Session n°13

The role of AI in the fruit and vegetable sector

Tuesday 12 Mai 2026

09:00-11:30 UTC/11:00-12:30 CET (*time in Paris/Brussels*)

Online (Zoom)

Live interpretation in English and French

1. Context

Artificial Intelligence (AI) is rapidly emerging as a transformative force in agri-food systems, driving improvements in productivity, sustainability and resilience across value chains.[1] In the fruit and vegetable (F&V) sector characterised by high perishability, strict quality requirements and complex logistics, AI is increasingly used to support decision-making and optimise operations across production, post-harvest handling and distribution. Applications in crop monitoring, quality control, logistics and market analysis are contributing to more data-driven and responsive value chains.[2]

While these technologies create new opportunities to improve efficiency and better align supply with market demand, their adoption remains uneven due to constraints related to infrastructure, data availability, technical skills and investment capacity, particularly in developing contexts.[3] The sector is largely composed of smallholders and SMEs for whom these barriers are not merely a matter of degree but of kind - requiring tailored approaches that reflect their operational realities and resource constraints.

In this context, understanding how AI can be effectively leveraged to optimise processes and strengthen performance across F&V value chains is becoming increasingly important.

2. AI applications in the F&V value chain

AI applications are expanding across key stages of the fruit and vegetable value chain, with increasing operational use to optimise processes and improve performance.

Production and crop management: AI-based tools, including satellite imagery, sensors and predictive models, support real-time crop monitoring, more precise irrigation and input use, and improved pest and disease management. These technologies enable more accurate and timely interventions in crop production systems, enhancing productivity and reducing losses.[4]

Post-harvest handling and quality control: Computer vision and automated systems are used for sorting, grading, defect detection and packaging optimisation. These applications support

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[1] OECD, 2019, Digital Opportunities for Better Agricultural Policies; FAO, 2022, The State of Food and Agriculture - Leveraging automation in agriculture

[2] European Parliament, 2023, Artificial intelligence in the agri-food sector Applications, risks and impact, World Bank, 2020, Harvesting Prosperity: Technology and Productivity Growth in Agriculture

[3] International Telecommunication Union, 2024, Measuring Digital Development: Facts and Figures

[4] FAO, 2022 The State of Food and Agriculture ,

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consistent quality assessment and facilitate compliance with market standards, which is critical for export-oriented value chains.[5]

Food loss and waste reduction: AI can potentially offer significant potential to reduce food loss and waste - a critical challenge in the F&V sector given high perishability rates. Predictive tools can optimize harvest timing, anticipate shelf-life, and trigger cold chain alerts, reducing post-harvest losses across storage and transport.

Traceability and market compliance: AI-powered traceability systems are increasingly used to meet food safety standards, export certification requirements and retailer compliance protocols. For producers and exporters in developing countries seeking access to EU, UK or US markets, these tools can support adherence to evolving regulatory frameworks and reduce the risk of rejection at border controls.

Supply chain and logistics: AI supports demand forecasting, transport planning and cold chain monitoring, enabling improved coordination of flows and more accurate management of perishable products. These tools enhance visibility across supply chains and support better synchronisation between production and distribution.[6]

Market intelligence and business management: AI-driven analytics support pricing strategies, demand analysis and sales planning, enabling businesses to process large volumes of market data and inform commercial decision-making in a more structured and timely manner.[7]

3. Key challenges

Despite its potential, the integration of AI in fruit and vegetable value chains raises several structural and strategic challenges.

First, access to infrastructure and technology remains uneven. Reliable connectivity, digital equipment and data systems are prerequisites for AI deployment, and gaps in these areas can significantly limit adoption.

Second, data availability and quality are critical constraints. AI systems rely on large volumes of reliable and standardised data, which are often fragmented or inaccessible across value chains. Issues of data ownership, interoperability and governance further complicate effective use.[8]

Third, integration into existing systems can be complex. Many F&V operators rely on established practices and infrastructures, and adopting AI often requires organisational changes, new skills and adjustments to workflows.

Fourth, cost and investment capacity remain important barriers. The return on investment may not be immediate or clearly measurable, which can slow adoption decisions.

Fifth, the specific constraints faced by smallholders and SMEs deserve particular attention. Beyond cost, smaller operators often lack access to the volume and quality of data that AI systems require and may have limited capacity to manage organisational transitions. Solutions designed for large agribusinesses frequently do not transfer readily to these contexts without significant adaptation.

Finally, broader **value chain implications** must be considered. Increasing reliance on digital technologies may influence relationships between actors, including potential dependency on technology providers and shifts in how value is created and captured.[9].[10]

[5] OECD, 2019, Digital Opportunities for Better Agricultural Policies; Sagar NA and Rani N,2026, Recent trends and innovations in smart and AI-based food packaging, [5] European Parliament, 2023, Artificial intelligence in the agri-food sector Applications, risks and impact,

[7] World Bank, 2021, World Development Report 2021: Data for Better Lives
[8] OECD, Data Governance in the Digital Age
[9] European Parliament, 2023, Artificial intelligence in the agri-food sector Applications, risks and impact
[10] OECD, Data Governance in the Digital Age

4. Way Forward

Advancing the use of AI in the fruit and vegetable sector requires moving from experimentation to structured and scalable adoption. This involves prioritising high-impact use cases such as irrigation management, pest control, quality assessment, packaging optimisation and market analysis where AI can deliver clear operational benefits. It also requires strengthening technical and managerial capacities and facilitating access to solutions adapted to sector needs, including solutions specifically designed for smallholder and SME contexts..

Effective adoption will depend on enabling environments, including investment in infrastructure, improved access to data and the establishment of governance frameworks that ensure transparency, trust and fair value distribution. These frameworks should explicitly address data sovereignty, ensuring that the actors generating data - including smallholders and producers in developing countries - are able to participate in and benefit from its use.

Collaboration between technology providers, agribusinesses, research institutions and development actors will be essential to adapt AI solutions to real operational conditions and support scaling. Public-private partnerships can play a key role in reducing adoption barriers and accelerating innovation.[11]

This session will focus on:

- How AI is applied across F&V value chains and its implications for performance and coordination
- Key challenges and constraints affecting adoption and integration
- Existing solutions and practical experiences from early adopters, including from the Global South
- Conditions required to support effective, inclusive and scalable deployment

[11] OECD, Going Digital in Agriculture, FAO, Digital Agriculture Profile

OECD-COLEAD Fruit and Vegetable Industry Series

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Agenda

Moderator: *José Brambila-Macias, Programme Manager, Trade and Agriculture Directorate, Agricultural Codes and Schemes, OECD*

09:00-09:10 **Welcome and introduction**: *Ines Bastos, Head of Network and Alliances; and Keynote speaker, OECD.AI expert*

09:10-09:45 **The role of AI in F&V value chains: trends, applications and strategic implications**

- *Bradford Warner, Global Head of Digital and Data, AgroFresh*
- *Elad Mardix, CEO & Co-Founder, Clarifresh,*
- *Justin Bakoubolo, Founder and AI Researcher, Umbaji*

09:45-10:05 **AI in practice: business applications, opportunities and constraints**

- *Esther Kimani, CEO, FarmerLifeline, Kenya*
- *Nakato Delia, Data Manager, Enimiro, Uganda*

10:05-10:20 **Q&A session**

10:20-10:30 **Conclusion and way forward**: *Ahoefa Soklou, Project Officer, Networks and Alliances, COLEAD*

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