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A systematic literature review of food sustainable supply chain management (FSSCM): building blocks and research trends

Maria Palazzo and Agostino Vollero
Dipartimento di Scienze Politiche e della Comunicazione, Università degli Studi di Salerno, Fisciano, Italy

Abstract

Purpose – The purpose of this paper is to explore the increased research attention gained by sustainability in food supply chain management. Although previous review studies have focused on aspects such as traceability, food safety, and performance measurement, sustainability has rarely been considered as a means of integrating these issues.

Design/methodology/approach – The paper presents a comprehensive review of the literature on food sustainable supply chain management (FSSCM). Using systematic review methods, relevant studies published from 1997 to early 2021 are explored to reveal the research landscape and the gaps and trends.

Findings – The paper shows the building blocks and the main research directions in FSSCM, particularly considering the opportunities in "neglected" emerging countries. Insights are provided into the various elements of the sustainability supply chain in the food industry, which have previously been analysed separately.

Originality/value – Only a few researchers have systematically reviewed the literature or taken a bibliometric approach in their analyses to provide an overview of the current trends and links between sustainability and food supply chain management.

Keywords Systematic literature review, Food sustainable supply chain management (FSSCM), Food industry, Global supply chain, Emerging countries, Sustainability

Paper type Research paper

1. Introduction

The debate over the approach to sustainability has become central to most businesses, as a proper sustainability perspective holistically considers all of a company's functions and business relationships along supply chains, which are increasingly interconnected globally (Carter and Rogers, 2008; Solér *et al.*, 2010). Managing the integration of sustainable environmental, social and economic criteria along the multiple aspects of the supply chain represents a major challenge for manufacturers and producers (Massaroni *et al.*, 2015).

Supply chain management (SCM) has been defined as "the configuration and operation of efficient and effective production and logistics networks and the intra- and inter-organizational management of supply, transformation and delivery processes" (Brandenburg and Rebs, 2015). A revolution in SCM has occurred in recent years, which has been noted by many scholars and researchers, as its focus has shifted from economic

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Although the views and ideas expressed in this article are those of Maria Palazzo and Agostino Vollero; "sections 1; 3; 3.1; 3.2; 3.6; 3.8; 4" are attributed to Maria Palazzo; while "sections 2; 3.3; 3.4; 3.5; 3.7; 3.9; 5; 6" are attributed to Agostino Vollero.

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performance to an integrated social and environmental approach (Seuring and Müller, 2008; Ahi and Searcy, 2013; Khan *et al.*, 2020).

Exploring the intersection between sustainability and SCM involves considering different viewpoints, as SCM is based on both downstream and upstream flows of goods (Cosimato and Troisi, 2015; Fahimnia *et al.*, 2015; Maditati *et al.*, 2018). The downstream flows of goods (towards the final customer) has been traditionally viewed as involving responsibility and ethical issues (Seuring and Müller, 2008), while upstream flows of products/services (towards the supplier) are explored from manufacturing, product recovery and reverse logistics perspectives (Feng *et al.*, 2017), and thus more concerned with environmental issues, such as energy and waste reduction (Naik and Suresh, 2018; Kumar *et al.*, 2020; Kumari *et al.*, 2021). There is general agreement that the sustainable management of a supply chain requires an integrated approach to social, environmental and economic goals (Carter and Rogers, 2008; Hassini *et al.*, 2012; Juettner *et al.*, 2020). Thus, the means by which SCM can develop sustainable features and follow the path of sustainable development have been considered (Manning, 2013; Zhu *et al.*, 2018). This can be challenging in industries such as food, in which the SCM can have a strong effect on not only the final consumer but also other stakeholders in the value chain (Matopoulos *et al.*, 2015; Ghadge *et al.*, 2017; Mangla *et al.*, 2019).

A food supply chain (FSC) is particularly complex, as it connects different sectors of the economy (agriculture and the food-processing industry and distribution sector) in a market dominated by rapidly changing customer preferences (Beske *et al.*, 2014). Food types can affect the natural environment, due to the food production systems, transport distances from producers and consumers, waste management, and workers' conditions in the sectors involved (Beer and Lemmer, 2011). The situation is even more complicated in the agri-fresh food sector due to the perishability of products and the short shelf-life (Siddh *et al.*, 2017). Thus, examining sustainable development in the FSC is extremely complex due to the high level of unpredictability in terms of demand and cost, the fragile nature of food and consumers' increased awareness of risks and safety issues associated with diets and eating disorders (Siddh *et al.*, 2018). Finally, many firms in the FSC are small or medium-sized enterprises (SMEs) (Beer and Lemmer, 2011; Ghadge *et al.*, 2017) that may find it difficult to address sustainability challenges and implement practices. The various FSC duties and tasks are often perceived as more demanding when sustainability is applied to enrich conventional profit-oriented models (Allaoui *et al.*, 2018). Studies in this area have addressed issues such as the triple bottom line, ethics and corporate social responsible principles in their analyses (Siddh *et al.*, 2018; Allaoui *et al.*, 2018), but few have provided an integrated overview of the phenomenon.

Only a few researchers have systematically reviewed the literature or taken a bibliometric approach in their analyses to provide an overview of the current trends and links between sustainability and food supply chain management (FSCM). However, many articles have applied specific methods to explore particular themes or typical processes. These themes and processes include sustainable sourcing (Ghadge *et al.*, 2017), food traceability (Bosona and Gebresenbet, 2013), approaches for enhancing sustainability in SCM (Sharma *et al.*, 2017; Dania *et al.*, 2018), sustainable supply chain strategies and tactics (Beske *et al.*, 2014; Zhong *et al.*, 2017), food safety (Siddh *et al.*, 2018), controls of the level of sustainability (Sharma *et al.*, 2017), measurements of sustainable items (Sharma *et al.*, 2021) and the circular economy (Corallo *et al.*, 2020).

Bosona and Gebresenbet (2013), for example, presented a literature review that focussed mainly on food traceability, which highlights several features, definitions, items and measurements of the food traceability system. The bibliometric approach was also taken by Beske *et al.* (2014), who described how sustainable supply chain management tactics allow organizations to manage their supply chain while putting into practice dynamic capabilities. Zhong *et al.* (2017) used the bibliometric approach to review the FSCM, and considered it in terms of systems and implementations. Siddh *et al.* (2017) explored the agri-fresh food supply chain quality features and definitions, by collecting and analysing relevant academic papers.

Using the same method, Sharma *et al.* (2017) analysed the performance indicators and sub-indicators of green SCM implementation. Dania *et al.* (2018) proposed a systematic review of sustainable agri-food supply chains to assess and manage collaborative performances, while Govindan (2018) focused on the influence of stakeholders in the food industry.

Thomé *et al.* (2020) recently provided several insights into food supply chains and short food supply chains based on a bibliometric analysis, while Kamble *et al.* (2020) proposed a framework for managers in the agri-food supply chain based on an extensive literature review, to increase supply chain visibility and resources. Finally, Sharma *et al.* (2020) applied a systematic literature review of machine learning applications in agricultural supply chains.

These studies demonstrate the pressing need to examine the "green" side of SCM in the food sector. They show that the number of empirical papers in this area is increasing, but that there is a lack of an integrated perspective for holistically linking recent trends and facets of the FSCM. The focus is on very specific viewpoints rather than a broader exploration. To increase our understanding of the intellectual progress and knowledge structure of food sustainable supply chain management (FSSCM), a comprehensive analysis is required. Thus, in the present paper, we aim to outline a comprehensive framework of the research and current trends in the FSSCM, and to identify specific research gaps that must be addressed.

To achieve this, earlier review analyses of FSSCM and broad research trends are identified objectively and systematically, by providing an analysis of the evolution of FSSCM over the past years, exploring the international research, studying the mainly empirical FSSCM research, examining the research tools applied, identifying any issues that arise, and by identifying the main gaps and directions for future research in the field of FSSCM.

The remainder of this paper is organized as follows. Section 2 presents the methodology used for the literature review. Section 3 provides the results and analyses of the selected papers. Sections 4 and 5 present the findings, a discussion and the implications in terms of FSSCM that can enrich further research. Finally, a conclusion and limitations are presented in Section 6.

2. Methodology

As other studies take various specific perspectives, we applied a comprehensive analysis of the literature focussing on the link between sustainability and FSCM. This offers a complete view and several insights for further studies in various emerging business contexts.

Unlike other conventionally structured literature reviews, a systematic review was selected as this can be effective in managing the exploration of a huge number of academic publications and enables the development of a complex framework for the research subjects (Garcia-Buendia *et al.*, 2021). The method can also help researchers and scholars explore the literature by considering its bibliographic elements (Xu *et al.*, 2020). This analytical approach also helps in terms of recognizing the main features and definitions of specific research field(s), identifying the main research questions and gaps, identifying the theoretical area in which the analyses will have an effect, understanding the theoretical concepts and their terminology, providing a list of the relevant resources available, and highlighting the research designs, methodologies and approaches that can be applied (Soni and Kodali, 2011; Fahimnia *et al.*, 2015; Feng *et al.*, 2017).

We follow a common procedure in systematic literature reviews (Siddh *et al.*, 2017) and apply an approach consisting of six steps (see Figure 1):

(1) Time horizon: The first step is the selection of a time period. The exploration period for academic and research articles is between 1997 and early 2021, as SCM and corporate social responsibility (CSR) were implemented in the food industry to a greater extent after 1997 (Henk and Hans, 1997). We end our paper collection in early 2021.

(2) Selection of publications: Only papers written in English were selected, and the articles were selected in Scopus. This database is commonly used by management science researchers (or in related fields) for bibliometric analyses or systematic

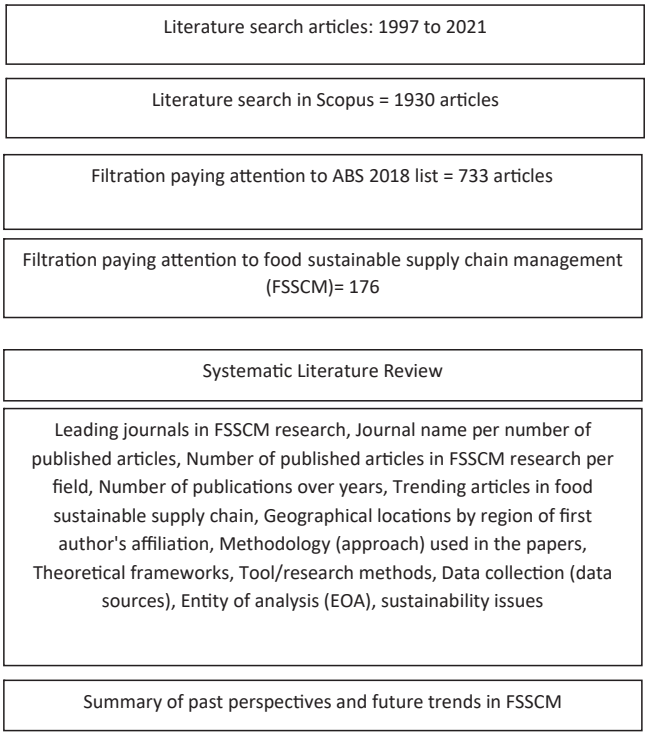

Figure 1.
Steps of the systematic literature review

literature review methods in SCM (Soni and Kodali, 2011; Fahimnia *et al.*, 2015). The Scopus database has greater coverage than the Web of Science, and it was deemed more appropriate for exploring complex research areas that are constantly changing and developing (Feng *et al.*, 2017).

(3) The keywords used for the selection of the publications: The keywords chosen for developing the search of the main publications in Scopus were "supply", "food", and "sustainabl*". In total, after using the "title, abstract, keywords" search in the Scopus, 1,930 papers were found by searching with these keywords. "Sustainabl*" involves environmental, economic, and social facets, and thus papers identified by searching for "sustainabl*" and "supply" were examined. The papers resulting from the searches were then analysed for information including title, author(s), affiliation(s), source title, number of citations, keywords, abstract and references.

(4) The categorization of academic publications according to the Association of Business Schools (ABS) 2018 list: The number of papers was further reduced by selecting only academic and well-referred journals that were considered in this list. Of the 1,930 papers, some were non-referred publications appearing in 0-star journals, magazines and conference proceedings that did not follow a rigorous scientific editorial approach. Chapters of books and whole books were also not selected for the analysis. After deleting these, 733 articles remained and were filtered from the total number of downloaded publications.

(5) Categorization of academic publications: After reading the abstracts and the complete papers, the number was further reduced by considering the relevance of

the publications. The sample size was condensed in this phase to create a representative data set. The rule for selecting the articles was that they had to be related to the food sector, supply chain management and sustainability. Thus, 176 papers remained.

(6) Systematic classifications of the papers: The articles were then categorized according to leading journals in FSSCM research and journal name per number of published articles; number of published articles in FSSCM research per field; number of publications; trending articles about the food sustainable supply chain; geographical locations by region of the first author's affiliation; the methodology used; theoretical frameworks; tool/research methods; data collection; the entity of analysis and sustainability issues.

3. Results and analysis

All of the identified papers are presented, discussed and analysed in the following sections in terms of their various aspects and features.

3.1 Year-based classification of number of publications

The number of articles about FSSCM has increased, probably due to the increased interest and awareness of managers and academics in the area of sustainability and SCM. The annual number of published articles has increased in recent times (2017–2020) to three times that of the 2015–2016 period (in fact, in 2017, 26 papers were published; in 2018, 29 articles were proposed; while in 2019 and 2020, 23 and 27 studies were focused on the selected topics).

3.2 Journal-based categorization of papers

This categorization illustrates the frequency of papers presented in various leading academic journals. Many of these appear to be very interested in issues and problems related to FSSCM. These include *Business Strategy and the Environment* (BSE), the *British Food Journal* (BFJ), *Corporate Social Responsibility and Environmental Management* (CSREM), *Food Policy* (FP), *Industrial Management and Data Systems* (IMDS), *International Journal of Production Economics* (IJPE), *International Journal of Production Research* (IJPR), *Journal of Cleaner Production* (JCP), *Journal of Manufacturing Technology Management* (JMTM), *Production Planning and Control* (PPC), and *Supply Chain Management – An International Journal* (SCM-IJ).

In total, 176 papers that focused on SCM definitions and features in the food industry from the perspective of sustainability were selected. This demonstrates that a considerable number of papers were published in the relevant fields of study. Table 1 shows the number of total articles published (PSC) and average global citations received per paper (AGC), and most are from JCP (49 PSC, 28.24 AGC), followed by IJPE (18 PSC, 94.56 AGC), PPC (7 PSC, 4.14 AGC), SCM-IJ (7 PSC, 17.29 AGC), and BSE (6 PSC, 21.67 AGC). Considering the average global citations received per paper (AGC), the journals with the highest are IJPE (18 PSC, 94.56 AGC), IJPR (5 PSC, 81.60 AGC), FP (4 PSC, 75.50 AGC), CSREM (4 PSC, 41.25 AGC) and JCP (49 PSC, 28.24 AGC).

Moreover, the distribution of published articles in FSSCM research per field (economics; ethics-csr management; international business and area; information management; marketing; operations research and management science; organizational studies; regional studies; sector; social studies), based on how they are ranked in the ABS Journal Guide of 2018 was analysed.

Rank	Ranked by PSC Journal	PSC	AGC	Rank	Ranked by AGC Journal	PSC	AGC
1	JCP	49	28.24	1	IJPE	18	94.56
2	IJPE	18	94.56	2	IJPR	5	81.60
3	PPC	7	4.14	3	FP	4	75.50
4	SCM-IJ	7	17.29	4	CSREM	4	41.25
5	BSE	6	21.67	5	JCP	49	28.24
6	IJPR	5	81.60	6	BSE	6	21.67
7	IMDS	4	20.50	7	IMDS	4	20.50
8	BFJ	4	16.50	8	SCM-IJ	7	17.29
9	CSREM	4	41.25	9	JMTM	3	17.00
10	FP	4	75.50	10	BFJ	4	16.50

Note(s): PSC = number of total articles published (min. 3), AGC = average global citations received per paper (Scopus)

Table 1. Leading journals in FSSCM research

It was highlighted that, especially, in the fields of "Operations Research and Management Science" and "Sector", there were many articles published in 2018, 2019 and 2020 in the realm of FSSCM.

3.3 Categorization of publications based on the geographical location of first authors

Publications are classified based on the first authors' affiliated regions and include developed and emerging economies. This classification clearly shows that most papers are from developed countries in Europe (63%), Asia (18%) and North America (8%), with less attention paid to FSSCM in developing areas such as South America (5%) and Africa (1%), although many countries in these regions are still mainly agrarian.

3.4 Categorization of trending articles in the field of FSSCM

Several of the papers achieved a remarkable number of total citations. The data presented in Table 2 show that two papers gained more than 300 total citations, four achieved over 200, and the remaining four publications gained more than 100 total citations.

3.5 Categorization based on methodology and tools/research methods

FSSCM papers can be analysed according to the methodology (approach) applied. Most publications utilized a qualitative approach (78%) and only 22% take a quantitative approach.

Table 3 shows that theoretical and empirical explorations of SCM sustainability in the food sector have been conducted (Pohlmann *et al.*, 2020; Yakavenka *et al.*, 2020; Khan *et al.*, 2021).

Case study analysis is the most used (26%: 46 papers) followed by statistical analysis (22%: 38 papers), conceptual analysis and/or frameworks (19%: 34 articles), mathematical models (13%: 23 articles), quality tool (11%: 19 articles) and finally bibliometric analysis and/or literature review (9%: 16 papers). Examples of the methodologies and tools applied to this complex concept include the following: Taghikhah *et al.* (2020) used several mathematical models to explore the relation between consumer preferences and environmental factors related to food production. Morley (2020) used case studies to analyse the impact of public procurement on various food company strategies. Thomé *et al.* (2020) used a structured literature review to examine studies of short food supply chains. Sharma *et al.* (2020)

Table 2.
Trending articles in food sustainable supply chain (1997–2021)

Authors	Year	Source title	Cited by	Purpose	Type of activity	Sustainability issues	Theoretical underpinnings	Perspective	Method	Author keywords
Beske P., Land A., Seuring S.	2014	*International Journal of Production Economics*	321	Analyse how sustainable supply chain management tactics aid organizations in controlling their dynamic capabilities.	Link sustainable supply chain management and dynamic capabilities	Strategic management	Resource-based view and the knowledge-based view	Supply chain	Qualitative	Dynamic capabilities; food industry; literature review; sustainable supply chain management
Govindan K., Jafarian A., Khodaverdi R., Devika K.	2014	*International Journal of Production Economics*	301	Analyse the effect of supply chain operations on environment, profit and people/society when creating a sustainable supply chain.	Integrate sustainability in decision-making, in the field of distribution in food supply chain management	Sustainable development	NA	Supply chain	Qualitative	Food supply chain; greenhouse gases emissions; perishable foods; robust multi-objective meta-heuristic; sustainability; sustainable supply chain design; two-echelon location-routing problem
Pullman M.E., Maloni M.J., Carter C.R.	2009	*Journal of Supply Chain Management*	285	Analyse in the food industry, how sustainability impacts on environmental and society	Enhance quality performance and related cost performance	Performance management	NA	Manufacturer	Qualitative	Path analysis; social responsibility; supply chain management; survey methods; sustainability

(*continued*)

Table 2.

Authors	Year	Source title	Cited by	Purpose	Type of activity	Sustainability issues	Theoretical underpinnings	Perspective	Method	Author keywords
Genovese A., Acquaye A.A., Figueroa A., Koh S.C.L.	2017	*Omega (United Kingdom)*	279	Integrate environmental issues into organizations' strategies, reducing negative effects of production and consumption processes	Highlight that integration of circular economy within sustainable supply chain management offers benefits from an environmental perspective	Circular economy	Circular economy	Supply network	Qualitative	Circular economy; decision support; environmental sustainability; green supply chain management; product life cycle analysis
Walker H., Jones N.	2012	*Supply Chain Management: An International Journal.*	246	Analyse what factors affect sustainable supply chain management	Explore sustainable supply chain management implemented by organizations leaders in their sector	Sustainable development	NA	Supply chain	Qualitative	Case studies; corporate responsibility; multiple retailers; supply chain management; sustainable development; sustainable supply chains; the United Kingdom
Van Der Vorst J.G.A.J., Tromp S.-O., Van Der Zee D.-J.	2009	*International Journal of Production Research*	216	Analyse food quality change, efficiency and responsiveness needs	Bond food quality and sustainability	Logistic management	NA	Conceptual	Qualitative	Food quality; logistics; simulation; supply chain; sustainability

(*continued*)

Table 2.

Authors	Year	Source title	Cited by	Purpose	Type of activity	Sustainability issues	Theoretical underpinnings	Perspective	Method	Author keywords
Grimm J.H., Hofstetter J.S., Sarkis J.	2014	*International Journal of Production Economics*	182	Analyse factors that aid to overcome challenges of sub-supplier management	Explore sustainability and critical success factors of sub-supplier management	Strategic management	Critical success factors	Supply chain	Quantitative	Corporate sustainability standards; field study; food industry; sub-supplier management; sustainable supply chain management; theory of critical success factors
Notarnicola B., Sala S., Anton A., McLaren S.J., Saouter E., Sonesson U.	2017	*Journal of Cleaner Production*	171	Analyse the challenges for life cycle assessment due to the complexity of food systems	Assess and improve food supply chain performance	Circular economy	Life cycle approach	Conceptual	Qualitative	Agri-food products; food lca; food supply chains; food waste; sustainable production and consumption
Erol I., Sencer S., Sari R.	2011	*Ecological Economics*	169	Analyse sustainability performance of supply chains	Evaluate and compare company performances in terms of sustainable supply chain.	Performance management	NA	Supplier/ farmer	Quantitative	Fuzzy arithmetic; multi-criteria decision-making; performance analysis; sustainable supply chain
Georgiadis P., Besiou M.	2008	*Journal of Cleaner Production*	158	Analyse the effect of ecological motivation and technological innovations on the long-term behaviour of a closed-loop supply chain with recycling activities	Focus on closed-loop supply chain	Innovation	NA	Conceptual	Qualitative	Closed-loop supply chains; electronic and electrical equipment; recycling; sustainable development; system dynamics

Tool/research methods	No. of articles (%)	Type
Case study analysis	46 (26%)	Case studies, multiple case studies, Delphi, focus groups, thematic analysis, etc.
Statistical analysis	38 (22%)	Regression analysis, structural equation models, econometric analysis, cluster analysis, analysis of variance (ANOVA/MANOVA), factor analysis, descriptive statistics, etc.
Conceptual analysis and/or frameworks	34 (19%)	Sustainability criteria, traceability, etc.
Mathematical models	23 (13%)	Algorithms, fuzzy, analytical tool, Decision making trial and evaluation laboratory (DEMATEL) method, simulation, etc.
Quality tool	19 (11%)	Integrated quality management system, life cycle approach, transaction cost approach, etc.
Bibliometric analysis and/or literature review	16 (9%)	Bibliometric analysis, co-citation analysis, structured and unstructured literature review, etc.

Table 3.
Applied tools/research methods in the field of FSSCM

statistically analysed aspects of food and other industries during the coronavirus disease 2019 (COVID-19) pandemic.

3.6 Research publications categorization on the basis of data collection

We first examine the data collection (data sources) applied in the FSSCM papers and find that the majority of the publications use primary data (i.e. survey, experiment, interviews, focus groups, observation, etc.) (56%: 99 papers). Secondary data (i.e. archival, content extraction, bibliometric records, etc.) are used in 46 papers (26%), a combination of primary and secondary data is used in 10 (6%), and 21 papers (12%) do not use data collection as they are based on conceptual analyses, viewpoint research, etc.

3.7 Research publications categorization based on issues of FSSCM

We then categorize the papers based on the FSSCM issues addressed, as shown in Figure 2. FSSCM involves multiple sustainability issues, and the majority of articles focused on "supplier management" (20%: 36 papers). "Sustainable development" was the next most common (17%: 30 papers), followed by "collaboration and coordination management" in 25 (14%), "performance management" in 17 (10%), "circular economy" in 15 (9%), "logistic management" in 14 (8%), "strategic management" in 11 (6%), "innovation" in 10 (6%), "agriculture" in 6 (3%), a "comprehensive view" (involving more than one issue) in 5 (3%), "quality management" in 4 (2%), and "other issues" were analysed in 3 papers (2%).

Thus, "supplier management", "sustainable development" and "collaboration and coordination management" were the most common issues, covered by over half of the total selected publications. Other issues are also significant in the area of FSSCM, but not to the same extent, while others are mainly neglected (i.e. "agriculture" and "quality management")

3.8 Research publications categorization on the basis of theoretical framework

The theoretical framework applied to develop the selected papers was then explored. Nearly two-thirds (114) of the articles did not follow any specific theoretical approach. The stakeholder approach was considered in 11 articles, 8 papers were based on the triple bottom line, 8 took the life cycle approach, 7 the circular economy approach, 6 applied resource-based view (RBV) and knowledge-based view (KBV) frameworks, 6 the institutional theory, 4

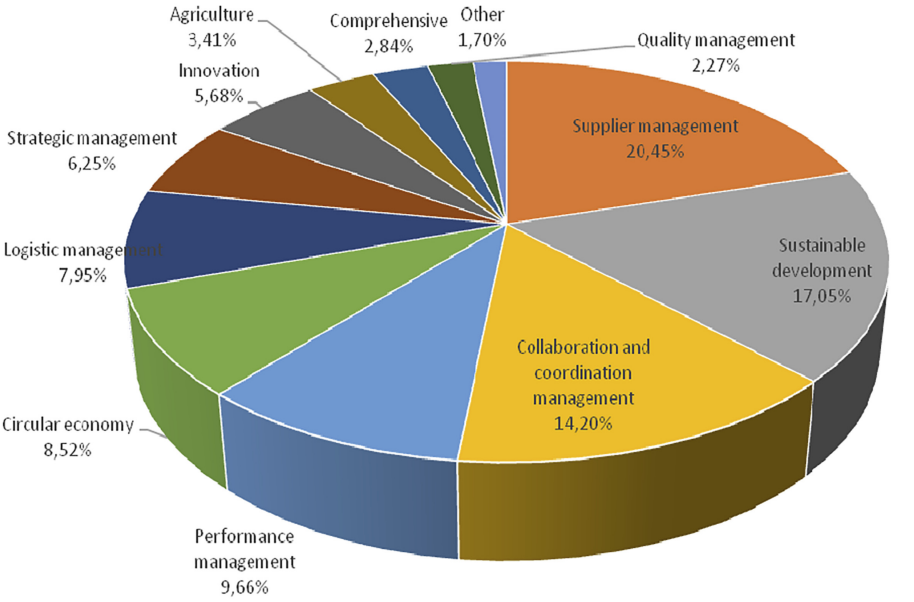

Figure 2.
Main sustainability issues in the field of FSSCM

applied the resource dependency theory and 2 the decision theory-based framework. Other approaches (i.e. country of origin, TOE, critical success factors, etc.) were taken in ten articles.

3.9 Publications categorization on the basis of entity of analysis

Finally, we examined the main perspectives taken when exploring FSSCM issues.

Many research publications use the supply chain as the entity of analysis (EOA) (70 papers). However, a significant number (23) consider the whole supply network or the manufacturer's point of view (21); 18 are mainly conceptual; 10 are based on the distributor's perspective; 10 take a dyadic view (more than 1 EOA); 9 take the suppliers'/farmers' perspectives; the logistic industry is examined in 7; consumers in 5; and the remaining 3 papers do not use any of these EOA.

4. Discussion: main themes and trends in FSSCM

The increase and evolution of FSSC studies suggests that supply chains in the food sector are moving towards a sustainable approach. Several new trends have emerged in the field, which focus on both intra- and inter-firm dimensions (Figure 3).

Increasingly, the multiplicity of stakeholders in FSSCM and the collaboration/coordination challenges this brings have been explored throughout the food supply chain phases. These include the sustainable purchasing relationships of food retailers (Chkanikova, 2016); increasing legitimacy in the food industry (Czinkota *et al.*, 2014); strategies for reducing food waste within the circular economy framework (Dora, 2019); and tools for increasing collaboration and coordination throughout the food supply chain (Vodenicharova, 2020). Collaboration has gained the attention of researchers exploring the competitive advantages derived from a sustainable approach by leveraging environmental information along the supply chain (Solér *et al.*, 2010), the alignment of sourcing with marketing and branding strategies (Croom *et al.*, 2007), and dynamic capabilities (Beske *et al.*, 2014).

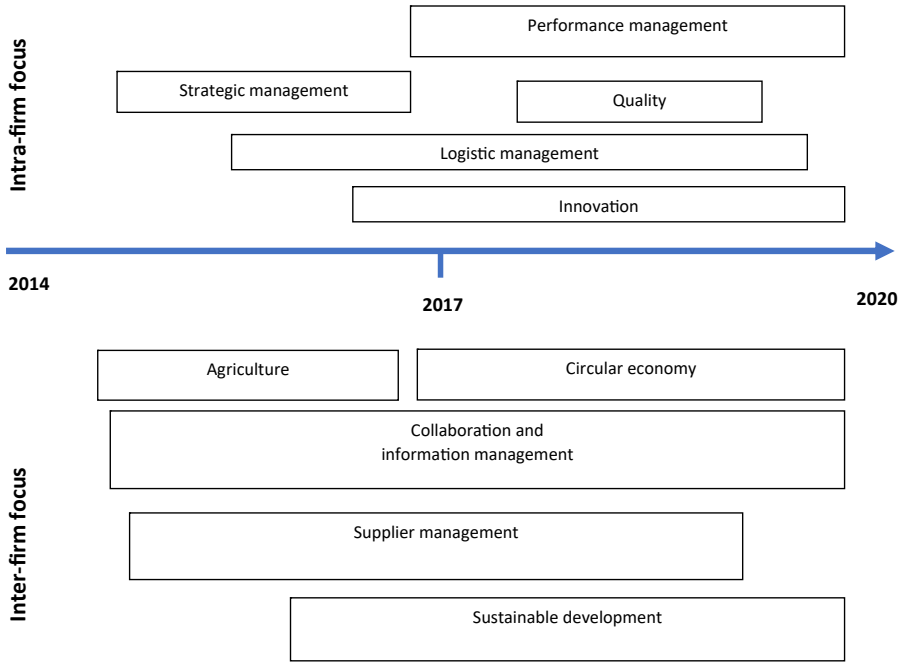

Figure 3.
Trends in FSSCM research

"Collaboration and coordination management", "supplier management" and "sustainable development" are the most common issues, covered by over half of the total publications. These include collaboration with partners along the supply chain (Pakdeechoho and Sukhotu, 2018), the criteria for selecting suppliers (Wilhelm *et al.*, 2016), the alignment of supplier-producer procedures (Vodenicharova, 2020), the overall efficiency of the supply chain (Danny and Priscila, 2004), and collaborations adopting mandatory and voluntary standards when assessing environmental, social and economic performances (Glover *et al.*, 2014; Touboulic and Walker, 2015; Govindan, 2018). Other recent emerging challenges include more general sustainability-related aspects, such as innovation and the circular economy. On the other hand, the inclusion of quality management in the field of FSCM seems to be scarce in academic literature (Ting *et al.*, 2014; Siddh *et al.*, 2018; Feng *et al.*, 2020), even though, there are several authors who tried to build a more centred approach in reviewing quality issues inside the analysis of sustainable supply chain. For example, Manzini *et al.* (2014) highlighted the existing connection between food quality and environmental sustainability of supply chain strategies and tactics, while Winter and Knemeyer (2013) explored how sustainability can be included in supply chain quality and, Ilbery and Maye (2005) presented a list of important sustainable food standards linked with environmental quality, socially inclusiveness and other relevant items.

Besides, the findings suggest that an integration of intra- and inter-firm processes can be crucial for the effective sustainable performance of organizations, as if FSSCM is based on sustainability it can have a positive effect on all stages of the supply chain (Erol *et al.*, 2011; Kahi *et al.*, 2017). Unlike traditional performance measurements, sustainable performance involves comprehensively considering social, economic, and environmental factors (Sharma *et al.*, 2017; Siddh *et al.*, 2018). Pullman *et al.* (2009) focussed on how to improve the quality performance of the food supply chain, which in turn improves cost performance.

Raut *et al.* (2019) analysed operational/technology-based and human resource-based performance indicators of the sustainable value chain that help those in the food sector minimize their effect on the environment while boosting their economic performance. Thus, when proposing new "green" performance measurements, food industry researchers should include the bases of sustainability in their analyses of FSSCM.

The development of these new FSSCM trends suggests that this field of research will continue to grow as many scholars and academics explore the specific features and perspectives applicable to developed countries. The literature review shows that few studies consider less developed countries, with just 1% having African authors. Developing economies, such as those in Asia, have however had more attention in recent years. Some studies show that a lack of infrastructure or inefficient logistics could result in more food waste and inefficient processes (Naik and Suresh, 2018; Kumar *et al.*, 2020). This is a major issue in FSSCM, as it is expected that 90% of the global population will live in developing countries by 2050 (PRB, 2020). Sustainability is therefore vital in the food global supply chains of these countries, which are characterized by strong interdependencies along the north-south axis.

Most scholars investigating the sustainability of the food supply chain directly collect their data using tools such as surveys, experiments, interviews, and focus groups. The case study is the most common method for these explorations, as indicated in previous research (Ashby *et al.*, 2012; Massaroni *et al.*, 2015). This emphasis on case studies indicates the novel and fast-changing nature of the field, and that more in-depth investigations are required to identify its boundaries and foundations. However, modelling-based studies are increasing in number (e.g. Chen *et al.*, 2018) as they address the need for a more integrated understanding of sustainable supply chains (Brandenburg *et al.*, 2014). In addition, the lack of specific theoretical frameworks in two-thirds of the studies indicates that the research field is still emerging, and thus extensive opportunities for research that bridges the gap between theory and practice are presented.

5. Implications and research directions

This systematic literature review offers several implications for practitioners, and insights for further research in the field of FSSCM.

Food supply chains make a significant contribution to the global economy and sustainable development, as they involve suppliers and other stakeholders from various industries working together so food can reach the final consumer (Joshi *et al.*, 2020; Kamble *et al.*, 2020; Thomé *et al.*, 2020). Kamble *et al.* (2020) suggest that better economic performance and social wellbeing can be achieved by food suppliers, retailers and others only if critical post-harvest losses can be avoided by applying new methods linked with supply chain visibility and sustainable resources. Thus, the focus should be on the upstream of the supply chain, particularly in many under-developed and developing nations where agriculture is still the essential basis of the economy (Taghikhah *et al.*, 2020). Some studies were identified as being conducted in developing geographic areas, but more should be encouraged due to the greater potential FSSCM can bring.

The specific directions identified include those of Kumar Sharma *et al.* (2019), who stated that the circular economy and sustainability are complex and must be managed by decision makers and practitioners in both developed and developing nations. They proposed a model that can inform the implementation of circular economy-driven sustainability FSC activities in emerging and under-developed economies, particularly in India.

Asian *et al.* (2019) examined how the increasing costs of logistics, lower yields, and strategic barriers have a negative impact on the level of competitiveness of farmers in developing countries. The authors proposed an algorithm to help key decision makers

address the challenges of the FSC and sustainable development. Further studies can also develop theories and practical tools based on specific features, as these geographic areas can support the food industry through new sustainable strategies and tactics.

Such strategies and tactics are high on the agendas of many types of companies, but the business models of start-ups differ from those of other organizations and thus affect their creation and implementation. Larger companies may be able to better sustain the impact of the evolving trends of FSSCM, but they may also be less flexible than start-ups in finding opportunities and innovating (Suchek *et al.*, 2021).

As suggested in previous sections, researchers must also focus on assessing the reliability and trustworthiness of FSSCM theories, as we found that many papers focussed on theory building. However, these theories generally address specific facets and thus the results cannot be easily generalized. Our study enriches the research by reviewing the most common theoretical approaches (e.g. the stakeholder approach, triple bottom line, the life cycle approach), and others that are less used (i.e. RBV and KBV, institutional theory, resource dependency theory, decision theory-based framework, etc.). This requires further exploration as a need to build a more solid conceptual framework for FSSCM research has also emerged.

In terms of FSSCM measurement and control, our analysis reveals an increase in the development of standardized constructs, which can be used to monitor and control how companies involved in the FSC achieve a successful level of sustainable development (Folkerts and Koehorst, 1998; Yakovleva *et al.*, 2012; Sharma *et al.*, 2017). This is required as most aspects of FSSCM are associated with government regulation, incentive policies, stakeholders' approval of pioneering "green" products/services and the associated cultural and social consequences, and entrepreneurs' inclinations to follow ground-breaking sustainable principles. These trends are often related to the market, and involve accessibility, the costs of raw materials, and new technology, which require specific knowledge and thus may incur huge costs that many companies cannot afford.

In terms of the EOA, we suggest that future empirical research should focus on intra-functional and intra-firm exploration at corporate and network levels, or on dyads that reveal the relationships between pairs of organizations (i.e. farms, manufacturers, distributors, etc.). Similarly, Siddh *et al.* (2017) also emphasized that empirical research should focus on exploring intra-firm and intra-functional relations, as integration between companies should be encouraged before sustainability at different levels of the FSC is achieved. Finally, the role of end consumers in the FSSCM is still largely unexplored but important, as they can prompt organizations, dyads and networks to adopt more efficient and effective methods of introducing sustainable innovations and identifying new niche opportunities in this area.

6. Conclusion

In this paper we provide a literature review of papers focussed on the various facets of the FSSCM. We identify relevant papers published over the past 23 years (1997 to early 2021), with the aim of informing academics and practitioners about the research landscape, gaps, and current and future trends in the FSSCM. The literature review considers 176 influential peer-reviewed articles using accurate selection procedures and content investigation.

The majority of the selected papers were published in the last eight years (2014–2021), probably due to the increased awareness of environmental problems and of the need to reduce hunger globally (Zero Hunger is Goal Two of the Sustainable Development Goals of the 2030 Agenda), the increased food risks, an awareness of the benefits of decreasing food wastage, health management and of the well-being of people in all geographical areas (Goal Three: Good Health and Well-being).

FSSCM research is undoubtedly increasing, but few studies succeed in combining the various sustainability constructs with the main elements of the FSCM, particularly in the

context of developing/under-developed countries. Thus, there are opportunities to increase our understanding of the integrative factors, particularly in less-developed regions of the world.

Our research has various limitations, like most studies. First, we used the specific keywords "supply", "food", and "sustainabl*" to select the articles from the Scopus database. While this identified nearly 2000 articles, using different keywords may have a different outcome. Additionally, only one database was used, so researchers can explore others such as Web of Science and compare their findings to ours, and although many analyses were identified, other methods of bibliometric analysis and systematic literature review may offer different insights into the specific context. Thus, we suggest that researchers apply different bibliometric methods when addressing this research domain.

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Corresponding author
Agostino Vollero can be contacted at: avollero@unisa.it

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