The Impact of Blockchain Technology on the Supply Chain Industry

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# Introduction

Blockchain structure is on top of the Gartner Hype Cycle 2016 and a lot of start-up companies use this technology in their portfolio. Blockchains have appeared in finance industry, gaining interest in non-financial industries as well.

Blockchain technology has had a huge impact on several big industries such as social, medical and supply chain industries. The technology makes sure the data is integrated without any third party included. It is a transparent decentralized transaction system that can be used in industries or certain businesses. Even being an interesting topic, blockchain technology lacks a systematic literature review, which has not been yet created. [(Youness Tribis, Abdelali El Bouchti, Houssine Bouayad, 2018](#_CTVL0017c8e2ca4f8f948938b4f8bde660df0fc)[; Thomas Bocek, Bruno B. Rodrigues, Tim Strasser, Burkhard Stiller, 2017)](#_CTVL0018ac282784e3f4f6abce0add3d8bfe7f1)

This technological trend has got a lot of doubts, despite that governments and large corporations have recently started to adopt and improve this technology in various domains of applications, from finance, social and legal industries to design, manufacturing and supply chain networks. [(Abeyratne and Monfared, 2016)](file:///C:\Users\L380\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KSJSWLIJ\Blockchain#_CTVL00161b6aa0a60cf44debdf2ac81244e3b23)

# What is Blockchain?

Blockchain is a decentralized transaction and data management technology created by Satoshi Nakamoto for the cryptocurrency called Bitcoin in 2008. Based on the literature, the blockchain definition was synthesized as a distributed database, which is shared among and agreed upon a peer-to-peer network. It consists of a linked sequence of blocks, holding timestamped transactions. . Each block could be defined as an encrypted piece of information. Theoretically, anyone can add data to the chain of blocks by transacting in the network, anyone can review this data at any time, but no one can change it without authorization. This leads to a blockchain being a complete and immutable history of network activities, which are shared among all nodes of a distributed network. Blockchain technology facilitates two or more entities that may or may not know or trust each other to securely exchange value over the internet without including a third party. Blockchain technology can be explained as the technology that powers the Internet of Transactions.

Another powerful characteristic of a blockchain is its ability to get a distributed network to reach consensus regarding the state of data and agreeing on the rules of the network without a central governing entity. Consequently, improvement to a system can be proposed by any user, but are implemented only if accepted by all parties involved in the network, hence, enhanced transparency and trust. In a typical blockchain interaction, trust among a distributed network is possible due to the validation or mining process where each new transaction is verified by the whole network before being added to a blockchain. The arrival of this technology is timely because consumers are demanding supply chain transparency. [(Abeyratne and Monfared, 2016](file:///C:\Users\L380\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KSJSWLIJ\Blockchain#_CTVL00161b6aa0a60cf44debdf2ac81244e3b23)[; Francisco and Swanson, 2018](file:///C:\Users\L380\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KSJSWLIJ\The#_CTVL001139764301c734619a6b9335cab1e05e0)[; Youness Tribis, Abdelali El Bouchti, Houssine Bouayad, 2018)](#_CTVL0017c8e2ca4f8f948938b4f8bde660df0fc)

The use of the technology would be of a great interest for the financial industry in order to make the processes automated and digitalized especially with many stakeholders involved. Automated processes can save money and many start-ups believe that these cost savings can be applied in other areas.

Blockchains provide a trusted consensus in which data of products during the logistics process can be stored and accessed by both parties being ensured by a smart contract. The idea of smart contracts is to have a protocol or code representing a contract that is self-executing, making a contractual clause and the inclusion of a trusted third party. Blockchain and smart contracts allow to reduce the number of intermediaries. Reducing the number of intermediaries in the logistics process, less manual intervention will be required, reducing both the operational expenses and the manipulation risks. [(Thomas Bocek, Bruno B. Rodrigues, Tim Strasser, Burkhard Stiller, 2017)](#_CTVL0018ac282784e3f4f6abce0add3d8bfe7f1)

# The impact of Blockchain on the Supply Chain Industry

Supply chain in manufacturing systems comprises a series of system entities including people, physical resources, knowledge, processes, and financial contracts and transactions that facilitate moving a product from supplier to customer. In a large supply chain system, it is very difficult to have an overall picture of all transactions within the chains. This information is typically stored in multiple locations and are accessible to certain system entities. In such systems. the customers (being the final consumer or the larger company within the chain) usually have partial access to the overall information. In many cases, part of the information is treated as a commodity for a supplier. Therefore, due to the low level of transparency, the tractability of transactions is based on the trust between the system actors. The blockchain technology here can influence the transparency and traceability issues within the manufacturing supply chain through the use of immutable record of data, distributed storage, and controlled user accesses. [(Abeyratne and Monfared, 2016)](file:///C:\Users\L380\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KSJSWLIJ\Blockchain#_CTVL00161b6aa0a60cf44debdf2ac81244e3b23)

Blockchain has a possibility of facilitation the integration of supply chain. Despite that, industries and companies that are already well integrated, may not be willing to substantially invest in blockchain, which does not provide any benefits to present solutions. [(Francisco and Swanson, 2018)](file:///C:\Users\L380\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KSJSWLIJ\The#_CTVL001139764301c734619a6b9335cab1e05e0)

Blockchain improves the dependence of supply chain to some processes by putting pressure on supply chain companies to be responsible and accountable for their actions. There are some examples to proof the use of blockchain industry and its facilitation of the process for the supply chain.

At the end of 2016 Walmart was trial-testing a service it developed with IBM to monitor produce of pork in the U.S. and China. The first project involved tracking produce from Latin America to the U.S. The second involved moving pork products from Chinese farms to Chinese stores. Blockchain helped digitally track individual pork products in a few minutes compared to many days taken in the past. Details about the farm, factory, batch number, storage temperature and shipping could be viewed on blockchain. These details helped assess the authenticity of products and the expiry date. [(Kshetri, 2018)](file:///C:\Users\L380\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KSJSWLIJ\1#_CTVL00110eaa836643944c6afaf6e2af6d14a1a)

Chronicled is preventing fraud with a focus on luxury items. They use a tamper proof smart tag, which links the sneakers to the blockchain. The blockchain is an open registry where information about buyers and sellers is stored. With such tags, everyone could check the history of buyers and sellers.

Provenance is making the supply chain transparent by using blockchain to prove the authenticity of a product and to prove the origin, where it was produced. The blockchain allows to store and record those information without relying on intermediate auditors. This allows for a detailed view on the supply chain, especially on who created which part. [(Thomas Bocek, Bruno B. Rodrigues, Tim Strasser, Burkhard Stiller, 2017)](#_CTVL0018ac282784e3f4f6abce0add3d8bfe7f1)

In the context of Supply Chain Management information, the key blockchain benefits for businesses are managing supply chain information more efficiently without being overly concerned about properly securing them, privacy immutability of data, public accessibility of records and access for diverse populations and locations. The government could receive more trusted information for better and focused inspections. For customers, blockchain technologies would guarantee public security of personal data.

In supply chain finance, blockchain benefits for businesses are simplifying and making more agile and secure the trade finance commercial transactions among companies and financial institutions. Claims and contracts could be recorded onto a blockchain and validated by the network which allows all the stakeholders to identify the movements of funds between contractors, customers, and financial institutions. For government, auditing digital currency transactions help to raise the tax collection. (Youness Tribis, Abdelali El Bouchti, Houssine Bouayad, 2018)

# Conclusions

Over seven years since the discovery of blockchain technology, this field has seen massive growth through various new innovative and technological concepts put forward. Initially this technology gained a negative reputation due to its association with untraceable purchases on the ‘dark net’ where users would use digital currencies such as Bitcoin to make anonymous purchases. However, the recent years have seen many large companies such as IBM, JPMorgan and Barclays investing in the research and development of the Blockchain technology to reduce bureaucracy and saving costs. [(Abeyratne and Monfared, 2016)](file:///C:\Users\L380\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KSJSWLIJ\Blockchain#_CTVL00161b6aa0a60cf44debdf2ac81244e3b23)

While blockchain offers promise, the current state of the supply chain industry may makes adopting blockchain difficult. Blockchain is a data store. When coupled with IoT technology and smart contracts, it creates a compelling vision for a new paradigm, but what blockchain lacks is the thing supply chain needs the most to support automation: standardized data models. The supply chain industry is simply not prepared to adopt a shared ledger technology until there is more commonality in how participants exchange data. [(Scott *et al.*, 2018)](file:///C:\Users\L380\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\KSJSWLIJ\Evaluating#_CTVL001a7a0858665664d8283dfcc1a8ee41c9a)

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