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Business model innovations and their relationship with sustainable development in agribusiness: a bibliometric analysis

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Abstract

This article identifies the main links, commonalities, and future interdisciplinary topics between business model innovations and sustainable development in agribusiness. A systematic bibliometric analysis of the literature on business model innovations related to sustainable development in agribusiness was carried out using RStudio – Biblioshiny for Bibliometrix. Two hundred and fifty-one documents published in journals indexed in Scopus and Web of Science were analyzed between 2001 and 2023. Business model innovations and sustainable development in agribusiness are seen as ways of responding to social, economic, and environmental challenges. The research also reveals that when sustainable development is the topic, innovations in business models tend to incorporate practices that seek profitability and minimization of environmental and social impacts, promoting corporate social responsibility and long-term sustainability. There is a growing consensus that purely profit-focused business models have considerable limitations in neglecting social business activities and environmental impacts. About the question, "What are the innovations in business models that can improve sustainable development in agribusiness?", the literature provides no practical answers. The next steps, therefore, are to identify and analyse successful case studies.

Keywords

sustainable development – business model – innovation – agribusiness

1 Introduction

The agrifood sector combines primary production activities and agrifood industries, and has a prominent place in the European Union (EU) economy. It provides roughly 19.2 million jobs (9% of total employment) and about 4.3% of GDP in the EU-27 (Tell et al., 2016). Considered to be economically and politically essential, this sector is one of the EU's most protected and regulated sectors (Iakovou et al., 2014). In addition, it is a sector that involves many entities: according to the EU, in 2008, over 17 million operators were involved along the value chain of the agrifood sector (EU, 2011). According to Leis et al. (2011), most companies in the agrifood sector in the EU are micro-enterprises with fewer than 10 employees. Although accounting for 78.6% of the companies

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operating in the sector, their turnover amounts to only 6.95% of the total turnover. At the opposite extreme, there are large enterprises with more than 250 workers comprising 0.86% of the companies in the sector and having turnover of 51.54%.

In recent decades the agrifood sector, like so many others, has faced several challenges. The effects of globalization and the reduction of trade barriers resulted in more international competition and a greater number of actors with solid negotiating power (Brinkmann et al., 2014). This increased competitive pressure contributed to the emergence of many small and medium enterprises (SMEs). The EU had to adjust or completely reshape its business models to be more productive and competitive (Tell et al., 2016).

In addition to greater competition, there has been a growing concern about the negative externalities of the current agrifood system. Humanity today faces severe economic, social, and environmental crises, which are deeply interconnected and result mainly from unsustainable patterns of food production and consumption. More food resources are consumed than ever before, in both per capita and absolute terms. An agrifood system like the current one coupled with continuous population growth may negatively affect food security. Ensuring sufficient power to meet the demands resulting from continued population growth, as it minimizes environmental externalities arising from increased intensive production, is a central issue in current debates about sustainability at a time when much is said of scarce natural resources and climate uncertainty (Galli et al., 2017).

At the same time, profound societal changes have occurred in recent decades that have unequivocally affected lifestyles, quality of life, and the availability and consumption of food (de Morais et al., 2010). These changes have resulted in the rise of consumers who are more informed, more demanding, and have different needs and desires (Yang et al., 2017). This new operational context poses a considerable challenge for the sector. It has highlighted the importance of adaptation, development, and innovation capacities as necessary strategic instruments for the competitive success of the industry (Capitanio, 2010).

The main goal of this article is to identify critical links, standard points, and future interdisciplinary topics between business model innovations and sustainable development in agribusiness based on a literature review. To do so the authors used a combination of bibliometric, text-mining, and visualization analyses to address the following research questions:

RQ1: What is the volume, growth trajectory, and geographic distribution of published articles addressing business model innovation (BMI) and sustainable development (SD) in agribusiness topics?

RQ2: What are the field's most influential journals, authors, and research papers?

RQ3: What is/are the trend(s) in the topics of research regarding BMI and SD in agribusiness?

The next section presents a conceptual background. This is followed by a section on the methodology, data collection, and analysis. Section 4 presents and discusses the results obtained, highlighting their interpretation and implications. Section 5 has the conclusions, limitations of the study, and suggestions for future research.

2 Conceptual Background

2.1 *Innovation*

The concept of "innovation" is ambiguous, contributing to a multiplicity of interpretations of its meaning and a "lack of clarity in their definition" (El Bilali, 2018). The concept is broad and multidimensional and has undergone constant change in recent decades (Kühne et al., 2010). The literature contains many categorizations of innovation across different dimensions. According to El Bilali (2018), innovations can be categorized according to whether they pertain to 1) product, service, process, or market; 2) their dimension (objective or subjective); 3) the extent of change (radical, incremental, replicated); or 4) according to the model regarding their creation (open or closed). Various definitions and classifications have been developed and applied in the economic literature (Avermaete et al., 2003). One of the most widely employed definitions is found in the Oslo Manual developed by the OECD. This manual, which is currently seen as providing the main international guidelines for defining and evaluating innovation activities, defines innovation as "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. The minimum requirement for an innovation is that the product, process, marketing method, or

organizational method must be new (or significantly improved) for the company". The manual also distinguishes four main areas of innovation: product, process, marketing, and organization (Finco et al., 2018). According to Avolio et al. (2014), agrifood sector innovations can also be classified using the same categories.

In recent years an increasing number of researchers have sought to explore and analyse the innovation patterns in SMEs. This trend is closely related to introducing new indicators, which better capture the dynamics of innovation occurring in SMEs, especially in the sectors classified as most traditional/low technology, such as the agrifood sector (Avermaete et al., 2004). In the innovation literature the agrifood sector has been consistently classified as low in technology and innovation (Bigliardi and Galati, 2013).

The main results of this new trend of studies carried out at the turn of the century brought new contributions to the innovation literature. Some of these early studies indicated that the development of innovation processes in small companies was mainly associated with human capital's entrepreneurial characteristics and innovative capabilities. Several researchers also stressed a strong reliance of small companies on external sources of information and knowledge, given their difficulty in developing innovations in isolation (Avermaete et al., 2004). In traditional models of closed innovation, companies focus mainly on the internal development of innovation before its dissemination to the various external stakeholders, whereas in a new open-innovation approach, companies focus on the use of intentional flows of knowledge to accelerate their innovation processes (Chesbrough, 2002). In this sense, the creation and management of inter-organizational relationships with customers, competing companies, suppliers, public and private research institutes, or even with companies in apparently unrelated areas to acquire additional knowledge and skills for innovation processes have been increasingly identified as an essential way to boost the innovative capacities of companies (Gatignon et al., 2002; as cited by Sarkar and Costa, 2008). The importance of valuing relationships with external actors has become a central idea of the modern theory of innovation, or in other words, the contemporary theory of innovation has evolved, now recognizing innovation as a complex result that derives from the interaction of different actors with different interests and abilities (El Bilali, 2018).

2.2 *Business model* (*BM*)

The BM concept gained popularity in the 1990s, during the "dot-com boom" (Zott et al., 2011). Since then this concept has been the subject of successive studies resorting to widely varying perspectives. Evans et al. (2017) argue that researchers need to find consensus in a theoretical definition. According to Bernardi et al. (2020), two problems hinder the widespread adoption of a single business model definition. First, until now investigations have focused on developing business model concepts that are very specific for each scenario analysed and, in practice, seek to capture the inherent and underlying architecture of how each organization conducts its business. Second, the author notes that research on this topic has been conducted in the scope of very different domains, contributing to the imprecision of the term. The domains most commonly examined include electronic commerce, information systems, strategy, innovation, entrepreneurship, economics, and management.

Table 1 summarizes the BM definitions deemed by scholars to be the most important, revealing the chronological evolution of the concept.

2.3 *Business model innovation* (*BMI*)

In today's dynamic and rapidly evolving business landscape the ability to innovate the business model has become a key concern for organizations seeking to navigate the complexities of the modern market. BMI is not an isolated event but results from a confluence of factors, often driven by the need to adapt and thrive in changing circumstances. The emergence of transformative technologies, the forces of globalization, and growing customer demands have created an environment in which companies must continually redefine how they generate revenue and deliver value (Mont, 2019).

A growing body of research highlights the importance of BMI. Academics have noted that innovation no longer relies solely on technological advances but must also on the reshaping of the underlying structures and processes that define how a company operates (Johnson and Johnson, 2013). This rethinking has been driven in part by the recognition that a unique business model can serve as a powerful source of competitive advantage, allowing companies to differentiate themselves from rivals and engage with customers in more meaningful ways (Johnson and Johnson, 2013; Zott and Amit, 2010).

TABLE 1 Business model definitions

Authors	Definition
Timmers, 1998	The business model means "product, service architecture, and information flows, including a description of the various business actors and their roles, the potential benefits for the different business actors, and the sources of revenue.
Chesbrough, 2002	The business model is a "heuristic with logical thinking that links technical potential with realizing economic value". The business model provides a coherent structure that considers characteristics and potentials as inputs and converts them into economic outputs through customers and markets.
Osterwalder, 2004	The business model is "a conceptual tool that contains elements and their relationships and allows expressing a specific company's business logic. It describes a company's value to one or several segments of customers. It is the company's architecture and its network of partners to create, market, and deliver this value to generate a stream of profitable and sustainable revenue.
Richardson, 2008	The business model is a conceptual framework that helps bind the company's strategy with its activities and execution. The business model's structure can help companies think strategically about their business. The essence of the strategy is to create superior value for customers and capture more excellent value for that value than competitors.
Osterwalder and Pigneur, 2010	The business model describes a rationale for how an organization creates, delivers, and captures value. This description identifies nine blocks: consumer segments, value proposition, channels, customer relations, revenues, essential resources, key activities, key partners, and cost structure.
Teece, 2010	A business model "articulates logic, data, and other elements that support the value proposition for the customer and a viable structure of revenues and costs that generate value for the company.
Zott and Amit, 2010	The business model is "a system of interdependent activities that transcend the company and cross its borders. This system of activities allows the company, aligned with its partners, to create and share that value.
Magretta, 2002	Business models are "stories that explain how companies work and answer the following questions: Who is the customer? What values the customer? It also answers the fundamental question that every manager must ask: What is the underlying economic logic that explains how we can add value to customers at an appropriate cost?
Geissdoerfer et al., 2016	Business models are "simplified representations of the elements and interactions between elements that an organizational unit chooses to create, deliver, capture and exchange value.
Massa, 2017	A business model describes an organization and how it seeks to achieve its objectives (profits, growth, social impact, etc.).

2.4 *Sustainability and sustainable development* (*SD*)

Sustainability is a concept that appears with growing frequency in the literature, but often with clearly different approaches. The literature is replete with attempts to define sustainability (Robinson, 2004), and there are many terms used in the literature, such as sustainable development, human sustainability, social sustainability, ecological sustainability, sustainability, environmental sustainability, and corporate sustainability, as well as aligned concepts of social responsibility and corporate citizenship. (Stubbs and Cocklin, 2008).

With the creation of the World Commission on Environment and Development (WCED), also known as the "Brundtland Commission", the United Nations released its report "Our Common Future" in 1987, emphasizing that after decades of commitment to industrialization, poverty still existed in many countries. It became clear that a way had to be found to harmonize ecology with economic prosperity. The report alerted the world to the

negative environmental consequences of the economic development model that prevailed. From these concerns arose the definition of SD as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs, ensuring a balance between economic growth, the care for the environment and social well-being" (UN, 2015).

According to Ribeiro Romeiro (2012), "to be sustainable, the development should be economically sustainable (or efficient), socially desirable (or inclusive) and ecologically prudent (or balanced)". Elkington (1998) considers that a sustainable society requires three conditions: renewable resources utilization rates must not exceed the regeneration rates; fees for the use of non-renewable resources must not exceed the capacity for developing renewable substitutes; and pollutant emission rates must not exceed the capacity for assimilation by the environment. In turn, for Dyllick and Hockerts (2002), sustainability represents the development and evolution of society toward a more prosperous and more comfortable world, in which the environment is preserved for future generations, adding value and gains in the present.

Sustainability is a concept that has become increasingly important in the business structure of organizations, and the consumer has shown increasing sensitivity to this. Its meaning is likely revealed in organizations' strategic objectives, emphasizing the importance of sustainable development in the socioeconomic field (Elkington, 2013). In the 1990s this same author introduced the term Triple Bottom Line (TBL), which initially was an accounting structure that innovated by introducing environmental and social dimensions in the measuring of companies' performance, also known as the 3 Ps: People, Planet, and Profit (Elkington, 1998). These three pillars of sustainability encourage companies to focus not only on the economic performance of their business but also to consider the environmental and social impacts that their activity has in the community and on the environment.

The *economic dimension* values business profit and stresses the way that people and companies satisfy their needs (Elkington, 1998). Catalisa (2003) contends that this dimension addresses the flow of investments, the compatibility between production and consumption patterns, the balance of payments, and access to science and technology.

In the *environmental dimension* companies prioritize actions that affect the ecology of the planet, for example climate change, the preservation of natural resources, and the prevention of toxic waste (Elkington, 1998). Catalisa (2003) observes that this dimension is linked to the use of natural resources, whereby the goal is to maximize the sustainability of resources by complying with current legislation, considering environmental impacts, producing and using ecologically responsible products, recycling, using clean technologies, and undertaking effluent and waste treatment.

The *social dimension* addresses actions and circumstances that affect society such as poverty, violence, injustice, education, public health, work, and human rights. Elkington (1998) reiterates that this pillar incorporates the issue of social responsibility. Catalisa (2003) highlights the problems related to improving quality of life, equity in wealth distribution, and reduction of social asymmetries.

Despite the differences in approach to the theme of sustainability, researchers are unanimous in presenting three pillars: the economic, the environmental, and the social. In the agrifood sector sustainability is based on these three dimensions. This is important because of this sector's direct impact on the environment and society. The value propositions of the agrifood sector can favour success in this threefold sustainability if they provide economic benefits to all actors involved in the value chain; encourage agro-diversity without causing damage to either producers' or consumers' environment; and allow for a diverse set of productive companies that reduce shortages, increase supply, eradicate excess, provide food diversity, and promote healthy eating (Galeano Revert et al., 2018).

3 Methods and Data Collection

This study used bibliometric review methods to extract primary data and analyze citations from other studies in order to obtain a more extensive and complete analysis of the knowledge accumulated in the field (Zupic et al., 2014).

3.1 *Data collection and extraction*

Data collection took place in January 2024. The authors searched documents published in Scopus (Elvesier) and Web of Science (Clarivate) databases. These databases were selected because they are the most used and most prestigious citation databases in the academic environment, providing indexing services for scientific citations for research articles in various publications.

The search terms were business model, innovation, sustainable development, and agribusiness. In order not to overlook potentially interesting and relevant articles for the topic under discussion, successive searches were carried out:

– "business model*" AND "innovat*" AND "sustainab*"
– "business model* innovat*" AND "sustainab*"
– "business model*" AND "innovat*" AND "sustainab*
– "business model* innovat*" and "sustainab* development"

A search of similar terms may contain overlaps and duplication of documents. Therefore, using the Boolean operators AND and OR, the four searches were combined into one search string to query the articles, abstract, and keywords:

> (("business model*" AND "innovat*") OR "business model* innovat*") AND ("sustainab*" OR "sustainab* development").

As this search string did not limit the activity sector, a final search was conducted

> (("business model*" AND "innovat*") OR "business model* innovat*") AND ("sustainab*" OR "sustainab* development") AND ("agr*" OR "agribusiness").

The same procedure was used with Web of Science.

The data were downloaded in two different files in the BibTeX format. RStudio software (version 4.0.3 from 2020-10-10) was then used to eliminate duplicate documents and create a unified database, and 251 documents were obtained. The bibliometrix package had to be downloaded into the software. Following the example of Aria and Cuccurullo (2017), the data were thereafter subjected to an analysis carried out with R Bibliometrix 3.0.

3.2 *Research results*

The final database was composed of 251 documents published in 186 different sources by 792 authors. The publication period runs from 2001 to 2023. Table 2 shows details.

A total of 792 authors were identified along with their academic contributions and achievements, such as publications, citations, and overall academic impact. In the 251 documents identified these 792 authors appear 827 times – this is designated the Authors' Appearance level, i.e., the frequency of an author's presence amongst publications and their inclusion in bibliometric datasets. Of the 792 authors, 34 are authors of single-authored documents and the remaining 758 are authors of co-authored documents.

With regard to authors' collaboration, of the 251 documents, 50 are single-authored. The average number of documents per author is 0.317, the average number of authors per document is 3.16, the average number of co-authors per document is 3.29, and the collaboration index is 3.77.

3.2.1 Volume, growth trajectory and geographic distribution

This section takes a bird's-eye view of discussing the knowledge base for literature relevant to business model innovation and sustainable development in agribusiness. By investigating the literature's volume, growth trajectory, and geographic distribution, this section aims to answer the first research question previously stated.

The documents analyzed have a period of more than 20 years, between 2001 and 2023. The growth trajectory can be separated into two significant periods of 10 years each. The first period (2001–2011) can be seen as the foundation stage of BMI+SD in agribusiness literature, with only 37 published articles. In the second period (2012–2023), 214 documents were published, representing an average of 21 papers per year.

As reflected by the number of documents published during this time, companies became more concerned about sustainability, which has become vital to preserving the environment and organizational sustainable development and growth. It is also important to mention that, generally, there has been an increasing interest in business model innovation (Vatananan-Thesenvitz, 2019). This author also mentions that the "main topics discussed in this period range from business model innovation to co-creation and strategic planning for sustainable development". Figure 1 shows the growth trajectory of the BMI+SD in agribusiness literature over the past 20 years, whereby a greater interest can be noted in the last decade, during which the volume of published papers increased substantially compared to the earlier period.

This evolution easily reflects different factors, one of them being the globalization of the economy, which forced organizations to find new ways of surviving and thriving – business model innovation being a solution. Society is also increasingly aware of environmental problems, thereby making the sustainability concept important. There is the possibility of joining BMI and SD into a new concept of "sustainable business model innovation." The falling number of publications in 2021 is strongly related to the COVID-19 pandemic, which influenced not only research priorities but also the

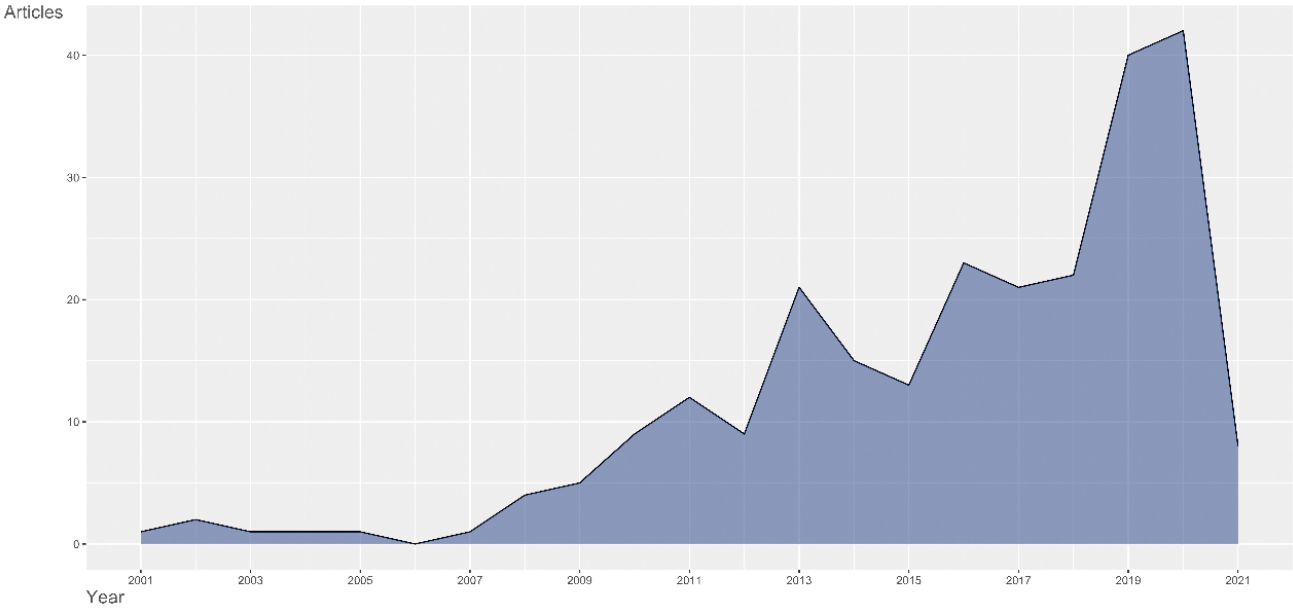

FIGURE 1 Growth trajectory of the BMI+SD in agribusiness literature, 2001–2023 (n = 251)

ability to carry out experiments, collect data, and produce academic output. Note, too, that in 2021 many concepts about sustainable business models and sustainable development in agribusiness were already relatively well established. The period from 2020 to 2021 was marked more by theoretical consolidation and less by new innovative paradigms for the sector. In other words, there was a greater emphasis on implementing existing practices and concepts, with fewer publications focused on new approaches or disruptive models.

TABLE 2 Database description

Database items	Results
Timespan	2001:2023
Sources (Journals, Books, etc.)	186
Documents	251
Average years from publication	5,07
Average citations per document	6,781
Average citations per year per doc	1,238
References	10749
Document types	
Article	136
Book	4
Book chapter	20
Conference paper	60
Conference review	15
Editorial	1
Erratum	1
Note	1
Retracted	1
Review	12
Document contents	
Keywords Plus (ID)	1420
Author's Keywords (DE)	847
Authors	
Authors	792
Author Appearances	827
Authors of single-authored documents	34
Authors of multi-authored documents	758
Authors collaboration	
Single-authored documents	50
	Median
Documents per Author	0,317
Authors per Document	3,16
Co-Authors per Documents	3,29
Collaboration Index	3,77

Geographic distribution reveals the countries that were most productive in publishing BMI+SD in agribusiness documents. Although the geographical distribution based on the country of the corresponding author provides valuable information on research productivity amongst countries, it may include biases related to the role of the corresponding author. The top five most productive countries accounted for 49% of the papers

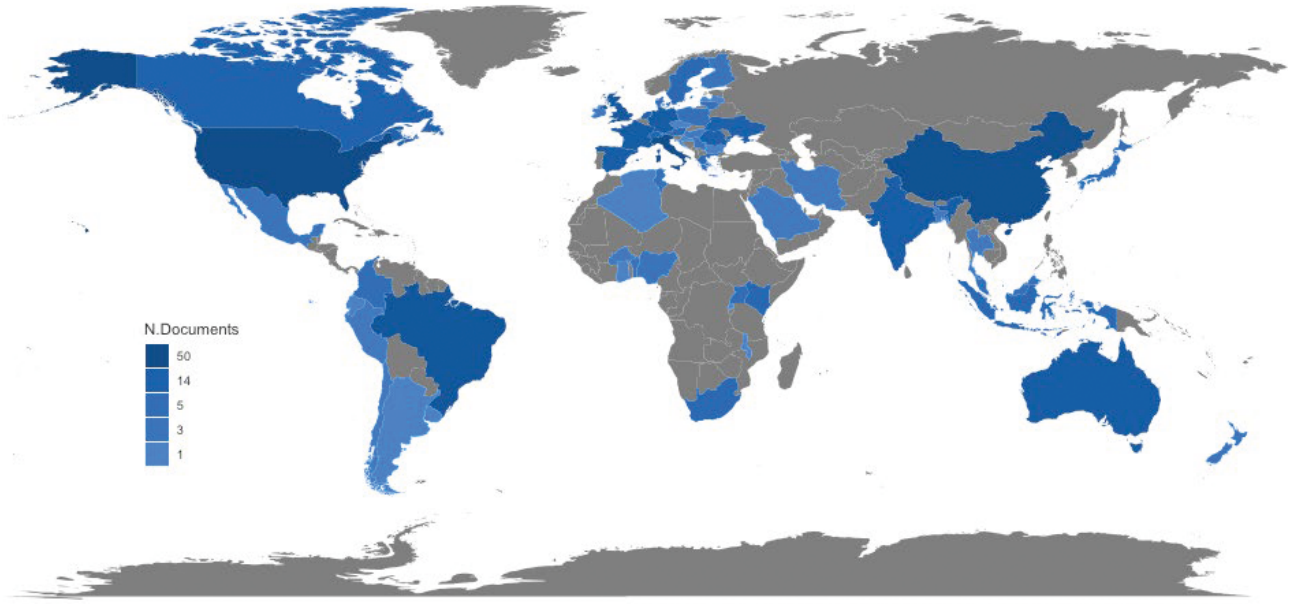

FIGURE 2 Country scientific production

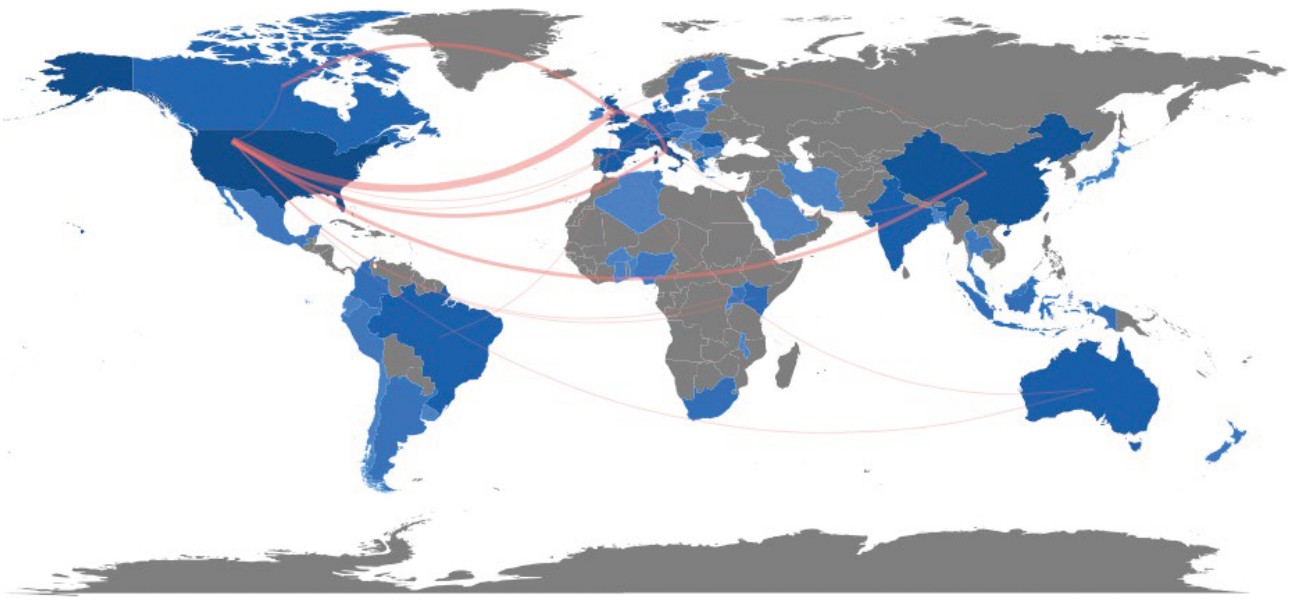

FIGURE 3 Country collaboration map in social science and management

published: the USA (14%), Italy (12%), China (10%), Brazil (7%), and the UK (6%). The top 20 most productive countries and 11 European countries produced 50% of the documents published. Although the USA greatly contributes to the total BMI+SD publications in agribusiness, the most-cited country is the Netherlands, followed by the UK, Italy, and China. The USA is in fifth place in terms of citations. The other country that registered more than 100 citations is Sweden, in sixth place, as shown in Table 3.

The world map in Figure 2 presents the countries' scholarly production for BMI+SD in agribusiness.

TABLE 3 Most cited countries (2001–2023)

Country	Total citations	Average article citations
NETHERLANDS	232	33,14
UK	215	16,54
ITALY	145	7,63
CHINA	131	7,71
USA	115	8,21
SWEDEN	101	20,20

Several countries establish collaboration links that indicate a common trend in management and social science literature publications (Figure 3). The USA has collaborations with 18 countries. The thickness of the arrows represents the number of co-authored documents between the connected countries.

3.2.2 Analysis of influential journals, authors, and documents

This section analyses the most influential journals, authors, and documents in the BMI+SD in agribusiness literature. One hundred and fifty-six journals published 251 in the sample. The top twenty journals account for about 31% of the publications. By far, the most significant number of publications is from *Sustainability* (17), followed by the *Journal of Cleaner Production* (11). These two journals complemented by the journal on *Environment, Development and Sustainability* and the *British Food Journal* have the highest impact as reported in table 4.

The relevance of the journal Sustainability and the Journal of Cleaner Production is further demonstrated in figure 4 which presents the growth in relevant publications for various journals. Another strength of bibliometric analysis is the possibility of distinguishing the critical authors of a specific research field. Figure 5 gives an overview of the co-citation network. The size of each rectangle indicates the relevance of the authors' publications (the more significant the rectangle is, the more citations the author has) in BMI+SD in agribusiness. A co-citation network maps the co-occurrence of citations of two articles in the same publication. In other words, when two articles are cited in the same research paper, this generates a co-citation, establishing a link between these articles. Nodes (vertices) represent the articles or authors, and edges (connections) represent the co-citations between the articles or authors. If two articles are cited in many papers, the edge between them will be more decisive. The more often two articles or authors are cited, the stronger the connection between

TABLE 4 Sources impact (2001–2023)

Source	h_index	g_index	Total citations
Sustainability (Switzerland)	7	13	174
Journal of Cleaner Production	6	11	145
Environment, Development and Sustainability	4	4	101
British Food Journal	2	3	18

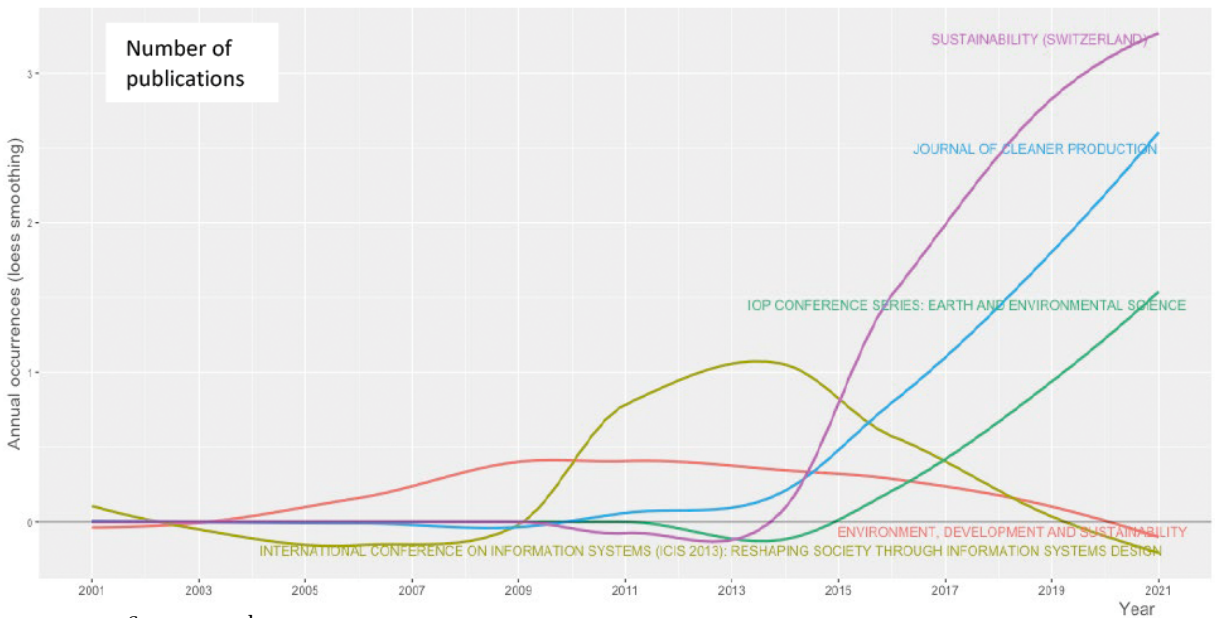

FIGURE 4 Source growth

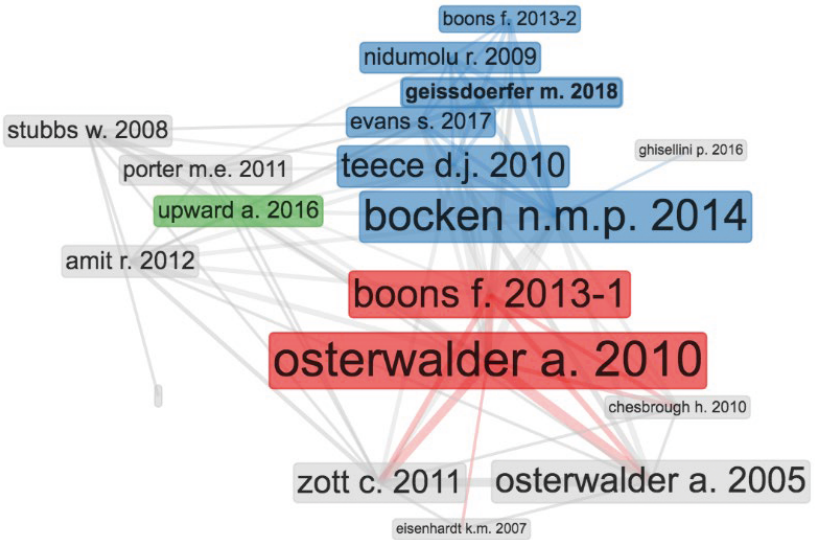

FIGURE 5 Co-citation network

TABLE 5 Top ten most cited documents, 2001–2023

Document	Total citations
Liu Y, 2018, Dili Xuebao/Acta Geogr Sin	102
Nosratabadi S, 2019, Sustainability	68
Adekunle AA, 2012, World Appl Sci J	48
Rodriguez D, 2014, Agric Syst	42
Zucchella A, 2019, Bus Strategy Environ	38
Stewart RB, 2013, Clim Change	38
Raman S, 2014, Biomass Bioenergy	37
Raman S, 2014, J Clean Prod	35
Karlsson NPE, 2017, J Clean Prod	31
Koval V, 2019, Entrep Sustain Issues	26

them can be visualized as a thicker 'link' between the nodes.

Table 5 shows the most cited documents in BMI+SD in agribusiness over the years.

3.2.3 Topical trend in the research field of business model innovation and sustainable development in agribusiness

The third research question has to do with identifying the topical trend in the research field of BMI+SD in agribusiness. Figure 6 is the thematic map obtained from R-bibliometrix software and shows the core themes of the dataset and their connections between the authors' keywords of the documents analysed. The themes in the top left quadrant (Niche themes) are well-developed but less central to the broader research field. They are specialized and play a key role in specific areas of study. An example is "Agricultural Extension". The bottom left quadrant (Emerging or declining themes) shows nascent research areas with growth potential or older topics that are in decline. Examples are the "Agroindustrial complex" and "Agricultural System". The top right quadrant (Driving themes) identifies highly relevant and well-developed themes that drive the field of research and serve as fundamental pillars for future studies. These are "Agribusiness", "Property", "Social Sustainability", "Sustainability assessment", "Biomass", "Social innovation", and "Sustainable development".

The bottom right quadrant (Basic Themes) shows themes with significant potential for further exploration

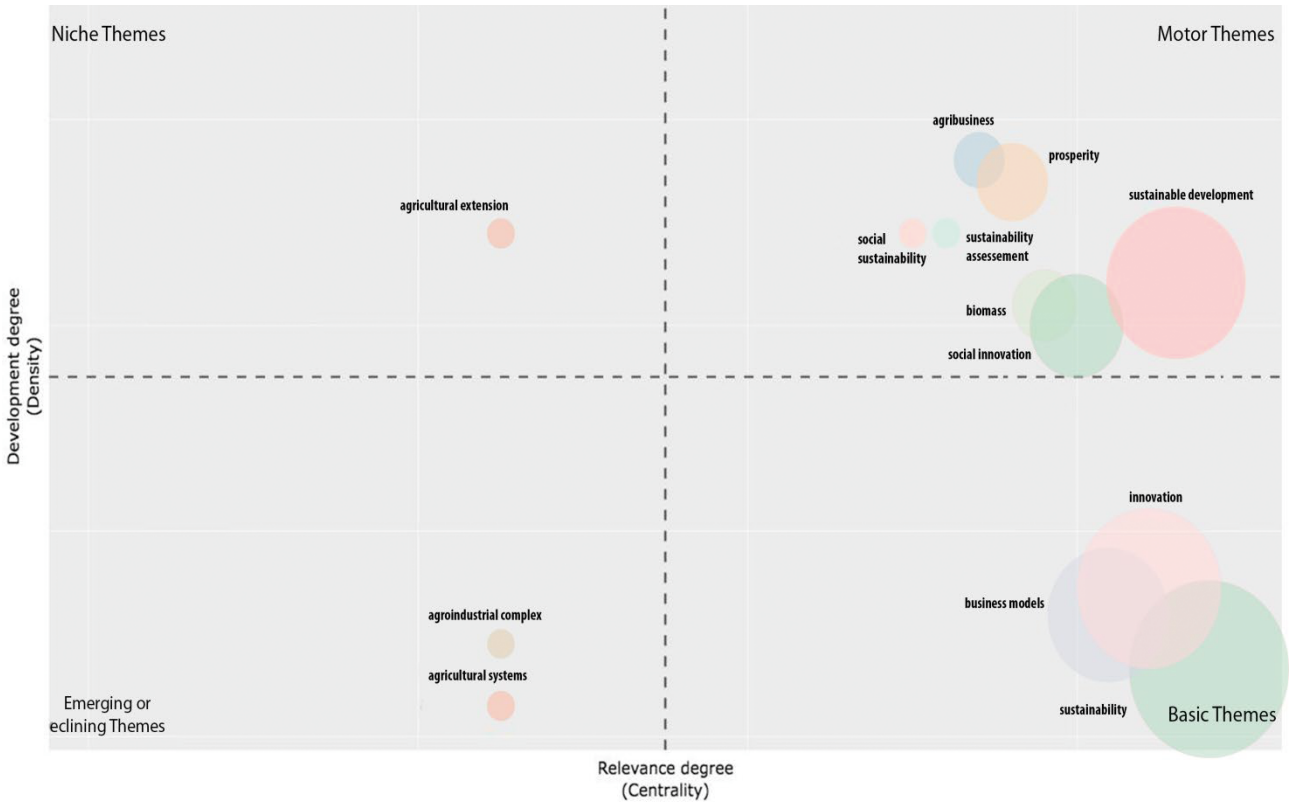

FIGURE 6 Thematic map – authors' keywords

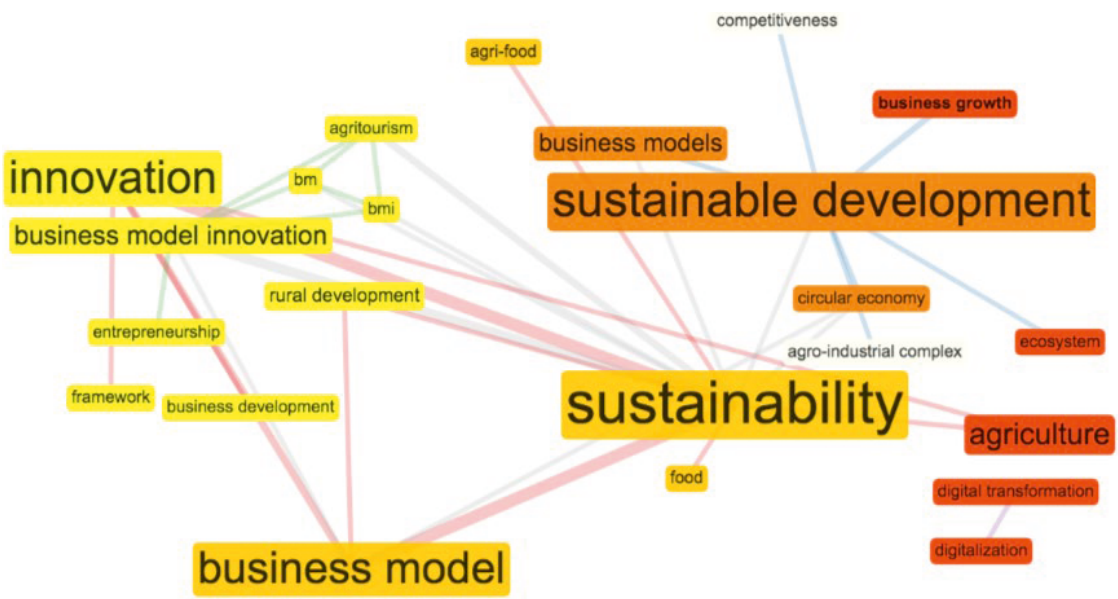

FIGURE 7 Co-occurrence network – authors' keywords

and development. They often serve as seminal or emerging topics. These are "Innovation," "Business models", and "Sustainability". The co-occurrence network shown in Figure 7 confirms the linkages, interdependence, and relevance between business models, innovation, sustainability, and sustainable development. According to Figure 8, sustainable development is the keyword having the most growth in recent years. Agriculture and innovation are also of importance.

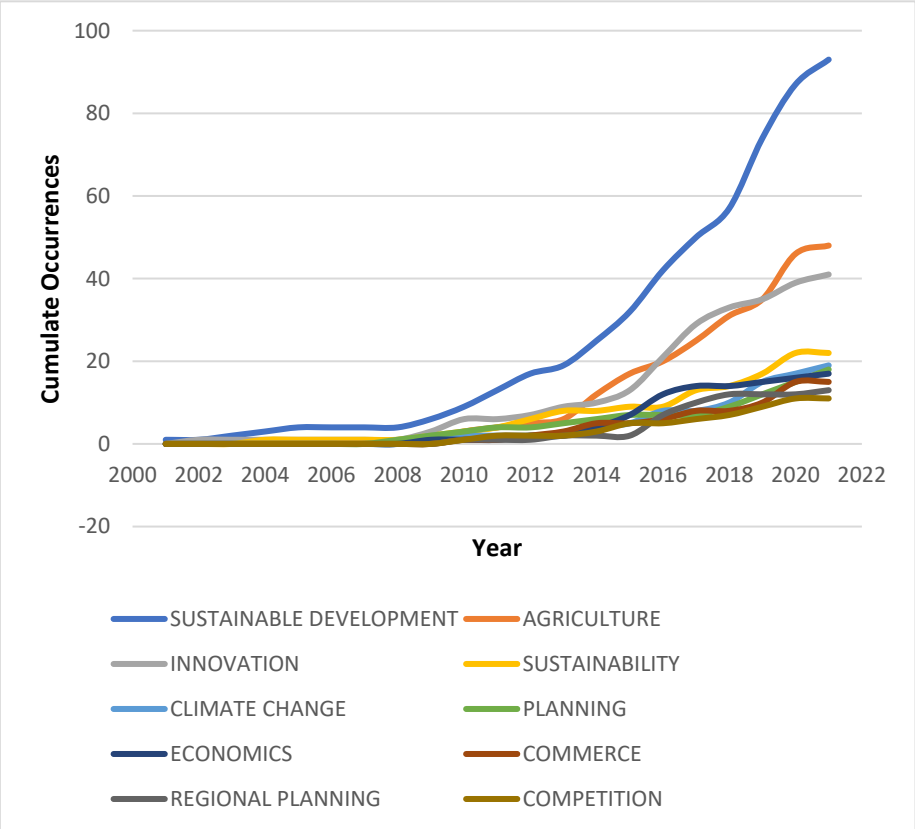

FIGURE 8 Keyword dynamics

4 Discussion

4.1 *Sustainable development and agribusiness*

Society, in general, faces multidimensional challenges related to sustainability and technological progress calling for substantial changes in the competitive landscape. Agribusiness, in particular, faces multidimensional sustainability challenges, including a growing scarcity of elementary resources such as water and land, soil erosion, and the loss of biodiversity. Additional pressures arise with population growth and the intensified demand for food, the manifold and complex consequences of climate change, a lack of workforce, and economic pressure due to the concentration of global markets (Böll Foundation et al., 2019).

The 2030 Agenda for Sustainable Development seeks to stimulate sustainability and sets the following priorities: nutrition for sustainable and healthy diets, intelligent and environmentally sustainable food systems, circularity of food systems, and innovation and empowerment of community (UN, 2015). In agribusiness, sustainable development means adopting practices that balance economic viability, environmental health, and social equity. This balance can be at least partially achieved by ensuring that workers in the agricultural sector are treated fairly, have safe working conditions and fair wages, and enjoy respect for their rights. This would improve everyone's access to sufficient, safe, and nutritious food to maintain healthy and active lives, as well as support the overall well-being of farming communities through education, healthcare, and infrastructure development.

By working for improvement in these areas, agribusinesses can play a significant role in achieving the sustainable development goals set out in the 2030 Agenda, ensuring that agricultural practices are resilient, equitable, and capable of supporting a growing global population.

4.2 *Innovation and agribusiness*

Innovation is a crucial factor in bringing SDGs into agribusiness in an effective way. Innovation is today a central factor in economic growth and productivity. The ability to innovate is a strategic tool for companies wishing to maintain their competitive position in the global market (Olsen et al., 2012). Innovation has become one

of the driving forces of business and the entire economy (Fiore et al., 2017). The world population faces significant global challenges caused by the growing demand for food associated with population growth. These challenges call for innovation in agribusiness to ensure food security and to improve the sustainability of the environment (Soldano, 2019). Agribusiness is complex, and it is not always easy to categorize innovations, to understand innovation patterns, or the factors for developing innovation processes within the agrifood sector. There is clear evidence that innovation is one of the essential instruments for increasing the sector's competitiveness nationally and internationally, as well as evidence that small agrifood companies can make a valuable contribution to the sustainable development of regional and local economies (Capitanio, 2010).

Companies in all sectors must address social and environmental issues explicitly, adopt innovations in their business models, and adapt their activities to them. The various economic agents in agribusiness are no exception since they, too, have been called upon to face numerous and diverse challenges in recent years, and this trend will continue in the future as well (De Bernardi and Tirabeni, 2018).

Thus, while for decades issues of sustainability and their social and environmental effects were not priorities incorporated in most business models, today there is greater pressure on companies to integrate sustainability into their business goals and to build a more sustainable economy (Nosratabadi et al., 2019).

4.3 *Business model and agribusiness*

Business models, as conventionally defined, have undergone changes, encouraging them to meet SDGs but maintaining productivity and profit. The concept of sustainable business innovation models is aligned with value creation according to the Tripple Bottom Line (TBL) (Dyllick and Hockerts, 2002) and seeks to promote proactive and innovative management that meets sustainability goals in the long term (Evans et al., 2017).

Although the concept of business model has been studied for decades, regarding agribusiness it is still relatively new. Most research depicts the business model as an output but some include an approach related to the process, which can be seen from either a static or dynamic perspective in the business models. If companies are classified according to their business models, under a static perspective they obtain alternative views about an industry or group of companies. From a dynamic perspective, developing a business model is an initial experimental process that is successively changed, supported by learning through trial and error. The static and dynamic perspectives are two complementary perspectives to understand the maturity and complexity of the business model in agribusiness. While the static perspective covers the output and final business model in a certain period, the dynamic perspective enhances understanding of the complexity of creating a sustainable business model. The dynamic perspective contributes to a more profound knowledge in the initial phase of the business or when a company wishes to enter a new market (Barth et al., 2017).

4.4 *Sustainable development and business model innovation*

Companies in the agrifood sector are under increasing pressure to adopt sustainable business models that consider economic, social, and environmental aspects. Innovative and sustainable business models are a potential answer to the current financial and ecological challenges and those that lie ahead (Ulvenblad et al., 2018). Using a conceptual structure related to innovation-oriented sustainability (Adams et al., 2016) and the eight sustainable business model archetypes (Bocken et al., 2014), Ulvenblad et al. (2019) reported on the innovation practices in sustainability and sustainable business models in Sweden, a country often pointed to as an example in food production. The author concluded that companies there have a focus on sustainable business, which is not limited to operational optimization but also extends to organizational transformation – seeking to obtain more with less effort.

The increase in global competition and the ongoing technological developments in the agrifood sector are facts. Because greater productivity becomes ever more imperative in the agrifood sector, business agents there should adopt a more innovative and focused sustainability strategy. Companies that have best dealt with these challenges through the differentiation of their businesses usually follow business models of diversification, cooperation, or knowledge networks. The interaction with society through greater community involvement and the focus on environmental issues are characteristics of these sustainable business models, while one of the limitations in the sector is excessive concern for profit (Barth et al., 2017).

Note that this work has a limitation associated with the keywords used for the research that may influence the results obtained. In future studies keywords related to sustainability and sustainable development should

be considered, such as "social or environmental development", so that additional articles can be included for analysis and bias avoided.

5 Conclusions

This article identifies critical links, common points, and future interdisciplinary topics between business model innovations and sustainable development in agribusiness. The research is based on a bibliometric and systematic literature review of business model innovations related to sustainable development in agribusiness in 251 documents published in journals indexed in Scopus and Web of Science.

The EU innovation program "Horizon 2020" and the United Nations' sustainable development goals prioritize research and innovation in food security and sustainable agriculture, assuming that they can help to improve the nutritional quality of food and, consequently, produce positive health effects. Agricultural and food systems worldwide must become more productive, resource-efficient, and less expensive.

This article examines business model innovations and sustainable development in agribusiness, presenting them as a means of answering the social, economic, and environmental challenges that lie ahead. By the year 2050 food production throughout the world must increase by 70%. Sustainable development efforts in the agrifood sector help to improve people's diets and can affect health in a positive way. Future studies might profitably examine case studies related to the implementation of SDGs in agribusiness, and/or investigate other activity sectors in order to compare them with agribusiness.

It is worth mentioning the dominant role that sustainable business models can play considering the current scenario in agribusiness. Competition is felt worldwide, technological advances are increasingly important, and there is a trend toward concentration whereby fewer and larger companies remain in the market. It is increasingly agreed that business models focused solely on profit have strong imitations, but what are the business model innovations that can enhance sustainable development in agribusiness? Researchers still need to answer this question fully, and this, therefore, is the path of future investigation. The following steps highlight the need to identify and analyse case studies concerning this subject.

It is essential to undertake research addressing agribusiness explicitly, since it has characteristics that differ from many other industries, notably the prevalence of SMEs. Researchers should endeavour to determine how these firms can become more sustainable through SDG implementation.

Innovative business models allow companies to compete in world markets, especially models based on networks and clusters. The ability to move quickly and with success in new business models is an essential source of sustainable competitive advantage and a key lever to improve the performance of organizations. A more in-depth analysis of barriers to implementing innovative business models may be a productive path for future studies.

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