



Policy Brief

September 2025

Enhancing transparency, accountability and sustainability in agri-food system through blockchain technology

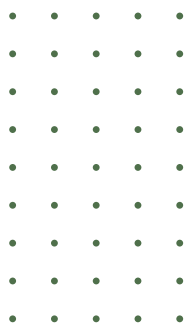


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This is the result of a study conducted in the framework of TRUSTyFOOD project, collecting and cross-matching numerous views and opinions from external stakeholders.

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Executive Summary

To date, along the food supply chain, it becomes difficult to confirm claims related to origin, quality, or sustainability—and to allocate accountability when issues arise^{1,2}.

Blockchain technology offers a revolutionary way of immutably recording, sharing, and verifying information which can enable enhanced traceability and proof-of-authenticity, improved accountability, supporting certification and audits, as well as sustainable practices. The adoption of blockchain aligns closely with several European Commission policy priorities: it directly supports the Farm to Fork Strategy, which emphasizes traceability, food safety, and fairer supply chains and contributes to the objectives of the European Green Deal by enabling better monitoring of environmental impacts and promoting sustainable food systems; moreover, blockchain is a key enabler of the EU Digital Single Market and can directly support the strategic goal of EU data sovereignty. The European Commission should establish a regulatory framework and develop a standardized operational framework (where international bodies are also included) based on blockchain technology tailored to the agri-food specific needs, increase supply chain players' digital literacy, awareness and training on the basis of blockchain technology and invest in multi-actors experimentation spaces.

1. Arayess S, de Boer A. How to Navigate the Tricky Landscape of Sustainability Claims in the Food Sector. *European Journal of Risk Regulation*. 2022;13(4):643–664. doi:10.1017/err.2022.6

2. Verifiable Sustainability Claims (Public version 2:nd ed.) Raul Carlsson, Tatiana Nevzorova RISE rapport 2025:22 ISBN 978-91-90036-04-4

Introduction

The agrifood sector involves many actors: suppliers, farmers, middlemen, processors, distributors, retailers, and regulators—often across multiple countries. This fragmentation makes it difficult to guarantee transparency, with key implications at different levels:



1. Erosion of consumer trust

- Citizens cannot make informed dietary, ethical, or environmental choices if they lack clear information.
- Consumers may become skeptical of food labels, certifications, marketing claims (organic farming practices, fair trade, and carbon footprint), or sustainability credentials.
- Growing concerns about “greenwashing”: for example, in 2021, a major European food retailer was fined for using misleading ‘eco’ labels (Danish Crown – “Climate-Controlled Pork” Labeling), hidden ingredients, or misleading terms (e.g., “natural”, “eco-friendly”).



2. Reduced accountability

- Difficult to hold actors accountable for unethical or illegal practices (e.g., deforestation, overuse of antibiotics, labor exploitation, fraudulent activities, such as mislabeling origin or ingredients).
- It is difficult to hold specific actors accountable for quality or safety failures.



3. Obstructed sustainability efforts

- Without access to reliable data, it is hard to measure and reduce the sector's environmental impact (GHG emissions, water use, etc.).
- Green transitions and Farm-to-Fork goals are undermined when sustainability metrics are unavailable or unverifiable.



4. Impeded innovation and policy design

- Missing data availability, low data quality and lack of data sharing between stakeholders hinders research, monitoring, and evidence-based policymaking.



5. Market distortion and power imbalance

- Large corporations may dominate food systems by controlling proprietary information (e.g., on supply chains or prices), creating unfair competition.
- Smallholders and innovators may be excluded from value chains due to information asymmetries.

Blockchain as a solution



One promising solution to these challenges is blockchain technology, which is essentially a distributed digital ledger that securely records information and activities—such as harvesting, processing, storage, and transport—across a network of computers. Unlike traditional databases, blockchain is decentralized and tamper-proof, meaning that once data is entered, it cannot be altered without consensus from the network. Its core function is to provide data integrity and auditable records.

This creates a revolutionary way of immutably recording, sharing, and verifying information which can enable:



Enhanced traceability and proof-of-authenticity: a product's journey—from the farm to the processing plant, to the distributor, and finally to the retailer, as well as compliance with sanitary and phytosanitary standards —can be recorded on a blockchain. This allows for verifiable tracing. Also, the immutability of the blockchain ledger makes it extremely difficult to alter records, thus ensuring the authenticity of a product's origin and claims.



Improved accountability: in the event of a food safety issue, blockchain allows for pinpoint accuracy in identifying the source of contamination, enabling faster and more targeted product recalls, which reduces both health risks and economic losses.



Supporting certification and audits: blockchain can verify claims from a trusted intermediary regarding organic or fair trade certification.



Supporting sustainable practices: it can record and verify data points related to sustainability, such as water usage, pesticide application, soil regeneration, biodiversity sequestration, carbon sequestration and fair labor practices, empowering food producers to valorise such behaviours (being remunerated for this) and consumers to make informed choices.

Recommendations for the European Commission



Four areas require a Call for Action as a priority:

1. Develop a legal and regulatory framework that fits for the sector's unique characteristics



Action

Policies such as the Green Deal, Farm to Fork Strategy, the Common Agricultural Policy (CAP), the EU Deforestation Regulation, CE Traceability Reg 178/02 and other trade relevant policies such as the US Food Safety Modernisation Act (FSMA) and the upcoming US Traceability Rule should be updated or supported by implementation guidelines to accommodate blockchain as an enabler technology of transparency, traceability, and compliance while supporting the EU's sustainability and food system resilience goals. This regulatory framework is not intended to replace existing food law, but to build upon and extend it for blockchain integration.

Impact

Such a framework will reduce the legal uncertainty and administrative burden for farmers, food businesses, and innovators and favor Blockchain wide application.

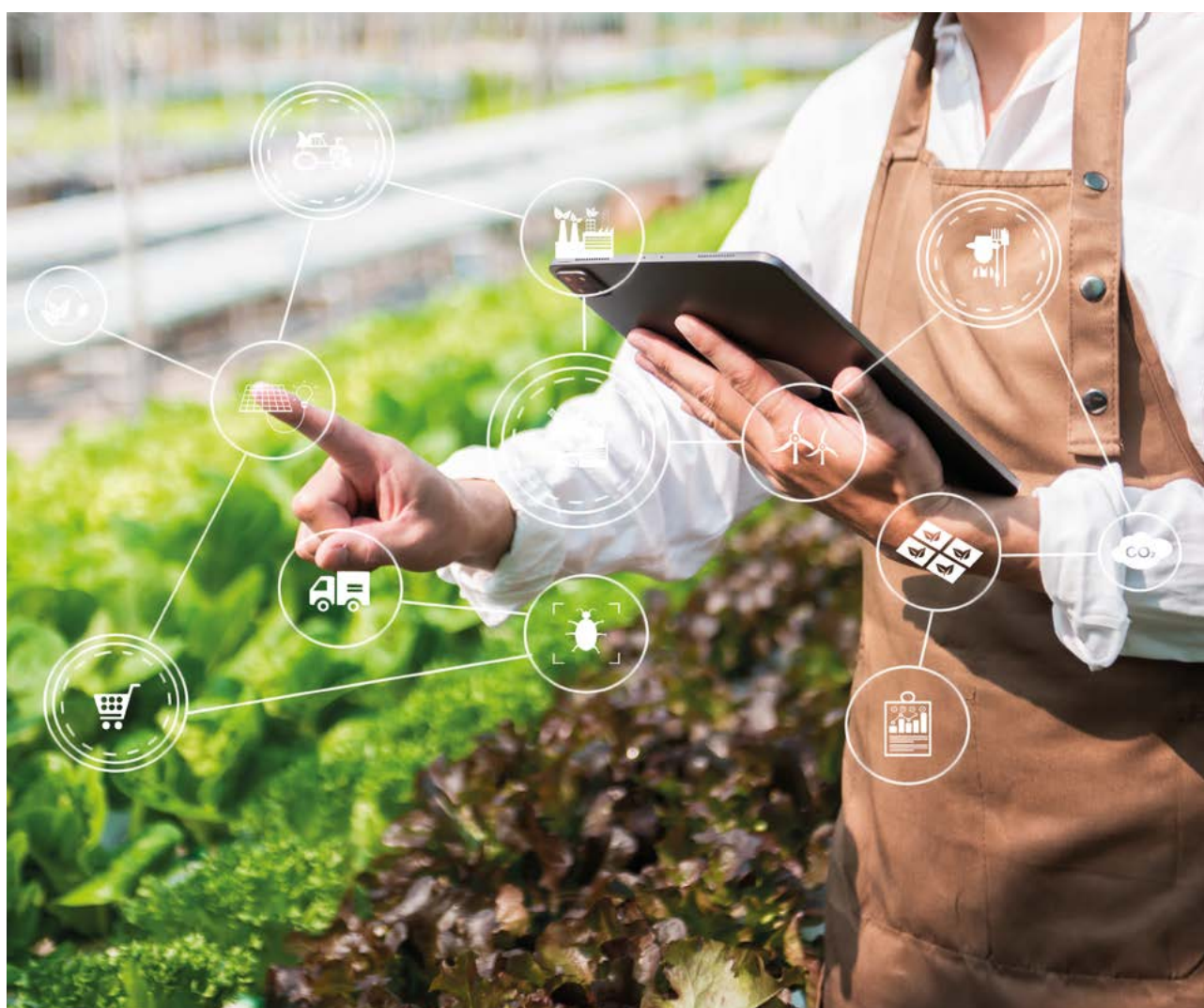
2. Fund and promote experimentation spaces and related pilot projects

Action

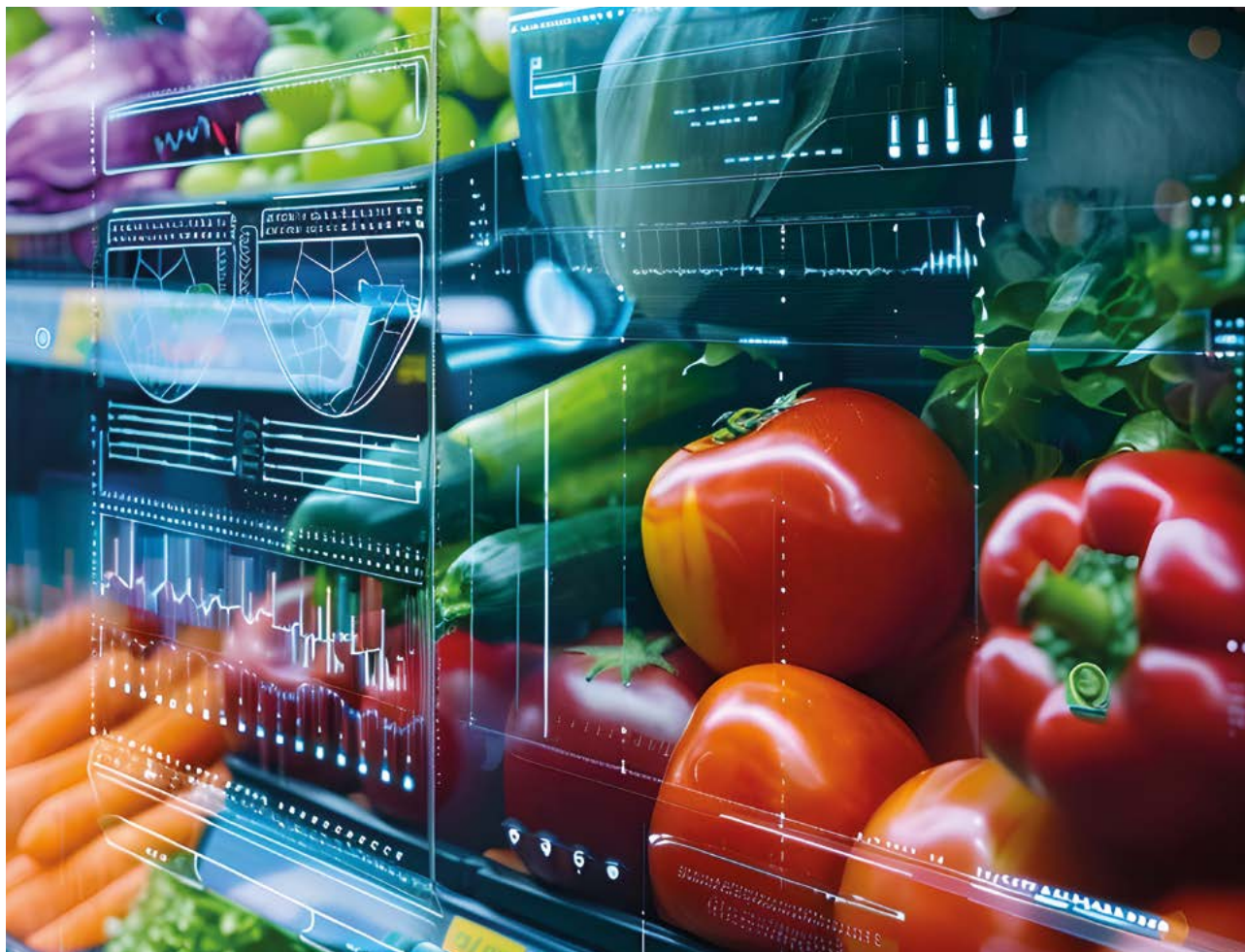
The EC should allocate funding for collaborative research and pilot projects involving farmers, food producers, retailers, and technology companies for proprietary and open-source solutions and where different technologies such as blockchain, IoT and AI can be combined and tested. These projects would demonstrate the tangible benefits of blockchain in different agricultural sub-sectors, starting from high-value products (organic, PDO/PGI, high-quality, etc). The recommendation is to use regulatory sandboxes to test blockchain tools in a controlled environment without the full burden of existing regulations, for then moving to the scale-up phase designing a 'sandbox-to-market' pathway to accelerate post-testing adoption.

Impact

This will provide real-world data and best practices, encouraging wider adoption and addressing practical challenges.



3. Develop a standardized EU framework, that would also be applied with non-EU affiliated members



Action

The EC should work on selective interoperability frameworks sector-specific that would focus on the data flows that actually matter. For example, the use cases might include flows where a food safety issue requires rapid tracing back to its source, when sustainability claims need verification, or when particular compliance documentation must be exchanged between supply chain partners and government bodies such as those related to food safety and customs. Another need is practical guidance that bridges the gap between existing technical standards, which may not be relevant to the agri-food sector, but truly addresses the existing operational gaps in agricultural operations and include the different digital maturity of the agri-food stakeholders along the supply chain.

Impact

Systems which do not communicate with others or a lack of standards could lead to a fragmented market, hindering the network effect and overall effectiveness of the technology. Such standardization would also streamline cross-border agri-food trade and regulatory compliance across states.

4. Provide training and awareness programs

Action

In this particular sector, the acceptance and adoption depend on an informed user base. The EC should support educational initiatives starting from digital literacy to move then to training programs to help farmers, SMEs, and other stakeholders understanding the benefits and technical requirements of blockchain technology.

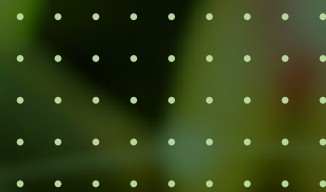
Impact

A more digitally empowered agrifood sector, where farmers, SMEs, and stakeholders can understand the value to enhance transparency, traceability, and efficiency across the supply chain will foster greater trust, innovation, and competitiveness in European agriculture and food systems.



Timeframe	Action
2026	Initiate regulatory alignment convoking steering committees and technical groups
2026 / 2027	Start training and awareness campaigns targeting farmers, cooperatives, and agri-food companies (via CAP networks, DIHs, etc.) as well as consumers through mediae
2026 / 2027	Launch experimentation spaces: Pilot blockchain use cases under real-world conditions
2027 / 2028	Develop standardized frameworks: Align with EBSI, Digital Europe, and Agri-Food Data Space developments
2028 / 2030	Scale adoption: Expand training, integrate blockchain into national strategies, and fund full-scale rollouts.

Conclusions



Over 36 months, TRUSTyFOOD studied how blockchain can respond to the above-mentioned sector's challenges. The research involved the assessment of 320 blockchain use cases, more than 300 public reports, 93 interviews, 97 surveys, 13 workshops, and 4 local focus groups, involving 150 stakeholders from 19 countries in EU and beyond. Findings confirm that blockchain is a powerful tool that can help the EU achieve its goals for a safer, more transparent, and more sustainable food system.

By using blockchain, stakeholders can track the journey of food products in real time, verify their origin, and ensure compliance with safety and sustainability standards. This increased transparency can help rebuild consumer trust, improve recall efficiency during food safety incidents, and provide verifiable proof of sustainable practices, such as organic farming or reduced pesticide use.

The adoption of blockchain aligns closely with several European Commission policy priorities. It directly supports the Farm to Fork Strategy, which emphasizes traceability, food safety, and fairer supply chains.

It also contributes to the objectives of the European Green Deal by enabling better monitoring of environmental impacts and promoting sustainable food systems. Moreover, blockchain is a key enabler of the EU Digital Single Market, which seeks to foster innovation and harmonize digital infrastructure across member states. By taking proactive steps, the EC can position itself as a global leader in harnessing technology for the benefit of its citizens and the environment. In such process it is important to diversify the approach, supporting more the weak rings of the chain (farmers and small food producers) through targeted support schemes and inclusive digital capacity-building efforts.

TRUSTyFOOD partners



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