

G20 REPORT ON BLOCKCHAIN IN GLOBAL VALUE CHAINS

Report for the G20 Digital
Economy Task Force

Trieste, Italy, August 2021



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BLOCKCHAIN IN GLOBAL VALUE CHAINS

G20 Collection of Practices and Examples

Report prepared by the OECD¹

Introduction

- 1. Distributed Ledger Technologies (DLTs) and blockchain are opening relevant opportunities to improve the quality and efficiency in managing goods along supply chains.** The technology, which was first developed for financial applications (OECD, 2020; FATF, 2019; Nakamoto, 2008), has rapidly been applied to a range of functions across industries (Casino, Dasaklis, & Patsakis, 2019). In particular, DLTs can have important applications in consumer goods global value chains (GVCs) to enhance traceability of goods in their path from producers to consumers, offering greater transparency and accountability.
- 2. The technology, which builds on decades of evolution of cryptographic research, creates decentralised, distributed systems where stored information are immutable, secure and transparent.** This allows for disintermediation, enhancing trust between parties and unlocking efficiencies and cost reductions (OECD, 2021; De Filippi and Wright, 2018). Systems based on this technology can allow real-time access to information related to each stage of product transformation to all relevant stakeholders in the GVCs: suppliers and other upstream partners; customers; governments, regulators and public agencies; non-governmental organisations (NGOs); and trade associations.
- 3. Supply chains extending across borders and regulatory systems, and engaging a large number of players, offer interesting areas of application for the technology but we are still at an early stage of their development and use.** Many applications are at an early stage development and only a few have reached the phase of commercialisation. Investments in R&D are needed in this regard in order to reach a higher level of adoption. Significant challenges remain, such as related to interoperability, scaling costs and lack of awareness and skills among potential users (Gaur and Gaiha, 2020; Hastig and Sodhi, 2020; Pournader et al., 2019; Ganne, 2018), in particular in developing countries.
- 4. This Annex comments on benefits and challenges of DLTs applications in supply chains, with a focus on consumer goods, and illustrates some recent practices and pilot projects across G20 countries to deploy DLTs in Global Value Chains, which often engage cooperation between government agencies, industry players and MSMEs. It benefits from the discussion held at the G20 Digital Economy Taskforce “Multistakeholder Forum on Consumers’ Awareness, Protection and Blockchain for Traceability in the Digital Economy”, organised on 6th May 2021 by the Italian G20 Presidency.**

¹ This document does not prejudice nor represent necessarily the positions of G20 members.



5. **The G20 multi-stakeholder forum held on 6th May 2021 suggested that crossgovernment cooperation at G20 level could help to:**

- Spread culture and improve knowledge about these new technologies, such as through education, building competences and skills;
- Create suitable legal frameworks for the development of the technology and its applications, including across borders;
- Define technical standards and promote interoperability (open sources);
- Promote the development of ecosystem, including MSMEs, such as through knowledge exchange on successful experiences and identification of good practices.

Benefits and challenges of the use of DLTs in supply chains

6. **Policymakers will have to keep abreast with the evolution of DLT adoption in supply chains, set regulatory frameworks and safeguards, while enabling the development of innovative solutions.** Governments and regulators need to strike a challenging balance between the need to allow businesses to experiment and bring new solutions to the market and the goal of protecting stakeholders from emerging risks that might be associated with the use of blockchain technologies in supply chain for consumer goods. While rules that are too restrictive can hamper digital innovation altogether, regulatory uncertainty might make it difficult for innovative businesses, especially MSMEs and start-ups, to invest.

7. **Supply chain traceability through DLTs could help firms in ensuring that production complies with mutually agreed rules and standards, including in relation with product safety, consistent with WTO Agreements.** Traceability of information is essential to companies in order to identify and manage risks in their supply chain, as well as to support authenticity claims about products and deter fraud. It is crucial to communicate on product specificities and enable informed choice by consumers, and to enhance consumer protection, such as through better targeted and more rapid recalls and/or withdrawals in case of incidents.

8. **DLT can help address the challenges related with traceability by providing a single source of truth for the participants of the supply chain.** Documents and data managed with blockchain can be exchanged and tracked ensuring immutability and transparency. The type of information gathered may include for instance the country of origin of raw materials and intermediate products, quality of the materials, method of production, time and means of transportation. In this way, trust among participants of the supply chain, as well as the final customers, can be achieved without the need to centralize all the information in the hands of a single player.

9. **The transparency of blockchain systems can help meet stakeholders' needs along the supply chain, down to the final consumer.** All participants can have a clear and immediate understanding of the state and “history” of products and components throughout the process. This helps firms also to respond more effectively to public demand and comply with regulations, demonstrating integrity and improving customer confidence.



10. **The technology can also increment operational efficiencies in supply chains.** DLTs applications can help reduce errors and streamline processes by making them more transparent, reducing physical documents, allowing monitoring and increasing consistency across information sources. Documents and data stored in a blockchain are exchanged and tracked without the need to make electronic duplicates between the sender and the receiver, while ensuring immutability and transparency. Robust “digital twins” embedding all available information about a product make it possible for different stakeholders to access the exact same source, making it impossible for one party to tamper it without everyone else noticing. The use of smart contracts to optimise order management, shipping and delivery times, administrative procedures, as well as to limit delays in collection of account receivables opens additional possibilities.

11. **MSMEs face greater difficulties than larger companies in tracing information along the supply chain and managing supply chain relationships and can gain a disproportionate benefit from DLT systems.** In global supply chains, large companies usually have a complete overview of the “path” of their products, while MSMEs often contribute to just one or few “steps” and typically lack information on relevant upstream or downstream phases. For MSMEs it is thus very challenging to provide precise information on some of the goods they are handling, even when required in order to comply with regulation and standards.

12. **Access to a blockchain registry can help MSMEs overcome information asymmetries.** In this sense, applications of the technology for traceability offer specific benefits for MSMEs, such as improved management and production processes, reduced transaction costs along the supply chain, strengthening of brand and market differentiation and avoiding data appropriation by large customers and distributors. Blockchain adoption provides also an opportunity to accelerate digitalization in MSMEs’ business practices (OECD, 2021).

13. **An increasing number of projects and platforms are being developed for blockchain in supply chains.** While large companies are stepping up investments to develop blockchain solutions to add transparency along their supply chain process, start-ups and innovative MSMEs are also developing DLT-based applications and infrastructure, prioritising speed and ease of application and providing companies new tools to track their performance, such as in relation with sustainability (Bianchini and Kwon, 2020).

14. **However, DLTs cannot solve all problems.** The technology has a potential, but detailed cost-benefit and technological evaluations are needed for experimentation and to identify use cases and viable business. For example, blockchain-based solutions might have to be integrated with existing legacy systems (i.e. pre-existing IT infrastructures), which might prove expensive and difficult. At the same time DLT-based solutions can benefit from the combination with other technology, as for example the Internet of Things (IoTs), which is particularly important in supply chain operations. Some of the elements enabling the use of IoTs in Supply Chain Management, such as RFID tags, Wireless Sensor Networks and data analysis platforms, present high costs and IoTs networks require robust security standards. This makes Supply Chain Management a promising case for the application of decentralised peer-to-peer blockchain networks.

15. **Specific barriers have to be overcome for businesses to uptake DLT-based solutions.** For example, lack of awareness and skills, among businesses, especially MSMEs



and in developing countries, in the supply chain can strongly limit application; fragmentation in the blockchain ecosystem and lack of interoperability among different proprietary protocols and blockchain infrastructures can hinder scalability; and uncertainty over legal responsibilities for cross-border supply chains can importantly affect deployment along Global Value Chains.

These challenges concern all engaged players but tend to have a disproportionate impact on developing countries and MSMEs, combining also with broader challenges to MSME digitalisation, such as access to high quality and affordable digital infrastructure, and business practices adaptation to digital processes.

16. **There exists a challenge of “input control” over the information that are integrated in the blockchain.** The fact that information inputted in the blockchain are not modifiable makes it crucial to ensure that this information is accurate. To overcome this challenge, institutions responsible for quality control and certification have been involved as “nodes” of the distributed network in order to integrate their assessments. On-site inspections and audits remain a core practice. However, to scale up blockchain systems to vast global supply chains, sometimes involving dozens of actors across multiple countries, including informal actors, the task of the “digital audit trail” can require sizeable investments (OECD, 2019).

Practices and pilot projects across G20 countries

17. **Many G20 countries have put in place “structural” policies to sustain the development of blockchain ecosystems.** Such policies aim at enhancing the skill pool, at creating the digital infrastructure and at proposing regulatory settings that can facilitate the development of DLT-based solutions and their use in the market. These policies have usually a broad scope and entail all possible applications of the technology, from financial markets to self-sovereign identity (SSI), which are beyond the scope of this note. With regard to applications for traceability in supply chains, notable components of broad strategies include learning and awareness programmes, for example Italy’s innovation managers (Ministero dello Sviluppo Economico, 2019), or the set-up of blockchain infrastructure, such as China’s Blockchain Based Service Network (TechCrunch, 2021) or EU’s European Blockchain Service Infrastructure (EU Commission, 2020).

18. **An increasing number of public agencies are piloting supply chain applications, with strong focus on ensuring product quality and origin, and on trademarks and anticounterfeiting.** Feasibility studies and pilots are enabling to test technology and governance processes and paving the way for larger scale applications.

19. Increasingly, consumers place a high value on **certainty about origin and quality, as well as compliance with regulatory standards** of the product they are buying. Some pilot projects in G20 countries are aiming to leverage DLTs to this purpose, since blockchain applications can offer increased visibility over the whole production and logistic process to all stakeholders in the supply chain. In Italy, a feasibility study was developed in 2019 by the Ministry of Economic Development in partnership with IBM, with the aim to test the effectiveness of a blockchain-based platform in tracing quality, origin, environmental and ethical sustainability in the textile supply chain. The Proof of Concept demonstrated that



blockchain solutions can enhance transparency on all phases in the supply chain, favouring consumers' aware purchase. It also revealed broader challenges to the upscaling of these solutions, including lack of knowledge and competences among entrepreneurs, the importance of an inclusive and participatory approach, as well as the value of successive focus and extension and system governance (Italian Ministry of Economic Development, 2019).

20. **Product safety in food supply chains** is the focus in some G20 countries. Some pilot projects are focusing in particular on cross-border operations and food imports, with expected benefits that range from strengthening consumer awareness and protection to enabling more expedite inspection and custom processes. For instance, the project on “Improving Safety and Visibility in the Cross-Border Food and Agriculture Supply”, launched in 2020 by the United States Department of Homeland Security (DHS), aims to use blockchain solutions to enhance the capacity of the DHS Customs and Border Protection to assess food-related risks (Department of Homeland Security, 2020). In Korea, in March 2021, the Ministry of Food and Drug Safety introduced blockchain technology to certify safety of imported food, integrating the application in the existing government portal, where import certificates of food products are stored (Ministry of Food and Drug Safety, 2021). In China, since 2017, the Guangzhou Municipality's Market Supervision Bureau has developed a blockchain-based “food traceability platform”, which provides detailed information to consumers and is intended also to facilitate quality control and recalls (Ledger Insights, 2020).

21. **Some international and regional organisations have also been active in piloting blockchain-based projects for global supply chains.** This is the case of UNECE's pilot project on a blockchain system for traceability and due diligence in cotton value chains, which aims to demonstrate the feasibility of end-to-end traceability of cotton-based products, from farm to consumer. The pilot is being implemented in collaboration with industry actors, such as brands, cotton cooperatives, certification bodies and garment manufacturers covering the entire spectrum of value chain processes in countries like Egypt, Germany, Italy, Switzerland, the United Kingdom and the United States (UNECE, 2021).

22. **Blockchain can help operators in supply chains lower the costs and risks deriving from administrative procedures.** Pilot projects have been launched in G20 countries to simplify administrative procedures in supply chains, such as those related to customs and quality certification. In 2021, Brazil's federal government piloted the integration of a blockchain system into its Single Foreign Trade Portal, Siscomex, to store trade-related information. The pilot project, initiated in January 2021, is being implemented in coordination with Mercosur members, with the aim to connect the customs network and facilitate data sharing among the participating economies, while ensuring data ownership (Thomson Reuters Brasil, 2021).

23. **DLTs are also being tested to enhance protection of Trademark and Intellectual Property and Anti-Counterfeiting.** Intellectual properties can be “tokenised” to become “digital assets”, registered and secured in a distributed ledger. This can allow for real-time update and version control, and provide a “proof of evidence”. This is the case for instance of the Smart Trade Mark platform in Australia, which is being piloted by IP Australia with the National Rugby League (NRL) to address the issue of counterfeit merchandise and make it easier for consumers to purchase with confidence. Through the digital platform, owners of trademarks can connect to the official government register and obtain proof of brand



ownership, and consumers can access details about the trademark and authenticity of the product (IP Australia, 2021).

24. Intellectual Property Offices are integrating DLTs in existing platforms to enhance their services. For example, since April 2021, the European Union Intellectual Property Office (EUIPO) has integrated blockchain technology in its search platforms for trademarks and designs, with the aim to enhance speed and quality of data transfers, while ensuring data integrity and security, which is expected also to expedite inter-IP Office procedures (EUIPO, 2021).

The Russian Federal Service for Intellectual Property (ROSPATENT) implements digital platform for IP Rights Management based on Distributed Ledger Technology. The Platform enables looking for relevant trade offers for the acquisition and assignment of IPRs and allows making deals and conduct operations in online mode.

25. Interoperability is of the essence for DLT-based platforms. In the United States, the Customs and Border Protection (CBP) has piloted the use of blockchain solutions to link information on products and licenses. This is intended to protect the IPR of American businesses, while also facilitating trade, since interoperability enables information exchange across participating entities regardless of the software used by different parties (U.S. Customs and Border Protection, 2020). In India, the Unified National Blockchain Strategy, developed by the Ministry of Electronics and Information Technology, places strong emphasis on blockchain interoperability and scalability, and on-boarding of new applications developed in the market (Ministry of Electronics and Information Technology, 2021).

26. Increasing trust in the use of the technology, by potential users and beneficiaries at large, is a common objective of pilot experiences in this field. At the project level, this is achieved for example by engaging in consultation with relevant stakeholders, involving key players in proof of concepts and giving visibility to processes and outcomes. The question of accountability towards a broad range of stakeholders is addressed also at a higher level in national strategies. For example, in France, the blockchain roadmap, published by the *Direction General des Entreprises* (DGE) in 2021, advances consideration about a certification for companies, products and applications using DLTs, in order to enhance trust in the system and provide accountability towards external stakeholders that might lack the technical competence to assess the actual use of the technology (Ministère de l'économie des finances et de la relance, 2021).

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