



Sustainability Transitions in Agriculture and Food Systems: A Global Bibliometric Study

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ABSTRACT This study presents a bibliometric analysis examining sustainability transitions in agri-food systems at the global level. A total of 519 documents extracted from the Scopus database for the period 2020-2025 were analysed. VOSviewer software was used to explore and map the data, and co-occurrence analysis and citation analysis were applied as bibliometric techniques. The results highlighted sustainability, agriculture, food security, agroecology, and climate change, as well as innovation and a systemic approach, as the dominant thematic groups. Influential publications in the field shape scientific trends and contemporary priorities, while the strong connectivity between terms and works demonstrates the interdisciplinary and multi-level nature of the international literature. Overall, the research contributes to strengthening theoretical and practical knowledge on the sustainable transition in the agri-food sector, providing a clear scientific basis for decision-making and future policy planning.

KEYWORDS: Sustainability transitions, Agriculture and Food Systems, Bibliometric Analysis.

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Introduction

Sustainability Transitions Theory is a multidimensional theoretical framework that analyses the profound systemic changes in socio-technical structures necessary for transitioning from

unsustainable to sustainable modes of operation (Geels, 2011). In the agri-food sector, this theory primarily focuses on the dynamic interplay between technological innovations, policy regulations, social practices, and environmental constraints (Goulas, 2025). This transition evolves through interconnected levels (a multi-level perspective) that encompass the macro-level of networks and organisations, as well as the micro-level of innovative practices and technologies (Geels, 2002).

Agri-food systems are characterised by complex socio-economic interactions, where established production and consumption practices clash with innovative and sustainable alternatives developed at the local and regional level (Goulas, 2025). Promoting sustainable transitions requires an understanding of the mechanisms that drive the tension and diffusion of these innovations. This theoretical framework incorporates interdisciplinary approaches that combine sociological, environmental, and technological sciences, offering an understanding of the complexities that lead to sustainable models of food production and consumption (Papanikolaou et al, 2025).

Food security, environmental protection, and economic prosperity are directly linked to sustainability in agri-food systems, which are an urgent and complex challenge in today's world (Karelakis et al, 2024). The modern world faces numerous challenges, including the depletion of natural resources, climate change, social inequalities, and environmental pollution. These challenges underscore the necessity for profound transitions toward sustainable production and consumption models in the agri-food sector (Elsner et al., 2023; Lamine & Marsden, 2023). Many efforts have been made in recent years. However, numerous studies indicate that current practices are insufficient to ensure long-term sustainability, particularly those systemic innovations that incorporate social, technological, and political changes (Gianni & Gotzamani, 2023).

Previous bibliometric studies have shown that the field of sustainable agri-food systems is evolving rapidly, with a significant emphasis on integrating ecological and socio-economic dimensions (Diaconeasa et al, 2024). Despite the numerous studies conducted and the substantial amount of knowledge produced, there remains a clear need for a more comprehensive understanding of the key thematic trends and academic networks that shape this knowledge. Specifically, bibliometric research techniques such as co-occurrence analysis and citation analysis enable the quantitative mapping of the literature, highlighting the most influential publications, leading researchers, and critical research fields (Tsotsas et al., 2025).

The challenges facing the agriculture and food systems sector are not only technical and economic, but also include social and cultural dimensions that make transitions complex and multi-layered (Garane & Manou, 2025). Exploring international research trends can contribute to both advancing theoretical knowledge and supporting evidence-based policy design. Furthermore, it helps to answer critical questions about what the key elements are that promote or inhibit a sustainable transition.

Research Aim and Research Questions

Based on the above, the primary objective of the research is to identify the key thematic areas

frequently associated with sustainability in the agri-food economy and to highlight the most influential scientific works that have shaped the field, revealing scientific trends and dominant theoretical approaches. This can be achieved through the bibliometric analysis employed in this study, as well as the techniques of co-occurrence analysis and citation analysis. Co-occurrence analysis was employed to map the thematic areas that exhibit the most closely related concepts, and citation analysis was utilised to identify the top publications, authors, and research trends.

The research questions that arise and are addressed in this study are as follows:

- a) What are the dominant thematic groups that frequently appear together in the literature on sustainability in the agri-food economy?
- b) Which publications and research projects have the greatest influence on the development of knowledge and the transition to sustainability in agri-food systems?
- c) How are the main thematic areas linked to influential works, and what are the prominent trends in the scientific literature?

These approaches provide a robust and focused analysis of the literature, aiming to offer a clear scientific picture that supports further research and strengthens decision-making in the field of agri-food system sustainability.

Research Results

This study is a bibliometric analysis of 519 scientific documents extracted from the Scopus database. The search was conducted using the keywords "Sustainability transitions" and "agriculture and food systems," which were found in the titles, abstracts, and keywords of the documents. The data were exported to a CSV file and analysed using VOSviewer software, employing the bibliometric techniques of co-occurrence analysis and citation analysis. The study period spans the years 2020-2025, and only articles written in English were included in the data analysis.

The bibliometric analysis reveals that the dominant thematic groups in international research on sustainability in the agri-food economy primarily focus on the concepts of sustainability, sustainability transitions, and agriculture, which exhibit the highest frequency and interconnections (see Figure 1). Particular importance is also attached to topics such as agroecology, food security, and food systems, which are linked to both the productive dimension and issues of resilience and food security. At the same time, climate change and the circular economy are axes directly related to the challenges and adaptation to sustainability. The concepts of sustainable agriculture, precision agriculture, innovation, and urban agriculture highlight technological and social innovations in agriculture. Ultimately, the multi-level perspective and environmental sustainability enhance the research field by incorporating systemic and environmental approaches. The results show that the most frequently co-occurring terms link sustainability, agriculture, and food security with innovation and sustainable development, composing an interdisciplinary and multi-thematic research framework.

Based on the results of the bibliometric analysis presented in the figures above, the publications

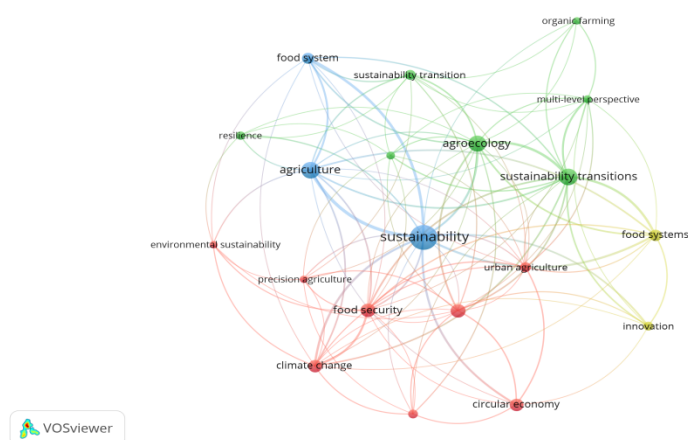
with the most significant influence on knowledge and the transition to sustainability in agri-food systems are those that receive the highest number of citations. Notable examples include the work of Mondejar (2021), with 616 citations; Wezel (2020), with 578; Klerkx (2020b), with 465; as well as Rumpel (2020), with 265, and Shah (2021), with 260 citations. Additionally, the work of Herrero (2021), Mottet (2020), Borsellino (2020), and Mana (2024) has a significant impact. These publications form the core of scientific influence in the field, as they are recognised in the international literature as key references for the study of transitions and sustainability in agriculture and agri-food systems.

The main thematic areas, as highlighted in the network graph, are directly linked to influential scientific projects, as the central publications concern concepts such as sustainability, agroecology, agriculture, food security, and sustainability transitions. High-impact works, such as those by Mondejar (2021), Wezel (2020), Klerkx (2020b), Rumpel (2020), and Herrero (2021), examine in depth the interconnection between issues such as environmental sustainability, climate change, innovations, and new forms of agricultural systems.

The scientific trend that stands out is a systemic approach to sustainability, where studies link technological and socio-ecological changes to sustainable agricultural and agri-food systems practices. At the same time, trends around climate change, food security, agroecology, and precision agriculture highlight the multidisciplinary and interdisciplinary nature of the literature. The links between these themes and the most widely discussed projects determine contemporary priorities and scientific interest in the transition to sustainability in the agri-food sector.

Figure 1

Network visualisation of key thematic correlations in the literature on sustainability in agri-food systems



Source: author(s) own development

Conclusions

The findings of this research demonstrate that the field of sustainability in the agri-food economy is characterised by a high degree of interdisciplinarity and strong connectivity between central

concepts, including sustainability, agriculture, and food security. The bibliometric analysis, combining co-occurrence analysis and citation analysis, revealed not only the main thematic groups – such as agroecology, climate change, innovation, and systemic approaches—but also highlighted the key scientific works that shape the development and priorities of the field. Influential publications by Mondejar, Wezel, Klerkx, Rumpel, and Herrero form the scientific foundation for current and future research. The dynamic interconnection of these works with emerging topics confirms the ongoing diversification and maturation of the field. Overall, these results highlight both the progress and fragmentation of the international scientific community, underscoring the need for integrated research programs and multisectoral collaboration to effectively support sustainable transitions in agri-food systems and inform evidence-based decision-making at the policy and practice levels.

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