

**INTERSESSIONAL PANEL OF THE UNITED NATIONS COMMISSION
ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT (CSTD)**

**Geneva, Switzerland
18-22 January 2020**

Contribution by FAO

to the CSTD 2020-2021 priority theme on “Harnessing blockchain for sustainable
development: prospects and challenges”

DISCLAIMER: The views presented here are the contributors’ and do not necessarily reflect the views and position of the United Nations or the United Nations Conference on Trade and Development

PRIORITY THEME 1: Harnessing blockchain for sustainable development: prospects and challenges

United Nations Commission on Science and Technology for Development (CSTD)

Dear international organization/UN entity/agency,

As you are aware, the CSTD 23rd annual session selected “Harnessing blockchain for sustainable development: prospects and challenges” as one of the priority themes for its 24th session (2020-21 period).

In an increasingly digitalized economy and society, the security and accountability of data transactions are critical elements for creating trust and enabling breakthrough innovations in the digital world. In this regard, blockchain technology has been perceived as a game-changer, with the potential to revolutionize processes from finance to pharmaceutical industries, from humanitarian work to development aid. The blockchain serves as the base technology for cryptocurrency, enabling open (peer-to-peer), secure and fast transactions. The application of blockchain has expanded to include various financial transactions (online payments and credit and debit card payments) as well as IoT, health and supply chain. However, issues associated with scalability, privacy concerns, uncertain regulatory standards and difficulties posed by the technology in integration with existing applications are some of the potential market constraints. The priority theme will focus on the importance of developing a local financial infrastructure that avoids financial exclusion of the most vulnerable communities. There is also the risk that the potential of blockchain for solving developmental problems had been somewhat inflated by its early adopters and the tech media and may not be as applicable for developing and least developed countries. What are the emerging uses of blockchain that can be breakthroughs in accelerating progress towards the SDGs? What are the potential negative unintended social and economic effects of this technology? How could governments maximize the opportunities and minimize the risks? The CSTD could consider this priority theme to examine the potential of harnessing blockchain for sustainable development.

The CSTD secretariat is in the process of drafting an issues paper on the theme to be presented at the CSTD inter-sessional panel meeting. In this context, we would like to solicit inputs from international organizations, UN entities and agencies on this theme. We would be grateful if you could kindly answer the following questions based on your organization’s work.

1. Could you share specific examples, projects or initiatives that have used or plan to use blockchain technology for the SDGs? What are the main challenges confronted while trying to implement these projects/initiatives? (Examples may include blockchain solutions for financial inclusion, trade facilitation, supply chains, health, energy, e-Government, etc.)

FAO released three publications on blockchain, which are listed under point 5. FAO is planning to release another publication on blockchain and climate at the end of 2020. In addition, FAO develops a blockchain position paper for (yet) internal purposes. These publications construct an intellectual framework for blockchain in agriculture.

FAO works on internal and external capacity building through digital innovation dialogues and blockchain update meetings. In parallel, FAO develops/developed these initiatives:

1) The Charcoal project in Cote d’Ivoire

The Alpha version of the legal and sustainable charcoal traceability blockchain application was developed by REM and tested by MALEBI. Progress in the next months depends on ability to travel and on the evolution of the political situation. Key findings:

- Blockchain has the potential to help build traceability systems that are more transparent, efficient and reliable, and demonstrate progress.
- But the issue of cost (private blockchain e.g Hyperledger) and complexity must be carefully studied to justify the use of such technology instead of other existing ones.
- Blockchain is only a tool, that will in no way help to solve the core issues.
- Efforts in the field on practices and procedures should be done first.

Risks identified: The value chain engages with various actors (workers, transporters) that are operating informally or may not want to collaborate. It is difficult to make other actors use the application. Actors not familiar with technologies. No market for traced charcoal in Ivory coast today. It is possible to find a market but it would need a strong business case.

2) Livestock traceability in Papua New Guinea

FAO together with the International Telecommunication Union and national partners and technical service provider conducted capacity development workshop, from 13-17 May 2019) to train national participants on blockchain so that they are able to update and maintain the Papua New Guinea (PNG) livestock traceability using blockchain application¹. Livestock Traceability System using the Blockchain Technology. One of the priority e-agriculture solutions identified in Jiwaka was the traceability of livestock, watermelon, capsicum and coffee. A pilot project on pigs (livestock) using distributed ledger technologies (Blockchain) to create a database for traceability was developed. Pig farmers were registered and their pigs were ear-tagged with (radio frequency identification) FRID-enabled tags which were linked to the traceability database. Farmers participated by inputting data (breed type, feed type, geography, incidences of pig disease and remedy) into the system until the pigs are ready for sale. Potential buyers are expected to visit the pig selling points with the app and scan the ear-tags to access and view the history before making decisions. Blockchain technology training for local ICT experts. A blockchain training was conducted for national ICT experts from different agriculture agencies and ICT organisations in PNG. It was a broad capacity development initiative on this emerging technology for the interest of ICT managers and enthusiastic but in the context of the Jiwaka traceability system for pigs. The objective was to develop local capacity and enhance sustainability of the livestock traceability system in Jiwaka and the development and maintenance of similar block-chain-derived products and services in future. Follow-up actions to be taken:

- The traceability project for pigs in the Jiwaka Province continues into early 2020 with data uploading. Project partners to ensure farmers continue in populating the database until such time the 'proof of concept' timeframe lapses. The datasets will be important for the project partnership for interpretation and use.
- The other important aspects are phases two and three of the traceability project in which the app will be upgraded (phase 2) and digital payment system added to the project (phase 3). Both phases will be supported by NICTA (technically and financially) but will require inputs from other partners for content and other required support. This also includes the transfer of the traceability database from Switch Marven to NICTA, as initially agreed.

3) The low carbon tea project in Kenya (GLI-TEA)

Global Low Carbon Tea - Triangular Cooperation in Tea Value Chain in Kenya (GLI-TEA Kenya). Policy recommendations and roadmap towards a resilient, low-carbon tea value chain are formulated, with an emphasis on incentive measures for farmers and companies. The project activities include a feasibility study and pilot testing on blockchain technology for the Kenyan tea sector. The use of blockchain will support traceability and transparency of both production and emissions of the tea value chain. While increasing the trust among consumers and retailers, tea promoted as a 'carbon sink' could give growers a potential access to carbon markets, bringing forward economic incentives for small-scale tea producers. By measuring emissions, costs of LC could be better accommodated by the final consumer, presenting a "fairer" price for sustainable tea production. The status of this project is under formulation.

4) Blockchain and related digital technologies for sustainable agri-food value chain development in Uganda

The project is jointly led by FAO and Ministry of Agriculture, Animal Industry and Fisheries of the Republic of Uganda (MAAIF) and the overall goal is to increase knowledge and improve capacity of blockchain technology for agri-food VC development for stakeholders in public and private sectors in Uganda, including policy makers and those representing smallholder farmers, SMEs, women, youth and rural communities.

¹ http://www.fao.org/in-action/pig-farmers-in-papua-new-guinea/en/?utm_content=bufferdd81d&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer

Some specific objectives and activities include: (1) identifying key areas of blockchain applications (e.g. supply chain management, certification, food safety, smart contracts and e-commerce) and key value chains for blockchain applications, and provide recommendations for adopting blockchain and related technologies for agri-food value chain development in Uganda; (2) develop training program for blockchain and related technologies for agri-food value chain development with relevant use cases and companies invited to share experiences, and carry out training and various consultations, and overall to increase knowledge and build capacity of stakeholders in public and private sectors; (3) disseminating findings and recommendations and promoting experience sharing via webinars and workshops and knowledge products; (4) engaging stakeholders through a participatory approach and promoting synergies of stakeholders and initiatives as well as partnerships and investment and innovation opportunities to ensure sustainable impacts.

The project just started and the project team is being formed.

2. What are the challenges that governments have faced or may face for promoting innovation and competence building in blockchain, to contribute to their national development priorities and accelerate the progress towards the SDGs?

The challenge is to find the enabling measures for inclusive technology adoption including policies, institutional support, capacity building and infrastructure development, and for incentivizing the private sector to lead its adoption and development (source: FAO/ESA Blockchain and related digital technologies for sustainable agri-food value chain development in Uganda).

3. What are the actions that the international community, including the CSTD, can take to contribute to harnessing blockchain for sustainable development?

First, the inherent features of blockchain as dis-intermediation, decentralization, trust and immutability can only be successfully applied for a digital transformation with a multi-stakeholder buy-in. The CSTD can help creating a platform for a multi-stakeholder dialogue. The multi-stakeholder approach ultimately is useful for the instantiation of a blockchain consortium that decides on the terms of the smart contract. Innovative methodologies as hackathons, agile approaches, proof of concepts, innovation centers can help creating new innovations. *Second*, the CSTD, through its intergovernmental work, can help governments to create awareness of their specific role for governments for providing the so-called *oracles* in blockchain ecosystems, see also Figure 1.

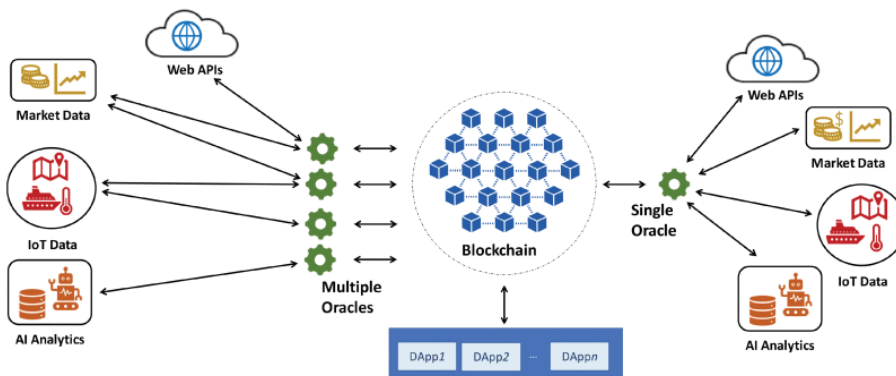


Figure 1: The role of oracles in blockchain ecosystems (Al-Breiki, Rehman, Salah, & Svetinovic, 2020)

4. Could you suggest some contact persons in your agency responsible for projects/policies and international collaboration in this context as well as any experts (from academia, private sector, civil society or government) dealing with projects in this area? We might contact them directly for further inputs or invite some of them as speakers for the CSTD inter-sessional panel and annual session.

From FAO, the following persons² can be contacted: Gerard Sylvester, Lan Li, Peter Johson, Mischa Tripoli, Sarah Fumey and Erik VanIngen. From the Wageningen University, Lan van Wassenaer³ can be contacted. From Gaiachain, the following persons can be contacted: Kacper Gazda (CTO) and Brad Mulley (CEO). From REM, Eulalie Guillaume can be contacted.

5. Do you have any documentation, references, technological assessments, future studies or reports on the priority theme?

FAO published three documents on blockchain:

- Emerging Opportunities for the Application of Blockchain (Tripoli & Schmidhuber, 2018)⁴
- E-agriculture in action: Blockchain for Agriculture *Opportunities and challenges* (FAO & ITU, 2019)⁵
- Blockchain application in seafood value chains (Blaha and Katafono, 2020)⁶.



Blockchain in
FAO.pptx

Please send your responses and any further inputs on the theme to the CSTD secretariat (stdev@unctad.org) by 7 October 2020. We look forward to receiving your valuable inputs.

Sincere Regards,

CSTD secretariat

References

Al-Breiki, H., Rehman, M. H. U., Salah, K., & Svetinovic, D. (2020). Trustworthy Blockchain Oracles: Review, Comparison, and Open Research Challenges. *IEEE Access*.
<https://doi.org/10.1109/ACCESS.2020.2992698>

FAO, & ITU. (2019). *E-agriculture in Action: Blockchain for Agriculture Opportunities and challenges* (G. Sylvester, ed.). Retrieved from <http://www.fao.org/3/CA2906EN/ca2906en.pdf>

Tripoli, M., & Schmidhuber, J. (2018). Emerging Opportunities for the Application of Blockchain in the Agri-food Industry Agriculture. In *Food and Agriculture Organization of the United Nations*.

² Email addresses : Gerard.Sylvester@fao.org, Lan.Li@fao.org, Peter.Johnson@fao.org, Mischa.Tripoli@fao.org, Sarah.Fumey@fao.org, Erik.VanIngen@fao.org, Lan.vanWassenaer@wur.nl, kacpergazda@gaiachain.io, bradmulley@gaiachain.io, eulalie@rem.org.uk

³ <https://www.wur.nl/en/Persons/Lan-dr.-L-Lan-van-Wassenaer-MSc.htm>

⁴ <http://www.fao.org/3/ca1335en/CA1335EN.pdf>

⁵ <http://www.fao.org/3/CA2906EN/ca2906en.pdf>

⁶ <http://www.fao.org/documents/card/en/c/ca8751en/>

The CSTD secretariat is in the process of drafting an issues paper on the theme to be presented at the CSTD inter-sessional panel meeting. In this context, we would like to solicit inputs from international organizations, UN entities, and agencies on this theme. We would be grateful if you could kindly answer the following questions based on your organization's work.

1. Could you share specific examples, projects, or initiatives that have used or plan to use blockchain technology for the SDGs? What are the main challenges confronted while trying to implement these projects/initiatives? (Examples may include blockchain solutions for financial inclusion, trade facilitation, supply chains, health, energy, e-Government, etc.)

The main objective of using the blockchain is to: Share the information with consumers and key players in the food system starting from the origin of food and the process from farm till fork. This reduces fraud due to adulteration, ensures food safety, and transparency in the food supply chain while reducing food loss.

Examples of the contribution of blockchain technology to SDG 12 and particularly to reducing food loss (12.3).

FAO has produced a **food standardization database** that makes use of block zero. This block zero serves as the genesis basis of blockchain development at the producer and consumer level. ESN-FAO has developed the standardization database for consumer level and producer level products. This provides details such as food commodity classification, food value addition, food by-product utilization, etc. The main objective is to reduce food loss and waste through the blockchain framework by maximising the use of food produced.

Zero kilometer food system: The blockchain reduces the initial financial load required by SMEs for food to reach the consumers table. Transparent information about the food provided to the consumer improves the acceptance of local produce in local markets, supporting the Zero kilometer food system.

Cold Chains: Blockchain-enabled technology is used to track, aggregate and share data on time-temperature management in the cold chain allowing one to pinpoint temperature fluctuations within specific pallets in the trailer, thereby facilitating rapid decisions on offloading and sale, contributing to reducing food loss due to temperature fluctuations.

Track and trace Blockchain technologies are increasingly used in assuring the authenticity of fresh produce, in certifying their safety, and in helping to reduce losses in the supply chain.

2. What are the challenges that governments have faced or may face for promoting innovation and competence building in blockchain, to contribute to their national development priorities and accelerate the progress towards the SDGs?
3. What are the actions that the international community, including the CSTD, can take to contribute to harnessing blockchain for sustainable development?

4. Could you suggest some contact persons in your agency responsible for projects/policies and international collaboration in this context as well as any experts (from academia, private sector, civil society or government) dealing with projects in this area? We might contact them directly for further inputs or invite some of them as speakers for the CSTD inter-sessional panel and annual session.

5. Do you have any documentation, references, technological assessments, future studies or reports on the priority theme?

Reference: World Economic Forum.2019. Innovation with a purpose: Improving innovation in food value chains with technology innovation.

http://www3.weforum.org/docs/WEF_Traceability_in_food_value_chains_Digital.pdf

Please send your responses and any further inputs on the theme to the CSTD secretariat (stdev@unctad.org) by 7 October 2020. We look forward to receiving your valuable inputs.

Sincere Regards,