



# How can digital technology use and innovation contribute to sustainable transformation of business models in the agri-food sector?

A systematic literature review

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## Extended abstract (700-1200 words)

### *Problem description*

Digital technologies (such as artificial intelligence, digital platforms, robots, decision support tools and related hardware) are expected to become major instruments in supporting sustainable agricultural development (Lajoie-O'Malley et al. 2020). Nevertheless, some authors call for a better understanding of the impact of digitalization, as it can lead to detrimental environmental, social and economic consequences (Plumecocq

et al. 2018). The links between digitalization and sustainability in the agrifood sector have been recently explored in some literature reviews (e.g. Myshko et al. 2024); however, the way in which digitalization induces new business models in agri-food value chains is barely studied (Klerkx et al., 2019), as is the capacity to integrate principles leading to sustainable practices.

In general, the growth of digital technologies has raised new questions about how businesses can deliver value (Teece, 2010). In the agri-food sector, the link between sustainability and digital technologies is often viewed through either a mere economic or technological lense. On one hand, precision agriculture is seen as providing a way to reach efficient agricultural practices by utilising technological solutions (Shafi et al., 2019). On the other hand, business model innovation is principally based on a 'profit first' or economic value orientation (Joyce and Paquin, 2016).

The main objectives of this literature review were to discover the state of the art of the research in the use of digital technologies in business models in agri-food value chains, to analyse the links between digitalization and the innovation of agrifood business models towards sustainability, and to make recommendations for future research.

The research questions were:

1. How do digital technologies lead to innovations of the different agrifood business model canvas components (value creation, proposition, delivery, capture)?
2. What are the drivers, benefits and drawbacks of the utilization of digital technologies in agri-food businesses?
3. How can the use of digital technologies by agri-food businesses contribute to sustainability?

### *Methodology*

In order to bring concepts together/develop a theoretical framework and to advance knowledge, performing a literature review is conducive. The PRISMA tool was used as it is a common approach for selecting articles and is associated with more complete reporting of systematic literature reviews (Page et al, 2021). As inclusion criteria, articles had to comply with having a focus on digitalization and business models in agri-food value chains, had to be in English and a peer-reviewed article. The following search terms were used: ("digi\*" OR ict) AND "business model" AND (food OR agr\*food). Some publications were excluded based on the following criteria, if the publication:

- Does not link the food sector, business models and digital technologies together
- Is a literature review
- Is solely focused on the agricultural aspect of the food system (farmers)
- Is focused on consumers instead of businesses

After selection, 39 articles from Scopus and Web of Science were included in this study, and analysed both in a quantitative and a qualitative way (with an emphasis on qualitative results).

### *Results and discussion*

According to the small quantity of articles that had been identified as suitable for the review, digital technology use by agrifood business models linked to sustainability seems to be scarcely studied. Nonetheless, the included articles provide interesting perspectives.

Firstly, the articles discuss different types of digital technologies. Yet, a few digital technologies stood out. The results show that agri-food businesses use digital platforms, digital marketing (social media), blockchain technologies, AI, cloud computing and IoT; in most cases combining several of these tools together. Digital communication technologies like block chain and digital platforms need additional technologies such as cloud computing, AI and IoT, and partnerships to be able to create value in a collaborative friendly way (Amaral and Orsato, 2023). They can change business models in value chains through their connective properties.

Nevertheless, most articles give an unbalanced view on benefits and drawbacks of digital technologies, and speak about restrictions to the adoption of digital technologies instead of the disadvantages. Yet, downsides exist, as human interaction can be minimized or even lost (Kawane et al., 2024). In this case, COVID-19 has driven change in digital technology use, but this change did not necessarily stay.

The majority of papers (51%) are focused on case studies in the global north (mainly Europe) without connecting them to value chains coming from other countries, specifically for the chains originating in the global south (e.g. coffee, cacao). These results showed that publications centre on one part of the value chain and business models are rather seen as entities on their own instead of a network. Even if one large business manages to use digital technologies in a successful way other parts of the value chain might not share in the success.

The broader (international) chain impacts of digital technologies are rather guessed instead of known. The business model concepts with a more system-based and multi-actor perspective approach such as ecosystem-based (Michelini et al., 2023) business models are in general less used. Sustainability as a concept is mentioned in most articles, but primarily centred around the survival of the business. Additionally, the circular economy e.g. in terms of agricultural waste valorisation (21%) and agro-ecology (3%) are not mentioned often while they are associated with sustainable agrifood business models (Donner et al., 2020). This means that digital tools are not necessarily linked to sustainable business transformation, especially if the business does not implement green values.

As to develop a theoretical framework towards these perspectives, this study urges to bring in concepts of value co-creation and open innovation in future business model analysis. This is the case as only few publications (15%) mentioned these concepts and only one paper links the two together, while the more openness a firm displays, the more likely it is to be able to collaborate with a variety of external actors in order to produce innovation with the help of digital technologies (Bigliardi & Filippelli, 2022).

### Conclusions

This review paper has brought new insights on the use of digital technologies in agrifood business models, their drivers, benefits and drawbacks as well as contribution to sustainability. It argues that even though digital technologies can enhance social interaction, the human element can be lost during this process. Even if one business makes successful use of digital technologies, others in local and international value chains might not profit. This urges us to look at agri-food value chains through a network perspective, instead of only at the individual business level. Businesses are obliged to look at the societal and environmental consequences in order to develop social, economic and environmental sustainability of business models. Digitalisation is one way to contribute, but not the only way, so its importance does not have to be overemphasised.

This paper recommends for future research and management practice to use a framework that looks through a value co-creation and open innovation perspective to both the business model level and the interaction between (sustainable) business models in local and global food systems.

## Keywords

Digitalisation, business models, sustainability, agri-food sector, systematic literature review

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