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Review

Issues and Challenges in Short Food Supply Chains: A Systematic Literature Review

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Abstract: Consumers increasingly prefer more direct and more transparent food distribution channels, such as short food supply chains (SFSCs). Nonetheless, SFSCs face a variety of issues and challenges in their creation and functioning, resulting in limited performance and sustainability, as well as in difficulties of upscaling. This study aims at improving our understanding of SFSCs' issues/challenges through a systematic review of the most recent literature. We perform a full-text content analysis of 44 studies, looking for answers to the research questions: At which parts of the SFSCs do the issues/challenges occur? How can we characterize the issues/challenges in SFSCs? While doing so, we offer a holistic perspective on SFSCs. We make use of the SCOR model to define SFSC processes as well as to describe the nature of these issues/challenges. The findings of this study shed light on the nature and strategic-tactical-operational level of the issues/challenges in SFSCs and point out the limitations in the existing literature such as the SFSC processes that are neglected. The holistic approach we suggest and the insight on SFSCs' issues/challenges we provide can help researchers offer effective solutions and strategies to support the overall development of SFSCs.

Keywords: short food supply chain; alternative food network; local food system; sustainability; logistics processes; supply chain modeling; SCOR model



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1. Introduction

1.1. Motivations of the Study

In recent years consumers' habits concerning food purchases have been changing due to a desire for healthy eating and sustainable consumption. Consumers who look for food products of high quality and well-known origins turn increasingly to more direct and more transparent supply chains (SCs). This trend further accelerated during the first year of the COVID-19 pandemic, leading to discussions about whether these alternative distribution channels can meet demand and improve food system resilience and sustainability. In this context, short food supply chains (SFSCs) respond to the demand of consumers for more proximity and quality, while providing small-scale producers an opportunity for autonomy and enhanced income.

The French Ministry of Agriculture, Food, and Forestry defines SFSCs as the "commercialization of agricultural products through direct selling or indirect selling when only one intermediary is involved" [1] (p. 198). According to this definition, even though the locality of the food and the minimized number of intermediaries make part of ideal-type SFSCs, these distribution channels are not limited to direct sales [2] or local food [3]. Similarly, SFSCs can be limited to organic products, but this is not always necessarily the case. Figure 1 below presents the scope of SFSCs as accepted in this study, with regard to directness, locality, and organic production.

SFSCs typically involve producers with limited production and logistics capacities. By participating in SFSCs, they find themselves suitable marketing channels that enable them to become entrepreneurs. Nevertheless, several studies argue that producers often cannot

upscale their activity through short distribution channels [4–6] due to their limited access to markets and financial resources. In certain cases, the inability of SFSC stakeholders to upscale their production and distribution leads to a mismatch between demand and supply in the face of the escalating consumer demand for SFSC products. During lockdowns caused by the COVID-19 pandemic, for example, there was a peak in demand for SFSC products, and the producers needed to show great agility to handle the dramatic increase [7].

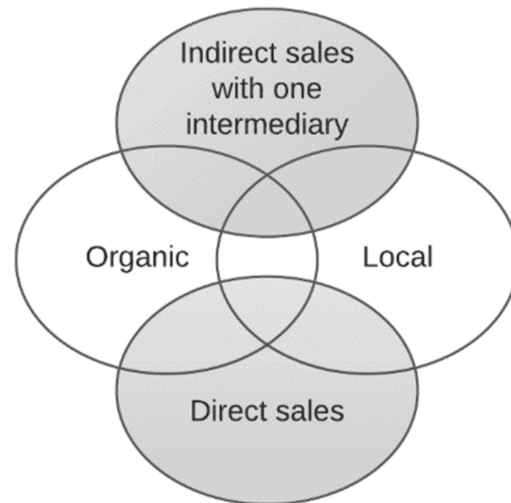


Figure 1. Scope of SFSCs as accepted in this study, represented by the regions highlighted in gray.

To satisfy the increasing demand and contribute to the creation of more sustainable and resilient food systems, SFSCs need to increase their overall impact [8]. To participate in SFSCs and expand their supply capacities, many active and potential stakeholders need the local, national, and supranational authorities to facilitate the access to infrastructure [9,10] and financial resources [11,12] as well as to training [13] and networking opportunities [11]. Policymakers also play an important role in facilitating the functioning of SFSCs through policy reforms [12,14,15]. On the other hand, contributions of the scientific community are equally critical for identifying and overcoming the issues and challenges that complicate the establishment, performance improvement, and upscaling of SFSCs (i.e., increased production and/or logistics capacities, increased number of producers) [16,17]. Moreover, in our opinion, the novelty of SFSC initiatives adds to the importance of methodically studying these issues and challenges, since these recent initiatives often include insufficiently experienced practitioners and the lack of an established culture of scientific management and optimization, resulting in poor performance and impeding their upscaling.

1.2. Originality of the Study

Literature reviews about SFSCs focus on characterization [18], sustainability properties [19,20], and logistics [17] of SFSC, as well as on the coexistence of long and short FSCs [21]. To the best of our knowledge, however, a systematic review of the issues and challenges in SFSCs is not available yet in the scientific literature. This study, therefore, offers a systematic review of issues and challenges that SFSC stakeholders encounter during the creation and functioning of these initiatives.

Even though there is no such systematic review in the literature, many studies mention the existence and acknowledge the importance of SFSC issues and challenges such as costly distribution [22], distribution channel diversification [23], and use of digital technologies [3]. Nonetheless, these studies typically focus on one specific SC process or activity, particularly on production and distribution processes [24], without discussing the other parts of the SC. Moreover, most studies tend to adopt a one-dimensional perspective in their evaluation of SFSCs; some approach the subject of SFSCs from a purely social point of view, while some limit it to an optimization problem. In other words, the scientific research on SFSCs does not embrace a holistic approach, resulting in a lack of effective models and solutions to support

the overall functioning and improvement of SFSCs. To overcome this limitation, we need to study SFSCs holistically by considering all the processes of SFSCs [17] and by embracing a multidimensional perspective (e.g., consideration of economic, social, environmental, and health-related aspects).

As a first step toward a holistic SFSC vision, we identify the main processes that compose an SFSC by benefiting from the SC processes defined in the supply chain operations reference (SCOR) model by the Association for Supply Chain Management. The use of the SCOR model and the definition of SFSC processes can help forge a link between the supply chain management field and SFSCs research, thus ensuring that we do not ignore any processes while aiming for performance improvement and upscaling. For the same purpose, we also define 12 issue/challenge (i/c) natures such as economic, optimization, social, and so on (see Section 2.2.1 for the complete list). Finally, we make use of strategic-tactical-operational levels to help characterize the issues and challenges encountered in SFSCs.

1.3. Objective of the Study

According to Pato [25], solving issues and minimizing difficulties in SFSCs require the participation not only of supply chain stakeholders but also of civil society organizations, public institutions, and scientific researchers. The contribution of this study, hence, is to provide these groups with a holistic approach to SFSC issues and challenges, contributing to the proposal of realistic and comprehensive solutions and strategies to support the performance improvement and upscaling of SFSCs. To improve our understanding of the issues and challenges that the SFSC stakeholders encounter, this study aims to answer the research questions (RQs) below in light of the existing scientific literature:

- RQ 1: At which parts of the SFSCs do the issues and challenges occur?
- RQ 2: How can we characterize the issues and challenges in SFSCs according to the SFSC processes that they relate to, i/c natures, and the level of the solutions that they require?

To answer these questions, the remainder of the study is structured as follows: The Section 2 describes the steps of the study, including a general literature review and the systematic literature review on SFSC issues and challenges. The dimensions we defined to reach our results (SFSC processes, i/c natures, and i/c levels) are also described in this section. Section 3 provides background information, particularly on the emergence and characteristics of SFSCs and includes a SWOT analysis as well as a thematic classification. Section 4 interprets the findings by making observations related to each research question. Finally, Section 5 summarizes our findings, states the limitations of the study, and provides perspectives for future research.

2. Materials and Methods

2.1. Review of the SFSCs Literature

We started our study with a broad review of the SFSCs literature. To complement our review with quantitative information, we also made a thematic classification of SFSC studies according to their focus: in other words, their main subject. In September 2020, out of the 474 studies we reached in the Scopus database that had been published since 2000 we identified 172 that directly handled SFSCs. (The search was cut off in 2000 since the first study to use the term SFSC was published that year [26]). We classified these studies according to their main interest, mainly based on their titles, author keywords, and abstracts. In this classification, we defined 26 themes such as emergence of SFSCs, characteristics of SFSCs, SC strategies, economic sustainability, and so on (see Section 3.3 for all the themes). Most studies were classified under more than one theme. The qualitative and quantitative results of this literature review are presented in Section 3.

2.2. Systematic Literature Review on SFSC Issues and Challenges

Following our broad literature review, we identified the need for a more detailed review of the literature with a particular focus on the issues and challenges (i/c) in SFSCs. To do so, we opted for a more systematic approach where we focused on the most recent publications, performed a full-text reading, and looked for particular information, namely SFSC issues and challenges (i/c). For this detailed literature review, we limited the timespan to 2020–2021 since we wanted to focus only on the most recent literature due to all the changes that have occurred in the sector, particularly the impact of the COVID-19 pandemic that increased the popularity of SFSCs among consumers and researchers. Among the 44 studies included in our review were three papers that were literature reviews ([17,20,21] in the reference list of the study). As a result, the impact of past research is still inherent in our study.

At the beginning of our systematic literature review of i/c in SFSCs, we made a keyword search in Web of Science database in September 2021, using the keyword string presented in Table 1. Later, we methodically selected the studies to include in our review as demonstrated in Figure 2. Among the 106 studies that were published in 2020 and 2021, five were eliminated after reading the abstracts since these studies were about sectors other than food (e.g., forest products), but they still appeared in the results due to keyword resemblance. Out of the 101 remaining studies, 57 were eliminated after full text browsing since they did not focus on SFSCs but rather mentioned them very briefly or only as an example.

Table 1. Keyword string used in Web of Science database.

Title	Abstract	Author Keywords
"short * food * supply chain **" OR "short * agri-food * supply chain **" OR "short supply chain **"	"short * food * supply chain **" OR "short * agri-food * supply chain **" OR ("short* supply chain **" AND ("agri**" OR "food**" OR "farm**"))	"short * food * supply chain **" OR "short * agri-food * supply chain **" OR "short supply chain **"

In Web of Science database, the asterisk (*) represents any group of characters or no characters.

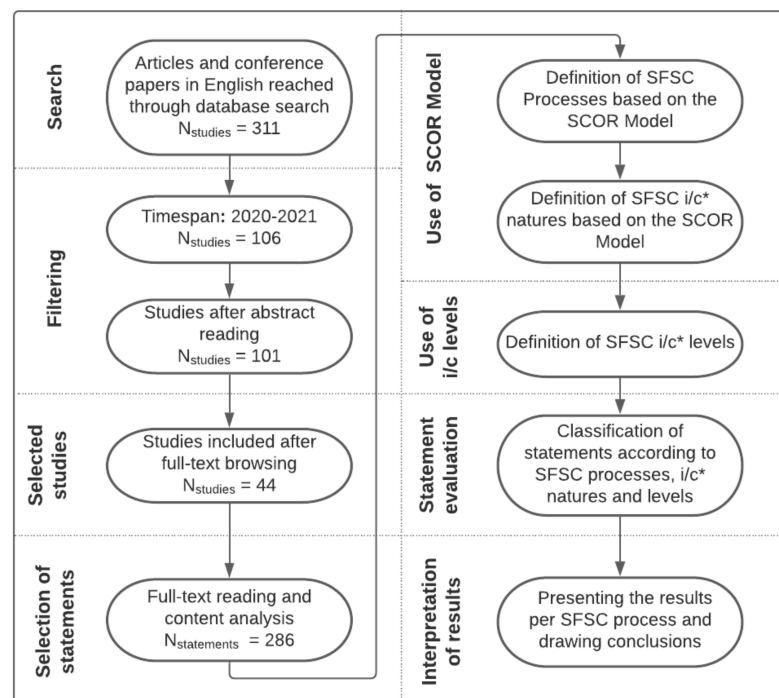


Figure 2. Steps of the systematic literature review.

During the full-text reading of the selected 44 studies, we looked for statements that pointed out the i/c that SFSC practitioners face. We opted for full-text reading since this information is not explicitly defined as “issue”, “problem”, “barrier”, “success factor”, or “challenge” most of the time, and it is often embedded in the text, requiring in-depth content analysis (see, for example [21] from the SFSC literature for another study that uses a similar content analysis method). As a result of the full-text content analysis, we reached 286 i/c statements that implied an i/c in SFSCs from the 44 selected studies. Concerning the identification of i/c, it is important to note that we considered only the statements that specifically concerned SFSCs and not any other similar concepts such as alternative food networks or local food systems.

2.2.1. Definition of 3 Dimensions for SFSC i/c: SFSC Processes, i/c Natures, and i/c Levels

Following the identification of relevant information in each selected study, we defined 3 dimensions to help us evaluate and interpret the selected i/c statements in a way to include every stage and every aspect of the SFSCs in our study.

To develop the definitions of the first two dimensions, SFSC processes and i/c natures, we used the SCOR model, proposed by the Supply Chain Council (APICS). The SCOR model is a comprehensive and well-known tool in the SCM domain that helps describe, analyze, and improve SCs by providing a methodology as well as benchmarking and diagnostic tools [27]. As displayed in Figure 3, the SCOR model proposes six main SC processes: “plan”, “source”, “make”, “deliver”, “return”, and “enable”.

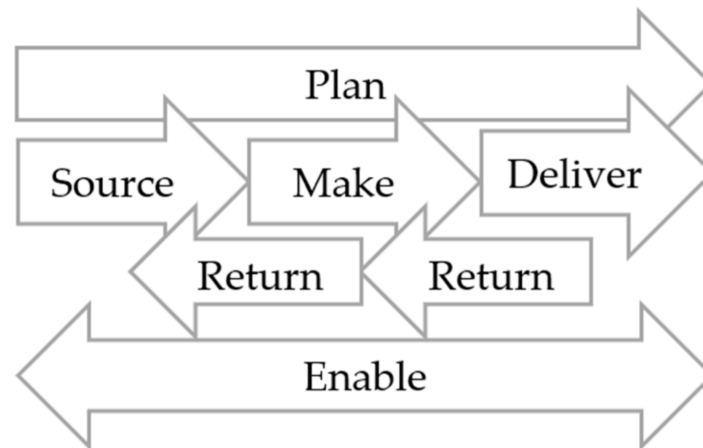


Figure 3. Six main processes in the SCOR model.

The processes, “source”, “make”, “deliver”, and “return”, refer to SC processes where material movement or transformation takes place, whereas the process, “plan”, concerns determining the courses of action regarding these processes. On the other hand, the SCOR model includes a sixth far-reaching process, “enable”, that is associated with the whole supply chain. “Enable” integrates processes such as human resources processes, financial processes, and ICT (information and communication technologies) processes with the supply chain processes [27]. Accordingly, we used the planning and execution processes defined in the SCOR model to propose SFSC processes (see Table 2), while we used “enable” for the definition of another dimension: i/c natures (see Table 3). As per the identification of i/c natures, we shared some keywords that describe the themes we frequently encountered in the selected studies in Table 4.

Table 2. Definition of SFSC processes based on SCOR model processes.

SCOR Model Processes	SFSC Processes
Plan	Planning of agricultural production Planning of food processing Planning of logistics activities
Source	Sourcing agricultural input Sourcing packaging material
Make	Agricultural production Food processing
Deliver	Product distribution: Order management Packaging Transportation Sales Consumption Waste management Storage
Return	Reverse logistics

Table 3. Describing the nature of SFSC i/c based on the SCOR model process Enable.

SCOR Model Process: Enable	i/c Natures
Supply chain business rules Supply chain risk Supply chain performance Supply chain procurement	Optimization and resilience Upscaling and marketing Economic Environmental
Supply chain human resources	Labor and competences Social Health-related Culture- and habit-related
Supply chain assets	Physical infrastructure
Supply chain contracts Supply chain network	Cooperation, collaboration, and coordination
Regulatory compliance	Political, bureaucratic, compliance
Data and information Supply chain technology	Data, information, and technology

Concerning the definition of SFSC processes, below are some clarifications:

- We include “product distribution” as an umbrella process even though we already defined several processes within it. This is because many i/c statements we encountered were related to product distribution in a general sense and often the relevant process within product distribution (e.g., order management, storage) was not specified.
- We use “distribution”, “logistics”, and “transportation” in such a way to refer to different concepts and not interchangeably. Accordingly, logistics includes any activities relating to sourcing, product distribution, and reverse logistics, while transportation refers only to moving products using a vehicle.
- “Order management” concerns tracking, preparing, and shipping customer orders.
- “Sales” process represents when customers purchase the food products, for example by selecting products and paying for them in a farmers’ market, or by placing an order online and paying by bank card.
- “Consumption” involves what comes after the sales process. In other words, it implies food preparation and consumption for consumers.
- “Waste management” consists of food and packaging material waste that occur during production distribution.

Table 4. Some keywords for each class of i/c natures.

Optimization and Resilience	Data, Information, and Technology	Upscaling and Marketing	Labor and Competences	Physical Infrastructure	Cooperation, Collaboration, Coordination
Logistics efficiency Small product volumes High distribution costs Delivery schedules Harvest schedules SC disruptions Responding rapidly to changing conditions Joint planning	Information about products Market information Data analytics Digitalization Online SFSCs Smart technologies Use of IT Information asymmetry Customer demands and trends	Product diversification Distribution channel diversification Demand Target clientele High-quality products Public interest Image, reputation Certification, labeling, branding Promotion, advertisement Competition Integrating new participants Niche market	Knowledge Skills Experience Creativity Training, education, mentoring Cross-learning Expert advice Small workforce Qualified labor Long working hours Volunteer work	Using LFSC infrastructure Access to land Access to transport Processing facilities Points of sale Internet infrastructure Food hubs, collection centers Electric vehicles Refrigerated vehicles Storage areas	Relationships with other actors Synergies Shared interests Sharing resources Networks Cooperatives Building communities Volunteers Communication among stakeholders Joint decisions Commitment Risk sharing Collective knowledge
Economic	Environmental	Social	Health-Related	Culture- and Habit-Related	Political, Bureaucratic, and Compliance
Investment Economies of scale Cost accounting Product pricing Capital shortage Price competition Survival Willingness to pay Distribution costs Wages Subscription fees for consumers	Organic farming Seasonality of agriculture Use of natural resources Eco-labels Packaging Waste	Access of low-income consumers Dedicated customer groups Face-to-face interaction Trust-based relationships Proximity relations Conflict resolution Fair prices Communication skills	Organic products Food quality Quality assurance systems Food safety Hygiene standards Nutritional recommendations COVID-19	Resistance to change Changing operation methods Purchasing and consumption routines Unwillingness for upscaling Ideological motivations Cultural barriers to cooperation Eating preferences	Incentives Proposals and grants Political support Policy reforms Tax policies Public procurement policies European projects Reduction the bureaucracy Lack of quality control Disabling regulatory frameworks Hygiene rules

2.2.2. Evaluation of i/c Statements According to 3 Dimensions

We identified 286 i/c statements in selected studies, each of which pointed out an issue or a challenge in SFSCs. We evaluated each i/c statement according to its relation to different SFSC processes, its nature, and the level (e.g., strategic, tactical, operational) of the potential solutions that can address it. The potential solutions were not necessarily mentioned in the reviewed studies.

Through such a methodology that combines several perspectives for evaluating the issues and challenges of SFSCs, we aimed to draw comprehensive and multidimensional conclusions about the limitations and difficulties of SFSCs.

Below, an example statement taken from the study of Borcic [14], as well as the Tables 5 and 6 are used to explain our approach when evaluating the i/c statements:

“Another problem related to boxes is that demand is usually much lower in the most productive times of the year. For example, in summer, when the yield is very high and producers can offer the richest boxes, many consumers are on vacation. One of the methods to save their produce from going to waste is to process it, for example by pickling, juicing, drying, making jams, etc.” [14] (22p.).

Table 5. Evaluation of the example statement according to first two dimensions.

Relevant Part of the Statement	Inference Made		Details
	SFSC Process	Issue/Challenge Nature	
"... demand is usually much lower in the most productive times of the year."	Sales	Upscaling and Marketing	Variability of the demand throughout the year relates to Marketing nature. Lower demand relates to the Sales process.
"... in summer, when the yield is very high ..."	Agricultural production	Environmental	Higher productivity in summer takes place among natural properties of agricultural production.
"... save their produce from going to waste is to process it ..."	Waste management, Planning of food processing, Food processing	Economic Social	Food waste is considered an economic and a social issue.

Table 6. Evaluation of the example statement according to the third dimension.

Inference Made		Details
Issue/Challenge Level		
Strategic	We classify this statement as "strategic" since the i/c can be addressed by investing in processing and/or storage infrastructure, making food processing a part of the business strategy.	We classify this statement as "tactical" as well, since the i/c can be addressed by using local infrastructure for processing and/or storage. The excess products can also be processed with the existing resources, without investing in infrastructure. In this case, food processing is performed only when necessary and potentially for a smaller quantity of products.
Tactical		

While interpreting the results we obtained, we formed and made use of a matrix that summarized the review results according to the SFSC processes that we defined (see Section 4). This matrix enabled us make observations related to our research questions.

3. SFSC Characteristics and Issues

To better understand the limitations of SFSCs and the need for overcoming them, we should first have a clear idea about the emergence and characteristics of SFSCs, as well as the obstacles to achieving their expected benefits. For this purpose, this section provides such background information, followed by a SWOT analysis and a thematic classification that complements the provided information.

3.1. Emergence of SFSCs

Even though industrialization in food systems via long food supply chains has obtained great success in reducing production and distribution costs and in making food available for more people, it has also attracted criticism due to its negative impact on the environment and society [19,28] as well as because of the food safety problems it causes [19]. Consequently, in recent years academics have extensively analyzed the drawbacks of industrialized food systems [18]. The main drawbacks concern environmental damage caused by intensive production and distribution [18,29,30], unfair distribution of margins among supply chain stakeholders [31,32], food safety issues that raise health concerns [18,29,33], and adverse social impacts on society [34]. Over recent decades these drawbacks have led to the emergence of alternative food distribution channels and SFSCs [29,35–38].

3.2. Characteristics of SFSCs

Marsden et al. [26] (pp. 424–425) describe SFSCs through their role in "shifting the production of food commodities out of their 'industrial mode' and potentially 'short-circuiting' the long, complex and rationally organized industrial chains within which a decreasing proportion of total added value in food production is captured by primary producers". They emphasize the recently increasing interest in "more local" and "more natural" food products as a trigger for the development of such supply chains, which typically brings back the social interaction between food producers and consumers ("resocializing food"),

as well as providing food products with an identity through their spatial aspects (“respatializing food”). The authors claim that “locality” of food is a major characteristic of SFSCs but point out that these supply chains can also be “spatially extended” [26]. Kneafsey et al. [2] argue that many researchers who have studied SFSCs accept the description of SFSCs by Marsden et al. [26] and note that some other newer definitions condition the minimum number of (ideally zero) intermediaries. Among the newer definitions in the literature, the below is a comprehensive one that incorporates the main characteristics of SFSCs, offered by Michel-Villarreal et al. [39] based on the SC definition made by Christopher [40]:

“Short Food Supply Chains (SFSCs) are networks of connected and interdependent actors mutually and cooperatively working together to control, manage and improve the flows of information-embedded products, services, resources, and/or information, from farm to fork, seeking a reduction of intermediaries and physical distance between producers and consumers.” [39] (3p.).

On the other hand, the European Network for Rural Development [41] emphasizes the enormous variety of SFSCs in EU member countries and concludes that we can interpret them in a flexible manner according to the context and the area in which they function. Accordingly, we use the term SFSCs in this study to include both direct and indirect distribution channels (with one intermediary as suggested by the French Ministry of Agriculture) as well as both spatially proximate and spatially extended settings. It is crucial to emphasize that the core characteristics of SFSCs need to remain valid even in indirect and/or extended scenarios. Accordingly, an initiative should provide their consumers with clear information about products and production processes, establish personal links among all SC stakeholders through fewer intermediaries, offer high quality (e.g., organic, ecologically produced, fresh . . .) food products with spatial identity, and strive to contribute to sustainable production, distribution, and consumption practices to qualify as an SFSC.

3.3. Thematic Classification of SFSC Studies

A further analysis that can help describe the characteristics and issues of SFSCs is a thematic classification of the studies in the SFSCs literature. Table 7 below presents in detail the results of the thematic classification we conducted for developing a deeper insight into the literature with regard to the studied topics, while Figure 4 provides a more compact presentation of the same results.

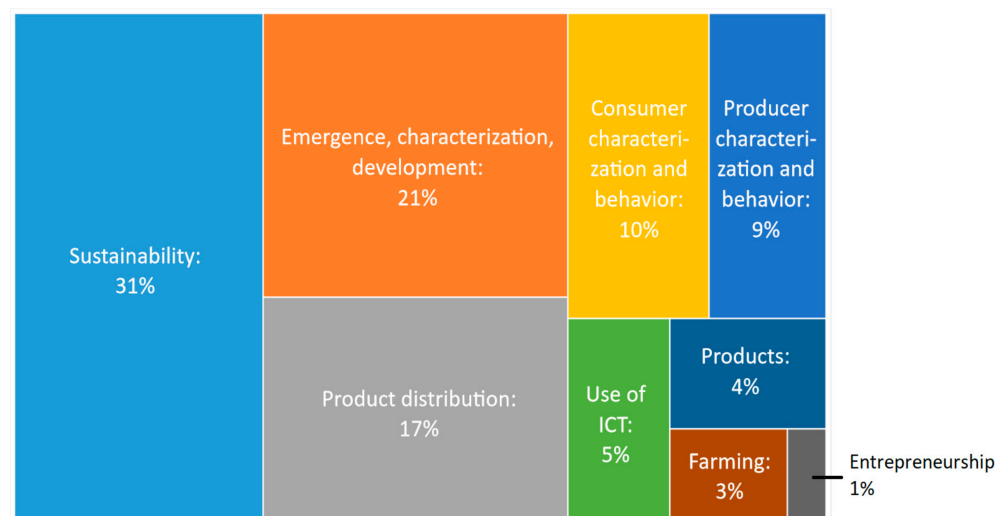


Figure 4. Thematic classification results with the themes grouped.

Table 7. Thematic classification results in detail.

Group of Themes	Theme	Number of Times the Theme Was the Focus of a Study
	Farming	9
Emergence, characterization, development	Emergence of SFSCs	19
	Market access in SFSCs	11
	Development of SFSCs	29
	Characteristics of SFSCs	8
	SC stakeholders	3
Product distribution	Distribution practices	2
	Distribution infrastructure	5
	Issues in distribution	5
	SC disruptions & resilience	11
	SC strategies	28
	Innovations in distribution	5
	Entrepreneurship, business model, organizational innovation	3
	Use of ICT	17
Sustainability	Economic sustainability	38
	Environmental sustainability	33
	Social sustainability	30
	Food self-sufficiency	2
Consumer characterization and behavior	Purchasing decisions of consumers	26
	Characteristics of consumers	3
	Perceptions of consumers	6
Producer characterization and behavior	Participation of producers in SFSCs	19
	Perceptions of producers	4
	Competences of producers	3
	Challenges of producers	3
	Products	14
	Total	336

According to these results obtained through 172 studies published between 2000 and 2020, we can conclude that the evaluated studies frequently concerned the characterization of SFSCs, the producers, or the consumers who participate in them. Based on the findings of the classification, we can also conclude that the sustainability properties of SFSCs are frequently handled in the scientific literature. We can also argue based on the figures that strategic, operational, and organizational aspects of SFSCs such as product distribution, use of information and communication technologies (ICT), and their business models have not had much attention in comparison.

3.4. Obstacles to Achieving the Expected Benefits of SFSCs

To facilitate and optimize the movement of food items from production to consumption, conventional food systems function through long food supply chains that involve numerous intermediaries, each of which often specializes in performing one specific activity in the most efficient way possible. SFSCs, on the other hand, are established on the principle of eliminating these intermediaries by putting the producers in the center of commercialization, enhancing their autonomy, and increasing their responsibility along the supply chain.

SFSC stakeholders and researchers often agree on the social benefits brought by SFSCs but not always on the environmental and economic ones [20], which points out the need for further studying and improving the environmental and economic performance of SFSCs. However, ADEME (French public agency for ecological transition) [42] argues that the high variety of SFSC initiatives makes it difficult to study the environmental performance of SFSCs and to confirm that they systematically have a lower negative impact on the

environment. Similarly, studying their economic viability (costs, profitability, and capacity to expand if necessary) also requires a consideration of specific cases.

Producers who opt for distributing their products through SFSCs are typically small- and medium-scale farmers with limited production and logistics capacities due to insufficient availability of resources such as workforce, infrastructure, skills, and capital. Coupled with their increased responsibility, their smaller scale brings about various issues and challenges that complicate establishing a new SFSC initiative or improving the performance of an existing one. Clearly, the type and significance of these issues and challenges depend on the features of the producer, the farm, the relationship with consumers, as well as the specific initiative of SFSC [43] since these can greatly change from one example to another. For this reason, Borcic [14] argues that farmers engaged in SFSCs must tackle problems that are quite different from those of conventional farmers and that they need to be creative and innovative concerning problem-solving.

Despite the huge variety of SFSCs that requires adapted solutions and strategies, stakeholders of SFSCs often face similar issues and challenges. For example, Rucabado-Palomar and Cuellar-Padilla [6] generalize the issues and challenges of SFSCs under the four groups below:

- Need for logistical infrastructure;
- Importance of social links;
- Need for diversifying the distribution channels;
- Product-related constraints.

All in all, distinctive characteristics of SFSCs that attract more and more consumers and producers do not suffice to ensure overall performance and scalability of such SCs. The market conditions in which they operate, and the lack of experience and resources of the participants lead to limitations to achieving their sustainability benefits, which are not limited to economic and environmental dimensions but also include a social aspect (e.g., enabling the access of more people to SFSCs by scaling up). To synthesize all the information about both the strong and weak sides of SFSCs analyzed in the literature, we propose a SWOT analysis as shown in Table 8. Our discussions with 10 SFSC practitioners who are representatives from community supported agriculture initiatives and from logistics service providers for SFSCs as well as individual producers involved in diverse initiatives confirmed the relevance and importance of the elements that are included in the analysis.

Table 8. SWOT analysis for SFSCs.

Strengths	Weaknesses
Local, fresh, and healthy food [31,44–46] Organic production [14,16,47–49] Decreased food miles [41] High traceability of products during distribution [50] Increased profits [47] Urban proximity [16,51,52] Greater autonomy for producers [14,53,54] Direct communication between producers and consumers [41]	Inefficient and costly distribution [3,55–60] Limited product availability (e.g., quantity, variety) [17,61,62] Lack of processing and/or distribution infrastructure [18,30,63] Limited marketing skills of producers [41] Reaching only a small range of consumers [30] Unfamiliarity of consumers with SFSCs [3]
Opportunities	Threats
Collaboration with other producers and/or consumers [1,41] Financial support by governments and/or EU [3,32] Public catering (e.g., school/hospital canteens) [64,65] Development parallel to other sectors (e.g., agritourism) [66] Use of existing infrastructure (e.g., sales points) [41] Food hubs/platforms [65] Increased consumer knowledge and trust in producers [67–70] Development and attractiveness of e-grocery [3,71]	Global and efficient food supply chains with easy-to-reach sales channels (e.g., supermarkets) [60] High prices for buying land [41] Highly time-oriented buying habits of consumers (e.g., demand for immediate access to products) [72] Excessive standards and/or legal requirements [50] Finding the balance between scaling up and preserving SFSC characteristics [30]

The “weaknesses” and “threats” presented in the SWOT analysis acknowledge the existence of various issues and challenges that hinder better performance and scalability, supporting our motivations to conduct this study.

4. Results and Discussion

Despite the growing demand for SFSC products and the potential of SFSCs for improving the sustainability and resilience of food systems, performance improvement and upscaling of such SCs remain difficult to achieve due to numerous issues and challenges. The systematic literature review that we conducted was aimed at providing the reader with a better understanding of the i/c in SFSCs through a holistic evaluation of the scientific literature.

In this section, we share the results of the systematic review and interpret the results to look for answers to each research question of the study. Table 9 below summarizes the results of the review in terms of i/c statements identified per SFSC process. On each line, the ratio of statements that relate to each i/c level and each i/c nature are represented as percentages. The cells are highlighted in different shades, differentiating between 0% to 25%, 26% to 50%, 51% to 75%, and 76% to 100%. For example, concerning the SFSC process of “product distribution (in general sense)”, we identified 178 statements in 41 studies. Of these statements 99% are classified as “strategic” and 74% of them as “upscaling and marketing”.

Table 9. Findings of the systematic literature review, per SFSC process.

SFSC Process	Number of Statements	Number of Cited Studies *	% of Times That the Statements Are Classified														
			Level			Nature											
			Strategic	Tactical	Operational	Optimization and Resilience	Data, Information, and Technology	Upscaling and Marketing	Labor and Competences	Physical Infrastructure	Cooperation, Collaboration, Coordination	Economic	Environmental	Social	Health-Related	Culture- And Habit-Related	Political, Bureaucratic, and Compliance
Planning of agricultural production	10	5	100	70	40	70	50	70	80	30	40	50	40	50	30	20	20
Planning of food processing	6	4	100	67	17	50	50	84	67	17	34	50	34	67	34	0	34
Planning of logistics activities	24	16	100	92	79	96	50	67	50	30	46	55	50	50	9	25	17
Sourcing agricultural input	1	1	100	100	0	0	0	0	0	0	0	100	0	0	0	0	0
Sourcing packaging material	1	1	100	100	0	0	0	0	0	0	0	100	0	0	0	0	0
Agricultural production	70	31	99	64	36	28	36	78	40	25	28	46	35	26	20	26	23
Food processing	58	22	98	50	24	38	38	83	49	35	23	56	16	26	23	18	26
Order management	2	2	100	100	50	50	100	100	100	50	50	50	50	50	50	50	0
Packaging	5	4	100	40	40	80	20	80	40	40	40	60	20	40	20	0	20
Transportation	28	19	100	82	82	86	29	68	40	43	33	58	58	33	15	22	25
Sales	167	39	100	50	33	32	44	90	38	23	31	51	16	45	18	25	22
Consumption	4	3	100	75	25	25	50	75	50	0	50	50	25	50	25	75	25
Waste management	5	4	100	80	40	40	20	80	20	20	20	60	60	60	20	20	20
Storage	6	5	100	100	50	67	50	100	67	67	34	67	67	50	34	34	0
Product distribution (in general sense)	178	41	99	46	28	34	38	74	45	24	45	43	17	48	15	22	24
Reverse logistics	1	1	100	100	0	0	0	0	0	0	0	0	100	0	0	0	0

* Refer to Table A1 in Appendix A for the list of cited studies per SFSC process.

4.1. RQ 1: At Which Parts of the SFSCs Do the Issues and Challenges Occur?

4.1.1. Observation 1: Most Studies Focus on i/c Encountered in Product Distribution and Production Processes in SFSCs

The findings confirm the motivation behind this study that the existing literature tends to focus on some parts of the SFSCs while neglecting to take into consideration some others. Referring to Section 1, the results of our review support the argument that most studies focus on product distribution and production i/c in SFSCs [24]. As seen in Table 9 above, most of the selected studies mention at some point an i/c about the product distribution (in general sense) (93% of cited papers) or the sales process within product distribution (89% of cited papers). Following the product distribution and sales, 70% and 50% of the cited studies, respectively, specify agricultural production and food processing issues and challenges. About the tendency to focus on the product distribution process, we also observe that the transportation and planning of logistics activities processes also take place among the frequently mentioned SFSC i/c, 43% and 36%, respectively.

4.1.2. Observation 2: Authors Tend to Overly Generalize Their Statements about Product Distribution i/c in SFSC: Product Distribution (in General Sense)

The large number of statements and cited studies that mention the product distribution process in SFSCs in a general sense confirm the importance of this process. Nonetheless, they also show that the literature tends to overly generalize the occurrence of SFSC i/c and that it does not mention the specific process within the product distribution (namely order management, packaging, consumption, waste management, and storage).

4.1.3. Observation 3: Planning, Sourcing, and Reverse Logistics Are Under-Studied SFSC Processes

In addition to the overlooked processes within product distribution, the results also point out three different groups of SFSC processes that are under-studied. First, consideration of the SC process planning is limited to the logistics activities in the SFSCs research. Planning of food processing and planning of agricultural production are neglected subjects, even though they are critical in terms of aligning supply and demand. Second, the SC process of sourcing is completely an under-studied subject in the SFSCs literature. Finally, the existing studies do not pay attention to the reverse logistics process.

4.2. RQ 2: How Can We Characterize the Issues and Challenges in SFSCs?

4.2.1. Observation 1: Strategic and Tactical i/c with Upscaling-Marketing and Economic Nature Are Dominant along the SFSC

Identified i/c statements in SFSCs point out a large dominance of strategic and tactical levels. This is due to the small scale and limited resources of such initiatives, leading to the conclusion that most problems they encounter can be addressed by long-term plans such as investing in infrastructure, gaining knowledge and experience, and restructuring the SCs. As per the i/c natures, the results show that upscaling-marketing and economic i/c are crucial along the SFSC. The dominance of strategic and tactical levels as well as of upscaling-marketing and economic natures supports the claimed difficulty in upscaling the SFSCs (refer to the Introduction) and leads to the conclusion that this difficulty mainly relates to a lack of financial and human resources, a lack of infrastructure, as well as to a need for better marketing organization (e.g., facilitated flow of materials) and for optimization (e.g., cost minimization) along the SC.

4.2.2. Observation 2: Planning of Logistics Activities and Transportation Can Be Improved over a Shorter Term Than Other Processes

According to the overall results, 99% of all i/c statements relate to the strategic level and 54% to the tactical level, while only 32% relate to the operational level. However, as seen in Figure 5, the distribution among the three levels differs according to the SFSC processes. Based on the number of statements identified, only the SFSC processes that have a higher number of statements are considered here.

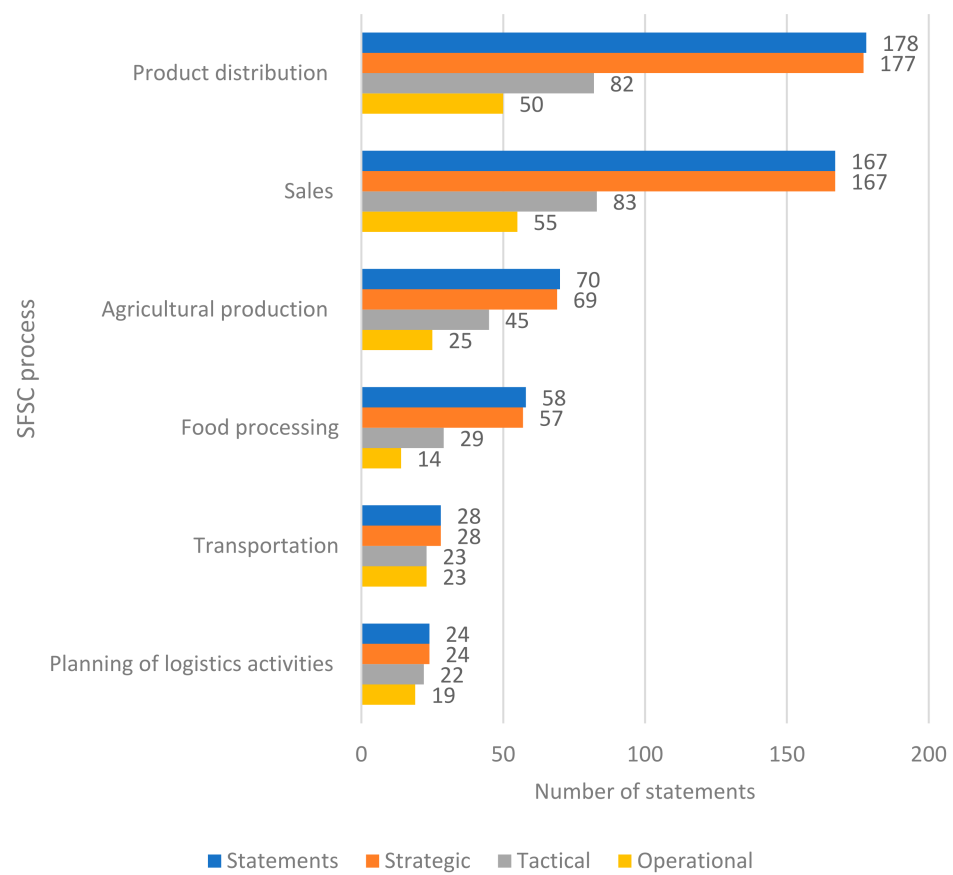


Figure 5. Number of i/c statements and their levels per SFSC process.

As in Figure 5 above, we observed that agricultural production, food processing, sales, and product distribution (in general sense) all have a heterogeneous distribution among the strategic, tactical, and operational levels. For these processes, nearly all the i/c mentioned require the implementation of strategic-level plans or solutions. Considering the statements that led to these findings, this is due to the need for improved infrastructure in such processes.

On the other hand, the processes planning of logistics activities and transportation have rather homogeneous distributions among the three levels. In other words, issues and challenges encountered in these processes can also be addressed by adopting solutions implemented in the short-term without needing to make heavy investments. In a way to support this claim, we also observed that the dominant i/c nature for these processes is optimization-resilience, which relates to operational-level improvement approaches such as vehicle routing.

4.2.3. Observation 3: Health-Related, Culture- and Habit-Related, and Political-Bureaucratic Aspects of SFSC i/c Are Under-Mentioned

In the scope of this study, we defined health-related, culture- and habit-related, and political-bureaucratic natures based on our knowledge of SFSCs, by assuming that they take place among important aspects of such SCs. However, interestingly, the results show that they do not take place among the frequently mentioned i/c natures. This can be because they are frequently handled in the context of SFSC characterization but not in terms of the issues and challenges encountered in SFSCs.

5. Conclusions

5.1. Main Findings and Contributions of the Study

SFSCs have been gaining popularity among producers and consumers in recent decades. However, their stakeholders have faced various issues and challenges that result in poor performance and difficulties in upscaling. To meet increasing customer demand and realize their claims of more sustainable and resilient food systems, SFSCs need to overcome their issues and challenges and become better performing and more scalable.

The goal of this study was to use SCM knowledge to offer a holistic, end-to-end, vision for SFSCs by examining their issues and challenges. To do so, we conducted a systematic review of the recent literature through full-text content analysis. We used SFSC processes and issue/challenge natures that we defined based on the SCOR model and our knowledge about SFSCs, as well as strategic-tactical-operational issue/challenge levels while conducting the content analysis. We used the results we obtained to find answers to the research questions of this study.

The findings helped improve our understanding of the issues and challenges in SFSCs holistically, by questioning every SFSC process, issue/challenge nature, and issue/challenge level and pointing out several gaps in the existing literature. First, most studies only focus on i/c in production and distribution processes in SFSCs. While mentioning product distribution issues and challenges, they often generalize them and do not particularly discuss order management, packaging, or storage processes. In line with the general tendency to handle product distribution and production issues and challenges, SFSC processes such as planning, sourcing, and reverse logistics are under-studied. Furthermore, strategic and tactical levels, as well as upscaling-marketing and economic natures are dominant along the SFSC. The only SFSC processes that appear to have operational issues and challenges are the planning of logistics activities and transportation. Among the SFSC issue/challenge natures we defined, health-related, culture- and habit-related, and political-bureaucratic issues and challenges are under-mentioned.

This study contributes to the literature by offering a holistic overview of issues and challenges encountered in SFSCs. The identification of SFSC processes that we have conducted in this study to ensure an end-to-end consideration of SFSCs is, to the best of our knowledge, a first in the literature. Moreover, the definition of natures and the use of levels for characterizing the issues and challenges of SFSCs is also a novelty offered in this study. Developing a deeper insight into the issues and challenges of SFSCs and embracing a holistic perspective while doing so are particularly critical in this area of research since SFSC initiatives are newly emerging, and there is a crucial need for improving their performance. Such a contribution is particularly important because the SFSC literature is mostly built around describing the characteristics of these initiatives rather than focusing on their problems and searching for solutions to these problems. Therefore, a review of their issues and challenges points out the need for studying SFSCs not only with a descriptive, but also with a diagnostic and prescriptive approach.

5.2. Limitations

This study also has limitations concerning its methodology as well as limitations that derive from its materials.

First, the systematic review was based on full-text reading and content analysis, where we identified statements that implied issues or challenges, made their connections to SFSC processes, classified them into different issue/challenge natures, and decided the levels of potential solutions according to our understanding. To reduce the impact of subjectivity, we followed keyword patterns in our decisions.

Another limitation concerns the materials we used and comes from the general and/or ambiguous expressions used in the cited studies while mentioning SFSCs' issues and challenges. For example, agricultural production and food processing processes are often generalized as "production", requiring attributing the statement to both processes during evaluation. This limitation decreased our ability to detect agricultural production

and food processing issues and challenges separately and blurred the line between these two processes.

A further limitation that derived from the materials was the use of the term SFSC in the literature. Even though there is an abundance of definitions for SFSCs, there is a consensus that they are not necessarily local, organic, or direct supply chains (see Figure 1 in Section 1). Nonetheless, researchers frequently reduce the scope of SFSCs to local food supply chains in their studies. More accurate use of the terminology can facilitate the researchers' access to the studies with the right focus and enable them to make historically more extended literature reviews.

5.3. Perspectives for Future Research

To conclude the study, we offer some perspectives for future research about SFSCs based on the findings of the systematic literature review. In our opinion, it is important to include the under-studied SFSC processes such as planning, sourcing, reverse logistics, order management, packaging, consumption, waste management, and storage in future theoretical efforts and case studies. The impact of these processes on the performance of SFSCs needs to be studied to propose appropriate solutions and strategies for an overall improvement of SFSCs' performance. Similarly, under-mentioned i/c natures such as health-related and culture- and habit-related aspects can be considered more in future endeavors. Another further research direction concerns identifying the relations among the SFSC processes, for example by making use of the issue/challenge natures. This way, the literature can evolve toward a holistic and integrated SFSC vision and offer more realistic and effective modeling approaches and improvement strategies.

Finally, reviewing the literature in terms of the issues and challenges of SFSCs in the years to come can enable researchers to observe and verify the changes that occur in the distribution of the issues and challenges handled in the literature. For example, the attention paid to sourcing issues and challenges can increase due to concerns about supply chain disruptions as experienced during the COVID-19 pandemic.

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Appendix A

Table A1. Studies where we found i/c statements, per SFSC process.

SFSC Process	Studies That Mention Relevant Issues or Challenges
Planning of agricultural production	[14,16,62,73,74]
Planning of food processing	[14,16,62,74]
Planning of logistics activities	[3,9,10,14–17,20,23,25,62,74–78]
Sourcing agricultural input	[24]
Sourcing packaging material	[24]
Agricultural production	[3,6,8,10,11,13–17,20,21,23–25,61,62,64,73,74,77–87]
Food processing	[3,6,8,10,11,13,14,16,17,20,21,23–25,39,62,64,74,77,78,80,82]
Order management	[14,39]
Packaging	[6,17,24,74]
Transportation	[3,6,9–11,14,16,17,20,23–25,39,64,76,78,81–83]
Sales	[3,5,6,8,10–12,14–17,20,21,23–25,39,47,61,62,64,74,75,77–92]
Consumption	[14,47,83]
Waste management	[14,17,39,61]
Storage	[6,14,17,39,87]
Product distribution	[3–6,8,10–17,20,21,23–25,39,47,61,62,64,73–88,90,92]
Reverse logistics	[14]

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