

Shared ledgers

Your favorite jeans or T-shirt in your closet at home were not made at one location. Each item in your wardrobe has gone through the hands of farmers, ginners, spinners and fabric mills before it ended up in a shop or was delivered at your door. You may not know what transactions took place to produce your T-shirt. Until recently, many of the actors in the cotton supply chain did not oversee the layers in the chain either. This is now changing. Shared ledgers have a crucial role in facilitating the flow of information between buyers and suppliers. What does blockchain add to this development?

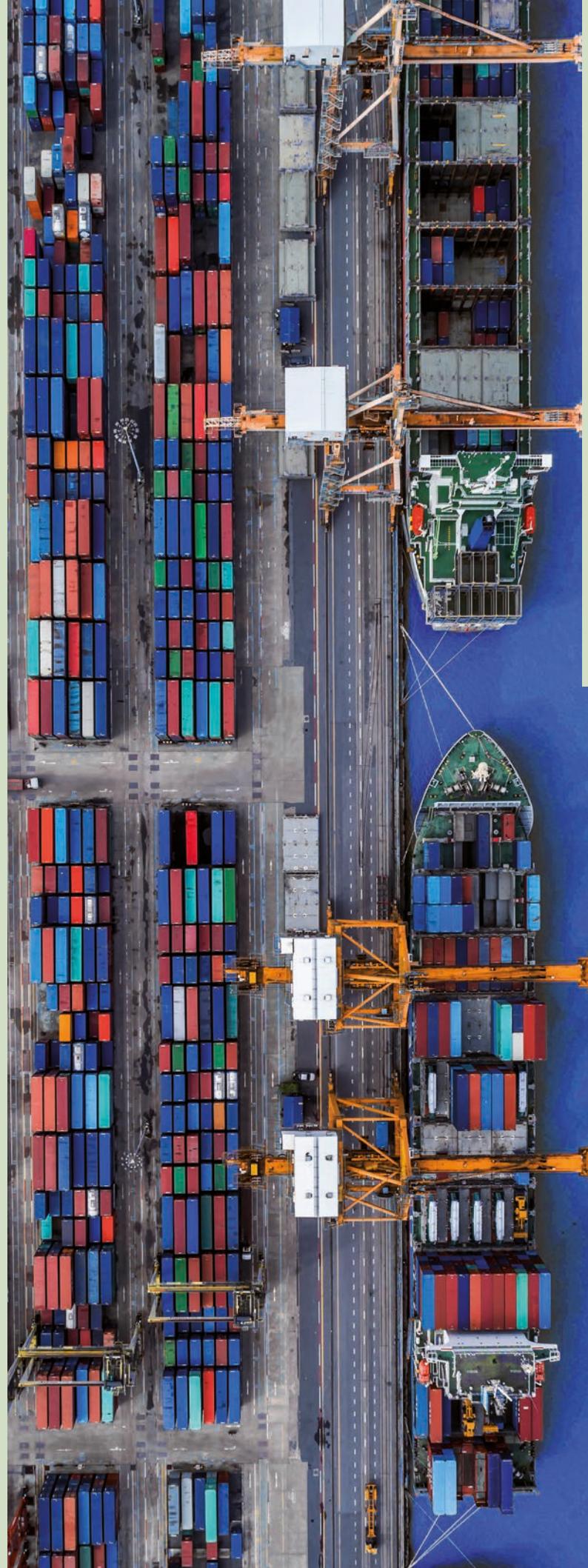
How shared ledgers facilitate the flow of information between suppliers and buyers in agri-food supply chains



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THE ROLE OF DISTRIBUTED LEDGERS IN SUPPLY CHAINS

Blockchains (also known as ‘distributed ledgers’ (DLs)) are expected to have a transformative effect on the core functions of the financial industry. However, in supply chains the predicted role of DLs lies in improving processes that are more ancillary. A ‘shared’ ledger (such as DLs) can help address inefficiencies related to information asymmetry ([Blec16]), which were previously more difficult to address. For example, in commoditized agri-food supply chains, end-users often have difficulties in tracing the origin of products back to the producer. By collating data at a supply chain level, while maintaining the data at the most granular level (e.g. at a farm-level), a shared, digital ledger can help to solve this issue. Some observers expect blockchain to facilitate origin tracking ([EMCO17]) and the identification of counterfeit products ([Hack17]).

INTRODUCTION

The jeans and T-shirts in your closet at home were not made at one location. Each item in your wardrobe has gone through the hands of farmers, ginners, spinners and fabric mills before it was sold in a shop or was delivered at your door. You may not know what transactions took place to produce your T-shirt. Until recently, many of the actors in the cotton supply chain did not oversee the layers in the chain either. As this article will show, more information is now shared between supply chain actors than before. Sharing information means improving transparency. Shared ledgers play a crucial role in facilitating the flow of information between buyers and suppliers.

Using a PFL, buyers can retrieve product information from suppliers without having access to data about competitors

An example of a blockchain-like solution: private federated ledgers

Before the world got to know the term ‘blockchain’ for the first time, tooling to improve transparency in supply chains was already being developed by industry pioneers and implemented by early adopters. The exhibit below outlines a case-study about ChainPoint, a provider of a cloud-based software platform to manage and share product, process and supplier information. Their collaboration with the Better Cotton Initiative resulted in a solution that can be classified as a ‘private federated ledger’ (PFL).

A private federated ledger (PFL) is a shared ledger that is governed centrally. It is ‘private’ because the information it holds is not publicly available. Users can enter data directly or push data through an API to the central database. Every buyer and seller in the supply chain submits transactional data using the same data model. The use of an API and pre-defined data model minimizes the administrative workload for participants.

Using a PFL, buyers can retrieve product information from suppliers without having access to data about competitors or about others than their direct suppliers. PFL is not a blockchain; it lacks some of the five key characteristics that qualify a blockchain (the five basic principles of blockchain: distributed database, peer-to-peer transmission, transparency with pseudonymity, irreversibility of records and computational logic) ([Ians17]). However, a PFL resolves the specific issue of traceability in a way that is similar to what would have been achieved using blockchain.

Better Cotton Initiative

The Better Cotton Initiative (BCI), founded in 2009 and initiated by organizations including Adidas, H&M, IKEA, Oxfam and WWF, aims to improve the livelihoods and economic resilience of farmers and their communities in cotton producing areas and reduce the environmental impact of cotton production.

To reach this goal, BCI defines what a better, more sustainable way of growing cotton looks like, and, through a network of partners, it trains and supports farmers to implement the corresponding principles. In the 2015-2016 season, 12% of all cotton produced worldwide was Better Cotton. This share of the global cotton supply was produced by 1.5 million licensed BCI farmers.

The figure below shows a typical supply chain for Better Cotton. Farmers bring their yield to a cotton gin, where cotton fibers are separated from their seeds and then processed into cotton bales. These bales are traded or directly sold to spinners that in turn supply fabric mills with yarn. The fabric is sold and further processed into consumer products, like clothes, which are then delivered to retailers.

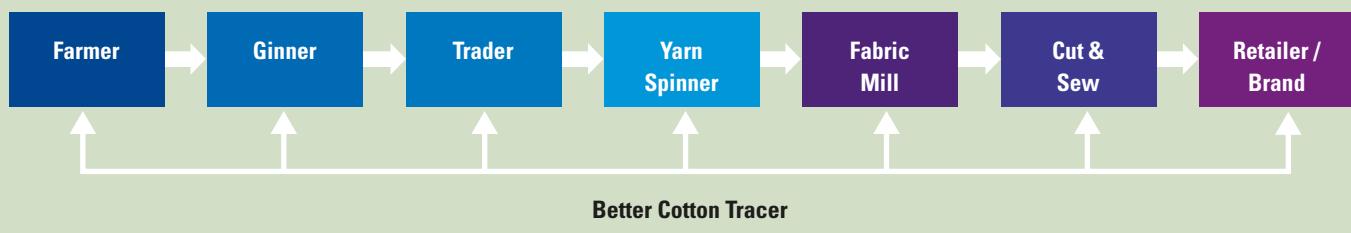
To make certain that retailers and brands can be confident when making claims about Better Cotton, BCI engaged ChainPoint to build the Better Cotton Tracer. This Tracer tracks the volume of licensed cotton orders between suppliers and manufacturers¹ ([CHAP17]), and serves as a reporting and documentation tool. The Tracer ensures for example that a trader cannot sell more Better Cotton to yarn spinners or other traders than he himself has acquired from Better Cotton ginnery or traders.

ChainPoint enables consumers to retrieve product information by scanning a bar-code with a mobile phone, while it also enables the insertion of data through mobile technology at the farm level. By integrating these technologies in one platform, ChainPoint offers an end-to-end solution that can provide transparency and traceability on the level of granularity required by end-users.

Where needed, ChainPoint can integrate with supply chain functions where distributed ledgers have been integrated, such as financing, food safety or document management.

¹ BCI uses a Mass Balance Chain of Custody to identify how BCI farmers are linked to end-users.

Figure 1. The Better Cotton Tracer enables traceability of cotton by linking each step in the Cotton Supply Chain.



BLOCKCHAIN VS. PRIVATE FEDERATED LEDGERS

Even though private federated ledgers (PFLs) existed long before blockchain was invented, there are several reasons to opt for a PFL over a DL. In comparison to DL, the advantages of a PFL are simplicity, the central governance structure and the maturity of the technology.

Blockchain is based on a form of decision making by consensus. This requires supply chain actors to release control in the governance of the digital ecosystem around their supply chain. In contrast, a central governing body can enable more swift decision making. In fact, many of the current Proofs-of-Concept (POCs) of blockchain in supply chains, are based on a more central governing authority ([Poppi17]). For example, IBM's Hyperledger is positioned as a solution that enables a

central governing body to maintain control. The preference to maintain control by major companies operating in agri-food supply chains, can also lead to the choice for a PFL over a DL.

In comparison to blockchain, PFLs are a proven solution that has been rolled out in many supply chains with the agreement of supply chain actors. A survey amongst logistics providers ($n=152$) found that around 60% of the participants with implementation experience indicate that the need for a high level of collaboration and commitment might be a barrier for blockchain adoption in their supply chain, followed by 49% of the participants who see the maturity of blockchain technology and lack of industry acceptance as a hurdle for adoption ([Hack17]). A PFL does not face these levels of skepticism and might be accepted earlier by industry actors as a proven concept.

Does this mean that DL does not bring anything new to supply chains? In fact, it certainly does. While this article focuses on transparency in the agri-food supply chain, the case for application of DLs in other application areas is more convincing. Using the five principles identified by Iansiti and Lakhani [Ians17], the element of immutability is essential. The same study cited earlier [Hack17] found that logistics specialists see two cases where DL has the highest likelihood of implementation and would be most beneficial: 1) to simplify paperwork processing in ocean freight and 2) the Internet of Things (IoT). For example, by ensuring a Bill of Lading is delivered unaltered to the next step in the chain, or by recording the temperature measured by sensors in a cold chain. A clear case for DL exists in these applications.

More data will flow through supply chains in the future: a case for shared ledgers

Will the interest in blockchain-like solutions vanish like so many hypes do? It might not. Looking forward, several trends may lead to a continued interest in shared ledgers, including PFLs and DLs.

First, KPMG's annual Top of Mind Survey amongst 500+ executives in the consumer goods sector shows that while today one third of companies have an integrated supply chain, more than half plan to have reached full integration by 2019 ([KPMG17]). An 'integrated' supply chain is a chain where there is coordination and information sharing between suppliers and manufacturers about materials, logistics, information and finances. Once large players, such as Maersk ([OCEI17]), Walmart ([Aitk17]) and financial service providers operating in the agri-field, start to implement blockchain-like solutions on a larger scale, the trend towards integrated supply chains might accelerate.

The vibe around blockchain might help to break through barriers in collaboration between supply chain actors

Secondly, the efficiencies to be gained by simplifying the paperwork of freight and the growth of the IoT will continue to drive interest and innovation.

A third reason why interest in shared ledgers will persist, is competition. Traceable products have been an important niche for market entrants in food and agricultural markets, where on average 15% of consumer expenditures are in product segments that have a 'responsible product' claim ([Smit14]). A PFL can help companies to back up responsible product claims with supplier approved data.

These developments imply that more and more data will flow through supply chains from end-user to supplier and vice-versa. Large players, such as FMCG companies or intermediaries, may consider launching PFLs to maximize the network effects gained by a supply chain-wide implementation ([EMCO17]). Where needed, PFLs could integrate with relevant blockchains.

CONCLUSION

In the agri-food supply chain, shared ledgers such as PFLs and DLs, have clear advantages in the areas of origin tracking, traceability and the identification of counterfeit products. ChainPoint, a private federated ledger, is one example of a service provider helping to address traceability and transparency issues in, amongst others, the cotton supply chain. In this article, we have tried to show how the role foreseen for blockchain in supply chains can be fulfilled by alternative technologies. Nonetheless, the vibe around blockchain might help to break through previously existing barriers in supply chain collaboration. A fresh perspective on long-existing supply chain challenges is already leading to new and promising alliances.

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About the authors

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