ISSN: 2249-877X Vol. 11, Issue 10, October 2021, Impact Factor: SJIF 2021= 7.642

South Asian Journal of Marketing &Management Research (SAJMMR)

(Double Blind Refereed & Peer Reviewed International Journal)

DOI: 10.5958/2249-877X.2021.00084.9

AN OVERVIEW BLOCKCHAIN APPLICATION IN SUPPLY CHAIN

Ratnesh Kumar Shukla*

*Faculty of Engineering, Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id: ratnesh.nitttr@gmail.com

ABSTRACT

Blockchain is a new kind of technology that evolved from the first. Bitcoin, a cryptocurrency, is continuously disrupting sectors of the economy. The blockchain idea is evolving, and although Bitcoin's future remains uncertain, although the situation is uncertain (as it is for most aspects of the economy), it is apparent that the Blockchain has a lot of room for development on a big scale. Being, on the other hand, a technology that has the potential to diminish the importance of many of today's major global companies, organizations, and power structures, all of which have a vested interest in maintaining their status. Its potential may likely go untapped due to existing hierarchies. The purpose of this article is to introduce and explain blockchain as a concept and its existing implementations in networks of logistics and supply Blockchain technology offers a level of trust that is unrivaled. Problems, as well as enabling a logistics system that is trustless, safe, and verified. In supply networks, information about supply chains is exchanged. The new applications. Within supply chains, the focus is moving away from blockchain and toward a broader concept of distributed computing. Technologies based on ledgers the purpose of this paper is to provide a description and explanation for existing and future policies. Future blockchain uses in logistics and supply chains are conceivable.

KEYWORDS: *Blockchain, Crypto currency, Distributed ledger, Supply chain Logistics*

1. INTRODUCTION

The 2008 financial crisis. fueled a group of activists' desire to create a stable, decentralized, independent, and sustainable financial system free of the power of individual "too big to fail" institution [1].Moreover, one that would be free of any influence from any institution. Loss of faith in financial intermediaries that privatized profits but socialized losses. Losses prompted tech-savvy fans to use the internet, which had developed by this point. Home computers that are considerably more powerful in new ways. Bitcoin was the first payment mechanism and completely digital money. In 2009, the first crypto currency was established. After two years, the first alternative crypto currencies emerged. There were over 1300 of them at the start of 2018, while there were over 1300 at the start of 2018[2]. Almost 500 tokens are available. The

blockchain technology which is one of Bitcoin's major contributions—is one of the currency's main contributions. The fundamental structure the blockchain idea is developing, and although the future seems bright, although the future of Bitcoin is unknown (as it is for other aspects of the economy), It's clear that the blockchain has a lot of room for large-scale improvements. Many various aspects of the economic system are represented. Being a powerful disruptor, on the other hand, many of today's big multinational companies may be brought down by technology. Institutions and power structures have a vested interest in maintaining the status. Its potential may possibly be underutilized due to hierarchy Blockchain has found uses and is being developed in the logistics and transportation industries. As well as supply chain operations Telematics, radio-frequency identification (RFID), Sensor-enabled technology, the Internet of Things (IoT), and barcodes and 2D codes other technologies are utilized to monitor goods as they move through the supply chain. However, their entire potential was not completely realized until recently, since the underlying technology was not properly used. Only inside an institution a company was data accessible, and it was perhaps shared. With a small number of reliable partners normally, there are a lot of supply options. Members of the chain each have their own information systems, but communication is key[3]. At best, communication between these systems is restricted. The major stumbling block was (and continues to be) a shortage of resources. In sharing information, there is a lack of confidence. Blockchain technology has the potential to be very powerful. Trust problems and enabling a logistics system that is trustless, safe, and authenticated in supply networks, information about supply chains is exchanged. Based on these characteristics and the rate of new implementations within supply chain blockchain development in genera. The chain is moving at a breakneck speed. Pilot projects are being established all around the globe, and supplies are being made available. The retail sector is anticipating changes. When it comes to the bulk of businesses, blockchain is still a mystery[4]. Use in logistical and supply chain operations. The purpose of this article is to introduce and discuss explain the blockchain idea and its existing supply chain applications management. The main characteristics of blockchain that apply to supply chains and which supply chains they apply to are there any chain locations that are presently being used? What are the possibilities for future development? What are the future prospects for blockchain applications in the supply chain? The paper is divided into four sections. The second chapter follows the introduction. Shows the current status of supply network developments. The third chapter examines the characteristics of blockchain as it arose from the bitcoin world, while the next one discusses its existing supply chain deployments and benefits logistics. The sixth chapter comes to a close[5].

1.1 Supply Chain:

The supply chain is defined as "the sequence of actions and organizations through which commodities pass on their way from original suppliers to ultimate consumers." Supply chain management is defined as “a conscious effort by supply chain firms to develop and run supply chains in the most effective and efficient ways possible” when organizations “actively (and collaboratively) manage activities and relationships in the supply chain to maximize customer value and achieve a sustainable competitive advantage”. New product creation, sourcing, manufacturing, logistics, demand management, coordination, and integration are the most essential supply chain operations[6]. In this respect, logistics is a component of supply chain management. Positive economics demonstrates that all economic structures that provide products and/or services from the origins to the final consumer are shaped as networks, with numerous participants (supply networks members) on each level and multiple links between them, despite the fact that normative logistics and supply chain management use the term "supply chain." As a result, the term "supply networks" (also known as "supply chain networks" or "distribution

networks") is more appropriate because it refers to more complex spatiotemporal structures that emphasize the number, location, nature of relationships, activities, business objectives, capacity, information services, and technology base of its participants. Supply network as seen through the eyes of a company. The supply network of a certain supply chain member (in this instance, a manufacturer) is made up of two parts: the supply side (or supplier network) and the demand side (or customer network) (or distributive network)[7]. The supply side includes all supply chain entities that give inputs to the focal2 business, either directly or indirectly. All supply chain participants that the product travels through on its route to the final customer are included in the demand side. Both the supply and demand sides of the network have a set of tiers that reflect different supply chain levels or echelons. A focal business may have different supply and demand tiers depending on its location in the supply network[6]. Upstream operations are those performed on the supply side of the network, whereas downstream activities are those performed on the demand side. They're all aimed at enhancing supply chain flow[8].

1.2 Application Of Blockchain In Supplychain :

1.2.1 Enhancements to Traceability and Visibility:

So far, the most widely used use of blockchain in the supply chain is in the process of validating product origin (primarily location, time, and who produced it) as well as information about the route that goods take from their point of origin to the ultimate customer (or just from any supplier to any consumer)[9]. Traceability and visibility have always been major concerns when it comes to delivering excellent logistical support to consumers. The ability to give information about where a product comes from, who produced it, how and by whom it was delivered, or simply where it is now, is very valuable to all consumers and a genuine competitive advantage for the business that provides it. On the one hand, this data enables improved planning and synchronization of customer processes, resulting in additional operational improvements. On the other hand, most companies or individuals acting as customers have little or no knowledge of what is happening with products upstream in the supply chain, and as a result of this lack of transparency, they are making less accurate assessments of product value and raising questions such as: Are these apples truly organic? Is this product really made without the use of children's labor? What are the real figures behind this car's pollution levels[10]. Blockchain has the potential to offer consumers with accurate information about product sources and freight routes, allowing for better product assessment before making a choice. Blockchain technology is frequently used in conjunction with radio frequency identification technology (RFID) transponders (or tags) on products that carry different product information and are read (or written on) in a contactless way through radio waves imitated by different “scanners) to increase product tracking of origin and path through supply network. Abeyratne and Monfared emphasize the need of combining RFID with blockchain technologies (particularly in the industrial supply chain). The quickest non-contact transmission of product information into a digital format from a product to a computer, or from a computer to a product is provided by an RFID system. It enables you to read data from a large number of goods at the same time and to add new data to them. The capacity of the information to be written to (depending on the size of the memory chip in the product tag) may be considerably more than that of the presently most commonly used product labeling method barcode technology.

1.2.2 Public Access:

Depending on the kind of blockchain, information/records on the distributed ledger may be accessible to everyone or just a small number of people. This open access to information throughout the supply chain may result in advantages such as faster paperwork processing, fewer

direct contacts, and more information for the end client and/or consumer. When it comes to logistics and supply chain, the advantages of open access are most well-known in the transportation industry. Maersk and IBM have been working on cargo tracking systems (particularly for containers) as well as applications for the digitization of global commerce for some time. From June 2016, they began an open broad collaboration (with other participants such as Microsoft, DuPont, Dow Chemical, Tetra Pak, Port Houston, and the Rotterdam Port Community System Portbase) to enable container shipping and connected data on blockchain to interested parties, primarily insurance companies and banks, but also all supply chain members, throughout the entire time of goods traveling and by the end of the year. They declared their aim to create a worldwide trade digitization platform with a tamperproof repository and secure transactions based on open blockchain standards and intended for usage by the whole global shipping industry in early January 2018. Maersk used the example of transporting a container of flowers from Kenya to the port of Rotterdam, which required approximately 200 contacts across linked companies and resulted in a lot of waste, spoiling, and flaws. International imports of mandarin oranges from California and pineapples from Columbia are also tested. Document and information processing for container shipping is expected to cost as much as the physical conveyance itself. They were able to ensure that all documents and activities in the supply chain were available and visible to every partner, supported by information about who, where, and when they were issued or moved the goods, by involving all participants in the information and material flow into the blockchain application and creating a digitized document workflow. This reduces the need for direct domestic and international communication, eliminates errors, delays, and other waste, and ensures considerably quicker information transactions and, consequently, faster material flows in the supply chain. All information becomes decentralized and accessible, which reduces delays and fraud. The main benefit for ports, terminals, ocean carriers, and intermodal transporters would be accurate and real-time information about the disposition of shipments, allowing for more efficient preparation and planning for their own activities as well as end-to-end visibility in supply chain activities.

1.2.3 Preventing Fraud:

Verification of authenticity and origin, as well as free access to this information, may be an effective tool in the fight against fraud and counterfeit goods. In the pharmaceutical and luxury jewelry industries, these blockchain capabilities are very useful. There are many places where medications pass in the pharmaceutical supply chain (raw materials suppliers, medical institutions, manufacturers, repackagers, wholesalers, logistics companies, retailers, and patients), and blockchain could help manage such a complex supply chain by ensuring medicines visibility and prompt response in the event of a recall. But counterfeit medicines remain the most serious problem according to PricewaterhouseCoopers (PwC), the pharmaceutical market is the world's largest fraudmarket, with sales of counterfeit medicines ranging from US $ 163 billion to $217 billion per year and this is especially true when it comes to online drug purchases, where the World Health Organization estimates that 50 percent of drugs purchased on the Internet are counterfeit. As a result, pharmaceutical serialization (a prescription drug labeling system that allows for authentication throughout the supply chain from manufacturer to consumer) is becoming a standard practice in almost all developed countries, and it will be mandatory in the European Union starting in 2019 (Commission delegated regulation EU 2016/161). The use of blockchain as a distributed ledger containing data on medications and their origins makes serialization easier and has the potential to reduce fraud substantially. Consumers may be able to select medications based on genuine and confirmed information from blockchain, avoiding the health risks associated with the use of counterfeit medicines. In the luxury jewelry business, a

similar mix of blockchain usage for traceability and fraud prevention may be seen. Everledger, a company, has identified this need and is working to make the diamond supply chain more transparent, reducing fraud, illicit markets, and trafficking. They digitally secure records of 40 metadata points that define a diamond (e.g. serial number, color, carats, cut, clarity, angles) on blockchain with links to the laser inscription on the stone's girdle. So far, 1.6 million diamonds have been uploaded to the blockchain network [39]. Their services are mostly utilized in the transaction verification process by insurance companies, banks, and open market places, and they have recently expanded their company idea to include other luxury items such as fine wines and artworks.

2. DISCUSSION

Because the original blockchain was intended to be a transaction protocol and a payment system, its programming language was purposefully limited: no loops or sophisticated features were included. Every command in the Bitcoin code (scripting language) is only ever performed once, in a straight line. This guarantees scripts have a low level of complexity and predictable execution durations, which is referred to as a non-Turing-complete9 programming language in computer science. This also implies that Bitcoin can't run complex functions with endless loops, which is a security measure designed to keep Bitcoin safe from malicious or careless users who could otherwise block the network.However, since Bitcoin's data format had a limited amount of open space, programmers created apps that might take use of it. Although purposefully restricted, the Bitcoin protocol is not limited to simple input-output transactions; it may also communicate transaction instructions such as locking the cryptocurrency for a certain length of time and/or needing multiple signatures for spending an amount.

3. CONCLUSION

Although it is unclear (at this moment) whether the blockchain is an overhyped solution15 searching for issues it can solve just another technical breakthrough that gets people enthusiastic but fails to deliver or a true disruptive force that will sweep the economy, its promise is undeniable. Despite the fact that it was the initial blockchain designers' perspective that brought the blockchain to public notice, the subtle change in nomenclature from "blockchain" to "distributed ledger technology" implies a distancing and detachment from their philosophy. Controlling and controlling it may also eliminate its primary selling point: decentralization. Although blockchain as a technology will not replace current supply chain technologies, its features of secure data storage and interchange, as well as transaction automation, may ensure its position as a critical support and upgrade in supply networks (SWOT analysis in Table 2). Regardless of its flaws and threats, Blockchain significantly alters the information and financial flows that support material flows, allowing for optimization of material flows (by lowering costs and increasing customer satisfaction) as well as an increase in exchange based on improved supply chain trust. Improving current consensus algorithms and creating new ones is at the core of the blockchain's development. Cryptography, by significantly improving communication between components in the supply network, may create the groundwork for creating trust.

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