

Measuring Short Food Supply Chain Sustainability

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Short food supply chains (SFSCs) are one of the most direct approaches to more directly connecting consumers with producers. The scaling-up of SFSCs is often challenged by critical issues which can be overcome with identification of the most sustainable, replicable schemes.

Keywords: short supply chains ; producers ; sustainability ; co-creation exercise

1. Introduction

Short food supply chains (SFSCs) can be understood as supply chains with a minimized number of intermediaries. Although they have been proven to bring economic, social, and environmental benefits, they represent a niche phenomenon in the agri-food market ^{[1][2][3][4][5]}. The so-called “gold standard” for SFSCs would be direct contact between the producer and the consumer in terms of maximizing revenue and income for farmers and producers ^{[6][7]}.

SFSCs are also considered in the Farm to Fork strategy as a useful way of improving the resilience of regional and local food systems, considering their production, processing, and selling processes, as an alternative to conventional longer chains ^{[6][8]}.

The literature presents and catalogues many different types of SFSCs; these are classified according to different criteria, including the geographical distance between the production and sales points and the chain's organizational aspects ^{[5][9][10][11]}.

Nowadays, the spread of SFSCs is enhanced by many factors, including an interest in and awareness of the consumption of local and secure products, as well as a willingness to establish direct contact with the producers or a level of trust regarding the origin and traceability of a product ^{[7][9][12][13]}. Despite this growing trend, some barriers limiting the scaling-up of SFSCs still exist, including a lack of information (e.g., unclear labels or difficulties in communicating the added value of products), weak cooperation between producers, a generational gap, and infrastructural deficiencies (e.g., critically minimal Internet connection in rural areas, and logistics and distribution issues). Several studies, such as that of Hyland et al., conducted in 2021 ^[14] within the framework of the H2020 agroBRIDGES project, highlight that major consumer motivations to purchase within short chains include product quality in terms of taste and freshness, food safety issues, support for the local economy, and trust in SFSC producers.

2. Short Food Supply Chains

Traditionally, SFSCs allowed producers to have a strong position in the food chain, but their role decreased with Europe's industrialization and the rise of long-distance transportation, urbanization, and technological advances ^[15]. Mass distribution rose spectacularly in the 1960s with the import of the American model of supermarkets to Western Europe, unbalancing the producer's position in the agri-food supply chain and decreasing their income. During the 1990s, many small farms disappeared, and local open-air markets were often dominated by retailers who procured from wholesalers and large chain suppliers. Nowadays, renewed consumer interest in direct purchasing, in relation to the demand for more secure products, has boosted the resurgence of SFSCs and of new and innovative business models ^{[5][7][16]}. In 2015, 15% of farmers sold half of their products via short chains ^[17].

On the policy side, several EU member states have developed legal frameworks and incentives to support short agri-food chains. At the EU level, support for short supply chain initiatives is provided by rural development policies. Within the “CAP towards 2020” proposals, the European Commission (EC) has also proposed that SFSCs may be subject to themed sub-programs within the oncoming Common Agricultural Policy (CAP) strategic plans. This is what occurred with the Farm to Fork strategy, in which the promotion of SFSCs had a central role.

SFSCs are attracting more and more attention in research on food systems, partly as a result of their growing popularity among consumers, producers, and policy makers. Longitudinal interdisciplinary assessments of different types of SFSCs could also be useful for identifying levers and barriers to sustainable production and consumption, as well as for assessing their role in improving the agro-industrial scheme based on intensive production and long chains ^[18]. Their potential input in the transition towards a more sustainable food system ^[19] offers many research insights.

Concerning SFSCs, different approaches are used to classify their models, including innovation, the interpretation of local concept, proximity, organizational issues, and trust (**Figure 1**).

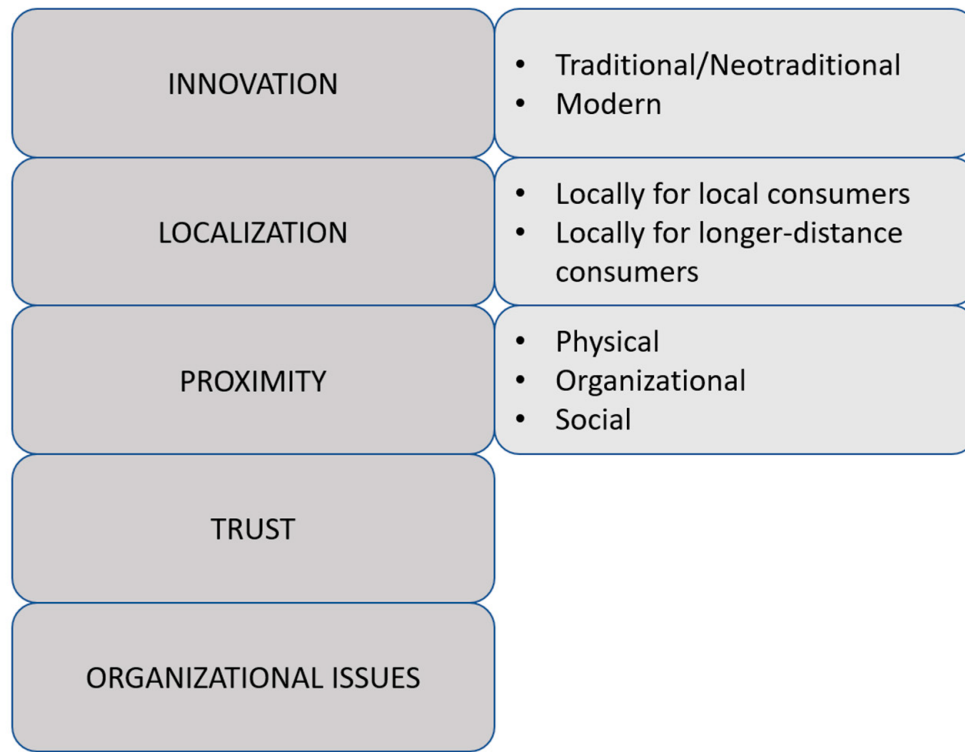


Figure 1. Approaches to classifying SFSC models.

One vision of SFSCs is based on the concept of innovation, dividing SFSCs into two overarching clusters: traditional or neo-traditional ^[6] and modern ^[20]. Within the SmartChain project, Sebök et al. (2022) ^[21] identified technological and non-technological innovations that can be applied in short food chains to increase their attractiveness for consumers and to improve the ability of SFSCs to deliver products and services reliably and consistently. The largest number of innovations identified concerns the issue of “logistics, product accessibility and short food chain channels”, followed by food preservation and other processing technologies (i.e., preservation of freshness; nutritional value; packaging).

Some authors have focused on the context-based understanding of the concept of local food, distinguishing between “locally produced food for local consumers” and “locally produced food for longer-distance consumers” ^[22]. These terminological clarifications stress the complexity of SFSCs, their link with food, their local context, and the role of knowledge-based relations between local actors ^[22]. Thomé et al. (2021) ^[23] grouped chain models by convergence of interests and the need to add value criteria and described the conceptual coexistence framework of the food supply chains and SFSCs, this being at odds with the current bias of the literature.

Otherwise, according to Malak-Rawlikowska et al. (2019) ^[5], SFSCs can be categorized in terms of proximity between producers and consumers from three points of view: physical, organizational, and social. Contrary to what common sense might suggest, the application of physical proximity could lead to an unclear assessment of environmental impact ^[7]. For example, frequent deliveries of small quantities of products, even with very few displacements, may lead to negative impacts on environmental sustainability ^{[24][25]}. Majewski et al. (2020) ^[10] highlighted how SFSC models are characterized by the highest level of emissions, as they entail the use of personal cars (i.e., pick-your-own and on-farm sales). Eco-efficiency indicators display wide variability across the different types of SFSCs because the distribution process depends on numerous factors, including not only geographical proximity, but also supply chain infrastructure and logistics. On the other hand, organizational and social proximity generate social benefits ^[12], increasing consumer confidence in producers and bringing economic benefits to the local economy ^{[4][26]} while allowing producers to strengthen their position ^{[5][7]}. Different types of SFSCs also have different outcomes: for instance, farmers’ markets may create stronger producer–

consumer interactions, while direct sales are generally more efficient in terms of demand stability and economic return for producers [27].

Petropoulou et al. (2022) [28] highlight trust as the single most important determinant of success in SFSCs: “Without trust, any collective endeavor is doomed to fail. At the same time, trust is both an input and an outcome in SFSCs, where trust leads to more trust and vice versa”. In general, organizational issues, i.e., the way initiatives are organized using traditional or new methods, seem to be an important factor in how the social, economic, and environmental sustainability of an SFSC is perceived, even in spite of geographical differences [12].

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