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EXPERT BRIEF

IDENTIFYING SUSTAINABLE SUPPLY CHAINS IS SHORTENING THE ANSWER? A STATE OF PLAY

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EXECUTIVE SUMMARY

Although short food supply chains (SFSCs) have existed in Europe for a long time, they have been undergoing a process of renewal and reconfiguration in recent decades, due to consumer expectations and concerns about food quality, producers' innovative organisational initiatives and the development of food policies.

The majority of studies found in the literature explain their revival or emergence in specific countries or places, assuming different conceptions, and/or describe new types of SFSCs or innovative local initiatives around SFSCs. These studies pointed out how SFSCs are often associated with economic, social and/or environmental motivations or values in line with improved sustainability but rarely provided sufficient data to confirm these impacts. Other studies directly addressed this issue, by either focusing on one sustainability pillar or incorporating different dimensions.

These studies, mostly developed in EU research and innovation projects or in national multi-actor projects, mostly relied on a qualitative case study approach, and less frequently on large surveys and quantitative data, those ones remaining collected mostly at farm level. These studies tend to agree on the social benefits of SFSCs, and less on their economic and environmental impacts, the latter two dimensions typically eliciting outcomes that are more heterogeneous. Yet, suitable methodologies and data to evaluate behavioral changes over time (e.g. conventional farms or consumers entering SFSCs) and to assess SFSCs at the chain and territory levels are still lacking. Moreover, while the social, economic, and environmental dimensions have been the major focus of sustainability assessment, the health/nutrition dimension remains under-explored. The internal and external governance of SFSCs is mainly addressed in the frame of urban food policies trying to conciliate sustainability-oriented goals.

In addition to highlighting focused research needs, the state of play proposes two main research and innovation priorities: **i) the role of SFSCs in food systems transition**, and how it particularly relates to the up-scaling of SFSCs, and to a larger extent, the impact of SFSCs up-scaling on the transition of long chains; **ii) the contribution of SFSCs to food systems resilience**, taking into consideration the actual and possible complementarity or competition between short and long chains.

It also suggests: **i) the development of a network of experts at the European level** to conduct a qualitative and quantitative meta-analysis of case studies addressing sustainability dimensions, in order to propose a systemic impact assessment of SFSCs; **ii) the implementation of appropriate and innovative training tools**, devices and methods to build the skills needed for SFSC development and performance; **and iii) the inclusion of SFSCs in European and national statistics**.

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The paper does not reflect the views and opinions of single ESAD members that were consulted. As such, their contribution is not to be interpreted as an endorsement of the final paper.

INTRODUCTION

The purpose of this literature review[i] is to **provide a state of play on the concept of short food supply chains (SFSCs)** and to highlight priority research needs for a future research and innovation programme.

In the first section, the definitions of SFSCs will be reviewed, followed by a discussion of their sustainability impacts and a final section examining the governance of SFSCs.

The state of play will end with a conclusion highlighting the main research needs, amidst the current context of a global health crisis in which SFSCs become more widespread.

Given the vast literature on SFSCs, **this review mainly considers the most important and recent papers** spanning, for the most part, European and North American publications written in English and French and issued from both academic journals and research and innovation projects (EU FP7, H2020).

For the purpose of this review, only studies from developed countries were considered.

1. DEFINING AND CHARACTERIZING SFSCS

1.1 The different conceptions of SFSCs

Amid a global food system widely acknowledged as unsustainable (IPES, 2016; FAO, 2017), SFSCs have garnered considerable research attention in recent decades, especially since the sanitary and health crisis that marked the agri-food industry at the turn of the twenty-first century, also known as "mad cow disease".

At the time, **SFSCs were first captured under the emerging "umbrella" literature on local/alternative food systems or networks** in different contexts, though an important distinction between European and North American perspectives is underlined (Goodman, 2003). In Europe, where some types of traditional SFSCs (e.g. on-farm sales, open-air markets) were already integral to consumer food procurement practices, 'alternative food systems' were initially regarded as a vector for reviving rural economies and a response to consumer demand for high-quality food (Goodman, 2004).

On the other hand, a more politicized narrative prevailed in the United States and Canada where the presence of traditional SFSCs was much less pronounced (Deverre and Lamine, 2010). In Eastern Europe, the alternative food narrative emerged about a decade later, alongside already-present non-market based food procurement practices (e.g. home gardens), which still play a fundamental socio-economic role at the individual and community levels (Balázs, 2018).

Amidst this novel food system discourse, SFSCs (re)appear as a response to heightened consumer demand for high-quality, transparent and local food with known origins of production (Goodman, 2004; Renting et al., 2003; Kneafsey et al., 2013), seeking to reduce information asymmetry and opacity between producers and consumers, the latter regarded as typical of conventional food procurement channels (Nicolosi, 2006).

The last two decades have witnessed a proliferation of SFSCs in Western Europe, Canada and beyond (Chaffotte and Chiffoleau, 2007; Kneafsey et al., 2013; Mundler and Laughrea, 2016). Operating mainly in urban and peri-urban settings (Aubry and Chiffoleau, 2009; Opitz et al., 2016), SFSCs respond to an increasing desire of urban "food citizens" to access secure and sustainable food (Sonnino, 2016), and align with political efforts geared towards the localisation or re-localisation of food and agricultural systems (Kneafsey et al., 2013).

The notion of SFSCs, relative to 'alternative food systems', has been more commonly used since 2010, owing to its inclusion in a few public policies. Conceptually, a SFSC captures two fundamental elements: the number of intermediaries between chain actors, and spatial limitations within a certain geographic area (Brunori and Galli, 2013).

The European IMPACT project proposed 3 types of SFSCs: face-to-face, proximate SFSCs (few intermediaries, production and sale in the same region), and spatially extended SFSCs (few intermediaries information about origin, sale out of the region) (Marsden et al., 2000; Renting et al., 2003). In practice, in Europe, the focus has been on face-to-face and proximate SFSCs. For instance, in France, in 2009, the Ministry of Agriculture officially defined SFSC or "*circuit court*" as a market sale of agricultural products involving, at most, one intermediary actor between the producer and the consumer, whatever the physical distance, but the State development programme has been focused on locally- to regionally-based short chains (Chiffoleau, 2019).

Since 2013, the European Commission officially recognizes SFSCs and promotes them in its rural development policy. The EU's definition combines both physical and social dimensions to delineate a SFSC as "a supply chain involving a limited number of economic operators, committed to co-operation, local economic development, and close geographical and social relations between producers, processors and consumers" (EC, 2013).

Despite their official political recognition in some contexts, **there is currently no single universal conception of SFSCs, which makes comparison difficult.** This is certainly associated with a shifting perception of "proximity", or a context-based understanding of "local".

Some authors have underlined that SFSCs may enact different types of proximity (geographical, relational, organised…; Praly et al., 2014); others have stressed the difference between "local food" and "locality food" (Brunori, 2007), or locally produced food for local consumers and locally produced food for distant consumers (Fonte, 2010), distinctions which stress the complexity of trying to delimit the meaning of "local". Often, subjective, less quantifiable dimensions influence the construction of the "local" in SFSCs: these include, among others, understanding place as a socio-cultural construction (Allen, 2010; Bazzani and Canavari, 2017; Beriss, 2019), producers' (Raton and Raimbert, 2019) and intermediaries' (Grando et al., 2017) spatial perceptions and how it affects their mobility, consumers' spatial perceptions and their impact on food procurement strategies (Vicart and Wathelet, 2016), and the role of knowledge-based relations between local actors (Fonte, 2008).

In the European GLAMUR FP7 project, Brunori et al. (2016) demonstrate that local and global chains, in practice, are far from being mutually exclusive or opposed. Six criteria were proposed to describe the hybrid forms that may emerge along a spectrum between two radically opposed situations depicted as "truly local" and "truly global": spatial configuration, product identity, physical distance, farm size, chain governance, and technologies and resources.

Given these more subjective parameters, **more recent research has called for a mixed-methods approach for deconstructing and assessing various types of SFSCs,** i.e. the consideration of both qualitative and quantitative dimensions (Boutry and Ferru, 2016; Gava et al., 2018).

1.2 Three SFSCs highlighted in the literature

Despite the variability in SFSC context and definitions, they have been generally divided into two overarching types: "traditional" and "neo-traditional" (EPRS, 2016) or "modern" (Mottershead and Schweitzer, 2018).

These modern SFSCs are significantly more present in the literature, especially farmers' markets (also called public markets in some cases), **CSA, and community gardens**.

In countries in Southern and Western Europe (e.g. Italy, France, Spain, Greece, Portugal), farmers' markets have long existed, alongside the more common, traditional open-air markets mixing at once, producers selling directly their products and reselling other products, as well as resellers selling products in short and/or long chains on other. Conversely, they emerged on a broader scale in Anglo-Saxon and Northern European countries (Åsebø et al., 2007; Guthrie et al., 2006; McEachern et al., 2010) during the late 1990s-early 2000s (though some began to flourish earlier like those in the USA in 1970s), mainly as an 'alternative' response to the dominant agro-industrial model (Hinrichs, 2000).

A decade later, in 2010, farmers' markets boomed in Eastern Europe, following economic liberalisation (Syrovátková et al., 2015; Spilková et al., 2013). Community supported agriculture (CSA), originating in Japan as teikei in the 1960s, is also considered a more modern form of SFSCs. It consists of a long-term partnership between a producer (or group of producers) and a group of consumers during a growing season, where the risks of farming are shared. While founded on certain key principles, diverse forms of CSA have flourished in different countries under different names[ii], promoting different values (URGENCI, 2016; 2020).

Some, like the pioneer AMAP initiatives in France, stress peasant agriculture and anti-globalisation logic (Dubuisson-Quellier and Lamine, 2008) while others, like the Japanese teikei, emphasize health

motives. In Eastern European countries, CSAs mainly began to emerge at the onset of the 2010s, motivated by consumer desire to access higher quality foods and to support local farmers (URGENCI, 2016; Sylla et al., 2017).

Lastly, community gardens have drawn increasing attention, especially those established by municipalities or civic associations and driven by political and/or activist aims. While some gardens address food insecurity and food sovereignty (Clendenning et al., 2016; Migliore et al., 2019; Poulsen, 2017), others are less focused on food consumption per se and more on food as a vector for community-building (Levidow, 2018).

Such gardens are also renewing traditional 'food-self provisioning' systems in Eastern Europe, where they coexist with traditional home production, both with aims to cultivate food security and strengthen social cohesion (Balázs, 2016; 2018; Pickard, 2018).

1.3 New research directions

Current research, though still limited, is increasingly documenting and unpacking the innovative character of SFSCs, looking past the number of intermediaries or the physical distance in which they operate (Chiffoleau and Loconto, 2018; Grando et al., 2017; on-going H2020 SMARTCHAIN project).

In light of their immense diversity, **some constituents of SFSCs remain relatively unexplored, such as the role played by intermediary actors.**

The latter tend to be overlooked as just "connectors" rather than cooperators and contributors to SFSC development. Some studies have nonetheless addressed the role of artisans (Aubrée et al., 2018) and the potential role of small independent businesses (Grando et al., 2017; Maltais, 2017), chefs/restaurant owners (Salvador et al., 2017), and distributors, namely wholesalers and retailers (Baritaux and Billion, 2016) in supporting and promoting SFSCs.

By drawing attention to the nature of intermediaries' role (that is, deconstructing *who* intermediaries are and *how* they can add - or capture - product value in SFSCs), these studies underline the need to consider them.

They can be a significant bridging point between consumer and producer, especially for farmers who have limited capacity/knowledge to market and sell their own products.

However, some authors have warned against the risk of "local washing", i.e. the appropriation and cooptation of local food by the agri-food industry, namely large retailers (Cleveland et al., 2015) -a prospect reminiscent of the conventionalisation effects previously documented in the organic and fair trade sectors (Guthman, 2003; Jaffee and Howard, 2010).

Scaling-up SFSCs while respecting their fundamental ideological motivations is another important issue (Chiffoleau, 2017; Le Velly and Dufeu, 2016; Navin, 2015) that merits further exploration, opening a debate between growing (in size) vs. multiplying small-scale initiatives as particularly discussed in the EIP Focus group on short chains (Kneafsey, 2015). The use of digital technology and social media platforms in SFSCs has recently been documented as a vector for up-scaling, notably in the ongoing H2020 SKIN and SMARTCHAIN projects.

For instance, a recent study from the SKIN project evaluated the role of social media in SFSCs, particularly Facebook, and found producers use it more as a sales marketing tool than as a platform for consumer interaction (Drejerska et al., 2019). On the other hand, actors of online SFSC sales open source platforms, like the international Open Food Network, emphasize the virtual dimension of SFSCs as enabling the democratisation and reappropriation of food, collective mobilisation and the building of resilient local food economies (Bouré, 2017).

However, it remains debated whether virtual connection paradoxically risks the dissolution of producer-consumer linkages, despite its potential for improving accessibility to local food products (Chiffoleau et al., 2018; Elghannam et al., 2019). Moreover, as for other economic activities, one must also assess the use of IT in SFSCs using a political economy perspective, attentive to the risks of labor 'uberisation' as well as of data appropriation by big players. Scaling-up SFSCs also requires a better consideration of **competency-building.**

For instance, the development of SFSC in Eastern Europe remains hindered by farmers' lack of entrepreneurial/marketing skills and a competitive retail environment remain key obstacles that hinder the their development of SFSCs, factors which are also further exacerbated by a communist socioeconomic past (Kneafsey, 2015; Syrovátková et al., 2015). Some pan-European studies, like SMARTCHAIN and SKIN underline the need to create experience- and knowledge-sharing platforms, as a basis for upscaling SFSCs.

Following a research phase mainly focused on three specific SFSCs, as was described in the previous section, current research efforts are drawing attention to the diversification and diffusion of SFSCs. The EU has favoured the capitalisation of their good practices and innovations within different on-going or forthcoming projects in the H2020 programme (see Annex). However, empirical data documenting their importance, diversity and hybridity at macro level, from both an economic and a socio-demographic point of view, is still lacking.

It would therefore be useful to **better account for SFSCs in national and European statistics.** Recent publications have underlined the need for **SFSCs to be conceived as complementing rather than replacing or radically opposing global chains** (Brunori et al., 2016; Malak-Rawlikowska et al., 2019; Lamine et al., 2019).

This conceptualisation therefore suggests a shift away from dualistic language to describe them, a similar point previously made by Holloway et al. (2007) concerning the alternative-conventional dichotomy often used to qualify food networks.

Lastly, the sustainability impacts of SFSCs remains a relatively novel research theme on which European projects procured new knowledge and could further address research gaps; the following section will shed further light on this matter.

2. EVALUATING THE IMPACTS OF SFSCS

SFSCs are often positively associated with different sustainability impacts. Although some empirical data and appropriate methodologies are still lacking, recent research has challenged this idealized vision.

In what follows, we first separately consider four pillars of sustainability (economy, social, environment, health/nutrition), then point out the need, beyond multi-criteria analysis, of systemic, interdisciplinary and longitudinal approaches.

A separate section will address territorial approaches and the governance of SFSCs as both a pillar of sustainability and as a means to articulate different pillars.

2.1. The economic dimension

The emergence, or revival of SFSCs, in various countries and for multiple actors, aims to increase farmers' income.

This dimension may be difficult to assess, as many small-scale farmers do not have analytical budget accountancy. A large survey conducted in France between 2009 and 2014 on more than 800 farms in diverse sectors (dairy products, fruits and vegetables, among others), including the implementation of budget accountancy with small-scale farmers, revealed that **farms operating in SFSCs gain a higher income per asset and per**

hour than farms in long chains - after at least 5-7 years following their foundation - but that **results are very heterogeneous**, and can even be negative (Capt et al., 2011; RCC, 2013; Morizot-Braud and Gauche, 2016). Research in Quebec found similar results (Mundler and Laugrhea, 2016; Mundler and Jean-Gagnon, 2019).

The recent H2020 STRENGTH2FOOD project considered 186 farms in 7 countries and 6 products, across 6 types of SFSCs and 4 types of long chains. Assuming small samples and low representativity, the results showed better prices and higher value-added in SFSCs compared with long chains, especially in farmers' markets and pick-your-own farms, while sales to retail shops represent the highest market share among SFSCs (Malak-Rawlikovska et al., 2019; Cesaro et al., 2020).

The large survey conducted in France also demonstrated that collective farmers' initiatives for producing, selling (e.g. in collective farmer shops) or transporting food, had a positive effect on their income. The survey also showed that organic farming practices were associated with higher farmer income.

Moreover, it showed that **economic performance depends on factors at both farmer- and farm-level** (esp. skills and labor organisation), **and at chain and territorial level** (e.g. degree of local competition, margin taken by the intermediary). Notably, increasing added value in SFSCs requires local equipment in close proximity to farms (e.g. slaughterhouse, vegetable processing plant), and adapted to process small quantities (De Vries et al., 2017), which may be seasonal and irregular.

In addition to income, SFSCs reduce economic uncertainties in contrast to the market volatility typical of long chains (Boutry and Ferru, 2016), and ensure a regular cash flow that also favours the greening of agricultural practices (Millet-Amrani, 2020, see after). Nevertheless, the determination of a 'just' price in SFSCs remains a fundamental issue, both in direct sale schemes and in chains involving intermediaries (Prévost, 2012).

Moreover, the potential economic impact of SFSCs collaborating with big retailers remains controversial (Kneafsey, 2015), and requires more longitudinal data. Finally, as farmers often combine diverse short chains, as well as short and longer chains, more research is needed, as a follow-up of STRENGTH2FOOD, in order to **model/simulate the relevant combinations of chains according to farmers' capacities and objectives, products, and territories** (Tundys and Wisniewski, 2020). For instance, procuring food to catering companies, introduced in public policies in many European countries, often appears as unprofitable enough for small-scale farms, yet may be an opportunity for mid-scale farms to combine with sales issued from long chains.

The economic dimension is also captured by the quantity of jobs created/maintained by SFSCs. In France, the national agricultural survey conducted in 2010 showed that farms in SFSCs represent more jobs per hectare than those in long chains (0,75 FTE[iii]/ha vs. 0,26) (Barry et al., 2012). Similarly, in Quebec, farms operating in SFSCs created on average four full-time jobs per farm relative to the provincial average of two and a half full-time jobs (Mundler and Laughrea, 2016). However, **the quantity of jobs induced at the chain level but also in territories** (for instance, strong relation with agritourism) **has not been assessed. Job quality should also be considered**: for instance, the risk of 'self-exploitation' has been highlighted in CSA models (Galt, 2013) due to a high workload and consumer pressure. Increased workload can also affect the continuity of the farm operation, i.e. the desire of the following generation to take over the family business (Boutry and Ferru, 2016; Dufour and Lanciano, 2012). Work organisation in SFSCs remains an important issue, also from an environmental perspective (see after), while the use of digital technologies opens new opportunities to save time but needs skills (Chiffoleau et al., 2018). On a broader scale, SFSCs are expected to contribute to the local economy.

The New Economic Foundation (UK) proposed to evaluate the 'local multiplier effect' of on-farm purchases, compared with purchases in supermarkets or grocery shops, and highlighted

important differences (Sacks, 2002). Few studies have been done yet in this line, and calculation methods are debatable (Goldenberg and Meter, 2019).

However, this generates **a new field of research concerning the mapping and calculation of detailed economic flows within and surrounding SFSCs.**

This issue should be related to the emergence of new organisational arrangements (e.g. food hubs; Berti and Mulligan, 2016) **and new economic models which often remain idealized and insufficiently detailed** (Hebinck et al., 2015; Chiffoleau et al., 2019). Those models range from social and solidarity, or platform/sharing economy, challenging property rights, to auctioneer-driven economy, encompassing high-tech urban farming practices, circular economies or bioeconomies.

These new models question relations with market intermediaries, and call for a further analysis of the contracts that they may include, in order to compare them with those used in long chains.

The ongoing H2020 SMARTCHAINS project highlights successful cooperative business models in SFSCs and the H2020 programme for 2020 includes a topic on innovative agri-food chains connecting producer and consumer (RUR-05-2020), intended to address the costs and margins of food chains implying intermediaries not systematically involved in fair trading practices.

2.2. The social dimension

The emergence (in Anglo-saxon countries) or renewal (in Southern Europe) of SFSCs is very much tied to their social motivations (Deverre and Lamine, 2010; Giampetri et al., 2016). In contrast with the anonymous character of long supply chains, **SFSCs 're-embed' the economy in personal relations of respect and trust between producers and consumers** (Sage, 2003).

They also contribute to **redevelop relations of technical dialogue and cooperation between farmers** (Chiffoleau, 2009), **value womens' work** (Malak-Rawlikowska et al., 2019) and **include newcomers** with no agricultural background, who contribute, by proposing to new ideas, to the renewal of the agricultural sector (Dufour and Lanciano, 2012; Chiffoleau, 2012; Dupré et al., 2017).

The social dimension is also captured by **a wide range of multi-actor collective actions and social innovations in territories** (Chiffoleau and Loconto, 2018) which promote place-based products (Sonnino, 2007), strengthen social cohesion/community-belonging (Aragau et al., 2016; Connelly et al., 2011), develop food democracy (Hassanein, 2003; Renting et al., 2012), renew institutional/state food aid programmes (Le Velly and Paturel, 2013), and address food insecurity and food sovereignty, including racial and class inequalities (Brent et al., 2015; Guthman, 2008). Such actions thus stress the need for instilling food justice or solidarity among low-budget consumers who often remain excluded from these chains (Allen, 2010; Chiffoleau and Paturel, 2016; Darrot and Noël, 2018).

Nevertheless, solutions oriented towards communities with a low socioeconomic status remain difficult to find or to stabilize in an emancipatory vs. charity perspective (Booth and Coveney, 2015); Further, **access to SFSC for low middle-class groups, neither rich nor poor, remains unconsidered.**

In a context of increasing SFSC diversification and diffusion, **examining the influence of these chains on the food habits of average consumers recently entering them is lacking.**

Most studies document SFSCs involving consumers already engaged in sustainable consumption practices or just stated a correlation between a higher density of SFSCs and a lower rate of obesity (Bimbo et al., 2015). A few explored how SFSCs activate diverse social mechanisms among average consumers (influence, identification, learning, social control, self-promotion; Dubuisson-Quellier, 2011; Chiffoleau et al., 2017), and how these factors can enable transitions towards more sustainable practices.

The transition may also be facilitated by the contribution of SFSCs in shaping new foodscapes or food environments: for instance, new on-going collaborations between geographers and epidemiologists evaluate how increased exposure to local food in shops or to neighbouring farms provokes changes in food behaviours, also taking into account consumer mobility (project Foodscape, see Annex). One ongoing study called "JArDinS" (whose protocol has been published), is also investigating the health/lifestyle impacts of urban community gardens in Montpellier, France (Tharrey et al., 2019).

These structural approaches need however to be more articulated with social mechanisms, in a larger vision of 'food environment' (Mattioni et al., 2020).

2.3. The environmental dimension

SFSCs are often criticised with regards to their environmental footprint: Schlich et al. (2006) argued that lamb purchased from New-Zealand and transported by cargo to Europe generates an inferior rate of CO2 emissions, in comparison to lamb purchased and produced in Europe, transported by trucks/cars and sold in short food chains.

This study, based on Life Cycle Analysis (LCA), was questioned and nuanced in the GLAMUR project (Brunori et al., 2016) but confirmed in the STRENGTH2FOOD project (Malak-Radikowska et al., 2019), though in the latter only food transport is considered.

However, transport accounts for just a small portion of CO2 emissions produced by food chains: the highest is due to agricultural production (Barbier et al., 2019), therefore leading one to question the impact of SFSCs on farming systems. This does not prevent actors and researchers from **seeking solutions to improve logistics in SFSCs, especially for the last kilometer in cities, while the first kilometer and rural settings are less considered** (Vaillant et al., 2017).

On the other hand, **new ways of evaluating carbon footprint have been suggested**, for instance to change the unit of measurement (CO2 emissions per nutrient in the product or per euros procured by the product vs. per kilo) or to develop territorial LCA (Loiseau et al., 2018).

Concerning farming systems, as for consumer food behaviours, most studies have focused on SFSC actors already involved in sustainable/organic agriculture or agroecology.

Given that conventional mid-sized farms are now permeating these chains, **more research is needed to document the impact of SFSCs on the agroecological transition of (conventional mid-size) farms.**

Still few studies addressed this issue and highlighted the positive impact of SFSCs on consumer pressure, on the renewal of technical dialogue between peers, and on the economic risk alleviation in farmers' decisions to use less chemical treatments (Maréchа and Spanu, 2010; Chiffoleau et al., 2016; Millet-Amrani, 2020). Nevertheless, they also showed a contrasted impact according to the type of SFSCs: while the effects of direct selling are statistically significant for mid-scale conventional fruits and vegetable producers, local procurement of supermarkets does not have any ecological impact, given that it remains regulated by the "zero default" norm, which obliges producers to use pesticides (Millet-Amrani, 2020).

Moreover, even in direct selling, some technical advisers argue that the suppression of pesticide treatments can also be simply the effect of a low capacity to organize work, and thus could provoke ecological problems (ibid.).

The FP7 GLAMUR project, especially, addressed other environmental indicators (resource use, pollution, biodiversity, food waste) to compare local vs. global food chains but concluded that results are very context- and product-dependent. The clearest result concerned the preservation of agrobiodiversity, which local food chains seem to better address than their long counterparts (Brunori et al., 2016). The H2020 DIVERSIFOOD, LIVESEED

and CERERE projects focusing on farmer-led participatory breeding for organic farming also highlighted the strong relation between 'peasant'/local varieties and 'alternative food systems' (Chable et al., 2018; Chable et al., 2019). On the other hand, projects on (peri)urban agriculture stress its role in preserving farmland (Brinkley, 2012) and procuring **ecosystem services** (Lin et al., 2015), which can be considered **as indirect impacts of SFSCs and could be more directly and largely addressed.**

2.4. The nutrition/health dimension

The health dimension has also been one of the key drivers of SFSCs' emergence or renewal, already present in the Japanese teikei in the 1960s. Local food consumers are increasingly seeking fresh, nutritious and safe food (Lappo et al., 2015). This questions both the agricultural practices (see above) and the food processing techniques used in SFSCs.

Concerning the latter, studies are just emerging (De Vries et al., 2017), especially for vegetables which have been little considered (see ongoing H2020 FOX project, Annex). For instance, geneticists highlight the nutritious potential of ancient varieties and landraces, typically more cultivated in SFSCs (Meynard et al., 2017), for healthy and diversified diets (Longin and Würschum, 2016; see also H2020 DIVERSIFOOD, LIVESEED and CERERE projects).

Further, food technologists and socio-economists stressed the specific qualities of bread and pasta (Galli et al., 2015) made from the joint use of ancient varieties/landraces of wheat, organic farming, and 'mild technologies' (stone milling, slow fermentation, suppression of additives, etc.) (Chiffoleau et al., 2020a). Moreover, in a context of rising consumer gluten-sensitivity, geneticists, microbiologists, agronomists have also analysed the gluten quality of these products, in relation with consumers' evaluations (Lhomme et al., 2016; Desclaux et al., 2018).

However, **more research is needed to assess how SFSCs de-standardize, de-commodify food out of Geographical Indications schemes or high-end products, and procure diverse, safe food that is accessible to all** (SCAR Food systems, 2019). This destandardization could also provoke new sanitary risks, as these chains may imply non-professionals (e.g. consumers contributing to transport food, consumer cooperatives), a topic that requires further investigation.

Finally, the nutrition/health impact of SFSCs should also be studied in order to document potential changes in the food behaviour of average consumers towards healthier diets (this aspect is discussed in the section 2.2.).

2.5. From multidimensional to systemic and longitudinal approaches

So far, the EU research and innovation programme has favoured the implementation of multidimensional approaches to assess the sustainability impacts of SFSCs.

The already-mentioned FP7 GLAMUR and H2020 STRENGTH2FOOD projects made great contributions, taking into account experts' and SFSCs participants' sustainability indicators (Brunori et al., 2016; Vittersø et al., 2019; Schmitt et al., 2017). Results underline that a compartmentalized approach to SFSCs can lead to incomplete and insufficient observations (e.g. relying only on LCA to measure environmental impact) and confirm the need to consider both qualitative and quantitative data (Brunori et al., 2016; Gava et al., 2018).

If findings from French and Italian surveys (RCC, 2013; Mastronardi et al., 2019) as well as EIP focus group expertise on innovative short chains (Kneafsey, 2015) are included, **both researchers and participants tend to agree on SFSCs social benefits, and less on their economic and environmental outcomes** (Vittersø et al., 2019). The latter two dimensions typically showing more variability (Galli and Brunori, 2013; Brunori et al., 2016; Kneafsey et al., 2013; Kneafsey, 2015; Schmutz et al., 2018). Research and innovation thus provide inputs in order to make trade-offs and propose paths for progress.

Two other EU projects, SKIN and SMARTCHAINS, offer supplementary insights about the interaction between sustainability dimensions, as well as about sustainability factors, for instance by highlighting the economic performance of cooperative SFSCs.

Nevertheless, **a meta-analysis of case studies at the European level would be useful for developing a more systemic assessment**. Moreover, longitudinal studies, evaluating the change in conventional farmers' practices as well as those of consumers newly entering these chains, are needed to better capture **the role of SFSCs in agricultural and food system transition.**

3. GOVERNING SFSCS TOWARDS INTEGRATED SUSTAINABILITY

As highlighted in the key conclusions of the GLAMUR project, food chain governance is an important determinant of impact assessment.

Although it could have been included in the previous section as a dimension of sustainability, it merits a specific section as governance dynamics could favour (or limit) the articulation of the different pillars of sustainability at both the chain and territorial level. In line with the SKIN project, one can consider both internal and external governance, the latter referring to the political context surrounding the SFSCs.

3.1 SFSCs at the heart of new local food policies

SFSCs have been the subject of a growing literature in different disciplines (geography, rural sociology, food planning and political sciences, among others), interested in the emergence of urban food policies as expressions of new place-based, horizontal and inclusive governance schemes, for instance through Food Policy Councils (Lever et al., 2019). Studies examining these councils have mostly focused on large-scale cities, from the pioneer case of Toronto (Blay-Palmer, 2010; IPES Food, 2017), now included among others in the international Milan Urban Food Policy Pact (2015) through which cities worldwide commit to act locally to develop more sustainable food systems (Candel, 2019).

In centralised states like France, local food policies act as an expression of decentralised power dynamics and of the growing role of local authorities (Brand et al., 2017).

Within these policies, studies are especially examining the rise of farm-to-school programmes to support local farmers and provide children with fresh, local foods, and agricultural education (Morgan and Sonnino, 2013). More recent research also highlights how food policies specifically shape land preservation or farmland access in peri-urban areas (Baysse-Laisné et al., 2018; Horst and Gwin, 2018).

Nevertheless, some scholars have raised questions about the empowerment processes produced by these policies and governance structures (Coulson and Sonnino, 2019).

While cities remain central to food governance dynamics, few studies consider this issue in small-scale cities and rural territories (Bedore, 2012; Baysse-Laisné et al., 2018; Chiffoleau et al., 2016). However, the role of these spaces is expanding, for instance in the frame of 'Territorial food projects' (Projets alimentaires territoriaux) included in the 2014 French Agricultural Law (Brand et al., 2017) or in the development of bio (organic/eco)-regions (Stotten et al., 2017).

Moreover, more longitudinal research is needed in order to highlight the conditions of local partnerships, and of the organisation of local ecosystems around SFSCs. This organisation opens a new line of innovation and research about local reindustrialisation (i.e. installation of local units to process local raw material) beyond local distribution, and calls for adaptation/innovation in food systems and territorial actors training (Chiffoleau et al., 2020a).

3.2 SFSCs and power issues

As briefly evoked in the economic dimension of SFSCs' sustainability, these chains also favour the experimentation of new inclusive economic models and tools in line with the social values expected from them, including, among others, fair trading, equity, participation, transparency, and food and employment re-localisation (Chiffoleau et al., 2019). Recent papers explored the development of 'prosumption' in SFSCs, i.e. the implication of consumers in productive tasks (Arcidiacono et al., 2018).

Another new research direction has been open on the extension of participatory guarantee systems, usually studied in the realm of organic farming (Loconto, Hakanaka, 2017), to SFSCs (Chiffoleau et al., 2016; Cuéllar-Padilla, Ganuza-Fernandez, 2018).

A last recent orientation consists in studying the 'mid-tier chains' which are developing at regional levels and involving more intermediaries, but whose actors assume or promise a combination of economic objectives and social, environmental values.

These 'values-based chains', which may be juxtaposed with territorial branding (Fleury et al., 2016; Ostrom et al., 2017), may be considered as one of the possible ways of articulating different pillars of sustainability in an inclusive manner (Chiffoleau et al., 2020a), as well as of the up-scaling of SFSCs More research is however needed as they can also preserve or create new power imbalances and unfair trading, especially when the use of IT is concerned.

3.3 SFSCs in food systems resilience

One of the most recent, and salient topics of research on SFSCs concerns their contribution to food system resilience, especially regarding the capacity of food systems to guarantee food procurement in case of sanitary, climatic, social or economic shock.

For instance, Smith et al. (2016) highlighted the complementarity between short and long chains in procuring food during major floods in Australia. In the earlier FOODLINKS project (EU Seventh Framework Programme), the resilience of SFSCs was highlighted as a key factor to be used in policy changes — SFSCs can complement long chains, thus diversifying the sources of food supply (Galli and Brunori, 2013).

More research is however needed to qualify and quantify the concrete economic, social and spatialized flows in each type of chain, including their importance and vulnerabilities, in order to guide decision-makers (Chiffoleau et al., 2020b). Another new direction of research, developed in the FP7 FOODMETRES project, consists in assessing the foodshed of cities and to test diverse scenarios to increase self-sufficiency in relation with possible evolutions in diets, population, etc. (Zasada et al., 2019).

SFSCs and food relocalisation, implying local reindustrialisation, have been suggested as key components from a food planning perspective but their current/potential role has to be better understood in relation with possible shocks, as demonstrated during the Covid-19 crisis in which they, among other factors, provide reassurance to consumers.

CONCLUSION

Sustainable supply chains: is shortening the answer?

The state of play of short food supply chains first demonstrated their high potential, as they have been renewed or created in relation with sustainability values. SFSCs are however not systematically sustainable; their sustainability typically depends on the particular indicator, product, and context in question.

The state of play exposes several research gaps:

- the role played by intermediary actors in SFSCs, and more broadly, **the diversity and impacts of new economic models** which are emerging in the up-scaling processes of SFSCs (collective entrepreneurship, online platforms…), and may include new types of contracts;
- the **governance** of SFSCs in rural settings and small-scale cities;
- the quantity and quality of **jobs** created directly and indirectly by SFSCs;
- the influence of SFSCs on **farming techniques, processing techniques and food behaviours** by actors newly participating in them (conventional mid-size farms, 'average' consumers, artisans…);
- the production of **ecological, cultural, ecosystem services** by SFSCs, which could include an evaluation of their possible payment (by consumers, through public policies…);
- the **de-standardization of food** by SFSCs in the perspective of healthier diets, and addressing technological lock-in;
- the **logistic organisation** of SFSCs in rural settings (taking into account the risk of dehumanising relations in SFSCs by using technological devices);
- the **economic and material flows** within and around SFSCs, accounting for small flows (which are not considered in territorial metabolism approaches), including food waste, both to assess their contribution to the local economy, to develop circular economy, and to strengthen food system resilience (by assessing their complementarity/competition with long chains);
- the **adaptation of LCA** to SFSC aims (improved health, increased farmer income…), specificities (complex systems of flows…) and territorial embeddedness;
- the ensured long-term **access** to SFSCs by low middle-class groups;
- the risks induced by SFSC **expansion**, especially sanitary risks; and
- the most suitable **combinations of (short, long) chains** for farmers, according to their situation, product, and territory.

In the frame of Horizon Europe, for a contribution to the EU New Green Deal and given the COVID 19 crisis context, some of these research gaps appear as particularly important to overcome.

They could be jointly addressed in two priority RIA (Research and Innovation) issues:

1. **the role of SFSCs in food systems transition,** from farming techniques of conventional midsize farmers to food behaviours of regular consumers, in relation to the up-scaling of SFSCs - this up-scaling often relies on the use of digital technologies, on new economic models, on local food policies, on higher middle-class demand for high-quality food, on foodscape evolution which would have to be better framed -, and by also addressing the impact of up-scaling on the transition of long chains (by imitation and because both farmers and consumers combine short and long chains);
2. **the contribution of SFSCs to food systems resilience,** from the assessment of the multiple socio-economic, material, spatialised flows, the diverse assets, vulnerabilities and risks linked with SFSCs to the simulation of diverse shocks and scenarios; those ones should take into account short and long, local and global chains actual and possible complementarity or competition. They could also consider shortening international trade flows – in terms of intermediaries - to transform suffered dependencies in chosen, controlled, and equitable interdependencies, thus

importing some of the characteristics of short chains in longer ones. This would thus open a larger perspective for international fair trade, as no longer a market niche, but as a strategy to strengthen the resilience of both Northern and Southern food systems. This would also offer an opportunity to (re)discuss the notion of food sovereignty (Pimbert, 2019), initially developed in Southern countries, and applied to Northern contexts in the context of the COVID-19 crisis.

From this state of play, we also suggest:

1. In a CSA (Coordination and Support Action), developing a network of experts at the European level to make **a qualitative and quantitative meta-analysis of case studies addressing sustainability dimensions**, in order to propose a systemic impact assessment of SFSCs;
2. In a IA (Innovation Action), implementing **appropriate and innovative training tools, devices and methods** to build the skills needed for SFSC development and performance; and iii) better **including SFSCs in European and national statistics.**

ANNEX: RECENT, ONGOING AND FORTHCOMING EUROPEAN PROJECTS ON OR RELATED TO SHORT FOOD CHAINS / SUSTAINABLE FOOD CHAINS

Date	Project title	Main objective	Website
2011-2013	Foodlinks	Develop and experiment with new ways of linking research to policy-making in the field of sustainable food consumption and production	www.foodlinkscommunity.net/foodlinks-home.html
2013-2016	GLAMUR	To assess the impact of global and local food chains (20 cases in 10 countries)	www.glamur.eu
2016-2019	SKIN	Reducing knowledge gaps by reconnecting producers and consumers	www.shortfoodchain.eu
2019-2023	Food processing in a box	Innovative processing technologies for fruits and vegetables	www.fox-foodprocessinginabox.eu
2016-2021	STRENGTH 2FOOD	Qualitative assessment of organisational development of 12 SFSCs and their impact assessment (social, economic, environmental)	www.strength2food.eu
2018-2021	SMARTCHAIN	Foster and accelerate shift towards collaborative SFSCs (analysis of various types)	
To come	RUR-05-2020: Connecting consumers and producers in innovative agri-food supply chains (CSA)		
To come	CE-FNR-07-2020: FOOD 2030 - Empowering cities as agents of food system transformation (CSA)		
To come	FNR-03-2020 A comprehensive vision for urban agriculture (CSA)		

BIBLIOGRAPHY

Arcidiacono, D., Loconto, A.M., Maestripieri, L., & Podda, A. (2018). Introducing the wave of prosumers in the age of labour market shattering**.** *Sociologia del Lavoro, Franco Angeli*, 152, 7-22.

Åsebø, K., Jervell, A. M., Lieblein, G., Svennerud, M., & Francis, C. (2007**).** Farmer and consumer attitudes at farmers' markets in Norway. *Journal of Sustainable Agriculture*, 30(4), 67–93.

Allen P. (2010). Realizing justice in local food systems. *Cambridge Journal of Regions, Economy and Society*, 3, 295–308.

Aragau, C., Darly, S., Falies, C., Hochedez, C., Gall, J. L., & Poulot, M. (2016). Les liens invisibles entre agriculture de proximité et commerce alimentaire dit "ethnique". Colloque "La Renaissance rurale d'un siècle à l'autre?", commission de Géographie Rurale du CNFG/Laboratoire Dynamiques Rurales, Toulouse, May 2016, Toulouse, France.

Aubrée, P., Chiffoleau, Y., & Villarroël, A. (2018). Coopération entre agriculteurs et artisans commerçants dans les circuits alimentaires de proximité. *Innovations Agronomiques*, 63, 57-69.

Aubry, C., & Chiffoleau, Y. (2009). Le développement des circuits courts et l'agriculture périurbaine: Histoire, évolution en cours et questions actuelles. *Innovations Agronomiques*, 5, 53-67.

Balázs, B. (2016). Food self-provisioning–the role of non-market exchanges in sustainable food supply. In book: Sustainable value chains for sustainable food systems. A workshop of the FAO/UNEP Programme on Sustainable Food Systems. Publisher: FAO, Rome, Editors: Alexandre Meybeck, Suzanne Redfern

Balázs, B. (2018). Community-building through food self-provisioning in Central and Eastern Europe: An analysis through the food as commons framework. In Viver-Pol, J-L., Ferrando, T., De Schutter, O., & Mattei, U. (Eds.), Routledge handbook of food as a commons. (pp. X).

Barbier C., Couturier C., Pourouchottamin P., Cayla J-M, Sylvestre M &, Pharabod I (2019). Energy and carbon footprint of food in France. *Club Ingénierie Prospective Energie et Environnement*, Paris, IDDRI, 24p. Janvier 2019.

Baritaux, V., & Billion, C. (2016). Les intermédiaires de la distribution dans la relocalisation des systèmes alimentaires: Perspectives de recherche. RIODD 2016, Jul 2016, Saint-Étienne, France.

Barry C., 2012. Commercialisation des produits agricoles. Un producteur sur cinq vend en circuit court. *Agreste Primeur,* 275,

Baysse-Lainé A., Perrin C. & Delfosse C. (2018). Le nouvel intérêt des villes intermédiaires pour les terres agricoles. Actions foncières publiques et relocalisation alimentaire. *Géocarrefour*, 92, 4.

Bazzani, C., & Canavari, M. (2017). Is local a matter of food miles or food traditions? *Italian Journal of Food Science*, 29(3), 505–517.

Bedore, M. (2012). Chapter 7 Food system planning in small, buzz-less cities: challenges and opportunities. In Viljoen A., & Wiskerke J.S.C. (Eds), Sustainable food planning: evolving theory and practice, Wageningen Academic Publishers, 91-102.

Beriss, D. (2019). Food: Location, location, location. *Annual Review of Anthropology*, 48(1), 61–75.

Berti, G. & Mulligan, C. (2016). Competitiveness of small farms and innovative food supply chains: The role of food hubs in creating sustainable regional and local food systems. *Sustainability*, 8(7), 616.

Bimbo, F., Bonanno, A., Viscecchia, R., & Nardone, G. (2015). The Hidden Benefits of Short Food Supply Chains: Farmers' Markets Density and Body Mass Index in Italy. *International Food and Agribusiness Management Review*, 18(1), 1–16.

Blay-Palmer, A. (2010). The Canadian Pioneer: The Genesis of Urban Food Policy in Toronto. *International Planning Studies*, 4, 401-416.

Bloom, J.D. & Hinrichs, C.C. (2016). Informal and formal mechanisms of coordination in hybrid food value chains. *Journal of Agriculture, Food Systems, and Community Development*, 1 (4), 143–156.

Booth, S. & Coveney, J. (2015). Food democracy: From consumer to food citizen. SpringerBriefs in Public Health, Springer.

Bouré, M. (2017). Réappropriation des systèmes alimentaires par les citoyens: Une logique de Communs urbains. Netcom, 31-1/2, 175-192.

Boutry, O., & Ferru, M. (2016). Apports de la méthode mixte pour une analyse globale de la durabilité des circuits courts. *Développement durable et territoires,* 7(2).

Brand, C., Bricas, N., Conare, D., Daviron, B., Debru, J., Michel, L., Soulard, C.-T. (Eds) (2017). Designing urban food policies. Concepts and approaches. Springer.

Brent, Z. W., Schiavoni, C. M., & Alonso-Fradejas, A. (2015). Contextualising food sovereignty: The politics of convergence among movements in the USA. *Third World Quarterly*, 36(3), 618–635.

Brinkley, C. (2012). Evaluating the benefits of peri-urban agriculture. *Journal of planning literature,* 27(3), 259–269.

Brunori, G. (2007). Local food and alternative food networks: A communication perspective. Anthropology of Food, March, available at: http://aof.revues.org/index430.html

Brunori, G., Galli, F., Barjolle, D., van Broekhuizen, R., Colombo, L., Giampietro, M., Kirwan, J., Lang, T., Mathijs, E., Maye, D., de Roest, K., Rougoor, C., Schwarz, J., Schmitt, E., Smith, J., Stojanovic, Z., Tisenkopfs, T., & Touzard, J.-M. (2016). Are Local Food Chains More Sustainable than Global Food Chains? Considerations for Assessment. *Sustainability*, 8(5), 449.

Candel J.J.L. (2019) What's on the menu? A global assessment of MUFPP signatory cities' food strategies, *Agroecology and Sustainable Food Systems,* DOI: 10.1080/21683565.2019.1648357

Capt, D., Chiffoleau, Y., Gauche, A., Gervreau, G., Leseigneur, A., Touzard, J.-M., Traversac, J.-B., Diallo, A., & Tozanli, S., 2011. Elaboration d'un référentiel technico-économique dans le domaine des circuits courts de commercialisation. Research report for the French Ministry of Agriculture and Food.

Cesaro, L., Dries, L., Ihle, R., Marongiu, S., Peerlings, J., Poetschki, K., & Schioppa, A. (2020). 678024 Strength2Food Public R (Report) WU – CREA. 83. Impact of farmer's engagement in food quality schemes and short food supply chains on farm performance.

Chable V., Bocci R., Colley M., Costanzo A., Fadda C., Goldringer I., Messmer M., Nuijten E., Oeh en B & Rey F. (2018). Proceedings of Diversifood Final Congress, 10-12 December 2018, Rennes, France, 90p.

Chable V., Ducottet C., Kutelmach M., Flipon E., De Santis G., & Rodriguez I. (2019). CERERE BOOK OF CASE STUDIES Agrobiodiversity: Success stories in Europe. H2020 CERERE Project.

Chaffotte, L. & Chiffoleau, Y. (2007). Vente directe et circuits courts : Évaluations, définitions et typologie. Les cahiers de l'observatoire CROC, n°1.

Chiffoleau, Y. (2009). From politics to cooperation: The dynamics of embeddedness in alternative food supply chains. *Sociologia Ruralis,* 49 (3), 218–235

Chiffoleau, Y. (2012). Circuits courts alimentaires, dynamiques relationnelles et lutte contre l'exclusion en agriculture. *Économie rurale*, 6(332), 88-101.

Chiffoleau, Y. (2017). Dynamique des identités collectives dans le changement d'échelle des circuits courts alimentaires. *Revue Française de Socio-Économie,* 18(1), 123.

Chiffoleau, Y. (2019). Les circuits courts alimentaires: Entre marché et innovation sociale. Toulouse, France: Éditions Érès.

Chiffoleau, Y., Bouré, M., & Akermann, G. (2018). Les circuits courts alimentaires à l'heure du numérique: quels enjeux ? Une exploration. *Innovations Agronomiques* 67, 37-47.

Chiffoleau, Y., Akermann, G. & Canard, A. (2017). Les circuits courts alimentaires, un levier pour une consommation plus durable : Le cas d'un marché de plein vent. *Terrains & travaux,* 31(2), 157-177.

Chiffoleau, Y., & Loconto, A.M. (2018). Social innovation in agriculture and food. *International Journal of the Sociology of Agriculture and Food*, 24(3), 306–317.

Chiffoleau, Y., Millet-Amrani, S., & Canard, A. (2016). From short food supply chains to sustainable agriculture in urban food systems: Food democracy as a vector of transition. *Agriculture*, 6(4), 57.

Chiffoleau Y., Millet-Amrani S., Rossi A., Rivera-Ferré M.G., & Lopez Merino P. (2019). The participatory construction of new economic models in short food supply chains. *Journal of Rural Studies,* 68: 182-190.

Chiffoleau, Y. & Paturel, D. (2016). Les circuits courts alimentaires « pour tous », outils d'analyse de l'innovation sociale. *Innovations*, 50(2), 191-210.

Chiffoleau Y., Echchatbi A., Rod J., Gey L., Akermann G., Desclaux D., Jard G., Kessari M., Moinet K., Peres J., Robin M.H. (2020a). Quand l'innovation sociale réoriente l'innovation technologique dans les systèmes agroalimentaires: le cas des chaînes locales autour des blés. Innovations, forthcoming.

Chiffoleau Y., Brit A.C., Monnier M., Akermann G., Lenormand M., & Saucède F. (2020b). The coexistence of supply chains in feeding a city: a vector of resilience? *Review of Agricultural, Food and Environmental Studies*, forthcoming.

Clendenning, J., Dressler, W. H., & Richards, C. (2016). Food justice or food sovereignty? Understanding the rise of urban food movements in the USA. *Agriculture and Human Values*, 33(1), 165–177.

Cleveland, D. A., Carruth, A., & Mazaroli, D. N. (2015). Operationalizing local food: Goals, actions, and indicators for alternative food systems. *Agriculture and Human Values*, 32(2), 281–297.

Connelly, S., Markey, S., & Roseland, M. (2011). Bridging sustainability and the social economy: Achieving community transformation through local food initiatives. *Critical Social Policy*, 31(2), 308-324.

Coulson, H., & Sonnino, R. (2019). Re-scaling the politics of food: Place-based urban food governance in the UK. *Geoforum*, 98, 170–179.

Cuéllar-Padilla, M., & Ganuza-Fernandez, E. (2018). We don't want to be officially certified! Reasons and implications of the participatory guarantee systems. *Sustainability*, 10(4), 1142.

Darrot, C., & Noël, J. (2018). Vers des solidarités alimentaires territorialisées. Retour sur la recherche-action SOLALTER menée en Bretagne. *Anthropology of food*. http://journals.openedition.org/aof/8271

Desclaux, D., Samson, M.F. & Chiffoleau, Y. (2018). Gluten : mythe ou réalité ? À la recherche des personnes hypersensibles. *The Conversation*, 2018/03/03.

Deverre, C., & Lamine, C. (2010). Les systèmes agroalimentaires alternatifs. Une revue de travaux anglophones en sciences sociales. *Économie Rurale*, 317, 57–73.

De Vries, H., Mikolajczak, M., Salmon, J.-M., Abecassis, J., Chaunier, L., Guessasma, S., Lourdin, D., Belhabib, S., Leroy, E., & Trystram, G. (2017). Small-scale food process engineering - Challenges and perspectives. *Innovative Food Science and Emerging Technologies*, 46, 122-130

Drejerska, N., Gołębiewski, J., & Fiore, M. (2019). Social media for interactions with customers within the short food supply chain: The case of the SKIN project. *Studies in Agricultural Economics*, 121(2), 94–101. https://doi.org/10.7896/j.1908

Dubuisson-Quellier, S. (2011). Le consommateur responsable. La construction des capacités d'action des consommateurs par les mouvements militants. *Sciences de la Société,* 82, 105-125.

Dubuisson-Quellier, S., & Lamine, C. (2008). Consumer involvement in fair trade and local food system: Delegation and empowerment regimes. *GeoJournal*, 73(1), 55-65.

Dufour, A. & Lanciano, É. (2012). Les circuits courts de commercialisation: Un retour de l'acteur paysan ?. *Revue Française de Socio-Économie*, 9(1), 153-169.

Dupre, L., Lamine, C., & Navarrete, M. (2017). Short food supply chains, long working days: Active work and the construction of professional satisfaction in French diversified organic market gardening. *Sociologia Ruralis*, 57(3), 396-414.

Enjolras, G. & Aubert, M. (2018). Short food supply chains and the issue of sustainability: A case study of French fruit producers. *International Journal of Retail & Distribution Management*, 46(2), 194-209.

European Commision [EC]. (2013). Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32013R1305

European Parliamentary Research Service (EPRS) (2016). Short food supply chains and local food systems in the EU. Retrieved from https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/586650/EPRS_BRI(2016)586650_EN.pdf

Elghannam, A., Mesias, F. J., Escribano, M., Fouad, L., Horrillo, A., & Escribano, A. J. (2019). Consumers' Perspectives on Alternative Short Food Supply Chains Based on Social Media: A Focus Group Study in Spain. *Foods*, 9(1), 22.

Fleury, P., Lev, L., Brives, H., Chazoule, C., & Desolé, M. (2016). Developing mid-tier supply chains (France) and values-based food supply chains (USA): A comparison of motivations, achievements, barriers and limitations. *Agriculture*, 6(3), 1-13.

Food and Agricultural Organization of the United Nations (FAO) (2017). The future of food and agriculture Trends and challenges. Rome. Retrieved from http://www.fao.org/3/ai6583e.pdf.

Fonte, M. (2008). Knowledge, food and place. A way of producing, a way of knowing. *Sociologia Ruralis*, 48(3), 200–222.

Galli, F., Bartolini, F., Brunori, G., Colombo, L., Gava, O., Grando, S. & Marescotti, A. (2015). Sustainability assessment of food supply chains: An application to local and global bread in Italy. *Agricultural and Food Economics*, 3(21).

Galli, F. & Brunori, G. (2013). Short food supply chains as drivers of sustainable development: Evidence document. Document developed in the framework of the FP7 project FOODLINKS (GA No. 265287). Laboratorio di studi rurali Sismondi, ISBN 978-88-90896-01-9

Galt, R.E. (2013). The moral economy is a double-edged sword: Explaining farmers' earnings and self-exploitation in community-supported agriculture. *Economic Geography*, 89(4), 341–365.

Gava, O., Galli, F., Bartolini, F., & Brunori, G. (2018). Linking sustainability with geographical proximity in food supply chains. An indicator selection framework. *Agriculture*, 8(9), 130.

Giampietri, E., Koemle, D. B. A., Yu, X., & Finco, A. (2016). Consumers' sense of farmers' markets: Tasting sustainability or just purchasing food? *Sustainability*, 8(11), 1157.

Goldenberg, M. P., & Meter, K. (2019). Building economic multipliers, rather than measuring them: Community-minded ways to develop economic impacts. *Journal of Agriculture, Food Systems, and Community Development,* 8 (Suppl. 3), 153–164.

Goodman, D. (2003). The quality 'turn' and alternative food practices: Reflections and agenda. *Journal of Rural Studies*, 19 (1), 1–7.

Goodman, D. (2004). Rural Europe redux? Reflections on alternative agro-food networks and paradigm change. *Sociologia Ruralis,* 44(1), 3–16.

Grando, S., Carey, J., Hegger, E., Jahrl, I., & Ortolani, L. (2017). Short food supply chains in urban areas: Who takes the lead? Evidence from three cities across Europe. *Urban Agriculture & Regional Food Systems*, 2(1), 1–11.

Guthman, J. (2003). Fast food/organic food: Reflexive tastes and the making of "yuppie chow". In Counihan C. & Van Esterik, P. (Eds.), Food and Culture: A reader. New York, NY and Abingdon, UK: Routledge, 496-509.

Guthman, J. (2008). Bringing good food to others: Investigating the subjects of alternative food practice. *Cultural Geographies*, 15(4), 431–447.

Guthrie, J., Guthrie, A., Lawson, R., & Cameron, A. (2006). Farmers' markets: The small business counter-revolution in food production and retailing. *British Food Journal*, 108(7), 560–573.

Hassanein, N. (2003). Practicing food democracy: a pragmatic politics of transformation. *Journal of Rural Studies*, 19(1), 77–86.

Hebinck, P.G.M., Van der Ploeg, J.D., & Schneider, S. (Eds.) (2015). Rural development and the construction of new markets. Abingdon: Oxon.

Hinrichs, C.C. (2000). Embeddedness and local food systems: Notes on two types of direct agricultural market. *Journal of Rural Studies*, 16(3), 295–303.

Holloway, L., Kneafsey, M., Venn, L., Cox, R., Dowler, E., & Tuomainen, H. (2007). Possible food economies: a methodological framework for exploring food production-consumption relationships. *Sociologia Ruralis*, 47(1), 1–18.

Horst, M., & Gwin, L. (2018). Land access for direct market food farmers in Oregon, USA. *Land Use Policy*, 75, 594–611.

IFOAM. Website. "Community supported agriculture (CSA)". Retrieved from https://www.ifoam.bio/en/community-supported-agriculture-csa

IPES-Food. (2016). From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems. International Panel of Experts on Sustainable Food systems. Retrieved from http://www.ipesfood.org/_img/upload/files/UniformityToDiversity_FULL.pdf

IPES-Food. (2017). What makes urban food policy happen? Insights from five case studies. International Panel of Experts on Sustainable Food Systems. www.ipes-food.org

Jaffee, D., & Howard, P. H. (2010). Corporate cooptation of organic and fair trade standards. *Agriculture & Human Values*, 27(4), 387-399.

Kneafsey, M., Venn, L., Schmutz, U., Balazs, B., Trenchard, L., Eyden-Wood, T., Bos, E., Sutton, G., & Blackett, M. (2013). Short food supply chains and local food systems in the EU. A state of play of their socio-economic characteristics. Scientific report, Brussels, European Commission. Available at: http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id¼6279.

Kneafsey, M. (dir.), 2015. EIP-AGRI Focus Group Innovative Short Food Supply Chain management. Final report, Brussels, European Commission.

Lamine, C., Garçon, L., & Brunori, G. (2019). Territorial agrifood systems: A Franco-Italian contribution to the debates over alternative food networks in rural areas. *Journal of Rural Studies*, 68, 159–170.

Lappo A., Bjørndal T., & Fernández-Polanco J. (2015). Consumers' concerns and external drivers in food markets. FAO, Fisheries and Aquaculture Circular No. 1102. Rome, Italy.

Le Velly, R., & Dufeu, I. (2016). Alternative food networks as "market agencements": Exploring their multiple hybridities. *Journal of Rural Studies*, 43, 173–182.

Le Velly, R., & Paturel, D. (2013). Des circuits courts pour l'aide alimentaire ? Hybridation de régulations dans un marché expérimental en Languedoc-Roussillon. *Revue d'Études en Agriculture et Environnement*, 94(04), 443–446.

Lever, J., Sonnino, R., & Cheetham, F. (2019). Reconfiguring local food governance in an age of austerity: towards a place-based approach? *Journal of Rural Studies*, 69, 97-105.

Levidow, L. (2018). London's urban agriculture: Building community through social innovation. *International Journal of Sociology of Agriculture and Food*, 24(3), 354–376.

Lhomme, E., Urien, C., Legrand, J., Dousset, X., Onno, B., Sicard, D. (2016). Sourdough microbial community dynamics: an analysis during French organic bread-making processes. *Food Microbiology*, 53 (part A), 41-50.

Lin, B. B., Philpott, S. M., & Jha, S. (2015). The future of urban agriculture and biodiversity-ecosystem services: Challenges and next steps. *Basic and Applied Ecology*, 16(3), 189–201.

Loconto, A.M. & Hatanaka, M. (2017). Participatory guarantee systems: Alternative ways of defining, measuring, and assessing 'sustainability'. *Sociologia Ruralis*, 58(2), 412–432.

Loiseau, E., Aissani, L., Le Féon, S., Laurent, F., Cerceau, J., Sala, S., & Roux, P. (2018). Territorial Life Cycle Assessment (LCA): What exactly is it about? A proposal towards using a common terminology and a research agenda. *Journal of Cleaner Production*, 176, 474–485.

Longin C.F. & Würschum T. (2016). Back to the future – tapping into ancient grains for food diversity. *Trends in Plant Science*, 21(9): 731-737.

Malak-Rawlikowska, A., Majewski, E., Wąs, A., Borgen, S. O., Csillag, P., Donati, M., Freeman, R., Hoàng, V., Lecoeur, J.-L., Mancini, M. C., Nguyen, A., Saïdi, M., Tocco, B., Török, Á., Veneziani, M., Vittersø, G., & Wavresky, P. (2019). Measuring the economic, environmental, and social sustainability of short food supply chains. *Sustainability*, 11(15), 4004.

Maltais, A. (2017). Petits commerces de bouche et réseaux alimentaires alternatifs: Un regard montréalais. *Canadian Food Studies / La Revue canadienne des études sur l'alimentation,* 4(1), 24.

Maréchal, G., & Spanu, A. (2010). Les circuits courts favorisent-ils l'adoption de pratiques agricoles plus respectueuses de l'environnement ? *Le Courrier de l'environnement de l'INRA*, 59, 33–45.

Marsden, T., Banks, J., & Bristow, G. (2000). Food supply chain approaches: Exploring their role in rural development. *Sociologia Ruralis*, 40(4), 424-438.

Mastronardi, L., Marino, D., Giaccio, V., Giannelli, A., Palmieri, M., & Mazzocchi, G. (2019). Analyzing alternative food networks sustainability in Italy: A proposal for an assessment framework. *Agricultural and Food Economics*, 7(21).

Mattioni D., Loconto, A & Brunori G. (2020). Healthy diets and the retail food environment: A sociological approach. *Health Place*, 61:102244.

McEachern, M., Warnaby, G., Carrigan, M., & Szmigin, I. (2010). Thinking locally, acting locally? Conscious consumers and farmers' markets. *Journal of Marketing Management,* 26(5-6), 395-412.

Meynard J.-M., Jeuffroy M.-H., Le Bail M., Lefevre A., Magrini M.-B., & Michon C. (2017), Designing coupled innovations for the sustainability transition of agrifood systems. *Agricultural Systems*, 157(C), 330-339.

Migliore, G., Romeo, P., Testa, R., & Schifani, G. (2019). Beyond alternative food networks: Understanding motivations to participate in orti urbani in Palermo. *Culture, Agriculture, Food and Environment*, 41(2), 129–139.

Millet-Amrani S. (2020). Nouveaux marchés, nouvelles pratiques ? Le rôle des circuits courts dans l'écologisation des pratiques agricoles. PhD Thesis in Economics, Montpellier University, France.

Morgan K., & Sonnino R., 2013. The school food revolution: public food and the challenge of sustainable development. London, Routledge.

Morizot-Braud, F., & Gauche, A. (2016). Références sur les circuits courts de commercialisation (RCC). *Innovations Agronomiques,* 49, 59–68.

Mottershead, D. & Schweitzer, J.-P. (2018). Short food supply chains. Briefing for the report: Unwrapped: How throwaway plastic is failing to solve Europe's food waste problem (and what we need to do instead). Institute for European Environmental Policy (IEEP), Brussels. A study by Zero Waste Europe and Friends of the Earth Europe for the Rethink Plastic Alliance.

Mundler, P., & Jean-Gagnon, J. (2019). Short food supply chains, labor productivity and fair earnings: An impossible equation? *Renewable Agriculture and Food Systems*, 1-13.

Mundler, P., & Laughrea, S. (2016). The contributions of short food supply chains to territorial development: A study of three Quebec territories. *Journal of Rural Studies*, 45, 218–229.

Navin M. (2015). Scaling-up short food chains. *Journal of Social Philosophy*, 46(4):434-448.

Nicolosi, G. (2006). Biotechnologies, alimentary fears and the orthorexic society. *Tailoring biotechnologies*, 2(3), 36-56.

Opitz, I., Berges, R., Piorr, A., & Krikser, T. (2016). Contributing to food security in urban areas: Differences between urban agriculture and peri-urban agriculture in the Global North. *Agriculture and Human Values*, 33, 341-358.

Ostrom, M., Master, K. D., Noe, E. B., & Schermer, M. (2017). Values-based Food Chains from a Transatlantic Perspective: Exploring a Middle Tier of Agri-food. *International Journal of Sociology of Agriculture and Food*, 24(1), 1-14.

Pickard, D. (2018). Factors for Effectiveness of Social Innovations in Urban Agriculture: An Analysis of a Negative Case. *The International Journal of Sociology of Agriculture and Food*, 24, 3.

Pimbert, M. (2019). Food sovereignty. In Ferranti, P., Berry, E. & Jock, A. (eds.). Encyclopaedia of Food Security and Sustainability, Elsevier, 181-189.

Poulsen, M. N. (2017). Cultivating citizenship, equity, and social inclusion? Putting civic agriculture into practice through urban farming. *Agriculture and Human Values*, 34(1), 135-148.

Praly, C., Chazoule, C., Delfosse, C. & Mundler, P. (2014). Les circuits de proximité, cadre d'analyse de la relocalisation des circuits alimentaires. *Géographie, Economie, Société*, 16(4), 455-478.

Prévost, B. (2012). Échanges alimentaires et juste prix: Un détour par l'histoire de la pensée économique pour alimenter un débat contemporain. *L'Homme & la Société*, 1(183-184), 35-59.

Raton, G., & Raimbert, C. (2019). Livrer en circuits courts: Les mobilités des agriculteurs comme révélateur des territoires alimentaires émergents. Étude de cas dans les Hauts-de-France. Géocarrefour, 93.

RCC (2013). Références circuits courts. Casdar Project, https://www.centre-diversification.fr/liste-documents/13/casdar-rcc.html.

Renting, H., Marsden, T. K., & Banks, J. (2003). Understanding alternative food Networks: Exploring the role of short food supply chains in rural development. *Environment and Planning A*, 35(3), 393–411.

Renting, H., Schermer, M., & Rossi, A. (2012). Building food democracy: Exploring civic food networks and newly emerging forms of food citizenship. *International Journal of Sociology of Agricultural & Food*, 19(3), 289–307.

Sacks, J. (2002). The money trail: Measuring your impact on the local economy using LM3. London: New Economics Foundation.

Salvador, M., El Euch Maalej, M., & Frochot, I. (2017). Le rôle de la restauration gastronomique dans la valorisation des produits alimentaires localisés. *Décisions Marketing*, 85, 49–62.

SCAR Food systems, 2019. Diversifying Food Systems in the Pursuit of Sustainable Food Production and Healthy Diets. 3rd and Final Workshop, Paris, France, 2019-05-14.

Schlich, E., Biegler, I., Hardtert, B., Luz, M., Schroder, S., Scroeber, J., Winnebeck, S. (2006). La consommation alimentaire d'énergie finale de différents produits alimentaires: un essai de comparaison. *Courrier de l'environnement de l'INRA,* 53, 111-120.

Schmit, T.M., Jablonski, B.B., & Mansury, Y. (2016). Assessing the economic impacts of local food system producers by scale: A case study from New York. *Economic Development Quarterly*,30(4), 316–328.

Schmitt, E., Galli, F., Menozzi, D., Maye, D., Touzard, J.-M., Marescotti, A., Six, J., & Brunori, G. (2017). Comparing the sustainability of local and global food products in Europe. *Journal of Cleaner Production,* 165, 346–359.

Schmutz, U., Kneafsey, M., Sarrouy Kay, C., Doernberg, A., & Zasada, I. (2018). Sustainability impact assessments of different urban short food supply chains: Examples from London, UK. *Renewable Agriculture and Food Systems,* 33(6), 518–529.

Smith, K., Lawrence, G., MacMahon, A., Muller, J., & Brady, M. (2016). The resilience of long and short food chains: A case study of flooding in Queensland, Australia. *Agriculture and Human Values*, 33(1), 45–60.

Sonnino, R. (2007). The power of place: embeddedness and local food systems in Italy and the UK. *Anthropology of Food* (Online).

Sonnino, R. (2016). The new geography of food security: Exploring the potential of urban food strategies. *The Geographical Journal*, 182(2), 190-200.

Spilková, J., Fendrychová, L., & Syrovátková, M. (2013). Farmers' markets in Prague: A new challenge within the urban shoppingscape. *Agriculture and Human Values,* 30(2), 179–191.

Stotten, R., Bui, S., Pugliese, P., & Lamine, C. (2017). Organic values-based supply chains as a tool for territorial development: A comparative analysis of three European organic regions. *International Journal of Sociology of Agriculture & Food,* 24(1), 135-154.

Sylla, M., Olszewska, J., & Świąder, M. (2017). Status and possibilities of the development of community supported agriculture in Poland as an example of short food supply chain. *Journal of Agribusiness and Rural Development*, 16(1), 201–207.

Syrovátková, M., Hrabák, J., & Spilková, J. (2015). Farmers' markets' locavore challenge: The potential of local food production for newly emerged farmers' markets in Czechia. *Renewable Agriculture and Food Systems*, 30(4), 305–317.

Tharrey, M., Perignon, M., Scheromm, P., Mejean, C., & Darmon, N. (2019). Does participating in community gardens promote sustainable lifestyles in urban settings? Design and protocol of the JArDinS study. *BMC Public Health*, 19(1), 589.

Tregear, A. (2011). Progressing knowledge in alternative and local food networks: Critical reflections and a research agenda. *Journal of Rural Studies*, 27(4), 419–430.

Tundys B. & Wiśniewski T. (2020). Benefit Optimization of Short Food Supply Chains for Organic Products: A Simulation-Based Approach. *Applied science*, 10, 2783.

URGENCI. (2016). Overview of community supported agriculture in Europe. European CSA research group. Retrieved from http://urgenci.net/wp-content/uploads/2016/05/Overview-of-Community-Supported-Agriculture-in-Europe-F.pdf

URGENCI. (2020). The international CSA network. Retrieved from http://urgenci.net/the-network/.

Vaillant, L., Gonçalves, A., Raton, G. & Blanquart, C. (2017). Transport et logistique des circuits courts alimentaires de proximité : la diversité des trajectoires d'innovation. *Innovations*, 54(3), 123-147.

Vicart, M., & Wathelet, O. (2016). Des familles conso-motrices ? Ethnographie des mobilités alimentaires dans les pratiques d'approvisionnement en France. *Anthropology of food*, 11.

Vittersø, G., Torjusen, H., Laitala, K., Tocco, B., Biasini, B., Csillag, P., de Labarre, M. D., et al. (2019). Short food supply chains and their contributions to sustainability: Participants' views and perceptions from 12 European cases. *Sustainability*, 11(17), 4800.

Zasada I., Schmutz U., Wascher D., Kneafsey M., Corsi S., Mazzocchi C., Monaco F., Boyce P., Doernberg A., Sali G. & Piorr A., (2019). Food beyond the city – Analysing foodsheds and self-sufficiency for different food system scenarios in European metropolitan regions. *City, Culture and Society*, 16, 25-35.

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[ii] Examples of CSA names in different countries include, among others, AMAP (*Association pour le Maintien d'une Agriculture Paysanne*) in France, ASC (*Agriculture soutenue par la communauté*) in Quebec, *Gruppi di Acquisto Solidale* in Italy, and *Socially Supported Agriculture* in Greece.

[iii] Full-time equivalent: the number of full-time equivalent jobs, defined as total hours worked divided by average annual hours worked in full-time jobs; a measure used to compare jobs in different contexts.