

Could Blockchain Technology Help Improve Supply Chain Traceability?

Fredrik Jansson, Oskar Petersen

Tracing physical objects from producers to consumers is a challenging task. In the wake of Bitcoin's success, the retail industry sees potential in using blockchain technology to tackle some of these challenges head on.

Blockchain technology is most commonly known from the Bitcoin currency, where the technology is used to keep track of transactions. It can be thought of as a physical book, where each page contains approximately ten minutes of transactions. The book is distributed in a global network which anyone can join, and anyone can create new transactions, as long as they follow some simple rules. If a transaction is deemed valid, it will be accepted by everyone else and incorporated into the book.

Once a page is filled up with transactions it is time stamped, signed with a unique serial number, and glued into the book. In this analogy, the pages represent blocks and the serial numbers represent the link between the blocks. The serial number is a product of the transactions in that page, and the serial numbers of adjacent pages are locked together through a mathematical function, forming a robust chain of pages. This makes it impossible to alter one of the transactions without altering the serial number of that page, hence ruining the link between that and the following page.

The result is a system where historical records are nigh impossible to alter, and transactions can be made between individuals without the need of a central authority. Everyone can see the complete transaction history which ensures the global agreement on all historical events. The completeness of the records also enables the validation of each coin; all coins can be traced to the moment they were created. Inspired by the Bitcoin blockchain, tailored blockchain applications are currently being explored to better suit other business contexts.

There are many popular reports describing how blockchains will revolutionise many different areas, including traceability. The transparency of transactions and the completeness of the transaction history are aligned with some of the core concepts of successful traceability. However, there are several challenges that need to be addressed before the technology is applicable. Two prominent issues are the implicit coordination between organisations, and the lack of technological development within suppliers and producers.

In collaboration with ÅF, the authors developed an evaluation model in which companies can assess if blockchain technology is an efficient means of improved traceability. Using the model with business representatives, it was difficult to specify how the technology should be used to directly address the objectives. Two of the more promising use-cases are presented in the study, and the challenges related to their implementations are discussed. The first case uses a blockchain for storing digital certificates of products to combat fraud, the second case uses a blockchain for storing the same type of traceability data as the companies store today, only in a distributed fashion.

Blockchain technology offers no turn-key solution, and high capabilities from the supply chains are required to implement it successfully. Can modern supply chains reach the expected levels of coordination between actors, transparency towards consumers, standardisation of data, and technological development? And if so, is blockchain technology still relevant, or are there more efficient ways of improving traceability?