

**Introduction**

In recent years, international actors and countries have implemented efforts to address these issues through innovative and multidisciplinary approaches. This paper identifies innovations that have the potential to be implemented at the EU and global levels. The integration of digitalization elements such as artificial intelligence (AI), blockchain, and smart sensors for monitoring food supply chains are being adopted to identify food by-products and reduce environmental impact. Food loss and waste is a significant environmental, economic, and social challenges in Albania and good practices across the world.

New technological platforms and social innovation models are enabling the redistribution of food products. Education campaign in food loose and waste plays a critical role in changing consumer behavior and reducing waste at all levels of supply chain. International cooperation and digital platforms are essential to harmonize methodologies and promote best practices globally. These innovations collectively represent an innovative method toward more sustainable and efficient food systems. In response, international actors and countries have implemented innovative and multidisciplinary approaches, integrating digital technologies and social innovation models. This paper aims to identify these innovations and evaluate their potential implementation at EU and global levels, with a specific focus on their relevance for Albania. The research addresses the following questions:

- Which technological and social innovations are most effective in reducing food loss and waste?
- How do digital tools improve monitoring and efficiency across food supply chains?
- To what extent can these innovations be adapted to the Albanian context?

**Literature Review**

Food loss refers mainly to losses during production, post-harvest handling, and processing, while food waste occurs predominantly at the retail and consumer levels (FAO, 2019). Research emphasizes that FLW is a systemic issue influenced by market failures, governance structures, consumer behavior, and technological gaps (OECD, 2022). Beyond economic inefficiency, food loss and waste contribute significantly to climate change, accounting for approximately 8–10% of global greenhouse gas emissions (IPCC, 2022). Digital technologies are increasingly recognized as key tools in reducing FLW. Artificial intelligence is widely used for demand forecasting, inventory optimization, and predictive analytics, helping firms avoid overproduction and excessive stock levels (Ribeiro et al., 2021). Blockchain technology enhances traceability and transparency across food supply chains, reducing information asymmetries and improving food safety and quality control (Tian, 2017). Smart sensors and Internet of Things (IoT) devices enable real-time monitoring of storage and transportation conditions, significantly reducing spoilage of perishable goods (Ben-Daya et al., 2019).

Social innovation models supported by digital platforms play a crucial role in redistributing surplus food to vulnerable groups. Platforms connecting producers, retailers, non-governmental organizations, and consumers have proven effective in reducing edible food waste while promoting social inclusion (Michellini et al., 2018).

Education and awareness campaigns are essential for changing consumer behavior. Studies show that targeted education initiatives can reduce household food waste by improving meal planning, storage practices, and consumption habits (Hebrok & Boks, 2017).

**Methodology**

This study adopts a qualitative comparative research design, suitable for analyzing policy innovations and technological solutions across different institutional contexts. The approach allows for the identification of transferable best practices applicable to Albania.

Secondary data were collected from:FAO, OECD, and World Bank reports, EU policy documents and strategies on food waste reduction. Peer-reviewed academic articles on sustainable food systems, International case studies on digital and social innovations.

Innovations were assessed using three main criteria:

- Effectiveness in reducing food loss and waste
- Scalability and adaptability across countries
- Relevance for Albania’s economic and institutional context

**Conclusion**

The analysis indicates that AI-based forecasting systems can reduce food waste at the production and retail levels by 20–30% through improved demand estimation and inventory management (Ribeiro et al., 2021). Blockchain-based traceability systems reduce food rejection rates and enhance trust among supply chain actors (Tian, 2017). Smart sensors and IoT technologies significantly reduce post-harvest losses by ensuring optimal storage and transport conditions, particularly for fruits, vegetables, and dairy products (Ben-Daya et al., 2019). These technologies are especially relevant for Albania, where post-harvest losses remain relatively high.

International case studies show that digital food-sharing platforms effectively reduce edible food waste while supporting social objectives. These platforms require relatively low financial investment and can be implemented quickly, making them highly suitable for urban areas in Albania (Michellini et al., 2018).

Education campaigns targeting households and businesses reduce food waste by 10–25%, depending on program design and duration (Hebrok & Boks, 2017). In Albania, limited public awareness suggests that education initiatives could yield substantial benefits at relatively low cost.

The findings confirm that international cooperation and digital platforms are essential for harmonizing methodologies, sharing data, and promoting best practices. Alignment with EU standards is particularly important for Albania’s EU integration process (European Commission, 2020). For Albania, the most feasible policy actions include:

- Introducing smart storage technologies in agriculture
- Supporting digital food redistribution platforms
- Implementing nationwide education campaigns
- Aligning national strategies with EU food waste policies
- These measures collectively contribute to more sustainable, efficient, and inclusive food systems.

**References**

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