

Blockchain as Part of Industry 4.0.

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Abstract. Blockchain technology is considered to be the driving force of the industry 4.0. It will enable more agile value chains, faster product innovations, closer customer relationships, and quicker integration with the IoT and cloud technology. This paper introduces relevant aspects of Industry 4.0 that illustrate its impacts on blockchain, some of the benefits and challenges that arise when using blockchain. Also there is an overview on blockchain technology. How such ledger technology as blockchain affects on industry 4.0 and implements some of the technologies.

Keywords: blockchain, industry 4.0, internet of things, logistics, economy, supply chain, big data.

We live in an amazing time - in an era when radical changes in technology are happening during our lifetime. What seemed to be a fantasy yesterday is today a real project that innovative companies are working on, and tomorrow it becomes natural. We no longer imagine our lives without it. It is connected with the Internet, smartphones, and the same, undoubtedly, it will happen with many technologies. A feature of this revolution is that the introduction of new technologies will be characterized by tremendous speed and be accompanied by powerful competition. Already, we see that innovation is becoming the arena of the struggle of many thousands of companies around the world - both large corporations and very small startups. All of them are competing for the opportunity to become the first among those who can bring a new product, a new service to the market, and win the favor of customers.

The fourth industrial revolution will have a cardinal effect on the entire structure of the global economy. It will be so far-reaching and multifaceted in nature that it will be almost impossible to separate one particular effect from another. Indeed, it will affect all large macro variables: GDP, investment, consumption, employment, trade, inflation, and so on.

In this article we will talk particularly about blockchain in logistics. It's fair to mention how it work. Firstly, it was introduced as a distributed ledger underlying Bitcoin. After that, it started to be similar to cryptocurrencies, it deals with enormous arrays of data and numerous complicated transactions that involve red tape, paperwork, vehicle tracking, and warehousing issues, amongst others.

Blockchain is capable of recording every movement of a truck, moves all intermediaries away and dramatically simplifies the document flow. This all comes with the renowned security and auditability of the technology that makes any attempts to pull an illegal act virtually impossible.

Also it gives no response on ecosystem, provides much more security and reliability, and, straightens the entire supply chain. Talking about the value of blockchain it's on a high level and it has the potential to create huge value in other industries as well.

When it comes to freight and logistics, it is ideal for tracking assets making it extremely helpful in transportation management. When it comes down to it, carriers, shippers, freight forwarders, freight brokers, distributors, and resellers – yes, pretty much every single person in the supply chain – are all working toward the same goal: they want accurate, relevant information.

When problems arise, gathering information and managing paperwork is crucial no matter what the problem. Everyone in the supply chain needs a technology that can provide true visibility, thereby building trust in the system and reducing delays. Blockchain in logistics and supply chain has the potential to do exactly that, while simultaneously reducing freight spends, and therefore it will also influence on economy.

The new generation of intelligent industry 4.0 relies on automation and hyper-connectivity. This hyper-connectivity, however, represents a weakness for Industry 4.0. Today the main issue of the industry concerns cybersecurity. Blockchain embodies this innovation, and represents a potential antidote to the cybersecurity risks of Industry 4.0.

Here are two uses specific to the industrial context:

- Distribution chain risk management. The associated device of “smart contracts” is ideal for managing the risks of the distribution chain.
- Industrial Security IoT and Blockchain. The blockchain provides a way to register and verify each device in a highly connected IIoT equipment network including big infrastructure systems, such as ICS units.

Now, imagine that data flows across various kinds of integrated solutions and devices, including analytics capabilities, machines, devices, and platforms. Also, the data needs to pass various administrative boundaries, with each having its own set of policies. In this case, it becomes complicated to ensure the safe functioning of an IoT system and the proper management of data.

Since blockchain technology is decentralized, there is no central authority or necessity of specific administrator. Such a structure is not responsible for approving transactions or establishing guidelines for their use. With the removal of intermediaries, the long and inconvenient banking processes can be bypassed, providing a reduction in both costs and time.

In addition, blockchain technology is based on cryptography algorithms that are designed to ensure high security. Every block on a network has a hash to the previous block, which means that an intermediate block on the database can't be substituted. Essentially, while a block can be extended, you can't change it.

Today, we can see the rise of investments by various sectors of the economy in the blockchain technology. From the governments of the world, universities, and corporations, it would seem that more and more industries have been seeing reasons why they should invest in the technology.

In the context of the Internet of Things, blockchain technology can be applied to ensure the successful processing of multiple transactions, the tracking, and coordination of millions of smart devices, etc.

To draw the conclusion, it should be said that blockchain is challenging the status quo in a radical way by using math and cryptography. Blockchain provides an open decentralized database of every transaction involving value: money, goods, property, work or even votes. The future global economy will move towards one of the distributed property and trust where anyone with access to the internet can get involved in blockchain based transactions. The uses of blockchain technology are endless. Probably less than ten years it will be used to collect taxes, financial fraud will be significantly reduced as every transaction will be recorded on a public and distributed ledger. It will be accessible by anyone who has internet connection. Blockchain will become global decentralized source of trust. Blockchain technology is also a leading technology in Industry 4.0 that has built-in robustness. By storing blocks of information that are identical across its network, the blockchain is controlled by any single entity and has no single point of failure.

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