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Collaboration for the sustainable food supply chain: A bibliometric analysis

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Abstract

There is increasing attention on the topic of collaboration for sustainable food supply chains (SFSCs), with increasingly contributing journals and publications every year. The urgency of this topic is even more highlighted due to the COVID-19 pandemic and the more recent energy and food crisis. Hence, the field needs to have a good portrait of the ongoing research in this area and to better understand future research directions to enable optimized future strategic plans and problem-solving capability of effective collaboration for SFSCs. This paper reviews, analyses, and synthesizes the current state of research into collaboration for SFSCs. We examine a sample of 528 articles identified from the Scopus and Web of Science databases using bibliometric analysis methodology. We identify four research clusters: collaboration and sustainable supply chain management, emerging markets and resilience, digital technologies, and perishable food products. This paper clarifies interrelated themes and identifies a range of topic areas that still demand further investigation.

KEYWORDS
bibliometric analysis, collaboration, food industry, network analysis, supply chain, sustainability

1 | INTRODUCTION

Recent disruptive events have provided compelling evidence that transforming food supply chains (FSCs) for sustainability is crucial for achieving sustainable development goals (SDGs) (Gómez & Lee, 2023). FSCs primarily include two main products: fresh foods (e.g. fresh fruits) and processed foods (e.g. ready-to-eat meals) (Zhu et al., 2018). Compared to other supply chains, FSCs have some unique characteristics, such as the perishability of food products, supply uncertainties due to climate change or ineffective food production practices, and variations in consumer demand (Krishnan et al., 2022). Typically, FSCs focus on the economic performance of the whole chain (Li et al., 2014). However, disruptive events (e.g. the COVID-19 pandemic, unpredictable weather patterns due to climate change and wars), have worsened the food waste situation, raised concerns about food shortages, and have put a significant strain on the already stretched FSCs, making food products more expensive and less accessible (Sezer et al., 2024). Consequently, recent studies have focused on approaches to make the FSCs more sustainable through innovations (Rogers & Dora, 2024) and changing farming practices (Gómez & Lee, 2023). Sustainable FSCs (SFSCs) are defined as the management of information, materials, activities, and capital flows along FSCs while considering three dimensions economic, environmental, and social goals (Beske et al., 2014). Previous studies commonly underlined that FSCs are dynamic and complex networks with high numbers of partners (e.g. farmers, producers, and governments) and associated connections among these partners (Sezer et al., 2024). These partners

Abbreviations: CE, Circular economy; DCV, Dynamic capability view; FSCs, Food supply chains; PFPs, Perishable food products; PFSCs, Perishable food supply chains; ROT, Resource orchestration theory; RQ, Research question; SDGs, Sustainable development goals; SFSCs, Sustainable food supply chains; SMEs, Small and medium enterprises; SSCM, Sustainable supply chain management; WoS, Web of Science.

need to collaboratively take urgent actions to seriously stabilize food prices, ensure food security, and improve food sustainability (Santos et al., 2023). Hence, collaboration, a key factor in this process, enables information, resources, and knowledge sharing between partners within FSCs, making FSCs more sustainable (Camel et al., 2024).

Generally, collaboration includes two facets: cooperation which refers to an alignment of interests and values among partners to reach a common goal, and coordination which refers to an alignment of parties' actions and tasks to identify a common goal (Roehrich et al., 2024). The literature on collaboration for a sustainable food supply chain (SFSC) is broad but mostly focuses on two main streams in the literature. The first stream focuses on the effects of collaboration on the SFSC, e.g. enhancing food safety and quality (Zhao et al., 2021), reducing food loss and waste (Nader et al., 2022), and enhancing food security (Golgeci et al., 2022). The second stream focuses on factors that influence collaborations. This stream defines trust, incentives (Kam & Lai, 2018), firm strategy (Zaridis et al., 2021), collaborative behavior (Dania et al., 2018), and farmer willingness (Anastasiadis & Poole, 2015) as some of the factors affecting collaborations in FSCs. To benefit from collaborations, firms need to develop capabilities, change operational processes, and even restructure for collaboration (Blome et al., 2014). Small firms may be reluctant to collaborate for fear of becoming dependent on another firm (Matopoulos et al., 2007). Regulation is another challenge for international collaboration, as firms have to meet different standards and certifications in different countries (Despoudi et al., 2021). The diversity of the literature indicates a high level of interest in SFSCs (Oyedijo et al., 2024).

However, the current business environment is changing faster than ever with unprecedented sustainability challenges. According to The Global Risk Report 2022, there are 37 types of global risks that can cause significant impacts on industries and countries (WEF, 2022). Once a disruption occurs, it can lead to regulations, policies, and behavioral changes that challenge the collaboration. Although supply chain collaboration is largely a well-developed domain, current circumstances are forcing us to rethink and refocus on collaboration as a potential way to address many of the challenges in the food industry (Aarikka-Stenroos et al., 2022; Sahu et al., 2023). A comprehensive review of collaboration for SFSC is therefore needed, given the diversity of the literature and the current highly complex business environment.

This paper is a timely response to the urgent calls to investigate sustainability in supply chains, particularly after the COVID-19 pandemic (Silva et al., 2023), and the emerging need to study collaborations along FSCs (Dong et al., 2023). Some prior works help to build research foundations and identify facets that need further investigation to address the compelling challenges currently faced by FSCs (Choudhary et al., 2023). For example, Cloutier et al. (2020) investigated the role of collaboration in sustainability-oriented supply chain initiatives. Siems et al. (2021) focused on how to build SFSCs with a dynamic capabilities lens. Moreno-Miranda and Dries (2022) incorporated coordination mechanisms and analyzed the assessment of FSC sustainability. These papers focused on a specific aspect of the topic and encouraged further reflection on FSC sustainability. For example, the social dimension of sustainability is still at an early stage and requires further consideration (Cloutier et al., 2020). Therefore, a thorough review is needed to gain a comprehensive understanding of SFSCs and the role of collaboration in enhancing sustainability and to pave the way for future research on SFSCs. Particularly, we seek to answer three research questions:

RQ1. What are the foundations and theoretical themes of the field of collaboration for SFSCs, and how have theoretical themes in the field developed and evolved over time?

RQ2. What are the main research clusters associated with the field of collaboration for SFSCs?

RQ3. What are the future research directions in the field of collaboration for SFSCs?

To answer these questions, this research follows an insightful bibliometric analysis approach (Chabowski et al., 2022), a powerful method for identifying established and emerging topic areas (Khare & Jain, 2022). It adopts a quantitative approach for the mapping analysis and represents a transparent and systematic process (Mura et al., 2018). Also, given the rapid growth of literature on this topic, many articles have been published in various journals. Thus, conducting a bibliometric analysis could systematically summarize different strands of literature, map main research themes, and identify future research directions.

This paper is structured as follows. The second section presents the methodology that we adopted in this research. The paper then presents findings from the bibliometric analysis. This is followed by future research directions discussed in the fourth section. Finally, the fifth section offers conclusions, identifies important future research directions, and points out research limitations.

2 | METHODOLOGY

Bibliometric analysis is a common method for systematically constructing a structural overview of a research topic (Khare & Jain, 2022). Numerous studies have employed bibliometric analysis in different disciplines to summarize the development of the literature, and recently it has been adopted in business and management (e.g. Chabowski et al., 2022; Vogel et al., 2022). This method allows us to investigate the evolution of a research field and shed light on future research areas (Donthu et al., 2021).

Data were retrieved from Scopus and Web of Science (WoS), the most common bibliographic analysis databases (Mura et al., 2018) in July 2022. To initiate this process, we examined and adopted four sets of keywords from recent review works on supply chain collaboration, sustainability, and the food industry (Beske et al., 2014; Dania et al., 2018). The first set of keywords relates to supply chain (e.g. "supply chain", "supplier", "value chain", and "logistics"). The second set of keywords refers to collaboration (e.g. "collaboration",

"integration", "cooperation", "joint planning", "joint product development", and "coordination"). The third set relates to sustainability (e.g. "green", "sustainable", and "sustainability"). The final set refers to food (e.g. "food", "agri", and "agro").

On Scopus, the search was carried on "Title-Abstract-Keywords". The queries resulted in 3,027 documents. To ensure the consistency and quality of the sample publications, we only focused on 338 peer-reviewed journal articles published in English and in the "Business, Management and Accounting" area. On WoS, the search was carried on "Topic", which resulted in 1,908 documents. We only selected 305 "Article", "Review article", and "Early access" journal articles published in English and in "Business Economics", and "Operations Research Management Science" research areas. In total 643 journal articles from Scopus and WoS were identified. After removing 115 duplicates, the final sample includes 528 journal articles.

Several software (e.g. BibExcel, CiteSpace) support bibliometric analysis. However, they do not assist researchers in a completed analysis. Thus, this research adopts *bibliometrix*, an R-package, that could perform comprehensive science mapping analyses (Aria & Cuccurullo, 2017). We follow the process of adopting *bibliometrix* outlined in Khare and Jain (2022). Bibliographic information from 528 articles was downloaded from Scopus and WoS and was imported to *bibliometrix*.

3 | RESULTS

The findings of this research reveal the breadth of the area, main research themes, and the research agenda on this topic area. First, we present results from citation analysis, such as the most cited documents and the publication trend. Second, we examine the research topics obtained through co-citation analysis and bibliographic coupling.

3.1 | Descriptive analysis

The sample includes 528 articles published in the period 1997–2022, written by 1,557 authors. Forty articles were single-author articles, and 488 were multi-author articles. Around 24% of the samples are international co-authorship articles. Figure 1 presents the publication trends in the sample. The publication was scarce until 2013. Then, there is increasing attention in this field. This pattern in the food industry is relevant to the increasing attention to supply chain collaboration and sustainability in general (Marty & Ruel, 2024).

Articles in the sample were published in 186 journals. The top 10 journals (Table 1) published 203 articles out of a total of 528 articles, representing approximately 28% of all articles. *Journal of Cleaner Production (JCP)* contributed the highest number of publications (95 articles), followed by *Supply Chain Management: An International Journal (SCMIJ)* (15 articles). The list also includes *Business Strategy and the Environment (BSE)*, *International Food and Agribusiness Management Review (IFAMR)*, *Production Planning and Control (PPC)*, and the *International Journal of Production Economics (IJPE)*.

A high number of studies were conducted by authors based in the UK (106 occurrences), the USA (86 occurrences), China (55 occurrences), India (50 occurrences), and Italy (48 occurrences). Not many

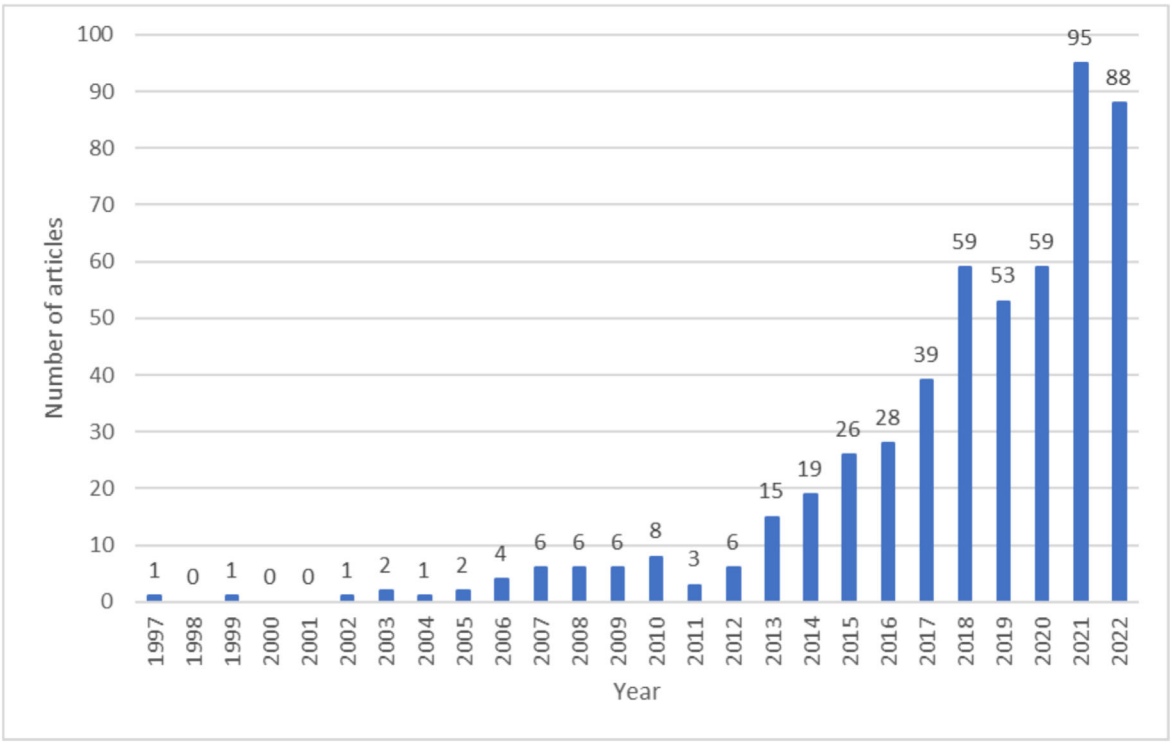

FIGURE 1 Total number of articles on collaboration for SFSCs published by year.

authors are based in Asian countries (apart from China and India) and African countries, which might be explained by the underdeveloped infrastructures for SFSC, and, hence, limited research in those countries. However, since African and Asian countries are vulnerable to climate change, more research should focus on these regions to support the achievement of sustainable development goals.

3.2 | Citation analysis

Citation analysis assumes that researchers cite publications based on the publication's importance and relevance (Donthu et al., 2021). Highly cited authors and articles influence and shape the research area. Table 2 presents the 10 most cited articles within the sample. The local citation is the number of citations by other articles within the 528 sample articles. The global citation is the total citations in the whole WoS and Scopus databases. The difference between local and global citations indicates the attention paid to an article from other disciplines. The sample's top-cited articles are review works that provide critical analysis of SFSCs and offer insights for building SFSCs (e.g. Beske et al., 2014; Govindan, 2018).

TABLE 1 Top journals most frequently published.

Journal	No. of articles
Journal of cleaner production	96
Supply chain management: An international journal	15
Production planning and control	14
Business strategy and the environment	14
International journal of production economics	12
British food journal	11
World development	10
Journal of agribusiness in developing and emerging economies	10
International journal on food system dynamics	9
International journal of logistics management	7
International journal of logistics research and applications	7
Annals of operations research	7
Food policy	7
International food and agribusiness management review	7

3.3 | Co-citation analysis

Co-citation analysis measures the frequency of any two articles being cited in a third article (Marty & Ruel, 2024). This analysis is used to identify the foundations of a research field. The assumption is that researchers cite works based on their relevance and similarity (Donthu et al., 2021). The more frequently the two articles are cited by other articles, the more likely they belong to the same cluster. We conducted a document-based co-citation analysis by using the *biblioNetwork* function in *bibliometrix*. Figure 2 presents three research foundations identified from co-citation analysis.

3.3.1 | Foundation 1: sustainable supply chain management

Foundation 1 represents sustainable supply chain management (SSCM). The most commonly adopted methodologies in this foundation are case study (Yin, 2009) and theory development (Eisenhardt & Graebner, 2007). The most frequently cited article in this cluster is Seuring and Müller (2008), which offers a comprehensive literature review and a conceptual framework for SSCM. While sustainability receives much attention, theory-building studies for SSCM remain scarce (Touboulic & Walker, 2015b). Additionally, sustainability studies primarily consider the economic aspects of sustainability. The social aspect of sustainability is still rare, which deserves more focus in future research to better understand the trade-offs to develop more comprehensive sustainable supply chains (Sudusinghe & Seuring, 2022).

TABLE 2 Top articles based on local and global citations.

Articles	Local citation	Global citation in WoS	Global citation in Scopus
Beske et al. (2014)	30	414	536
Govindan (2018)	21	183	242
Mangla et al. (2018)	18	138	175
Touboulic and Walker (2015a)	17	116	133
Gold et al. (2013)	11	146	168
Walker and Jones (2012)	10	261	340
Genovese et al. (2017)	9	507	649
Kittipanya-ngam and Tan (2020)	7	65	101
Touboulic et al. (2014)	7	157	192
Dania et al. (2018)	6	107	129

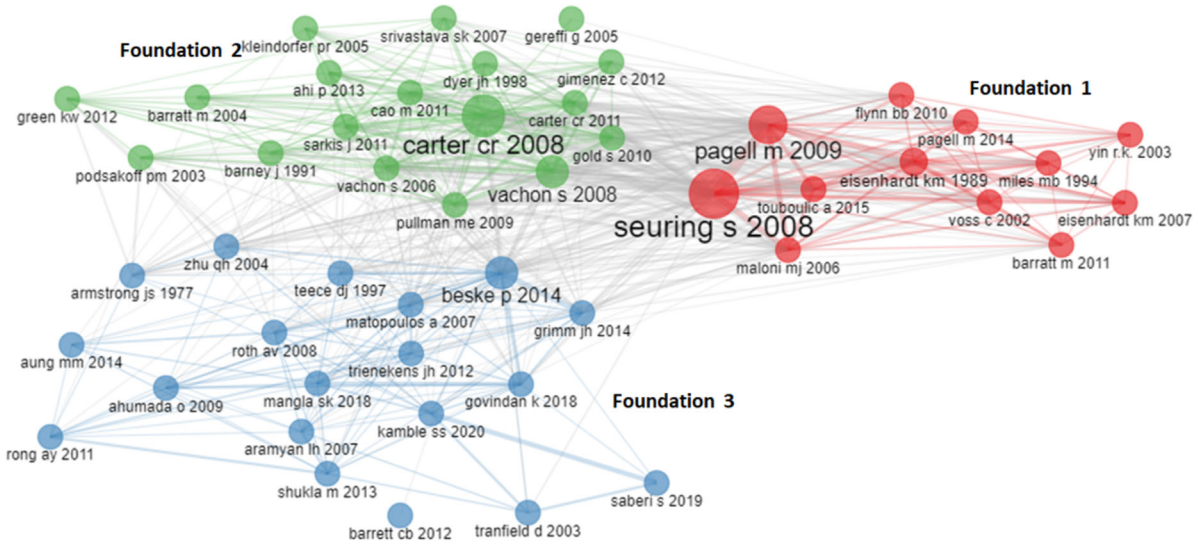

FIGURE 2 Co-citation network of articles.

3.3.2 | Foundation 2: collaboration for sustainability

Foundation 2 represents collaboration for sustainable supply chains. For firms attempting to move to sustainability, they must extend their management efforts across their supply chains (Vachon & Klassen, 2008). Collaboration across the supply chain increases transparency, improves economic sustainability, and reduces the consequences of high resource dependence (Carter & Rogers, 2008). Collaboration helps firms leverage knowledge and resources and improve performance (Cao & Zhang, 2011). Foundation 2 mainly examines the environmental collaboration activities, which generate valuable inter-organizational resources and sustained inter-firm competitive advantages (Gold et al., 2010).

3.3.3 | Foundation 3: sustainable food supply chains

Foundation 3 discusses SFSCs. Beske et al. (2014), the most influential work in this cluster, offers insights into sustainability practices in the FSC to address increasing concerns about food security and safety. Mangla et al. (2018) identified 10 important enablers for SFSCs from rigorous literature review and suggested information inaccuracy, lack of transparency and inadequacy of management as significant issues in SFSCs. Emerging technologies, such as big data analytics, blockchain, and IoT, have the potential to facilitate SFSCs (Kamble et al., 2020). Additionally, foundation 3 highlights the importance of supply chain collaboration in the context of FSCs, which focus more on maximizing revenue and customer satisfaction but focus less on food waste reduction (Shukla & Jharkharia, 2013). Matopoulos et al. (2007) revealed that the structure of the food industry and the nature of food products impinged the intensity of collaboration.

3.4 | Conceptual structure

Conceptual structure analyses the co-occurrence of words or terms extracted from titles, abstracts, or keywords. It helps identify the important themes within a research area and the evolution of these themes over time (Khare & Jain, 2022). Our review analyses the conceptual structure based on the co-occurrence of keywords within 528 articles. The themes identified from the conceptual structure were plotted into the composite thematic map consisting of centrality and density. Centrality measures a theme's importance, whilst density measures themes' level of development (Callon et al., 1991). The details of these themes are presented in Figure 3. The bubble size represents the number of words occurring. For each bubble, we include the top three keywords with the highest occurrence value. Each theme can be interpreted based on its position on the map.

"Sustainability", "sustainable development", and "food industry" are **basic themes**, which are highly relevant but less developed in the research field. Topics under basic themes include "innovation", "circular economy", "sustainable supply chain", "supply chain", and "agriculture". The basic themes indicate that these topics are underdeveloped in the field. Thus, they have the potential for future research.

"Food supply chain" is a **motor theme**, which is a developed and essential theme. This theme includes topics such as "blockchain" and "literature review". Blockchain and other digital technologies have offered many potentials in the transition to SFSC, especially in facing the significant disruption caused by the COVID-19 pandemic.

"Consumer behavior", "performance", "value chain", and "food" are **niche themes** that are high density but less centrality. It means they are developed themes and are marginally important for this research field. These themes include topics such as "global value

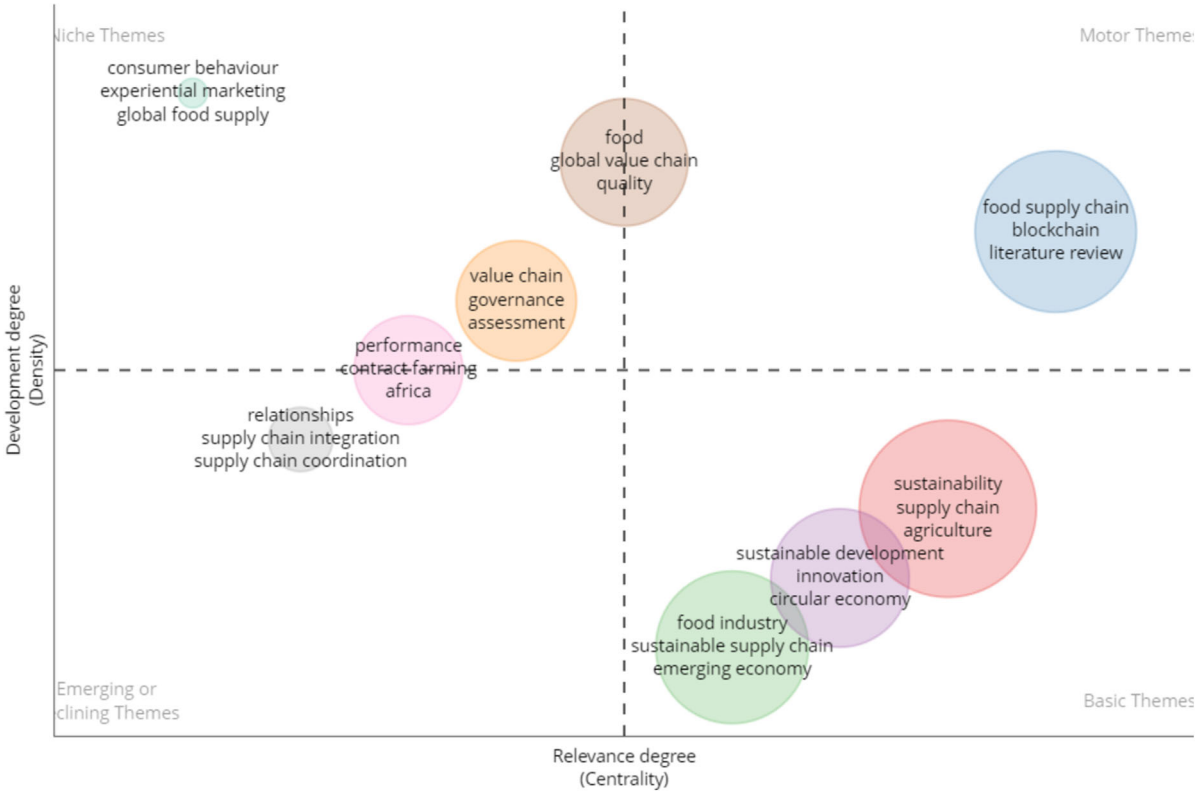

FIGURE 3 The composite thematic map of the research field.

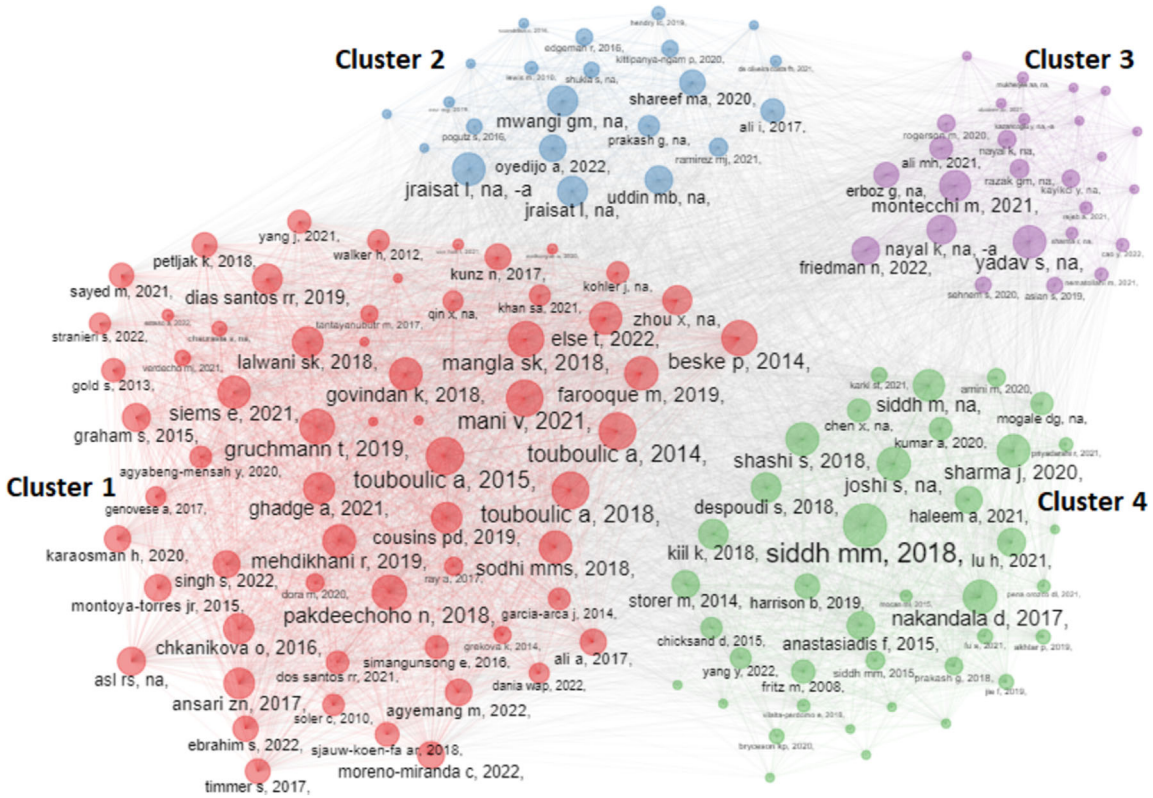

FIGURE 4 Bibliographic coupling among articles.

chain", "quality", "experiential marketing", "global food supply", and "governance".

"Relationships", "supply chain integration", and "supply chain collaboration" are topics under **emerging or declining themes** that are low in both centrality and density. As they are mainly low in centrality and less developed, they are possibly emerging themes. Although these topics seem to be well-studied, they have only received much attention since 2013 (as mentioned in the Descriptive analysis section).

3.5 | Bibliographic coupling

This section provides findings from bibliographic coupling, which measures the similarity between two articles based on the share of common references in two articles. If one article appears in the reference list of two other articles, these two articles are bibliographically coupled (Aria & Cuccurullo, 2017). The greater the number of shared references between the two articles, the more significant the overlap. The 528 sample articles cite 31,563 references. We started by screening and cleaning all the references to ensure they have a consistent format (e.g. consistent publication years, author names, and journal names). Then, the *bibliometrix* package was adopted for bibliographic coupling (Aria & Cuccurullo, 2017). Results from the *bibliometrix* package reveal four clusters—predominant research themes related to the topic (Figure 4).

3.5.1 | Cluster 1. Collaboration and SSCM

Cluster 1 (62 articles), the largest cluster, provides insights into the role of collaboration in SSCM. Articles in this cluster are mainly empirical adopting case study, survey, and interview-based methodology. The most influential article in this cluster is Touboulic et al. (2014), who used the resource-dependence theory and analyzed the effects of the relationship between buyers and suppliers on the implementation of sustainable practices in the food industry. Mehdikhani and Valmohammadi (2019) found that cooperation positively impacted the implementation of sustainable practices and had a positive impact on SFSCs. Grekova et al. (2016) claimed that coordination with suppliers could improve the environmental performance of suppliers. Interestingly, Pakdeechoho and Sukhotu (2018) argued that supply chain collaboration does not improve environmental performance in developing countries; probably, it is because environmental performance still receives little attention in developing countries.

Additionally, social sustainability has received attention since it positively relates to a firm's reputation and performance. Sodhi and Tang (2018) highlighted that collaboration could enhance buyers' and suppliers' social performance. Particularly, collaboration for sustainability enhances ethical performance for suppliers and the reputation of focal firms (Mani & Gunasekaran, 2021). However, for food firms, managing sustainability tensions is significantly difficult due to firms' limited resources (Somlai, 2022). Also, a higher number of firms within an FSC causes challenges in assessing and managing social sustainability performance in an FSC (Mangla et al., 2018).

3.5.2 | Cluster 2: emerging markets and resilience

Cluster 2 (22 articles), the smallest cluster, focuses on emerging markets and resilience. Although supply chain collaboration has received much attention, there are still shortcomings in the literature that investigate supply chain collaboration, specifically cooperation, in emerging markets and enhance sustainable competitive advantages (Oyedijo et al., 2022). Emerging markets have a strong potential for economic growth, though, they have common issues, such as inefficient technology infrastructure, political instability, risks in food security and safety, and a lack of regulations that might restrict the adoption of knowledge gained from developed countries and the implementation of supply chain collaboration (Takahashi et al., 2020). In addition, the transition toward SFSCs in emerging markets is problematic and requires government intervention (Shareef et al., 2020). Extending the current literature to the emerging market can expand the knowledge in cross-country settings and generate country-related practical implications. For example, Jraisat et al. (2022) emphasized that food firms in emerging markets should collaborate and adopt good information-sharing practices to improve sustainability across the FSC. Hence, we call for further studies to investigate the collaboration and information-sharing mechanisms for FSCs in emerging markets.

The increasing number of disruptions and uncertainties make food firms vulnerable and affect the transition toward sustainability, which requires firms to adopt resilience strategies (e.g. collaboration) to increase their resilience (Ali et al., 2023). These strategies require more investment and can affect the ability of firms, especially in emerging markets, to maintain profitability. Accordingly, Mwangi et al. (2022) found that although food firms engage in resilience and sustainability practices, not many resilience practices are implemented. Therefore, Shareef et al. (2020) called to develop mechanisms for enhancing cooperation among stakeholders in FSCs.

3.5.3 | Cluster 3: digital technologies

Cluster 3 (26 articles) discusses the role of digital technologies in the collaboration of SFSCs. For example, using Blockchain technology, Walmart collaborates with its suppliers and successfully develops a scope 3 emission evaluation framework (Asif et al., 2022). The development of digital technologies, such as blockchain, IoT, and big data analytics, enhances the collaboration within FSCs for information sharing, strategic alignment, and joint decision-making (Yadav et al., 2023). Ali et al. (2021) highlighted several examples of the benefits of digital technologies on the collaboration for SFSCS. These benefits include information sharing for enhancing innovation capability and achieving food quality and safety requirements (Nayal et al., 2023), reducing the amount of food loss, enhancing product traceability (Montecchi et al., 2021), and driving sustainability (Friedman & Ormiston, 2022).

Existing literature on this cluster highlighted that digital technologies help firms share information, and this requires adequate digital devices available at all firms in the FSC for data entry (Kamble et al., 2020). This requirement makes food firms reluctant to adopt digital technologies as they, especially small and medium enterprises (SMEs), commonly have limited resources (e.g. knowledge and finance). Thus, food firms are cautious about investment and only make investment decisions after observing success stories from the adoption (Ali et al., 2021). Here, we call for studies to investigate factors affecting the adoption of digital technologies (e.g. a firm's readiness to take risks of information sharing), which foster collaboration and support the transitions toward SFSCs.

3.5.4 | Cluster 4: perishable food products

Cluster 4 (39 articles) focuses on how collaboration helps perishable food supply chains (PFSCs) to be more sustainable. Food products are perishable by nature and due to uncertainties from both the supply and demand sides, ensuring sustainability for perishable FSCs generates challenges. For example, a misunderstanding about the collection time between farmers and collectors can leave harvested products on the field without proper protection, which decreases the quality of harvested products and increases the amount of food loss and waste (Cattaneo et al., 2021). Other factors (e.g. temperature, environmental conditions, and storage conditions) can affect the quality of PFPs and make the perishable FSCs unsustainable. Thus, it is required to have consistent and systematic approaches to address complexities and challenges in PFSCs (Siddh et al., 2018). For this reason, collaboration is considered an important factor for sustainability in PFSCs (Kumar et al., 2020). For example, Yang et al. (2021) demonstrated that the cooperation between farmers and other stakeholders is crucial to maintaining vegetable quality. Despoudi et al. (2018) suggested that collaboration between farmers and cooperatives could reduce food loss.

4 | DISCUSSION AND IMPLICATIONS FOR FUTURE RESEARCH

Our review examines the networks of leading articles, research foundations, and research themes in the area of collaboration for SFSCs. The integration of findings from co-citation analysis, bibliographic coupling, and conceptual structure helps to identify research foundations, research clusters, and the evolution of research themes. This section reflects research findings and informs future research directions.

4.1 | Sustainability transition

The thematic map shows "sustainability" as a basic and urgent theme, given the growing pressure to achieve net-zero emissions in global food systems by 2050 (Costa et al., 2022). There are many opportunities to accelerate the sustainability transition in the food industry, particularly in the era post-COVID-19 pandemic, such as opportunities to promote local supply chains (Sarkis, 2021). Cluster 1 highlights that achieving sustainability is a dynamic and innovative process (Beske et al., 2014). Existing literature primarily pays attention to the economic and environmental aspects rather than to the social aspect of sustainability. As the FSC faces many social issues (e.g. farmer welfare and forced labor), improving social sustainability is one of the main concerns of FSC stakeholders (Agyemang et al., 2022). Research in Cluster 1 (e.g. Agyemang et al., 2022) demonstrated that food firms enhanced the implementation of social sustainability practices through collaboration. However, these practices are mostly focused on their first-tier suppliers (Kalkanci et al., 2019). Thus, future research should include multiple stakeholders in the FSC to ensure the success of these social sustainability practices. Moreover, future studies could investigate how the collaboration could help food firms manage the tensions between the social aspect and the other two aspects of sustainability (i.e. environmental and economic) and transform their business model (Somlai, 2022).

However, the transition toward sustainability is lengthy and involves many stakeholders who usually have conflicting objectives (Chauhan et al., 2022). Therefore, finding ways to get all stakeholders involved to collaborate and work toward sustainability issues remains a challenge (Sodhi & Tang, 2018). Interestingly, while collaboration includes both cooperation and coordination, we found that food firms mostly focus on coordination practices in the transitions toward sustainability. The lack of cooperation within FSCs could be because of differences in regulations, culture, and technologies between food firms. This finding is supported by Marty and Ruel (2024), who suggest that the main barriers to global supply chain collaboration are regulatory, contextual, and technological. Given that strong consensus on interests and values among stakeholders is critical for achieving a common goal (sustainability in this case) (Govindan, 2018), future studies should focus on mechanisms to enhance cooperation in FSCs. Also, future research should investigate the multiple perspectives of different stakeholders or the role of communication among stakeholders in the sustainability transition. Such understanding could enhance the trusted relationship between food firms, leading to better embedding of sustainability practices in FSCs (Faruquee et al., 2021).

Cluster 2 and the thematic map highlight the lack of research in emerging markets, which face more difficulties in the sustainability transition process due to the limited infrastructure, finance, and high-skilled labor (Shareef et al., 2020). For example, emerging markets may rely on low-cost labor but pay little attention to labor rights. Moreover, emerging markets, having high pressure to improve economic performance, face more challenges in raising awareness of social and environmental performance and adopting sustainable practices (Mangla et al., 2018). Therefore, collaboration along the FSC is needed for the sustainability transition in emerging markets. Collaboration mechanisms (e.g. goal congruence, resource sharing, and information sharing) have been evidenced to enhance sustainable performance in developed countries (Despoudi et al., 2018). Here, future research should explore the unique contextual factors in

emerging markets that affect the adoption of collaboration mechanisms and sustainability transitions.

Furthermore, the thematic map shows that circular economy (CE)—one of the main approaches to achieving sustainability (Dossa et al., 2022)—remains an underdeveloped theme in this topic. CE encourages reuse and improves resource recovery within a supply chain (Genovese et al., 2017), leading to the reduction of environmental impacts (e.g. reducing food loss and waste), and improvement of financial performance (Dossa et al., 2022). These benefits can only be achieved if firms collaborate with their stakeholders to implement CE (Farooque et al., 2019). Zucchella and Previtali (2019) showed that collaboration is a key factor in building circular business models, which requires a complex mix of governance mechanisms and resources. The literature mostly discussed coordination in the CE implementation for FSCs (Moreno-Miranda & Dries, 2022). Hence, there is a need for food firms to cooperate and adjust mutual goals for the CE implementation (Castilla-Polo & Sánchez-Hernández, 2022). Furthermore, there is also a lack of studies on CE practices in the context of emerging markets (Sehnem et al., 2020) and SMEs (Colley et al., 2020). This would be an opportunity for future studies to conduct exploratory studies in these contexts and provide insights into the role of CE practices and how food firms work together to implement CE practices in these contexts.

4.2 | Digital technologies

Our findings suggest that digital technologies are an underdeveloped theme. This finding is supported by Sarkis (2021) who considers digital technologies an approach to address the challenges of the transition toward sustainability. FSCs require timely and accurate information, which leads to the adoption of technologies such as big data analytics, blockchain, and IoT (Annosi et al., 2021). Such technologies enable firms to manage and share data to foster collaboration across the FSCs and improve sustainability performance (Nayal et al., 2023). To successfully implement digital technologies, food firms need to collaborate together and with other stakeholders such as public organizations, communities, and social organizations (Kalkanci et al., 2019).

More specifically, the successful adoption of digital technologies requires a multi-stakeholder and multi-disciplinary approach (Broekhuizen et al., 2021). This approach is crucial as FSC becomes more interconnected and involves stakeholders in different geographies with diverse cultures and objectives (McKinsey, 2022). Although there are calls for multi-stakeholder and multi-disciplinary approaches (Vallet-Bellmunt et al., 2011), our findings show that most existing studies focus on only one aspect of sustainability (e.g. food loss) without considering other related aspects, such as management or marketing. Multi-disciplinary approaches could promote the involvement of various stakeholders, providing robust knowledge and solutions for the transition toward sustainable food supply chains (Dora et al., 2021). Future work could focus on the multi-stakeholder and multi-disciplinary approach to better understand how stakeholders collaborate to adopt digital technologies in FSCs (Das et al., 2023). Topics such as how the government can increase awareness of contemporary issues (e.g. SFSC and food safety) or how the government can support food firms to develop skills and knowledge are vital to the adoption of digital technologies.

Moreover, farmers and SMEs have been less involved in digital transformation due to limited financial resources and required skills (Lioutas et al., 2021). Consequently, the data shared in the FSC is incomplete or inaccurate. For example, while data plays a vital role in digital transformation, small farmers are normally located in rural areas where collecting data is difficult due to weak mobile and internet networks or small farmers' inability to afford expensive data-collecting technologies (e.g. field sensors). As a result, the data collected for digital transformation is of poor quality. This could negatively affect the outcomes of digital transformation in FSCs and the performance of stakeholders involved in the digital transformation process, and finally the collaboration between firms in FSCs (Li et al., 2023). Therefore, large stakeholders (e.g. multinational companies or governments) need to find appropriate approaches to support farmers and SMEs in adopting digital technologies for the transition toward sustainable business models (Kazancoglu et al., 2024). Multinational companies normally work on the objective of selling more agricultural inputs (e.g. financial services and machinery) to small farmers and integrating small farmers into the company's network (GRAIN, 2021). Small farmers, on the other hand, might be concerned that multinational companies will control farming practices and, hence, hesitate to work with multinational companies (Sezer et al., 2024). Here, our findings highlight the critical role of information transparency in developing coordination between farmers, especially small farmers and multinational companies. Future research could explore how leading companies design collaboration strategies to engage and encourage farmers to adopt new technologies and improve supply chain performance (Reardon et al., 2019). Examples of initiatives in which big companies work with farmers in specific countries (e.g. Microsoft developed FarmBeats projects to analyze the condition of water, soils, and crops and Amazon provided precision agriculture technology in India (GRAIN, 2021)) could be expanded to other countries. Future research could investigate these initiatives to get a deeper understanding of these initiatives and to develop collaborative strategies for other settings (e.g. different countries and different engagement schemes).

Finally, public-private collaboration is considered a tool to drive innovation and address sustainability targets (George et al., 2024). For example, public organizations can work with tech companies to invest in internet networks and stimulate the sharing of knowledge and information to encourage innovation. The public sector plays a key role in developing policies for (small) farmers to access advanced technologies and achieve sustainability targets (Adenle et al., 2019). Sustainability for FSCs is an ambitious target with the involvement of private (e.g. farmers and food manufacturers) and public (e.g. local authorities and national institutions) stakeholders. Here, clear descriptions of expectations, roles, and obligations of any organization involved in the collaboration are critical for the achievement of sustainability targets (Roehrich et al., 2024). However, such coordination practices remain limited in FSCs (Biswas et al., 2023). Thus, future

studies should pay more attention to public-private collaboration for SFSCs. For instance, future studies could investigate how public organizations support food firms at different stages of the procurement cycle to achieve sustainability and what are the most effective forms of support to create public value.

4.3 | Theoretical development

The development of the supply chain management field has relied significantly on theories from other fields (e.g. general management, organizational behavior, and economics) (Carter et al., 2019). The dynamic capability view (DCV) is the most common theory in the field (Teece et al., 2016). DCV becomes more relevant in turbulent contexts (Govindan, 2018). For example, building on DCV, Gruchmann et al. (2019) identified core practices that can support the online business of local food producers and distributors and help them achieve higher sustainability performance. However, our results show that the use of theoretical perspectives remains scarce on the topic of collaboration for SFSCs.

Although stakeholders play a key role in the transition to sustainability, when and how to involve them in the transition process is still unclear. Stakeholders influence the firm's collaboration strategy and sustainable practices. They can lead the transition process and be involved in the implementation stage (e.g. monitoring the sustainability performance). This is evident when comparing articles discussing environmental assessment under clusters 1 and 2 of the bibliographic coupling. Cluster 1 highlights that firms pay attention to environmental certification to prompt better collaboration with stakeholders and enhance sustainability (Acquaye et al., 2015). Cluster 2, focusing on emerging markets, emphasizes the role of stakeholders in driving environmental practices and assessment (Lu et al., 2021). Future research could employ stakeholder theory (Parmar et al., 2010) to investigate how firms collaborate with different stakeholders during the transition toward sustainability. Also, as cluster 2 focuses on emerging markets which normally have limited resources, future studies could adopt the resources orchestration theory (Sirmon et al., 2011) or resource-based view (Barney, 2018) to investigate further the transition toward sustainability in emerging markets.

Soosay and Hyland (2015) reviewed the 12 organizational theories that have been employed to investigate supply chain collaboration. However, Wieland (2021) argued that most theories take a static view of the supply chain. In contrast, a supply chain cannot be isolated from the rest of the world and is vulnerable to any disruption (e.g. the supply chain crisis during COVID-19 is a perfect example of the vulnerability of the global supply chain). Thus, new research paradigms are needed to understand the complexity of a supply chain (Wieland et al., 2023). For example, resource constraint is a concern of food firms in facilitating SFSC, hence resource-based view (Barney, 2018) could explain the collaboration for SFSCs. We join Khan et al. (2023) in their call for research to investigate variables that intervene in the adoption of various resources in the transition toward sustainability, such as the role of managerial commitment in the relationship between supply chain information sharing and sustainable practices.

Future research could also adopt the resource orchestration theory (ROT) (Sirmon et al., 2011), which explains the manager's role in transforming resources into capabilities. For instance, grounded on the ROT, Ardekani et al. (2023) assessed the impact of relationship management on the sustainable performance of FSCs, under the impact of the COVID-19 pandemic. The ROT is suitable for understanding how firms mobilize and orchestrate their resources to achieve sustainable performance. However, Skipworth et al. (2023) noted the scarcity of empirical studies that investigate how firms collaboratively orchestrate their resources to swiftly respond to urgent agendas (e.g. sustainability). Thus, it is a prominent research avenue on this topic area (i.e., collaboration for SFSCs).

Additionally, there is evidence from Cluster 3 that food firms have paid much attention to digital technologies to support collaboration and their transitions toward sustainability. The adoption of digital technologies is a form of innovation that involves many stages and processes (Cole et al., 2019; Verhoef et al., 2021). In this perspective, the diffusion of innovation theory (e.g. Chen et al., 2017) can provide a better understanding of collaboration at different stages of the digitalization for SFSCs.

5 | CONCLUSION

This research reviews the literature on the topic of collaboration for SFSCs. Using the bibliometric analysis of 528 articles, we make several contributions to the field of collaboration for SFSCs. First, in response to RQ1 (*What are the foundations and theoretical themes of the field of collaboration for SFSCs, and how have theoretical themes in the field developed and evolved over time?*), we highlight that SSCM, collaboration for sustainability, and SFSCs are the three research foundations of the topic area. The conceptual structure analysis helps us identify theoretical themes and their evolution overtime, which is useful for answering RQ3. The results highlight the consensus on the need for collaboration for SFSCs due to the complexity of the food industry and the nature of the food products. However, we also found that the field has paid less attention to social sustainability which could be a challenge for achieving overall sustainability targets.

In response to our RQ2 (*What are the main research clusters associated with the field of collaboration for SFSCs*), through bibliographic coupling, we reveal collaboration and SSCM, emerging markets and resilience, digital technologies, and perishable food products are four main research clusters in the field. The discussion of the gaps within each cluster provides answers to RQ3 (*What are the future research directions in the field of collaboration for SFSCs*). We divide the future research directions into three groups: sustainability transition, digital technologies, and theoretical development. The sustainability transition group calls for studies to explore ways to engage stakeholders in the sustainability transition, with a stronger focus on social sustainability, and in the emerging economies context. Moreover, we argue that a complex mix of governance mechanisms and resources is

required to implement CE because there is a lack of research on CE implementation in SMEs and in the emerging markets context.

The digital technologies group highlights the importance of adopting digital technologies to share information in a timely and accurate manner along the FSC. However, the lack of successful cases and the limited resources of food firms are key challenges for the adoption of digital technologies. Finally, the theoretical development group shows a lack of the use of theoretical perspectives in the area of collaboration for SFSCs. We call for the more diverse use of research paradigms to understand the dynamics and complexity of SFSCs.

It is worth noting that the findings of this research are subject to several limitations. First, the selected keywords and search engines could limit the results of this research. While Scopus and WoS are the most commonly used databases, other databases could provide a larger sample for the literature review. Second, we only include journal articles published in English and in the field of business and management. For this reason, we acknowledge that certain insights could be gained from journals in other fields, such as agriculture and engineering, practitioner journals, or journals published in languages of emerging markets. Future research could extend our literature review following the approach adopted in this paper.

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CONFLICT OF INTEREST STATEMENT

None of the authors have a conflict of interest to disclose.

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