



TRADE POLICY BRIEFS

TRADE & AGRICULTURE INNOVATION

NO. 33

HOW CAN BLOCKCHAIN'S GENERAL ARCHITECTURE ENHANCE TRADE FACILITATION IN AGRICULTURAL SUPPLY CHAINS?

SUMMARY

- Distributed ledger technologies (DLTs) and smart contracts can enhance trade facilitation by bringing greater transparency, accountability, efficiency and traceability to the exchange of value and information in agricultural supply chains.
- These technologies have the potential to simplify transactions along agricultural supply chains, by facilitating access to trade finance, improving the transparency of transactions, and strengthening the compliance with trade agreements.
- Enhanced trade facilitation through DLTs can help achieve broader policy goals, such as food security and rural development, and be a catalyst to meet the Sustainable Development Goals (SDGs).

Introduction

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Organising transactions in agricultural supply chains often amounts to managing complex, expensive, and time-consuming processes. Transactions are intermediated by institutions, which rely on manual labour and paper-heavy settlement processes. For example, documenting transactions alone costs seven percent of the value of traded goods, according to the Global Alliance for Trade Facilitation. Not only are traditional transactions expensive, they are also slow. For example, the payment terms for Australia's grain sector range from two to five weeks, posing counterparty credit risk to producers (Fintech Australia 2016). Other challenges for trade facilitation include the lack of transparency and the limited traceability of products.

The World Trade Organization's (WTO) Trade Facilitation Agreement sets out to reduce costs, increase transparency, avoid delays and reduce uncertainty in trade. Blockchain and other DLTs¹, combined with smart contracts² can make a major contribution towards these goals. They can speed up transactions, lower costs and make trade finance more efficient. They enhance food safety, make transactions transparent and traceable and thus strengthen the compliance with international trade agreements (Tripoli & Schmidhuber, 2018).

¹ For the purpose of this brief, the terms blockchain and distributed ledger technologies (DLTs) are interchangeable, but note that blockchain is actually one type of DLT.

² Smart contracts are computer programmes that automatically execute when predefined conditions are met.

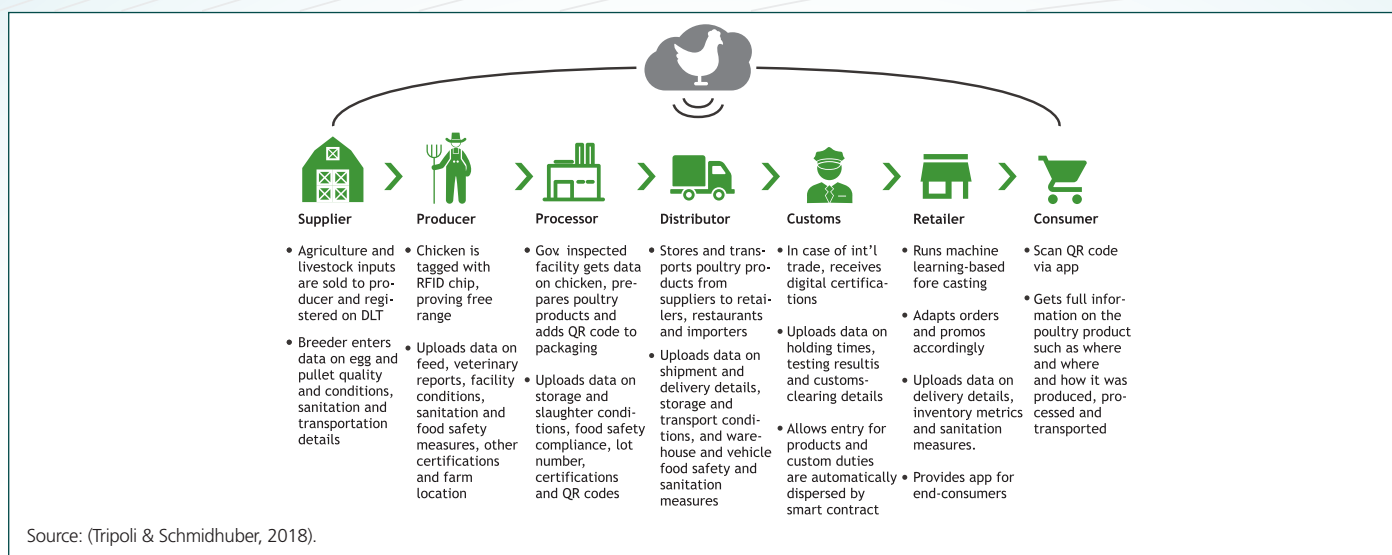
Enhanced trade facilitation in agricultural supply chains with DLTs

Enhanced traceability and higher quality transactions

DLTs offer a platform that records, tracks, monitors and transacts physical and digital assets in agricultural supply chains. The technology can integrate and manage each process and transaction throughout the agricultural supply chain in real time. Each transaction processed on a DLT carries process details and specific product attributes, which are added by supply chain actors and Internet of Things (IoT) devices and sensors, such as agricultural and livestock production practices, transportation and storage conditions, export-related certifications, sustainability information and certifications and other technical details. Every transaction can be traced by the cryptographic fingerprint in the DLT, while the movement of the physical product along the supply chain can be traced by an immutable link that connects the product to the DLT (process) to ensure the product's authenticity. There are number of ways to ensure these product-process links such as QR codes, RFID chips, facial recognition for livestock, and crypto-anchors³.

The ability of DLTs to trace a product's provenance, carry detailed attributes in each transaction and ensure its authenticity provides vast improvements in traceability and transparency. Regulatory control is easier with DLT as the product can be traced along the supply chain, which will allow for legal accountability, detecting fraudulent behaviour or noncompliance. The enhanced traceability improves

³ Crypto-anchors are tamper-proof digital fingerprints that are embedded into products in the form of edible ink using optical code or tiny computers, and linked to the DLT to prove a product's authenticity (IBM 2018).



monitoring of, and compliance with sanitary and phytosanitary (SPS) standards, sustainability certifications, food safety and the ability to respond faster to disease outbreaks and contaminated agri-food products. It helps combat food fraud and decreases frictions at the border⁴.

Disintermediation⁵ of transactions

In agricultural supply chains, DLTs and smart contracts can vastly reduce the number of intermediaries. This lowers the costs of transactions, reduces the risks for sellers and banks and brings greater efficiency to supply chains. DLTs and smart contracts provide a platform to digitize payments, regulatory compliance and contractual processes, and to auto-execute contracts for trade finance, as well as other types of agricultural financial services. DLTs provide a single ledger that stores all documentation (agreements, certifications and contracts) needed to facilitate trade, and auto-executes the settlement of payments in real-time. Frictionless and real-time payments can reduce counterparty risk, increase cash flow and free up working capital for farmers and sellers which is usually tied up in complex and paper-heavy settlement processes. DLTs can also increase access to trade finance and other financial services for micro, small and medium-sized enterprises (MSMEs) and other market players, by enabling them to build a track record based on the data stored on their operations and market activity. An improved reputation, in turn, is the basis for new market opportunities and a stronger business development.

International Agreements related to Agriculture

DLTs and smart contracts also have the potential to improve the implementation and monitoring of regional and multilateral trade agreements, such as the WTO agreements. Smart contracts can automatically disperse custom tariffs upon acceptance of goods at customs, and DLTs can store accurate data on tariff rates, which brings greater transparency and accountability to tariff commitments. In addition, enhanced traceability and transparency improves the ability to enforce compliance with the WTO SPS agreement, enforces the rules of origin to ensure the appropriate tariff is applied and to monitor intellectual property rights and geographic indications

⁴ For example, a DLT-based pilot project was able to track a package of mangoes along its path from shelf to farm in a matter of seconds, in comparison with traditional methods which takes seven days (Wass 2017).




⁵ A basic advantage of DLTs rests on their ability to reduce the number of intermediaries with a transaction. This process is known as disintermediation.

under the WTO Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement. DLTs can bring greater transparency and accountability to compliance with these agreements. An added benefit is that DLT-based trade provides the basis for improved trade statistics, creating an accurate and immutable record on the volumes, values and prices of traded goods.

Implications for public policy and the Sustainable Development Goals

The application of these technologies can be a means to achieving the SDGs, including for SDG 2. Lower transaction costs reduce food prices and thus improve access to food; enhanced traceability ensures food safety and adds to the utilization dimension of food security.

Key challenges

-  Strengthen the knowledge base of public and private sectors on how DLTs can improve traceability, efficiency and transparency in agricultural supply chains, and help achieve their policy objectives like trade facilitation.
-  Address the numerous technical, regulatory, institutional, infrastructure and capacity development-related challenges that are essential to ensure the scalability and accessibility of the technology (see Tripoli & Schmidhuber 2018 for a full review of these challenges);
-  Create an enabling environment that ensures that the productivity gains generated by DLTs can be shared by all market participants, including smallholder farmers, processors and MSMEs.

References

- Fintech Australia. 2016. "Full Profile's AgriDigital Successfully Executes World's First Settlement of an Agricultural Commodity on a Blockchain." FinTech Australia Newsroom, 9 December. <https://fintechaustralia.org.au/full-profiles-agridigital-successfully-executes-worlds-first-settlement-of-an-agricultural-commodity-on-a-blockchain/>.
- Global Alliance for Trade Facilitation. www.tradefacilitation.org
- IBM. 2018. "Crypto anchors and blockchain." IBM Research, undated. www.research.ibm.com/5-in-5/crypto-anchors-and-blockchain/.
- Tripoli, M. & Schmidhuber, J. 2018. Emerging Opportunities for the Application of Blockchain in the Agri-food Industry. FAO and ICTSD: Rome and Geneva. Licence: CC BY-NC-SA 3.0 IGO
- Wass, S. 2017. "Food Companies Unite to Advance Blockchain for Supply Chain Traceability." Global Trade Review, 22 August. www.gtreview.com/news/fintech/food-companies-unite-to-advance-blockchain-for-supply-chain-traceability/.
- Winters, L., McCulloch, N., & McKay, A. (2004). Trade Liberalization and Poverty: the Evidence So Far. *Journal of Economic Literature*, 42, 115-115.