Exploring Short Food Supply Chains from Triple Bottom Line Lens: A Comprehensive Systematic Review

Vikas Kumar, Meng Wang and Archana Kumari
Bristol Business School
University of the West of England
Bristol, UK
Vikas.Kumar@uwe.ac.uk, Meng2.Wang@live.uwe.ac.uk, Archana.Kumar@uwe.ac.uk

Supalak Akkaranggoon
Khon Kaen University
Nong Khai, Thailand
supakk@kku.ac.th

Jose Arturo Garza-Reyes
Centre for Supply Chain Improvement
University of Derby
Derby, UK
J.Reyes@derby.ac.uk

Daiane Neutzling
Universidade de Fortaleza
Fortaleza, Brazil
d.neutzling@unifor.br

Jiri Tupa
Faculty of Electrical Engineering
University of West Bohemia
Pilsen, Czech Republic
tupa@ket.zcu.cz

Abstract

Growing awareness towards the sustainability has compelled supply chain domain experts to explore its relevance in this context. As a result, a number of studies in recent years have focused on investigating sustainable supply chain practices across the globe. Short food supply chains (SFSCs) have emerged as a promising sustainable alternative to the industrialized agro-food supply systems. However, academic literature hasn't fully explored the linkage between SFSCs and sustainability. This study therefore aims to explore how SFSCs conforms to the dimensions of sustainability using the sustainability framework (social, economic, and environmental). The findings are based on a systematic literature review of 44 articles published between 2000 and 2018 selected from six electronic databases was used for the analysis. All items were properly analyzed by the researchers, seeking to identify the relationship or proximity of the information found in the papers with the SFSC concept. Our studies highlight the societal, environmental and cultural benefits of SFSC in addition to the associated economic and safety benefits. Our study thus, adds to the scant literature on SFSCs and shows a clear linkage between SFSCs and five-dimensional sustainability framework. We also propose a set of research questions that sets direction for future research.

Keywords
Short Food Supply Chains, Systematic Review, Sustainability, Social, Cultural, Economic, Environmental, Safety

1. Introduction

Current industrialized food supply chain is often criticized for its adverse environmental and social impact (Mastronardi et al., 2015) hence in order to fulfil the requirement for sustainability several alternative food networks (AFN) have emerged that abandons the main features of traditional food chain (Higgings et al., 2008). While AFNs is a broader concept and contains multiple initiatives, Short Food Supply Chains (SFSCs) is seen as a prominent sustainable practice (Chiffoleau et al., 2016). While there hasn't been a consensus on a unified definition of SFSCs (Marsden et al., 2000; Giarè and Giuca, 2012; Kneafsey et al., 2013), it generally refers to any forms of re-joining farmers with consumers, with minimized number of intermediaries (Ilbery and Maye, 2005). Given that SFSCs is potentially the newest concept when considering sustainability in supply chain management (SSCM) the literature exploring this aspect is scant (De Fazio, 2016), hence this study aims to examine its linkage to sustainability. The study also aims to find differences and similarities between the AFN concepts and analyze how the traditional SSCM could absorb some of these concepts to define new sustainability values in food supply chains.

Industrialized agro-food supply chain has achieved tremendous success in the past decades, however it has been increasingly criticized for its adverse environmental and social impact (Mastronardi et al., 2015) as well as safety issues (Llazo, 2014). Its massive production feature has raised widespread concerns about its unsustainability and harms to the environment, such as excessive land use, pollution of soils and water, and exhaust emissions (Bazzani and Canavari, 2013). Moreover, from the producer aspect, the increasing cost to maintain massive production and consumers' changing attitudes towards industrialized food both further compress the economic margin, leading to increased pressure on farmers' incomes (Renting et al., 2003).

Owing to all these disadvantages of current industrialized food supply system, there has been a wide consensus on improving the sustainability in food supply system (Forssell and Lankoski, 2015). These challenges can be classified according to the three pillars of sustainability. Economically, a prominent aspect is to improve the income and livelihood of farmers (Singh, 2013). Meanwhile, from the social aspect, attention is mainly concentrated on food security (Nonini, 2013). Whereas from the environmental aspect, biodiversity and pollution along the food supply chain is the main focus (Tanasa, 2014).

Based on the issues identified above, Short Food Supply Chains (SFSCs) have emerged as one of the sustainable alternatives to the conventional food supply chains. It is a type of Alternative Food Networks (AFNs) that operates as a local food system, and short-circuits the traditional long food supply chains. Instead of solely exchanging a product, this direct connection between producers and consumers shares additional information about knowledge, value, meaning of the product, and producer and consumer themselves (Marsden et al., 2000).

Some research evidences have shown that SFSCs have a close linkage with sustainability. For example, economically, farmers can regain the profit shared by intermediates, and hence improve their livelihoods (Hinrichs, 2000). Environmentally, it can improve biodiversity and reduce environmental pollutions (Canfora, 2016). Socially, more employment opportunities and a better visibility can be obtained with SFSCs (Marino et al., 2013). Meanwhile, farmers can re-socialize with consumers (Marsden et al., 2000).

Thus, SFSCs appears to have a potential to be a more sustainable supply chain. However, most SFSCs studies focus on regional practices, and the linkages to sustainability are not well articulated. Given that SFSCs is potentially the newest concept when considering sustainability in supply chain management, this study hence aims to examine its linkage to sustainability through one of the popular theoretical frameworks, the Triple Bottom Line (TBL), which has been used for sustainability evaluation (Alhaddi, 2015). The potential benefit of this study is to improve the theoretical understanding of the SFSCs and sustainability linkage, and hence encourage further studies in this area. Since previous literature fails to clearly document the SFSCs and sustainability linkages, this study adopts a systematic literature review approach.

Rest of the paper is organised as follows: next section discusses the research methodology, this is followed by research findings and discussions (section 3) and finally conclusions and future research directions are presented in section 4.

2. Methodology

This research followed a systematic review approach to focus more precisely on literature that is likely to be relevant (Saunders et al., 2012). A systematic review is a specific methodology that adopts a series of phases to ensure the clearly reasonable conclusions to be reached about what is and is not known (Denyer and Tranfield, 2009). There are various research synthesis methods for systematic review in management discipline such as realist synthesis, meta-synthesis and meta-ethnography (Tranfield et al., 2003). In order to effectively analyse the qualitative research and integrate the findings of those multiple studies, thematic synthesis was considered an appropriate method for the descriptive and analytical studies in each theme (Thomas and Harden, 2008). According to the thematic focus/content of the existing literature, a classification of the articles was made using the TBL framework based on the economic, social, and environmental dimensions of sustainability. To ensure the validity and reliability of the systematic review, a five-step process suggested by Denyer and Tranfield (2009) was followed which includes: (1) question formulation, (2) locating studies, (3) study selection and evaluations, (4) analysis and synthesis, and (5) reporting and using the results.

In order to explore the linkage between SFSCs and Sustainability, a comprehensive review of literature has been carried out. Five well known online databases (Emerald, Wiley, Scopus, Sage and Science direct) were selected as the source of literature. Alongside with the search strings of "short food supply chain", "sustainable food supply chain", "sustainability & food", and "short supply chain & food", the research terms in this study also used terms "alternative food networks" and "local food system", as these two words also lead to relevant articles for this study (Renting et al., 2003; Darolt et al., 2016; Deller et al., 2017). These phrases were searched in both keywords and abstracts, allowing the more relevant articles to be discovered in the initial searching. The search period of this research was limited to 2000 to 2018. This is because the term "short food supply chain" was first appeared in literatures in 2000 (Marsden et al., 2000).

The initial search resulted in 4,464 articles. However, after careful examination it was found that not all papers were relevant and valuable for the research. Thus, the inclusion/exclusion criteria were determined (Moher et al., 2009) to select the relevant research studies. The article duplication was excluded and a selection process was implemented through screening the titles and abstracts to remove papers that used these research terms once, but did not address the topic of SFSCs. Moreover, the papers that did not involve the perspectives on sustainability in SFSCs were also excluded after reading the full text. Therefore, only the articles having evidence of the linkages between SFSCs and sustainability were included in this literature review, resulting in a final selection of 44 publications. The findings of the study are thus based on these final 44 publications.

3. Findings and Analysis

This section presents the findings of the systematic review linking individual social, economic, and environmental pillars as well as the combined evidence of the sustainability pillars with SFSCs. A detailed review of selected 44 articles shows that SFSCs have gained increasing interest within the research community since 2014, with 34 papers (77.23%) being published in the following 4 years (see Figure 1). This growing interest suggests that SFSCs is a relatively new and emergent research field, which has started gaining popularity in recent years. With a wider recognition of its benefits, more publications can be expected in the next few years. To provide more clarity to readers, for each article, the research country and type of SFSCs were coded together with author list and publication year. After descriptive analyses of articles in each theme, an analytical discussion was presented to interpret the benefits of SFSCs under each theme. The reviewed 44 articles are listed in Table 1.

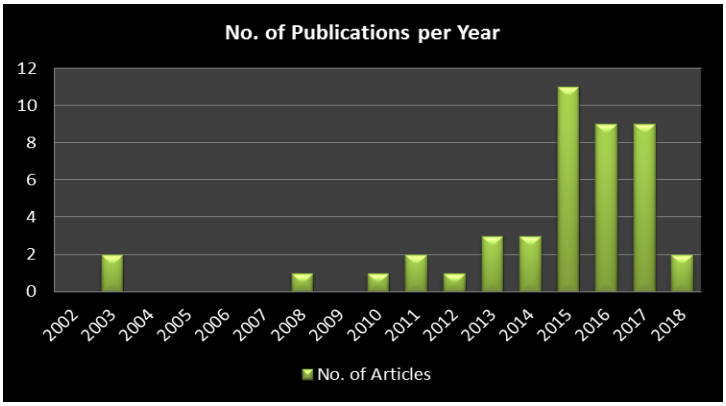

Figure 1 – Number of publications per year

Table 1 – List of paper reviewed

No.	Author	Year	Journal	Type	Region	Sustainability		
						Soc.	Eco.	Env.
1	Sage,C.	2003	J. Rural Stud.	Organic farm; Food artisan	UK	✓		
2	Nonini,D.M.	2013	Am. Ethnol.	Farmer market	US	✓		
3	Zirham,M., Palomba,R.	2015	CEUR WKSH.. Proc.	Direct sale	Italy	✓		
4	O'Kane,G., Wijaya,S.Y.	2015	Agroecology and Sustainable Food Syst.	Farmer market	Australia	✓		
5	Bimbo, F., et al.	2015	IFAMR	Farmer market	Italy	✓		
6	Giampietri, E., et al.	2016	Brit. Food J	Direct sale	Italy	✓		
7	Zirham,M., Palomba,R.	2016	Agric. Agric. Sci. Proc	Direct sale	Italy	✓		
8	Giampietri, E., et al.	2018	Food Qual. Preference	Direct sale	Italy	✓		
9	Janssen,B.	2010	Culture & Agric.	CSA	US		✓	
10	Watts,D., et al.	2011	Reg. Stud.	Farmer market	UK		✓	
11	Balázs,B., et al.	2016	Futures	CSA	Hungary		✓	
12	Benedek,Z., et al.	2017	Agric. Hum. Values	Farmer market	Hungary		✓	
13	Hara,Y., et al.	2013	Sustainability Sci.	Farmer market; Pick-your-own	Japan			✓
14	McClenachan,L., et al.	2014	Fish. Res.	CSFs	US			✓
15	Tasca,A.L., et al.	2017	J. Cleaner Prod.	Organic farm; Integrated farm	Italy			✓
16	Renting, H., et al.	2003	Environ. Plann. A	AFNs	Europe	✓	✓	✓
17	Smith, B. G.	2008	Philos. Trans. R. Soc. B Biol. Sci.	Local food system	NS	✓	✓	✓
18	Connelly, S., et al.	2011	Critical Social Policy	Box scheme; Food hub	Canada	✓	✓	✓
19	Beckie, M. A., et al.	2012	Agric. Hum. Values	Farmer market	Canada	✓	✓	✓
20	Marino, D., et al.	2013	Proc. Syst. Dyn. Innov. Food Networks	Farmer market	Italy	✓	✓	✓
21	Sgroi, F., et al.	2014	Am. J. Agric. Biol. Sci	Direct sale	Italy	✓	✓	
22	Farmer, J. R., et al.	2014	J. Leis. Res.	Farmer market; CSA	US	✓		✓
23	Aubert, M., Enjolras, G.	2015	Agric. Econ.	SFSCs	France	✓	✓	✓
24	Giampietri, E., et al.	2015	Quality	SFSCs	Italy	✓	✓	✓
25	Forssell,S., Lankoski,L.	2015	Agric. Hum. Values	AFNs	NS	✓	✓	✓
26	Mastronardi, L., et al.	2015	IFAMR	SFSCs	Italy	✓	✓	✓
27	Si, Z. Z., et al.	2015	Agric. Hum. Values	AFNs	China	✓	✓	✓
28	Falguieres, M., et al.	2015	IFAC	SFSCs	Spain	✓		✓
29	Migliore, G., et al.	2015	Food Qual. Preference	Farmer market	Italy		✓	✓
30	Tudisca, S., et al.	2015	Ital. J. Food Sci.	Direct sale	Italy	✓	✓	
31	Berti, G., Mulligan, C.	2016	Sustainability	Food hub	NS	✓	✓	✓
32	Darolt, M. R., et al.	2016	Ambiente & Sociedade	AFNs	France; Brazil	✓	✓	✓
33	Dixon, J., Richards, C.	2016	Agric. Hum. Values	AFNs	Australia	✓	✓	✓
34	Canfora, I.	2016	Agric. Agric. Sci. Proc	SFSCs	Europe	✓	✓	✓
35	Mundler,P.,Laughrea,S.	2016	J. Rural Stud.	SFSCs	Canada	✓		✓
36	Engelseth, P.	2016	Int. J. Food Syst. Dyn.	Supermarket hub	Norway	✓	✓	
37	Rover, O. J., et al.	2017	Sustainability	SFSCs	Brazil	✓		✓

38	Milestad,R., et al.	2017	J. Rural Stud.	Box scheme	Austria	✓	✓	✓
39	Wills,B., Arundel,A.	2017	Agric. Hum. Values	AFNs	Canada; Australia	✓		✓
40	Elghannam,A., et al.	2017	New Medit	SFSCs	Spain	✓	✓	
41	Leiper, C., Sather, A. C.	2017	Int. J. Justice and Sustainability	Farmer market	US	✓	✓	
42	Deller, S. C., et al.	2017	Community Dev.	Local food system	NS	✓	✓	
43	Demartini, E., et al.	2017	Agric. Econ.	SFSCs	Italy	✓	✓	
44	Sellitto, A., et al.	2018	J. Cleaner Prod.	SFSCs	Italy; Brazil	✓	✓	✓

Social pillar of sustainability

It can be noted from Table 1 that only eight papers from the sample solely focused on the linkages between SFSCs and social dimension of sustainability.

The earliest research investigating the social sustainability of SFSCs was implemented by Sage in 2003. Through 12 semi-structured interviews and 20 informal discussions with relevant stakeholders, Sage (2003) explored the benefits of direct interactions in these food systems. The study noted that additional moral values, such as ethics of animal welfare, consideration for sustainability and belief in local community, can be obtained in face-to-face transactions.

Alongside with Sage (2003), the close linkage between social sustainability and direct interactions in SFSCs was also confirmed in some other studies. For example, Giampietri et al. (2016, 2018) conducted two continuous studies to investigate the motivations of consumers' purchasing behavior in SFSCs. They found that the direct interactions in SFSCs can reinforce consumers' trust on food security and quality, and increase consumers' involvement in local development. A similar finding was also obtained by O'Kane and Wijaya (2015). Moreover, O'Kane and Wijaya (2015) also found that farmers could feel more empowered and equitable in Farmers Markets (FMs), a typical face-to-face category of SFSCs.

Apart from the social benefits introduced by direct interactions, the gender equality was also investigated in SFSCs. Two continuous studies by Zirham and Palomba (2015, 2016) explored the females' role in SFSCs. Through open and semi-structured interviews, they found that female features, such as high responsibility and good social manners, can improve food security and provide a more pleasant shopping atmosphere. Thus, SFSCs tends to have a better gender equality.

Moreover, as a form of local food system, SFSCs can also provide food with improved security to more low-income people (Nonini, 2013). Meanwhile, a positive correlation was also found between the density of FMs and Italian adults' Body Mass Index (BMI), indicating that FMs can provide higher quality food products (Bimbo et al., 2015).

Based on the identified 8 studies, it can be noted that the most widely acknowledged social benefits of SFSCs is the improved food quality and security. This fact is consistent with the consumers' expectation on SFSCs, as their growing preference of SFSCs is because the increasing occurrences of safety crises in conventional food systems (Llazo, 2014). Thus, SFSCs can be an effective solution to regain consumers' trust and improve social sustainability through the improved food products and gender equality.

Economic pillar of sustainability

Unlike the widely acknowledged improvements in social sustainability, research on the linkage between SFSCs and economic sustainability is rather limited. As shown in Table 1, only four articles were found to be focusing solely on economic sustainability of SFSCs.

Studies focusing on farmer markets (FMs) found that the direct interactions can help to regain the profit shared by intermediates in conventional food supply systems, and also facilitate economic development of local areas (Watts et al., 2011; Benedek et al., 2017). Moreover, Benedek et al. (2017) also found that farmers within FMs are more open to cooperation and tend to be higher educated. Thus, they can benefit more through the direct interactions with customers, and the pleasant social atmosphere can be retained as added values to the food products.

While the economic sustainability of FMs is obvious, there is some controversy over Community Supported Agriculture (CSA). While Balázs et al. (2016) confirmed that CSA can improve farmers' financial situation and

facilitate local economic development, both them and Janssen (2010) found the scaling up of CSA can be a major challenge. This is because the investment of CSA is much greater for hiring external labours. Thus, it can be a tough decision for growers to adapt to this form of SFSCs. Moreover, the empirical evidences of the return on investment for CSA are quite limited.

While the linkage between SFSCs and economic sustainability is less evident, it can be noted that the direct interactions in FMs can be retained as added values and hence help farmers to solve the price squeeze issues. Moreover, the short-circuit feature of SFSCs can help farmers to regain the profits shared by intermediates. However, it should be noted that the potential increased costs for small scale production is not fully evaluated. Although the economic performance of SFSCs can be difficult to assess, a thorough evaluation and more empirical evidences are recommended for further justification.

Environmental pillar of sustainability

Similar to linkage with economic sustainability, only 3 articles from the sample were identified to associate with solely environmental sustainability, as illustrated in Table 1.

Hara et al. (2013) conducted a multi-scale and a scenario analysis to examine the energy consumption of vegetables in Osaka city region, where they found that the local food movement can effectively reduce the energy consumption. Meanwhile, McClenachan et al. (2014) compared the environmental impacts of Community Supported Fisheries (CSFs) and industrial fisheries. CSFs were confirmed to be a more environmental sustainable alternative with much smaller carbon footprint. Moreover, Tasca et al. (2017) found that the abandon of disposable packing and industrial processing in direct distribution can effectively reduce environmental impacts by 20% to 48%. Nevertheless, they also indicated that additional improvements, such as better fertilization practices, are still needed to further improve environmental sustainability of SFSCs.

Therefore, it can be noted that SFSCs can improve environmental sustainability through direct distribution. Meanwhile, a better performance can be achieved through the adoption of environmental-friendly practices, such as improved fertilizations.

Combined pillars of sustainability

While articles focusing on one specific pillar of sustainability are rather limited, many studies in the sample document two or three combined sustainability pillars. A total of 29 papers were identified as illustrated in Table 1. The identified earliest research of this type was conducted by Renting et al. (2003). They explored the development of AFNs within Europe. A major contribution of their work was classifying AFNs into three categories based on proximity. They found that AFNs can satisfy all three pillars of sustainability through improving food quality, mitigating price squeeze, and protecting environment with more eco-friendly production methods.

Another research prior to 2011 was implemented by Smith (2008). He focused on the sustainable features of local food system. More complete benefits were found as improving food quality and security, supporting local economy development, improving livelihoods of farmers, reducing energy consumption, and improving biodiversity of local areas. This research can be regarded as a general summary as it almost covers all the identified sustainable benefits of SFSCs.

The remaining 27 articles were all published after 2011, which corresponds to the increasing research interest in this area. These studies can be classified into four groups based on their linkage to different sets of sustainability pillars, e.g. social and economic, social and environmental, economic and environment, and all three pillars.

A total of 7 articles were found to document the social and economic benefits of SFSCs. Elghannam et al. (2017) and Demartini et al. (2017) focused on the general form of SFSCs, and investigated the contribution of social network and farmers' motivation respectively. According to Elghannam et al. (2017), SFSCs can improve rural development and increase community sense and social awareness. Meanwhile, Demartini et al. (2017) found that farmers within SFSCs can obtain higher profits and closer relations with consumers. Meanwhile, Leiper and Sather (2017) investigated the motivations of both farmers and consumers in participating FMs. Alongside with the increased profits and community sense, they also found that FMs can supply food with improved quality, and provide an enjoyable vending atmosphere to both parties. According to Engelseth (2016), an increased profit and improved food quality can also be obtained through local food hub. In two continuous studies conducted by Sgroi et

al. (2014) and Tudisca et al. (2015) they found direct sales can increase farmers' profits and create new job opportunities. Meanwhile, Deller et al. (2017) found local food systems can improve public health and create sustainable economic growth.

5 articles were identified to mention the social and environmental benefits of SFSCs. While Wills and Arundel (2017) haven't declared the exact sustainable improvements, they confirmed that both social and environmental benefits can be obtained through AFNs. Meanwhile, Farmer et al. (2014) found that the positive influence on environment and food nutrition were the top two factors affecting participations in FMs and CSA. The remaining 3 articles all found SFSCs can create more job opportunities. Moreover, Falguieres et al. (2015) also confirmed that SFSCs can reduce environmental damage and help to mitigate the emigration wave in Spain. The improvement of biodiversity was declared by Rover et al. (2017), while Mundler and Laughrea (2016) found famers within SFSCs tend to adopt environmental production practices and implement educational activities.

Only 1 article was found to focus on the economic and environmental sustainability features of SFSCs. Through a questionnaire survey with 270 consumers, Migliore et al. (2015) assessed the food quality in FMs, and confirmed the positive effects of FMs on both environment and local economy.

Alongside with the two studies published prior to 2011, another 14 articles were also identified to document all three pillars of sustainability. 5 of them focused on the general form of SFSCs. According to Aubert and Enjolras (2015), SFSCs can promote rural development, increase producers' profits and benefit consumers with lower prices and higher quality food products. Moreover, farmers that favor SFSCs were also more likely to adopt environmental-friendly practices. While similar benefits were confirmed by Giampietri et al. (2015), they also addressed the benefits of direct interactions in SFSCs. Meanwhile, Mastronardi et al. (2015) identified the benefits of SFSCs as improvement of biodiversity, creation of more employments, a larger profit and control over farming products. Moreover, Canfora (2016) and Sellitto et al. (2018) both found that SFSCs can reduce transportation costs, and hence improve the environmental sustainability. Meanwhile, there are 4 articles that explored AFNs. Similar to the above literatures, Forssell and Lankoski (2015) found AFNs can increase farmers' profits, improve food quality and security, and adopt eco-friendly production methods, and reduce transportation distance. Meanwhile, Si et al. (2015), Dixon and Richards (2016), and Darolt et al. (2016) reached same findings, that AFNs can facilitate local economic development, create a closer social relationship between producers and consumers, and improve environmental conditions. The remaining 5 articles focused on more specific forms of SFSCs. For example, Connelly et al. (2011) examined the potentials of box scheme and food hub in community transformation. While the exact benefits were not mentioned, they confirmed that both initiatives can create more sustainable food systems, with reduced environmental impacts, improved social just and economic viability. Meanwhile, Milestad et al. (2017) investigated a box scheme in Austria, and reached same findings. Moreover, Berti and Mulligan (2016) examined the sustainable feature of food hub, and found that food hub can improve health, create more job opportunities, increase profits and improve biodiversity. Both Beckie et al. (2012) and Marino et al. (2013) focused on FMs. In addition to the mentioned sustainable benefits, it was also found that producers, especially retired seniors, can gain supplemental income and enjoy the social connections at FMs (Beckie et al., 2012), and consumers shopping there are mainly motived by the fresh and high quality food products (Marino et al., 2013).

4. Conclusions, Limitations and Future Research Agenda

This study provides a systematic review of literature on SFSCs. Using Triple Bottom Line as a theoretical lens, this study also improves our theoretical understanding of the SFSCs and sustainability linkage. In addition, the study clarifies the differences between the various AFN concepts and attempts to define new sustainability values in food supply chains. In addition to the theoretical contributions, this study has strong practical implications. The findings of the study will benefit policy makers and local/regional governments seeking to improve the sustainable livelihood of farmers by having a better understanding of the potential of SFSCs. As a result more supportive policies could be developed to promote SFSC activities to address major issues such as food safety, food transparency and rural employment opportunities.

From the 44 articles, it can be noted that the social benefits of SFSCs are the most widely acknowledged, as only 1 paper hasn't addressed the improvements in social sustainability. Growing consumer preference towards SFSCs due to the improved food quality, trust and security, is hence not surprising. Other commonly identified social benefits of SFSCs include creation of more job opportunities and increasing community sense. While the economic and

environmental benefits are relatively limited, it was still found that SFSCs can mitigate the price squeeze and increase farmers' incomes by regaining the profits shared by intermediates in conventional food supply systems. Moreover, SFSCs can also improve biodiversity, adopt more eco-friendly production methods, and reduce environmental pollutions. From the country's perspective, it is found that despite the 4 articles that did not specify any countries, only 3 articles focused on SFSCs in developing countries. This indicates a lack of empirical evidences from developing countries.

As SFSCs can improve food security and increase farmers' profits, it would hence be beneficial to encourage more studies in the developing countries context. As indicated by Balázs et al. (2016) and Janssen (2010), the scaling up of CSA can be a major challenge as it requires more investments than other forms of SFSCs. Thus, it might be worthy to release some relevant governmental policies to overcome this issue, and facilitate the developments of CSA. Future studies can also focus on understanding and transferring the best SFSCs practices from the EU region to developing nations and improve the livelihood of their rural regions. Understanding the role of government regulations in promoting SFSCs in rural areas can also be part of the future research agenda.

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Biographies

Vikas Kumar is a Professor of Operations and Supply Chain Management at Bristol Business School, University of the West of England (UWE), UK. He holds a PhD degree in Management Studies from Exeter Business School, UK and a Bachelor of Technology (first class distinction) degree in Metallurgy and Material Science engineering from NIFFT, India. He has published more than 170 articles in leading International journals and International conferences including the International Journal of Production Research, International Journal of Production Economics, Journal of Business Research, Expert System with Applications, TQM & Business Excellence, Computers & Industrial Engineering, and Production Planning & Control. He serves on the editorial board of six international journals and is co-founder and Editor of the International Journal of Supply Chain and Operations

Resilience (Inderscience). Professor Kumar has also guest edited special issues for a number of journals including Supply Chain Management: An International Journal, Int. Journal of Lean Six Sigma, Int. Journal of Lean Enterprise Research, Production Planning & Control and Journal of Information Technology. His current research interests include sustainability, supply chain management, operational excellence, process modelling, and service operations.

Men Wang is a PhD student currently pursuing her PhD in Management Studies. Her PhD is focused on investigating the link between short food supply chains and sustainability. She has published papers in international conferences including IEOM 2017 and EurOMA 2018.

Archana Kumari is a PhD student in Economics at Bristol Business School, University of the West of England, UK. She holds a Master's degree in Business Economics from University of Delhi. She has published in leading international journals and conferences. Her research interests are in innovation, sustainability, econometrics and quantitative modelling.

Supalak Akkaranggoon is an Assistant Professor at Khon Kean University in Nong Khai, Thailand. She has been actively pursuing her research in area of sustainability, short food supply chains, wine supply chains and tourism. She has published several papers in reputed international journals and conferences. She has also authored books in Thai.

Jose Arturo Garza-Reyes is a Professor of Operations Management and Head of the Centre for Supply Chain Improvement at the University of Derby, UK. He is actively involved in industrial projects where he combines his knowledge, expertise and industrial experience in operations management to help organisations achieve excellence in their internal functions and supply chains. He has also led and managed international research projects funded by the British Academy, British Council and Mexico's National Council of Science and Technology (CONACYT). As a leading academic, he has published over 100 articles in leading scientific journals, international conferences and four books. Areas of expertise and interest for Professor Garza-Reyes include general aspects of operations and manufacturing management, business excellence, quality improvement, and performance measurement.

Daiane Mülling Neutzling is an Assistant Professor in Business Management at University of Fortaleza in Brazil. She completed her PhD in Business Management in the area of Innovation, Technology and Sustainability from Federal University of Rio Grande do Sul (Brazil) in 2014. She was also a guest PhD student in University of Kassel-Germany in the Supply Chain Management Department from 2012-2013. Her research interest includes sustainable supply chains in food SMEs, short food supply chains and social innovation.