# Blockchain Disruption in Manufacturing Operations Excellence

SMART IDEA & PRACTICE

SMART PAPERS

# Index

**WATCH DIGITAL FUTURES
VIDEO**

# DIGITAL FUTURES

DIGITAL FUTURES is an online content publication platform catering for technology business leaders, decision makers and users, by sourcing and sharing valuable information and best practices in connection to the latest emerging technologies trends and market developments that leverage capabilities and contribute towards enhanced enterprise-wide performance.

WATCH VIDEO

LEARN MORE

# Introduction

The advent of cryptocurrencies, in particular Bitcoin, has mainstreamed the blockchain definition. A blockchain is a constantly expanding distributed database which protects against data manipulation and revision. Blockchain incorporates a consensus that sets out guidelines for how data should be applied and checked. The industry has already seen the power of a distributed system with Git Version control. Transactions are placed into blocks in order to be corrected. [1]

While Bitcoin failed to disrupt the world market completely, the technology is capable of doing so. At the moment, blockchain is used to solve cryptocurrencies – Nasdaq OMX is exploring equity technology, while E-commerce company, Overstock is launching its digital bonds with blockchain.

Blockchain is not just a financial system; it is a great solution for virtually any platform or product requiring confidence, such as the authentication of keyless car entry. Moreover, IBM and Samsung have also recently released a principle evidence, which proves that blockchain is the foundation of the Internet of Things (IoT). Blockchain also has the ability to develop current processes in society. A study from the State of Virginia reveals that many voting systems, which were using the passwords "abcde" and "admin," which were introduced between 2002 and 2014, making it were easy for them to be hacked from the car parks outside polling stations.

Thus, Elections will become much safer through the introduction of a blockchain based voting system. In short, the concept behind Blockchain is to create and validate trust without the need for a centralized framework. Instead, a decentralized network will have the power, which would make it not only to be more stable, but also more effective and quicker to magnify. Market giants like eBay, Amazon and Uber will replace a decentralized marketplace.

---

1. 3Pillar Global (2016). Introduction to Blockchain Technology.

This will lead to the incorporation of the faith, rules, IDs, reputations and payment choices, at the level of the users and to loyal and decent acknowledgement for the participants. Blockchain technology provides a lot of disruptive potential and businesses are already vying for various products. Blockchain is the strongest bet for future returns as the technology continues to grow.

Industry 4.0 has contributed to the need for independent, interconnected, stable manufacturing systems. This involves the development of industry. Today's intelligent systems, lack decentralized decision-making and communications infrastructure, a requirement for flexible, intelligent manufacturing systems. The aim of this paper is to adapt an independent, decentralized and collaborative network using Blockchain technology. The Blockchain Based Cyber Physical Production System Architecture (BDCPS) is designed to connect with computers, users, devices, suppliers, and other peers, in support of the Internet of Things and the cloud services. BDCPS validates the argument with a small-scale Blockchain with IoT framework, using the Smart Contract feature and trustless peer-to-peer decentralized ledger features. A private blockchain on a single board computer will be running, connected to a microcontroller that contains IoT sensors. The application of this methodology to Industry 4.0, is introduced in the car manufacturing industry. [2]

2. Raunav Chitkara, John Rajan A (2019). BDCPS – A Framework for Smart Manufacturing Systems using Blockchain Technology.
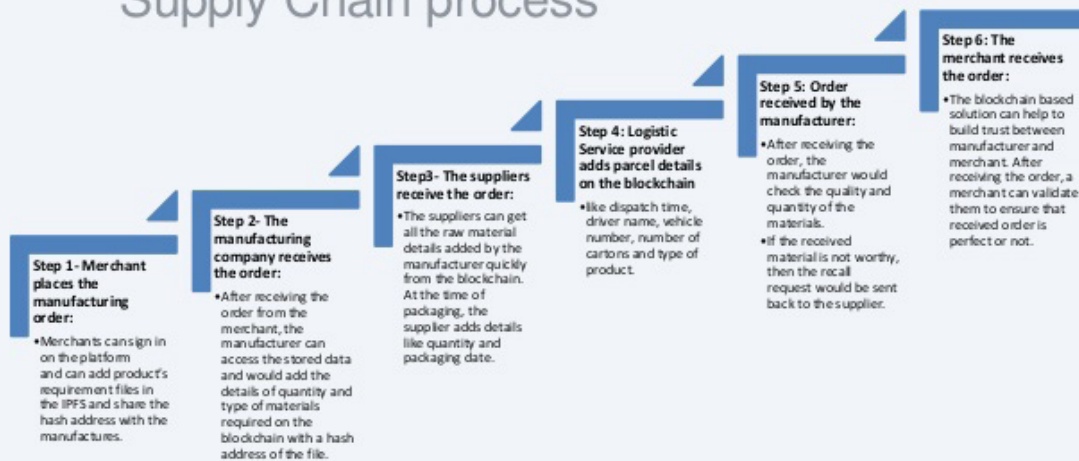
**4.0**

Figure 1. Blockchain Involvement Steps in Supply Chain Process. Lee Wayhertz (2018). Blockchain Manufacturing – Enabling Supply Chain Traceability.

The leaders who took the first steps to change their business models and adopt new distributed ledger technology, have begun to reap rewards. At the heat of this bold leap is a change in business models & relationships. The leaders understand that the greatest source of value comes from the ability to manage secure digital assets, related to the manufacturing process.

The head of the pack has discovered, beyond just digital skills, that the new confidence – the digital technology allowed – enables you to build connections with tiny, more versatile entities. The production of physical goods has been distributed around the world and is now outside the plant. Factories will offer "manufacturing cycles," similar to cloud storage services, in digital files containing all the details required to produce a product. In the manufacturing sector, transparency within the supply chain is crucial and blockchain can provide this across spades.



**Blockchain involved in the Manufacturing Supply Chain process**

**Step 1- Merchant places the manufacturing order:**
- Merchants can sign in on the platform and can add product's requirement files in the IPFS and share the hash address with the manufactures.

**Step 2- The manufacturing company receives the order:**
- After receiving the order from the merchant, the manufacturer can access the stored data and would add the details of quantity and type of materials required on the blockchain with a hash address of the file.

**Step3- The suppliers receive the order:**
- The suppliers can get all the raw material details added by the manufacturer quickly from the blockchain. At the time of packaging, the supplier adds details like quantity and packaging date.

**Step 4: Logistic Service provider adds parcel details on the blockchain**
- like dispatch time, driver name, vehicle number, number of cartons and type of product.

**Step 5: Order received by the manufacturer:**
- After receiving the order, the manufacturer would check the quality and quantity of the materials.
- If the received material is not worthy, then the recall request would be sent back to the supplier.

**Step 6: The merchant receives the order:**
- The blockchain based solution can help to build trust between manufacturer and merchant. After receiving the order, a merchant can validate them to ensure that received order is perfect or not.

With blockchain, visibility from manufacturers, strategic procurement and acquisitions in all areas of the production, including monitoring and service at the machine level, are increased. A vital aspect of production is an efficient and effective supply chain. But it can be difficult to get accountability in any moving part of supply chain, running through several companies, governments, and even nations. Even worse, there are also no standardized data collection, storage and sharing processes.
*Blockchain combines existing technologies and techniques into a novel architecture composed of five elements :* [3]

**1.**    ***Distribution.*** Blockchain participants are physically removed and linked to a network. A complete copy of the directory is maintained by each participant running a full node and is updated to new transactions. Nodes are computers which are owned or used and configured to execute the following consensus algorithm. Every participant can review some part of the ledger, but cannot alter it unless the circumstances are specified.

**2.**    ***Encryption.*** Blockchain uses technologies like public and private keys to safely and semi-anonymously register data in blocks (participants have pseudonyms).

**3.**    ***Immutability.*** Completed transactions are cryptographically signed, time- stamped, and sequentially added to the ledger. Records cannot be corrupted or otherwise changed, unless the participants agree on the need to do so. Such an agreement is known as *"fork"*.
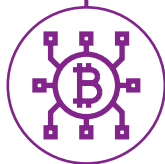
3. Gartner (2019). The real business of Blockchain

**4.**     *Tokenization.* Transactions and other blockchain transactions include anonymous value exchange. The meaning is in the form of tokens. The digital economies will work better with tokens, which need to be built for different reasons (tokenization). Tokens may act as digital representations of physical objects, as an incentive tool to attract network members, or allow new types of value to be generated and exchanged. They also enable individuals and businesses to manage their information.

**5.**     *Decentralization.* Multiple machines or nodes on the distributed network share all network knowledge and guidelines for how the network is run. In practice, decentralization means that no single entity controls all the computers or the information or dictates the rules. Every node maintains an identical encrypted copy of the network record. A consensus mechanism, operated by each full node, verifies and approves transactions. This decentralized, consensus-driven structure removes the need for governance by a central authority and acts as a fail-safe against fraud and bad transactions.

SMART PAPERS

APU INSIGHTS
Product of APU Commercial Information Services LLC

RESEARCH SPOTLIGHT