

Block Chain: Revolutionizing Supply Chain

Nishant Kumar*

International Business, Malikpur Village, Delhi, India

*Corresponding author: Nishant Kumar, MBA, International Business, Malikpur Village, Delhi, India, Tel: +918010152019; E-mail: nishantkumarx@gmail.com

Received date: January 01, 2019; Accepted date: April 23, 2019; Published date: April 30, 2019

Copyright: © 2019 Nishant Kumar. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Block-chain is a decentralized ledger account which performs transactions between the signed entities and the entities are signed using smart contract which uses the digital signatures of the involved parties to bind them to the contract.

In today's time it has gained a lot of popularity and has become a hot topic in all the industries which uses ICT. Same is the case with supply chain industry which has found a sea of opportunities to optimize the process after the introduction of Block-chain. Initially the technology was introduced to regulate the transaction of digital currencies but eventually the experts in the supply chain industry have started to explore the benefits which they can derive from the use of Block-chain.

Till date, researchers have found some of the uses of Block-chain which can help to optimize the whole process like tracking, cost-reduction, auditing, trust establishment, less lead times and resolving disputes.

In today's supply chain environment where the entities involved in the process are geographically distributed, it has become beneficial for the entities to use the technology.

Keywords: Block-chain; Smart contracts; Digital currency; Digital signatures

Introduction

Block-chain is a ledger formatted technology which holds information with multiple entities to enable transaction for intra process entities at a secured platform based on a trustworthy source. It was first time commercially used in 2008 by Satoshi Nakamoto as a public ledger for transaction of crypto-currencies. The initial job of block-chain was to operate on digital currencies, but eventually the companies began to learn the use of it and derived out the new ways to use it for their own purposes. Since then it has been trending news in supply chain Industry, which allows the distribution of information and not let that copy.

The block-chain is based on the concept of decentralization i.e., there is no central authority for the transaction; rather any transaction cannot be completed without the consent of majority of the involved parties.

In block-chain transaction and information flow and there is a block formed every time whenever a transaction takes place [1]. A single block holds 5 types of information on the five sides of its cube i.e., private key, public key, description (message, transaction), time and hash where, private key and public key are the digital signature of ownership of the ongoing transaction; time records the time when the transaction takes place to bring transparency.

Description holds the information of the task which takes place for which the block is created which are the transaction details, and hash is the information stored of the previous blocks i.e., whenever a transaction takes place, all the other 4 information are stored in the hash of the new formed block which continues a chain until the contract is ended.

The entities which enters the process and want to make the transaction must undergo a smart contract signing by using their digital signatures which binds them to terms signed under the contracts [2], and by mutual consent or by the approval of most entities involved one can end its contract (Figure 1).



Figure 1: The block-chain operates in a series of steps.

First a peer to peer network is established among the entities involved in the process. Then an entity in the network requests for a transaction. In the communication step the transaction is broadcasted to the P2P network which consists of computers, known as nodes [3]. The involved nodes validate that transaction using different algorithm. A verified transaction can involve contracts, records or other information.

Once the request is verified by parties, the requested transaction is combined with other transactions to create a new block of data ledger.

The new block is then added to the existing block-chain in the final step in a permanent way [4]. So, we can clearly see how difficult it is for any hacker to hack any data and hamper the cyber security as every time a new block is formed with a new hash of a long digit number and it is even difficult for a computer to find the combination of that hash in that limited time.

On the other hand, supply chain management is the management of flow of information, material, money and services in the form of raw material from suppliers and then transforming/manufacturing them in a final product and services through warehouse and delivering them to the end consumers.

The major entities in the SCM are suppliers, manufacturers, distributors and customers. Supplier is the one who owns the raw material; manufacturers are the one who is responsible for the manufacturing of final goods and services which are distributed to the end consumers directly [5]. Distributors is the entity which is responsible for the distribution and delivery of the goods to the end consumers, they stay at the front end of the supply chain and are also responsible for any value addition in the final goods. The last entity is the consumer, one who creates the demand and for the same reason is known as the first one to start the supply chain process.

Other than these major entities, there is a major driver which is a driver and acts as a catalyst in the process of supply chain i.e., logistics.

Logistics is the activity to organize the movement of goods, services and information (Figure 2).

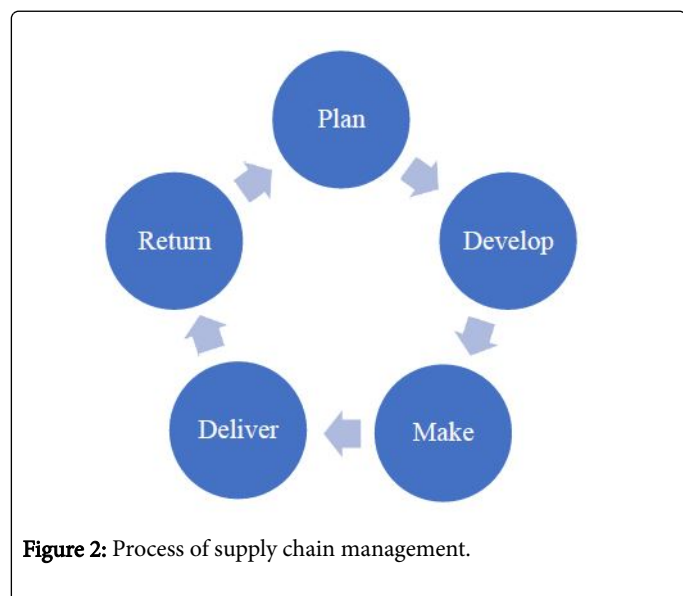


Figure 2: Process of supply chain management.

The process of supply chain starts with planning of orders to fulfill the requirement of the demand created by the consumers [6]. The

organization plans for the amount, quality and type of product required.

After planning, the development of vendor is done-also known as ‘Sourcing’ i.e., the source/vendor for the material required is searched and then the order is made.

Then the ordered goods are delivered by the vendor to the manufacturer under the ‘make’ step. The manufacturing takes place under this step.

After that the delivery of final goods takes place, the entity present at this step is directly in touch with the end consumers. Under this step the value addition by the delivering entity is also done and the final goods and services are delivered.

The supply chain process usually ends at this step but now a days, a new concept of return has also evolved under which the management of return of damaged goods is executed.

This process of supply chain requires some driver for the movement of goods from supplier to end consumers. This flow is organized by the logistics service provider in the form of transportation and warehousing.

Now, here the visible part supply chain is the flow of goods from vendor to consumers, but the part which is not visible here is the flow of information and money from consumers to the vendor.

At every step the information flow takes place to start the supply chain process, and this is the part where block-chain comes in role to boost and secure this part in many ways and the visible part of supply chain is then directly affected by the speed and safety of this invisible part. This was about the revolutionization of block chain in supply chain management [7].

Review of Literature

Steve [8] said that, block-chain can be said as the protocol for digital ledgers which enables the proof of ownership and its transfer from one entity to another without using any bank. The technology provides cyber security for the entities which can bear its expense and helps them to bring transparency in the process of supply chain.

Parul [9] published that block-chain is the future of supply chain management which can also help to digitalise the whole process of it. According to the article, block-chain helps to build the trust among the unknown entities. The added transparency by block-chain helps to show the proof about the goods sourcing detail and building trust and clear visibility for all the entities. Digital signature is used to sign the smart contracts among the involved parties which binds them to the terms signed upon. Decentralisation helps to revolutionize the whole supply chain process by breaking the orthodox nature of supply chain.

IDC [10] states that, block-chain technology has a direct impact on supply chain management as it is decentralised, verified and immutable. It helps supply chain by various ways like, ease in paper work processing, identify counterfeit products, facilitate origin tracking, operate the internet of things.

The information flow is core source in supply chain management as it provides the opportunities for the optimization of supply chain management. It provides platform for the product-tracking, product tracing and supply chain finance. Apart from these, the block-chain has 49 applications which is beneficial for the supply chain management.

Blockgeeks [11], report talks about introduction of block-chain technology with the working process of this technology. Network of nodes make up the block-chain. When the data is stored across the network, block-chain eliminates risk of handling data centrally. Since, the article talks about working of block-chain, so, here it talks about the distributed ledgers which enable the coding of contracts which will be executed when specified conditions will be met. By making the results fully transparent and publicly accessible, distributed database technology could bring full transparency to elections or any other kind of poll taking.

The Backbone of digital supply chain where Oliver Wyman offers the ideas on issues that are important to senior business leaders. It explains about end to end data transparency including parties, supplier, producer, distributor, 3PL, retailer, store and customers. Basically, it integrates all the players and finally explains the three-step approach to supply chain.

iScoop [12] blog provides details of Distributed Ledger Technology (DLT) and its growth in various companies based on its adoption. New digital services arrive where there is need to build trust, integrity and security on existing services. It also explains via image, the future of block-chain and distributed ledger in business according to IDC. The blog also explains about the application areas like in banking, insurance and finance services with the cross-border payment challenges along with its solution by the brief explanation of IBM's universal block-chain solution. Further, it talks about the requirements that business need to have in 2018 to get ready for block-chain along with its deep insights on advantages and disadvantages.

They provide insights in IDC on predictions with the emergence of cloud, big data, etc. Further, it discusses about strategic blueprint on using the technology which would help the professionals to make fact-based technology decisions with which the companies could achieve their objectives.

McKinsey & Company [13] in its article "Supply Chain 4.0-The new generation digital supply chain" discusses about how the organizations, with the use of supply chain can become faster, flexible, accurate, efficient and more granular. Further, the article takes into consideration, the IoT, use of robotics, big data analytics, etc.

Jon [14] states that, the block-chain technology allows to securely and transparently track all transactions and create a permanent history of all the transaction which can be documented every time the product changes its hands. Block-chain can help to improve supply chain with various abilities like, recording, tracking, assigning, linking and sharing [15-17]. Recording the quantity of assets as they transfer between supply chain entities. Tracking the purchase orders. Assigning quality certifications to the products wherever required. Linking goods their ID's. Sharing information about various steps and keeping everyone updated.

Hence the benefits provided by block-chain are enhanced transparency, greater scalability, better security and increased innovation.

Findings and Discussion

As per the definition of both block-chain and supply chain and based on the present literature it can clearly be concluded that block-chain acts like a catalyst to boost the process of supply chain and has clearly gained global recognition in a very less time.

The block-chain supports supply chain by helping in different departments like tracking, cost-reduction, auditing, trust establishment, less lead times and resolving disputes.

For big companies and MNC who operates on a global level becomes very difficult to keep track on each transaction as their supply chain consists of global players who are geographically distributed, so block-chain helps to keep track of every transaction that takes place between the signed entities.

Use of this technology helps companies to reduce their opportunity cost as the use of block-chain requires no verification other than one time smart contract signing and hence is not required to keep eye on each and every entity all the time because as the formed new blocks contains hash which holds the information for every transaction made till the formation of that block, so anyone involved can check the transaction whenever they want to and thus helps reduce their opportunity cost.

The establishment of trust is another role which is played by block-chain as the information which every block holds is consists of the private and public key used by the person who performs the transaction which is nothing but the digital signature of the entity itself and as we know that every digital signature holds the private information like IP address which is very easy to track if any crime is committed thus, these qualities helps build trusts among the involved parties. Other than trust among entities the trust of customer is also build as the transparency is being brought using block-chain.

Block-chain also helps in reducing the lead times for orders to manufacturers, suppliers, as the orders are made using various communication tools like email, SAP, but the orders are not executed by the suppliers until the payment is made because the companies are geographically distributed so the transit time is already very high but because of the use of block-chain the transaction are made with no time and the confirmation is sent to all the parties involved. Hence, helps to reduce the lead time i.e., the time between the order generation and order execution.

The technology can be used for auditing if developed properly as all the transaction made which can be documented are stored in it and has all the historical proof to support of the transaction. Thus, requires no additional entries and hence can be used for auditing purpose.

Another field in which block-chain helps is in dispute-resolving among the entities involved. There is a unique feature in the block-chain which is that any transaction can never be completed unless there is approval from majority of the involved parties under the contract. So, if any kind of dispute arises, no transaction will ever be made as the approval will not be provided by the different parties, as they also fear the losses arising from conflicts because supply chain is a department in an organization which operates at the global level, so the risk is high. Hence it becomes necessary for the parties to resolve dispute and then complete the transaction by consent of other parties.

Conclusion

This paper presents a study on the recent trends and impact of block-chain on supply chain management. Various review of literature is used to support the hypothesis that block-chain is helping to revolutionize the supply chain management by providing various solutions like tracking, cost-reduction, auditing, trust establishment, less lead times and resolving disputes. Also, the applications outside

these main clusters shows the sea of opportunities for supply chain management.

It is a treat to know how big impact does block-chain have on supply chain management in a positive way. The findings showed why entities are eager and taking step forward to install block-chain in their organization to increase their efficiency.

We also talked about the recent issue of cyber security with secret and important information and how it helps to overcome it with no addition in the process but by just using it.

This research can just be a starting point for exploring this vast area of block-chain and supply chain.

References

1. Oliver Wyman (2019) Block chain: The backbone of Digital Supply Chain, New York, USA.
2. Digital Supply Chain: it's all about that data. Ernst & Young Global Limited.
3. Applicature (2018) Block-chain as the Backbone of Digital Supply Chains.
4. IBM, Key food supply chain benefits using supply chain.
5. Applicature (2018) How to apply block chain to supply chain management.
6. Logistics Bureau (2018) Supply Chains and Block-chain Part 2-Making It Work.
7. DiscoveryIoT Administrator (2018) Impact of Block-chain in Supply Chain.
8. Steve B (2017) Block Chain in the supply chain: Too much Hype. Forbes Media.
9. Parul B (2017) How block chain is revolutionizing supply chain management. Digitalist Magazine. Ernst & Young Global Limited.
10. IDC (2017) Predictions Provide a Blueprint and Key Building Blocks for Becoming a Digital Native Enterprise.
11. Blockgeeks (2018) What is Block-chain Technology? A Step-by-Step Guide For Beginners.
12. I-scoop (2018) Block-chain technology: digital trust and distributed ledger technology (DLT) in business.
13. McKinsey & Company, Supply Chain 4.0-the next-generation digital supply chain.
14. Jon VA (2016) Why Block Chain is a game changer for Supply Chain Management Transparency.
15. Riley S (2017) How Block Chain is poised to impact Supply Chains.
16. Deloitte (2013) Using Block-chain and Internet of Things in supply chain traceability-Deloitte.
17. Mayank P (2018) How is Block Chain disrupting the Supply Chain Industry. Hackernoon.