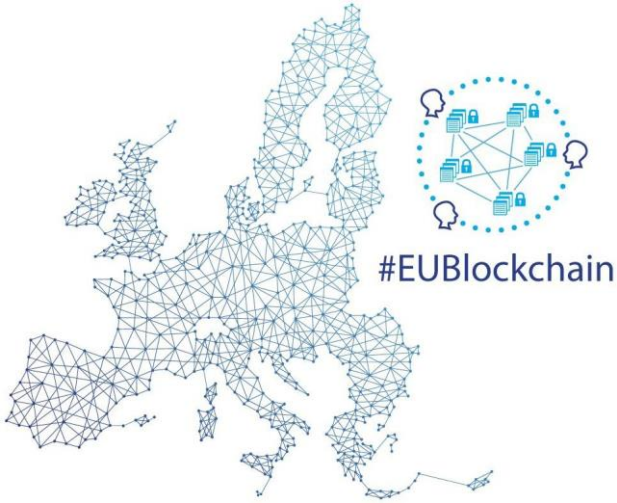
EU BLOCKCHAIN OBSERVATORY & FORUM

Workshop Report – Blockchain applications in the agri-food sector

Online Video Conference, 23 November 2020



By the European Commission, Directorate-General of Communications Networks, Content & Technology.

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Contents

Workshop Report – Blockchain applications in the agri-food sector 1

BACKGROUND 3

WELCOME 3

SESSION 1 – DEPLOYMENT OF BLOCKCHAIN IN THE AGRI-FOOD SECTOR 4

SESSION 2 – THEORY AND PRACTICE – OPPORTUNITIES AND CHALLENGES TO ACHIEVE ECONOMIC 6

Appendix 9

Official agenda 10

Speakers Biographies 11

BACKGROUND

Increasing sustainability of supply chains and transparency in the agri-food value chain are key objectives of the European Commission's Green Deal and the **Farm to Fork Strategy**.

The potential that blockchain technologies offer, has not been fully harvested by stakeholders in the agri-food sector. This concerns both, the private and the public sector in the fields of e.g. voluntary and official labelling schemes, proof of origin and ways of production as well as of smart contracts. To boost the use of blockchain applications in the agri-food sector in a tailored way and to achieve economic, environmental, and social gains, it is essential to take stock off:

- the state of play of application of blockchain technologies in the agri-food sector,
- the experiences gained with blockchain applications in the agri-food sector, including opportunities as well as challenges faced by the various actors and possible barriers to further roll-out the use of blockchain technologies,
- and of lessons, which can be learnt from other supply chains for the agri-food sector.

Several instruments at EU level are and will become available to (further) develop blockchain technologies for the agri-food sector, including the Research and Innovation Programme Horizon Europe, the Digital Europe Programme as well as Pilot projects within the framework of the **European Blockchain Partnership (EBP)**.

Against this background, the Directorate General for Communications, Networks, Content and Technology (DG CNECT) in cooperation with the European Blockchain Observatory and Forum and the Directorate General for Agriculture and Rural Development (DG AGRI) organised a webinar on the "**Use of blockchain applications in the agri-food sector**".

The webinar aimed at bringing together experts in blockchain technologies with actors along the agri-food supply chain to discuss how to further exploit the potential of blockchain within the agri-food sector. Based on the stocktaking of the state of play of the use of blockchain applications in the sector and of lessons learnt, needs in research, innovation, and development, as well as in capacity building in this field were identified.

WELCOME

Peteris Zilgalvis, Head of Unit, Digital Innovation and Blockchain, DG CONNECT; Co-Chair, FinTech Task Force, EC opened the meeting.

Kerstin Rosenow, Head of Unit for Research and Innovation, DG AGRI, presented the policy context for utilizing blockchain and related emerging technologies in the agricultural sector in the EU making reference to – among others – the Common Agricultural Policy and the Research and Innovation Framework Programme Horizon Europe.

Prior to the first session, **Pavel Ciaian**, Team Leader of food supply chain analysis at the Joint Research Centre, presented use cases of blockchain in the agriculture sector. More specifically, subjects of his presentations were the potential benefits of adopting blockchain, the stage of development of blockchain in the sector and the existing challenges and limitations in the adoption of the technology. To illustrate general fields of applications blockchain technologies, he referred to traceability of product origins, digital identity, and financial payments.

SESSION 1 – DEPLOYMENT OF BLOCKCHAIN IN THE AGRI-FOOD SECTOR

Moderated by Jacob Boersma, wbnode.io

Presentations and moderated discussion

- **Building Autonomous Supply Chains**, Mrs. Maria Minarikova, Fetch.ia
- **Using blockchain and digitalisation technologies to increase product value and enhance interaction with consumers**, Mr. Denis Avrilionis, Compellio
- **From global to local scale, how industry is bringing transparency to the agri-food sector using Fujitsu Blockchain solutions**, Mr. Cengiz Kakil, Fujitsu
- **Insights from Implementing the Safe Food for Canadians Regulations**, Mr. Karl McDermott, Morpheus.Network

The set of presentations can be accessed here.

Objectives of the session:

The principal objectives of the first session were:

- presenting use cases related to the adoption of blockchain technology in supply chains and especially in the agro-food sector.
- identifying and discussing the challenges and benefits of the adoption of blockchain technologies in the sector.
- shedding light and reflected on the different development stages of innovation in blockchain technologies in the agri-food sector, whereat market deployed solutions could serve as a reference for projects that are in the early development stages.

Main outtakes from the session:

- Use cases presented in this session, revealed that blockchain technologies can help to overcome challenges and inefficiencies the agri-food sector is facing, and the potential benefits of blockchain implementation in the agri-food sector are various: Blockchain is a tool that can generate trust if appropriately handled. Data are stored in the blockchain. Blockchain technologies allow tracking the course of food throughout every stage of the supply chain. Data privacy can be preserved as these technologies allow for revealing only action-relevant information. In other words, blockchain could help to manage information along supply chains, support traceability and increase transparency. For instance, consumers could track the origins of the products, while producers could develop plans optimising their production and marketing processes. Moreover, economic benefits could be harnessed as blockchain could create marketplaces without the numerous intermediaries. Providing one concrete example, products' brands could be protected from the existence of counterfeit products by using a unique QR code that redirects to the authentication certification stored in the blockchain. Finally, blockchain-based solutions can also facilitate to bridge the wide range of stakeholders (inspectors, shippers, insurers, payment institutions) to a single place that would result e.g. in reducing the time of performing audits.
- Blockchain can support the enforcement of food safety standards and provide an efficient way on the occasion of food recalls. IoT devices are gradually used in the transportation of food and could monitor the cargo's environment to ensure that standards are kept in all the stages. The IoT devices could automatically send data into the blockchain without human intervention. Moreover, products that are deemed hazardous could be recalled more efficiently as their

location could be found from the blockchain data.

- One of the prevailing questions that the audience was eager to know about was the underlying blockchain technology, i.e. the digital infrastructure, for the use cases presented. The use cases displayed a wide variety of implementation cases. One of the use cases has developed its own private blockchain. While another use case offered the opportunity to post information in the well-known public blockchain, such as Ethereum and Bitcoin. Moreover, Hyperledger Fabric and Baseline Protocol were some of the tools that were referred for the development of the use cases.
- In the closing Q&A session, the speakers were challenged to answer the question “What do you think are the most urgent developments needed to boost blockchain in agriculture?”. The digitalisation of SMEs was the most notable answer. Agricultural companies are mainly small businesses that would face hurdles to adopt new technologies.

SESSION 2 – THEORY AND PRACTICE – OPPORTUNITIES AND CHALLENGES TO ACHIEVE ECONOMIC, ENVIRONMENTAL AND SOCIAL GAINS

Moderated by Fabio Cossu, DG AGRI

Presentations and moderated discussion

- **The perspective of farmers currently not using blockchain**, Sebastian Linsner, M.Sc., Technical University of Darmstadt, Germany
- **Processors' and farmers' perspective**, Adam Patkowski, CEO of Agrego, Poland
- **Experience from a wine farm**, Kostas Nikou, Managing Director at Alpha Estate, Greece
- **Retailers' perspective**, Emmanuel Delerm, Global head of blockchain, merchandising and B2B supply chain platforms / GCTO team, Carrefour
- **Consumers' expectations in blockchain applications in the agri-food sector**, Sofia Kuhn, Head of Public Engagement, EIT-Food, European Institute of Innovation and Technology

The set of presentations can be accessed here.

Objectives of the session:

The principal objectives of the second session were:

- Providing the perspectives of the different stakeholders involved in the agri-food supply chain.
- Discussing opportunities, challenges and needs that need to be addressed in order to move forward with the adoption of blockchain technology in the sector.

Main outtakes from the session:

- Numerous stakeholders are taking part in every phase of the agricultural supply chain. The range of stakeholders reaches from farmers to customers with each stage adding different participants in the supply chain. International trade and the participation of stakeholders from various countries around the globe make supply chains additionally complex.
- Agricultural businesses are heterogeneous as it regards the extent of adopting technologies, depending – among others – on the available digital infrastructure, and farmers' beliefs in technologies. Some farmers would regard digital technologies as a means to improve the working routine, while other farmers would be afraid of turning into office workers and lose their social connections and in relation to the environment.
- Some farmers would be concerned about blockchain adoption. These concerns include the fear of becoming obsolete, a lack of trust in automated documentation, the unauthorised access to their business data. Data ownership turned out to be a general issue that makes farmers hesitant to adopt blockchain.
- On the other hand, farmers would also recognise the benefits of adopting blockchain. Bureaucracy could be decreased with a central ledger to be used by the reporting tools. A central ledger could act as a single point of truth and diminish the numbers of audits. Furthermore, administrative costs could be reduced as audits could be performed more efficiently. There might be the opportunity to access international markets more easily and at lower costs as border controls could be facilitated through blockchain technologies. Blockchain could facilitate the creation of digital marketplaces allowing for more flexible and transparent trading at various stages along the supply chain. Moreover, blockchain applications would offer the opportunity of incorporating loyalty programs that are available to farmers to reward their customers. Data on the farmers'

sales could be available from the blockchain to optimise their business plan to reach customers. Another benefit would the opportunity for farmers to protect their labelled products throughout all stages of the supply chain. A certificate of authenticity is accessible at all stages via the use of QR codes.

- The case of Carrefour displayed an application that acts as an intermediary between participants of the supply chain. The data prior to the blockchain adoption were retrievable but scattered in participants' systems, reliable but could not be accessed on-demand. They were decentralized, fragmented, and various formats were used to store the data. The adoption of blockchain has shifted the characteristics of data. In blockchain, the data are shared via logical events; are stored in an immutable ledger; are rich, organised despite being distributed; and are secured and immediately available.
- To roll-out blockchain (at a larger scale) along supply chains, some pre-requisites have to be given. It is essential that data models would be used that can serve as a "common language" between the actors. Moreover, interoperability of data and processes is a key element to allow data sharing and the future development of applications on blockchain. Raising awareness around blockchain is another issue that could help the acceleration of adopting technology. Finally, the role of consumer data in the blockchain applications in the agri-food sector is to be reflected, because not only are consumers interested in e.g. the origin of products, but also is the producers interested in e.g. the location of the consumer.
- Consumer trends were presented in the session. Consumer trends are to be considered for the development of blockchain applications and are likely to be decisive the success that these applications could have. Consumers tend to change their demand for products over time. Consumers are even eager to pay a premium for acquiring quality products. Moreover, consumers tend to search for specific products that are labelled as e.g. "free of", like free of antibiotics. All such information could be conveyed to the consumers via the use of blockchain.
- Consumer trust could be built on the openness of food system actors. Blockchain is viewed as a way of building trust, as information from every phase of the supply chain could be available to consumers.
- A report on consumer trends indicated that taste and safety are linked to confidence in food technology integrity. The adoption of blockchain could assist consumers in gaining a deeper knowledge of products and brands and making the experience more compelling.
- Consumers need to make informed choices on the products that they buy. The abundance of information could have the opposite effect as the sheer volume of information could overwhelm them. A careful choice in the information to be presented to consumers is key for the effective implementation of technologies. The phrasing used when providing information about information generation systems, such as blockchain based QR codes providing product information, is crucial, as consumers tend to have difficulties in assessing the risk associated with new technologies and the benefits that they could bring.
- In the closing Q&A session, the speakers were asked the question "What do you think are the most urgent developments needed to boost blockchain in agriculture?". The clarity in data ownership turned out to be a major point of interest as blockchain is envisioned to allow the interaction of numerous parties involved in data sharing and commands for transparency. Moreover, data privacy was identified as an important aspect as the unwanted sharing of data with third parties would be harmful to businesses. The legal framework would need to have a broader view as the trade is carried out internationally and new tools of tracking food are steadily developed. Furthermore, blockchain participants would need to accept that consumers would still have to learn understanding blockchain technologies and the impact that it could bring. This

would call for educating consumers on the added value that blockchain brings. Finally, consumers need to be given the opportunity of making informed decisions based on the products and brands data. However, it would be needed to pay attention to the volume and way of presentation of information as information needs to be easily searched and understood without overwhelming consumers.

SUMMARY OF THE DISCUSSIONS ON CHALLENGES AND DRIVERS FOR ROLLING OUT BLOCKCHAIN TECHNOLOGIES IN THE AGRI-FOOD SECTOR

- Blockchain technologies are available for the agri-food sector and functioning. However, costs linked to the acquisition of specific equipment and software present a burden for the adoption of blockchain technologies, especially for small businesses, such as farmers and processors. Further development of these technologies and their wider use may lead to a cost reduction for the individual users.
- A lack of awareness of blockchain technologies and a lack of skills to deploy them hamper the wider use of blockchain. Capacity building, like training, appear to be important.
- For effective and efficient use of blockchain technology, there is need of concerted action in the development and implementation of blockchain technology to foster a common approach in data sharing along supply chains and reach a critical mass of users. In other words, to reach a "network effect" and to scale up the adoption of blockchain technologies, it is needed to break data silos and to push for standardisation and interoperability.
- Trust in data sharing needs to be achieved among all actors on the supply chain.
- To raise interest in and achieve readiness to the adoption of blockchain, its benefits - including financial benefits - but also reduced administrative burdens, increased transparency along supply chains, facilitated the implementation of labelling schemes and tracking of food products, and enhanced producer-consumer relations, need to be clearly demonstrated and communicated.
- The increasing interest of consumers in the quality and origin of food products may form an additional driver to the adoption of blockchain in the agri-food sector.

Appendix

Workshop slides

- Full set of presentations of the webinar on Blockchain applications in the agri-food sector. Link

Workshop videos

- Videos from this and all other workshops can be found on the EU Blockchain Observatory and Forum website under the section Reports.
- Videos specific to this workshop: Agriculture workshop video

Official agenda

Time	Activity
13.00	**Welcome** Peteris Zilgalvis, Head of Unit, Digital Innovation and Blockchain, DG CONNECT; Co-Chair, FinTech Task Force, EC Kerstin Rosenow, Head of Unit for Research and Innovation, DG AGRI
13.10	**Use of blockchain applications: state of play** Pavel Ciaian, Joint Research Centre
13.25	**Building Autonomous Supply Chains** Maria Minarikova, Fetch.ia
13.40	**Using blockchain and digitalisation technologies to increase product value and enhance interaction with consumers** Denis Avrilionis, Compellio
13.55	**From global to local scale, how industry is bringing transparency to the agri-food sector using Fujitsu Blockchain solutions** Cengiz Kakil, Fujitsu
14.10	**Insights from Implementing the Safe Food for Canadians Regulations** Karl McDermott, Morpheus.Network
14.25	**The perspective of farmers currently not using blockchain** Sebastian Linsner, M.Sc., Technical University of Darmstadt, Germany
14.34	**Processors' and farmers' perspective** Adam Patkowski, CEO of Agrego, Poland
14.43	**Experience from a wine farm** Kostas Nikou, Managing Director at Alpha Estate, Greece
14.52	**Retailers' perspective** Emmanuel Delerm, Global head of blockchain, merchandising and B2B supply chain platforms / GCTO team, Carrefour
15.01	**Consumers' expectations in blockchain applications in the agri-food sector** Sofia Kuhn, Head of Public Engagement, EIT-Food, European Institute of Innovation and Technology
15.10	**Panel discussion & Q&As**
15.30	**End of day**

Speakers Biographies

Denis Avrilionis is an entrepreneur active in the software industry since 2001. As the founder of Compellio, he assists private companies and public organisations in utilising blockchain to streamline compliance and maximise efficiency. Compellio's latest product, the Compellio Registry, leverages blockchain technology to create solutions that deliver business added value in a variety of industries, including government, finance, and agriculture. Denis holds a PhD in Computer Science from the University of Grenoble in France and has worked as a visiting scientist at the Software Engineering Institute, Carnegie Mellon University, USA.

Emmanuel Delerm is the blockchain programme director within Carrefour, one of the world's leading food retailers with a multiformat network of 12,000 stores in over 30 countries. Emmanuel has been asked to develop a first experimentation of blockchain usage in food traceability in March 2017. Early 2018, the team implemented the first European blockchain in productive use for food traceability, and he is now managing the program with Carrefour worldwide.

In addition to a background in law, **Cengiz Kakil** has 3+ years of experience in the blockchain environment. Currently as a business analyst for the Fujitsu Blockchain Innovation Center, he is focusing on how to use the benefits that the blockchain technology can bring in order to support business ambitions, mainly in the fields of finance, supply-chain and logistics. He is also the co-chair of the supply chain working group of the INTATBA.

Sofia Kuhn is heading up the Public Engagement Team at EIT Food. Before joining EIT Food, Sofia worked in various science communication and public outreach positions in research performing, funding and science information organisations across Europe. She has a BSc in Biological Sciences from King's College London and a MSc in Science Communication from Imperial College London. Within the context of EIT Food, Sofia is the founder of FoodUnfolded® (www.foodunfolded), EIT Food's community of people engaged in dialogue around the origins and future of our food. EIT Food's work on understanding what drives consumer trust in the food chain, also falls within Sofia's remit.

Sebastian Linsner, M.Sc. is scientific associate at the institute Science and Technology for Peace and Security (PEASEC) at the computer science department of the Technical University (TU) of Darmstadt. His research interest is the resilient and privacy-preserving digitalization in agriculture, participating in the project HyServ, a project for realization of hybrid services in agriculture. He studied computer science (B.Sc.) at Ruhr-Universität Bochum, as well as Computer Science (M.Sc.) and IT Security (M.Sc.) at Technical University Darmstadt.

Karl McDermott is currently Global Head of Business Development for Morpheus.Network, a Canadian SaaS middleware platform for optimizing global supply chains by seamlessly integrating legacy and emerging technologies such as Blockchain, IOT, and AI. In 2016 he co-founded Biis, a non-asset-based transport platform with operations in Mexico and Colombia. Karl was a recipient of Mexico's innovation award and part of the delegation to Hannover Messe 2018. Previously he was EVP of a last mile Logistics firm with 5000 employees.

Maria Minaricova is a Director of Business Development at Fetch.ai, blockchain and AI innovation company based in Cambridge and at Mettalex – world's first decentralized exchange focused on token-based commodities trading. She is involved in the development of state-of-the-art tech applications using blockchain & AI/ML as part of solutions for DeFi, autonomous supply chains, smart cities, mobility - autonomous/electric vehicles, and energy.
Maria serves as Chair of the Board and founding member of Blockchain for Europe association, and is a member of the EU Blockchain Observatory and Women in AI organization. She has an extensive career in the IT field, having worked in Oracle and GÉANT.

Kostas Nikou, Managing Director, Alpha Estate Winery Greece
Kostas has been a Business Consultant since 2004. Equipped with a combined background of applied informatics and corporate investment expertise, he assists private companies into setting and implementing sound and sustainable business plans.
Since 2017 he is the Managing Director of the Alpha Estate Winery Greece. He holds an MBA from the International Hellenic University (Greece) and an MSC in Financial Engineering from the ISMA University of Reading (UK).

Adam Patkowski, CEO of the IDFS Ltd. running project Agrego.
Adam deals with the integration of agriculture horizontally (groups and producer organizations) and vertically - cooperation between farmers and processing plants, shortening (optimization) of food production chains. He is interested in changing the situation in these areas and building partnership in chains, and ultimately the cooperation of entire chains and the implementation of common goals. The main areas of interest are integration, innovation in agriculture, traceability and sustainability, high quality, and its unquestionable confirmation, limiting the negative impact on the environment, reducing the scale of food waste as well as balance and partnership in food production chains. He is involved in creating sensible solutions in the field of agricultural regulations. He strives to create solutions in the field of production safety monitoring and quality "certification" using modern technologies: IoT, blockchain, cloud, both in animal and plant production.
Adam is the co-creator of the AGREGO IT system. It is a tool supporting integration, scale building, communication, and value creation (quality and safety confirmation) in the agricultural sector, in food production chains.