest in Blockchain. Interviewees

occupy different positions including Project manager, Principle, Chief Technical Officer, and Senior Managers – Technical Implementation. Respondents are mainly based in the Middle East region – in the GCC area, Jordan, and Lebanon. After data collection, this research used descriptive analysis to make it easy and simple for the reader to understand the technical language.

Interview questions are:

1. Do you believe that disruptive technologies bring additional benefits to the consumers? Please explain.
2. How could blockchain technology enhance financial transactions? Please explain
3. Do you think using blockchain for financial transactions will face challenges? Please explain
4. Could blockchain reduce the cost of Financial transactions? Please explain.
5. In your opinion is blockchain applicable in the Retail industry? And in which areas? Please explain
6. Do you think applying blockchain in the retail industry will reduce transaction fees? Please explain?
7. Do you think using crypto-based blockchain in the retail supply chain will reduce transaction settlement time and improve customer service? Please explain.
8. In your opinion do you think that blockchain is the future of retail? Please elaborate.

4. Discussion and Analysis

Many researchers [43, 6, 15, 14, 5, 8, 2, 1] discussed the role of blockchain in reducing transaction costs, improve settlement time, and improve customer experience. Also, the latter authors discussed the benefits of implementing blockchain technology across several sectors, including the financial sector, real estate, supply chain & logistics, and the retail section, which is the area of focus of this paper. The first question was to assess the views of our interviewees about disruptive technologies in general, and what are the benefits of those technologies. Interviewees 3,4, 5, 6, and 7 mentioned that rapid advancements in technological developments reduced the life cycle of some products and introduced new preferences that are in line with the customer's expectations. In additions, new technologies streamlined businesses and consumers daily patterns of life. In this aspect Interviewee 3 stated *"During the past decade we have witnessed a leap in new technologies that shortened the life cycle of many existing ones and made consumer's life easier. New technologies not only connected the world but also streamlined the daily life of consumers, for example you can now connect your whole life on google platforms, including images, calendar, email, appointments, home automation, and a lot more to mention."* Interviewee 6 added *"You can even trust google with your bank accounts and payment methods, take your pick. So, what we call disruptive consumer calls creative, and what we call costly consumers call it the new norm."* On the same front, Interviewee 7 Mentioned *"I believe that disruptive technologies are beneficial to everyone. Without disruptive technologies, we wouldn't be where we are today. Disruptive technologies existing throughout history. The internet was a disruptive technology that shaped where we are today. The internet added values that would not be achievable without. What is considered disruptive today is the norm tomorrow."* On the other hand, Interviewees 1 and 2 mentioned that disruptive technologies are burdening consumers and business with social and financial problems. Interview 1 mentioned *"A better way of understanding the good a technology is doing is by looking at a holistic approach, i.e., what good and what bad its brining to the society, how its making people's life easier and what it is taking from them at the same time."* Despite having two different opinions on disruptive technologies, both sides agree that new technologies bring benefits to the people. However, we need to consider the ripple effect from a financial and social perspective. The continuous development of disruptive technologies needs to cater to the market needs.

The following question was about how could blockchain enhance financial transactions. Interviewees 1 through 7 had homogeneous responses. All agreed that private and public blockchain can make financial transactions, faster, more secured, transparent, and reduce transaction costs. Interviewee 4 mentioned *"blockchain might reduce the costs banks and clearinghouses are taking from us and the consumer."* Interviewee 7 stated *"There are many benefits to blockchain technology such as*

transparency, improved traceability, and enhanced security to name a few. Some of these benefits could bring lower costs and faster execution of transactions to the market.” The responses of the interviewees was totally in line with the scholarly articles developed by de Meijer [25]; Zhu & Zhou [16]; Tapscott and Tapscott [2], which mentioned that the autonomy brought by blockchain can reduce payment settlement time, bring more transparency and security to the payment process and reduce transaction costs. Interviewee 5 stated that the technology is there, and all that firms need to do is to encourage consumers and other business stakeholders to embrace it, which takes us to questions 3, asking about the challenges that might face the use of blockchain in financial transactions.

All interviewees agreed that the main challenge is to convince the wider community of embracing public and private blockchains. Interviewee 1 mentioned that it is not easy to convince people with the idea of virtual money as many people do not trust what they cannot see. However, Interviewee 2 mentioned that the time now is right time due to the existence of generations Z, iGen, or Centennials which are tech-savvy and embrace new technologies that simplifies their way of life. Interviewee 7 mentioned *“The fact that blockchain technology is fairly new and not widely known could bring some resistance. Furthermore, in the mind of many, blockchain is connected to crypto, and many consider crypto as a place for fraudulent activities.”*

Finally, Interviewee 5 highlighted another major challenge, which is the lobbying of governments and central banks against such technologies, as digital money is hard to trace. Governments always want to be in control of cash flows. Using crypto-based blockchain will not only minimize their control over cash flows but will also reduce their tax revenues coming from banks and other intermediaries involves in the money circulation scheme. Despite having some opposing literature cited by Guo and Liang (2016), that several international institutions, including the IMF and the World Bank, started investing in blockchain, alongside several nations, such as the United States, the United Kingdom, Japan, China, Russia, India, and South Africa. This paper agrees that dealing with governments and keeping their hands off this technology will be a hard fight. Recently, the government of Nigeria banned the use of crypto-based blockchain and several central banks, including the U.S. Federal Reserve, which launched a counter initiative, announcing a new digital currency that is monitored and controlled by the Federal Reserve. Therefore, this paper believes a common ground is needed for the sake of the good of the community.

Question number 4 was addressed to ask the interviewees about their opinion if blockchain could reduce the cost of financial transactions. All answers recorded agreed that blockchain will reduce the cost of financial transactions, Interviewee 1 mentioned *“the use of blockchain could save banks USD 1 billion in operating costs, reduce regulatory fines by USD 3 billion and reduce fraud expenses by up to USD 9 billion.”* Interviewee 2 also stated that *“the direct benefit will be eliminating the role of banks and clearinghouses as intermediaries, which is expected to lower transaction costs by 12% on a global scale.”* On the same front interviewee 3 gave data from a McKinsey report this study have analyzed mentioning that *“using blockchain in financial transactions could reduce the cost of international transactions from USD 26 to 15, lower annual operational costs for companies by around USD 15 billion, and the investment risks by around USD 1.6 billion.”* Besides, Interviewee 4 stated that *“the automation of blockchain could save our firm around 5-6% in operating costs in 2021.”* Finally, all interviewees agreed that the reduction in cost will be passed to the consumer, which was also discussed by Mori (2016) and Tilooby [1]. The consensus from all interviewees that blockchain might reduce the cost of financial transactions, transfers, and operating costs, opens the door for more investigation to assess the real benefit based on every company’s operational scheme. Therefore, this paper believes that every company must conduct a use-case for blockchain implementation before full application.

As for question 5, all interviewees mentioned that blockchain can be implemented in several areas in the retail industry including supply chain and logistics, payments, and loyalty programs. Interviewee 5 mentioned *“there were several case studies demonstrating the applicability of blockchain in the retail industry done either in our company or at other companies, based on my experience blockchain can be implemented in supply chain and logistics, payments, and loyalty programs.”* Interview 3 gave an example about the airline business and retail *“Take the example of airlines, Singapore airlines*

implemented a private blockchain to allow passengers to benefit from their miles at 650+ retail outlets without additional transactions costs, taxes, long payment settlement processes. Several more airlines are joining the game including Emirates, and Russian Airline S7.” Finally, Interviewee 7 mentioned “Blockchain is applicable in any industry, even retail. From better inventory management to the use of crypto as a payment method, the retail industry can benefit greatly from blockchain technologies. Blockchain can also reduce fraud in the retail industry between merchants and vendors.”

As for question 6, regarding the role of blockchain in reducing transaction costs in the retail industry, Interviewees 1 through 4 mentioned that they expect a reduction in transaction costs, especially for direct payments that are done by consumers whether online or physical. Interviewee 1 mentioned *“Definitely, and I expect the reduction will be between 3-7%, as intermediaries will be no longer there. Now, every customer who enters a shop and uses a credit or debit card will be charged between 3-7% as transaction fees. Imagine the world without these people, we do not have to pay them we will pass this cost saving to our customers, where they will enjoy paying less.”* On another note, interviewees 5 and 6 had another view, which mentioned that the real benefit and cost-saving will be achieved in bank transfers done by the retailer to the wholesaler, this would trigger millions of dollars in savings to the retailer, which will be passed to the customer. Interviewee 5 stated, *“Forget about credit cards and individual consumption and let us think big, think about the amount of money we are paying to our wholesalers via bank transfer in exchange for our goods and services. We pay for banks millions of dollars in transfer fees now, and we also transfer these fees to our customers as it is part of the cost of goods sold. All of this can go away if we invest in blockchain.”* Interviewee 7 summarized it in the following statement *“Whenever you can reduce a step that a transaction would need to go through during its cycle, an expected reduction in fees is to follow. Since blockchain technologies no longer require third-party entities to deploy and maintain systems that keep a record of these transactions, the cost per transaction should be reduced.”*

None of the scholarly articles mentioned earlier included the issue of bank transfers used by the retailers to acquire their merchandise. Transferring money from the retailer to the wholesaler will eliminate the role of intermediaries (the bank and the clearinghouses), which will reduce operating costs for retailers, and consequently, for customers. In this paper’s opinion, the reduction in cost can be direct to the customer, resulting from the reduction in direct transactions using a debt or credit card, and indirect, which results from the reduction in the operating costs of the company. Also, the interviewees were asked about their opinion about applying crypto-based blockchain in the retail industry. All interviewees agreed that crypto-based blockchain might reduce transaction settlement time and improve customer service. Yet, the only challenge remains in improving public interest in public crypto-based blockchains, since its formed of anonymous groups. All interviewees agreed that settlement time might be faster. Therefore, the customer will receive their goods faster, leading to better customer service. Also, everything on the blockchain is automated, so there will be no chance for error or customers not getting what they asked for.

Finally, the interviewees were asked about their opinion if blockchain is considered as the future of retail. Interviewees were classified into two groups. Interviewees 1,3,4, 6, and 7 stated that blockchain is with no doubt the future of retail customers will need to be able to use their electronic wallets to pay for their merchandise, whether it is an online or physical purchase. Blockchain needs to connect suppliers, retailers, and end-users without the intervention of an intermediary. It will allow the customer to keep transaction records online without any risk of fraud and improve customer experience. The first group believes that the implementation can be done using private blockchain, so that stakeholders can have control over the network and intervene when necessary.

On the other hand, interviewees 2 and 5 agree that the blockchain is considered as the future of retail, yet the implementation can be done using crypto-based or public blockchain. This paper believes that the best solution would be moving gradually from a private blockchain to a public blockchain, to avoid any complications.

5. Conclusion

Blockchain technology is considered by many researchers and consultant companies as a game-changer in several sectors including, finance, real estate, retail, and supply chain and logistics. This paper aimed to identify the role of blockchain in reducing the cost of financial transactions in the retail sector. In order to achieve the aim of this research, a thorough review was done on scholarly articles discussing how the technology works, its benefits, and the use-cases done. In addition, six interviews were done with senior staff from different technology and retail companies to discuss the impact of the technology on financial transactions done in the retail sector. Based on the results and analysis of the interviews, this paper concludes that the continuous development of disruptive technologies needs to cater to the market needs. Moreover, this paper believes that technology providers, public blockchains, and governments need to reach a common consensus on how to utilize the technology to better cater to the needs of the community. Considering the role of blockchain in reducing the cost of financial transactions, all interviewees and scholarly articles agree that blockchain might reduce the cost of financial transactions, transfers, and operating costs, opens the door for more investigation to assess the real benefit based on every company's operational scheme. However, a general opinion might not apply to all sectors. Therefore, this paper believes that every company must conduct a use-case for blockchain implementation before full application. This is in line with what Mori (2016) mentioned specifying that the challenges faced by companies today are 80% related to the operational scheme of the company and 20% are technology-related.

Looking at the implementation side, this paper can conclude that the application of blockchain in the retail sector can be in several areas, including supply chain and logistics, payments, and loyalty programs. The implementation in the payment area might lead to the reduction of direct and indirect costs. Direct costs are related to the payments done by the customers, and indirect costs are related to the costs settled by the retailer to its stakeholders. These findings open the door for more investigation based on every company's operating scheme. This paper also finds looking into crypto-based blockchains in the retail industry is an opportunity to aggregate more benefits.

Finally, the successful future of retail is highly related to the implementation of technology, including blockchain, which will allow customers to use their electronic wallets to pay for their merchandise, whether it is an online or physical purchase. In addition, the implementation of blockchain will streamline operations and connect suppliers, retailers, and end-users without the intervention of an intermediary. However, this paper believes that a gradual implementation must be done, and the operating medium of every company needs to be taken into consideration.

6. References

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