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The Significance of Short Food Supply Chains: Trends and Bottlenecks from the SKIN Thematic Network

Short Food Supply Chains (SFSCs) are central to the alternative food movement discourse. SFSCs are based upon the inter-relations among actors who are directly involved in the production, processing, distribution, and consumption of food products. They depend upon actors mobilising resources of various kinds: skills; knowledge; labour; capital; buildings etc. External factors such as policies and regulations can also encourage the creation of these shorter chains. The development of SFSCs can still be hindered by a range of other factors. Nevertheless, bottlenecks can be overcome via the sharing of information on successful SFSCs through the dissemination of Good Practices between various actors and territories. The Short Supply Chain Knowledge and Innovation (SKIN) project uses the term 'good' rather than 'best' practice to draw attention to the subjective lens through which a practice is ultimately evaluated by an end-user. This paper first outlines the many issues that confront SFSC actors which represent bottlenecks to the adoption of 'Good Practices'. It then documents the Good Practices collected as part of the SKIN project as tangible examples of how SFSCs overcome such challenges. Lessons learnt from project highlights are subsequently assessed in an effort to mitigate and offer solutions to the challenges associated with SFSCs. The paper demonstrates the considerable latent potential inherent to SFSCs. However, in order for the agricultural sector to realise the full promise of short supply chains it must first be conscious of the issues pertinent to their prosperity.

Keywords: short food supply chain, good practice, challenges, trends, barriers, foresight

JEL classifications: Q13, Q18

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Background and rationale

An Alternative Food Network (AFN) depicts a variety of 'post-productivist' market arrangements that offer an alternative to industrial food systems (Renting *et al.*, 2003). Short Food Supply Chains (SFSCs) are central to the alternative food movement discourse. SFSCs can be defined as "a supply chain involving a limited number of economic operators, committed to cooperation, local economic development, and close geographical and social relations between producers, processors and consumers" (EU, 2013). Some 15% of EU farms sell more than half of their produce directly to consumers (IPES, 2019), while only 2% of the total volume of fresh food is sold directly from producers to consumers in Europe (EC, 2015). Evidently, there are a host of challenges and bottlenecks that impede European primary food producers from operating a SFSC. The most prominent bottlenecks can be categorised according to the following themes: societal constraints, deficiencies in skills, a lack of resources, policy issues, and geographical fragmentation (SKIN, 2017a). What follows in the introduction is an account of how each of these themes in turn serves to inhibit SFSCs. Thereafter, in the results section we assess how well these challenges are being overcome and in the discussion, we paint a picture of how, in real terms, these challenges affect SFSCs.

Diverse social processes hinder SFSCs and their wide-ranging socio-economic, ecological and territorial benefits. Societal disparities in the productive and social roles of men and women is one such example and leads to imbalanced power relationships concerning SFSCs (Zirham and Palomba, 2016). In particular, women often lack the resources

that are necessary to get involved in SFSCs (Byrne *et al.*, 2014). They are also most affected by the increased time and effort required in preparing meals using ingredients bought locally (Little *et al.*, 2009). Another societal issue is that the established generation of older farmers are uncomfortable engaging directly with consumers as they have adapted to the conventions of industrial agriculture (Balázs, 2012). Whilst younger farmers are more willing to engage in direct sales, they face difficulties in attaining access to land as prices continue to rise in many Member States (Augère-Granier, 2016). Moreover, there is often a failure to pass on traditional know-how as younger people leave family farming (EIP-AGRI, 2015; Kneafsey *et al.*, 2013).

It can be arduous to reduce the dependence on powerful actors in the supply chain and foster a more direct relationship with consumers. Small suppliers often do not have the bargaining power required to challenge supermarkets in commercial negotiations (EIP-AGRI, 2015). This lack of influence is compounded by a reluctance of some SFSCs to sell to supermarkets due to a perceived loss of control or compromise on principles (EIP-AGRI, 2015). Collaboration is an effective method of overcoming many of the power imbalances in the food chain. Nevertheless, farmers often have narrow social networks and are consequently limited in their access to collaborative opportunities (McElwee, 2006). Building sufficient trust between competing producer groups to form networks of farmers large enough to supply significant and consistent volumes of high-quality differentiated food products is consequently challenging (Kvam and Bjørkhaug, 2015).

In order to operate SFSCs producers require certain resources. Farmers may, for example, be time-poor and consequently unable to undertake product development

(EIP-AGRI, 2015). SFSCs also have to contend with limited monetary resources while financial institutions are often reluctant to invest because of a perceived high level of risk (EIP-AGRI, 2015). This impacts SFSCs in a variety of ways; e.g. farmers may lack the financial resources to buy expertise from outside (Galli and Brunori, 2013). In contrast to more powerful actors in the supply chains SFSC producers have little access to the kind of advanced technologies for harvest and post-harvest practices which can result in efficiency gains. For these reasons SFSCs have not had the same capacity to adopt technologies to keep produce fresh from farm to fork (ECLAC-FAO-IICA, 2015).

Shortcomings in farmer skills have a negative impact on SFSCs (SKIN 2017c). Skills deficiencies encompass technical (know-how), psychosocial (skills) or financial (investments) dimensions and their amelioration becomes challenging in the context of SFSCs (Rucabado-Palomar and Cuéllar-Padilla, 2018). In addition to producing food-stuffs, farmers must become accustomed to roles such as marketer, business strategist, distributor, salesman, etc. Direct selling of goods to consumers offers opportunities to educate them regarding various aspects of the produce. Nevertheless, this will only be of benefit if producers are effective communicators (EIP-AGRI, 2015). Farmers operate in a tightly constrained and regulated environment which can act as a bottleneck to entrepreneurial activity and cooperation among actors (McElwee, 2006). Training is often necessary but peer-to-peer exchanges are not facilitated by public policies (IPES, 2019). Furthermore, mainstream agricultural advisory services primarily support industrial (quality) regimes and conventional forms of marketing (Knickel *et al.*, 2008).

Another significant bottleneck to SFSCs is represented by regulatory and contractual issues. Regulation (EU) No 1305/13 on Pillar 2 of the CAP encourages member states to use SFSCs as a means to promote rural development. However, there are numerous policy blind spots that often convey a patchwork of messages (Smith *et al.*, 2016). For instance, Regulation (EC) 854/04 exempts small farmers selling products directly to consumers from the Hazard Analysis and a Critical Control Point (HACCP) system for food safety. Despite this exemption, not all member states have implemented these allowances. Small primary producers also face exclusion from public procurement contracts and other lucrative markets. Similar to HACCP, local authorities and Member States are often unfamiliar with public procurement allowances with regard to the Green Public Procurement scheme (Ferrando and Lombardi, 2019).

Producers are also faced with the difficulty and expense of gaining certification (Smith *et al.*, 2015). Another major disadvantage is the difficulty faced in defining many aspects of labels: for example, how does one define or accredit “local”? Moreover, is there a single definition that would be applicable across member states (Kneafsey *et al.*, 2013)? Furthermore, EU geographical indication schemes are frequently perceived as too burdensome and expensive for small-scale farmers to access (IPES, 2019). SFSCs often have informal agreements between producers and consumers rather than binding contracts which may consequently add to economic uncertainty (Carbone, 2017). Problematic

issues also arise in contractual agreements between producers and large retailers as contracts typically include rules of production. A considerable concern is product quality, as are standardisation and consistency (Carbone, 2017). There can also be challenges in participating in public food procurement run by local authorities due to fragmented offers and a general lack of collective approaches, factors which make it difficult to compete in a public tender (EC, 2013).

Fragmentation of social and human capital in rural areas can make it difficult for producers to connect with consumers (Berlina *et al.*, 2017). Rural-urban connections are often poor and require the development of new outlets especially in sub/peri-urban areas (Macken-Walsh, 2017). Likewise, assembling customer orders can be cumbersome and may lead to unreliable distribution when conflated with the logistic challenges which prevail in many rural areas (EIP-AGRI, 2015). Geographical fragmentation further affects SFSCs as some locations are too remote for consumers to travel to; ensuring appropriate transport/distribution infrastructure is therefore essential (EC, 2013). The creation of local employment is also hindered by the low population density of some regions which can cause labour shortages (Wittman *et al.*, 2012).

It is worth noting the role of consumers in the context of SFSC as their attitude towards AFNs directly influences the quality of food products as they perceive it (Carzedda *et al.* 2018). It is therefore essential that producers build trust, commitment and loyalty among consumers (Carzedda *et al.* 2018). However, producers are often disadvantaged if their products are not readily available through multifarious retail points (Heron, 2011). Approximately 75% of Europeans live in cities (Eurostat, 2016); their busy lifestyles and long working hours leave little time for food cultivation and preparation (McMichael, 2012). Supermarket culture therefore dominates consumer behaviour with little consideration shown for locally produced food (EIP-AGRI, 2015). Additionally, much of the alternative food movement’s rhetoric reflects the mindset of an affluent and liberal individual which poses a bottleneck to wider engagement (Alkon and McCullen, 2011; Galli and Brunori, 2013).

SKIN

Collectively the issues outlined above highlight the need for measures which empower SFSCs. One such approach is the sharing of information on successful examples which contribute to transferring useful practices between various actors and territories (Karner *et al.*, 2010). The Short Supply Chain Knowledge and Innovation Network (SKIN) is an ambitious EU H2020 project that focuses on the domain of SFSCs and involves 21 partners in 14 countries. SKIN has the ambition of tackling the knowledge fragmentation that separates European farmers, researchers, practitioners and policy makers and citizens related to SFSCs. It aims at stimulating the creation of a collaborative innovation network in different EU agriculture sectors through the improvement of knowledge exchange among farmers, research centres, practitioners and, ultimately, but equally relevant, citizens.

The participative activities and tools developed are explicitly intended to close the research and innovation divide, thus, practitioners' experiences, needs and ideas are fed back to researchers through an intensive dialogue with stakeholders (both web-based and direct, achieved through personal meetings and events organized at regional and national level, but also through international workshops).

The manner in which inclusion takes place can vary significantly depending on structural features of local networks and governance factors (Ramirez *et al.*, 2018). A key element of SKIN is the collection of 'Good Practices' as well as the organization of six different thematic workshops identified as Innovation Challenge Workshops (ICWs). About 50 SFSC stakeholders are invited to each ICW which focuses on a specific topic (Fresh products; Technologies; Regulations; New skills and AKIS; Consumers and Society; Logistic and Industries). SKIN therefore embodies a bottom-up approach where needs are addressed through dialogue and the cooperation of all the actors involved. The Good Practices, available in a public repository (www.shortfoodchain.eu), provide the opportunity to share and disseminate knowledge, experiences and ideas with a view to fostering innovation and overcoming the challenges and bottlenecks outlined above.

Methodology

This study draws on a number of Good Practices drawn from the SKIN project. "Good Practices" refers to strategies, programmes, projects, procedures, management and implementation practices that are:

- Implemented with positive results
- Successful, (innovative), tested and validated: it contributes to the improved performance of an entrepreneurship/farm/organisation and this contribution is recognised
- Transferable: it can be adopted in and adapted to other contexts

The term 'good' rather than 'best' practice was used to draw attention to the subjective lens through which a practice is ultimately evaluated by an end-user (according to perceived relevance, usefulness, and innovativeness, etc.). Hot topics were prescribed as a method of thematically organising Good Practices and refer to key themes applicable to SFSCs. Four modular themes of hot topic were deployed for the exploration of Good Practices; products, institutional/organisational/systems, governance, and sales. Subcategories of hot topics were identified within each of the four themes (Table 1).

The collection of Good Practices relied heavily on researcher experience and observation. Nevertheless, the selection of Good Practices was based upon a particular set of characteristics which were derived from the relevant literature. Characteristics conducive to Good Practice included: multi-actor dynamics; having a multiplier effect; practicality; sustainability; reconnection and relationships; value and values; and proximity. Project partners identified example of Good Practice pertaining to SFSCs primarily from their region and followed the same methodological guidelines for selection. First, a common template for describing the Good

Practice cases was developed (SKIN, 2017b). The structure of the template makes the repository of Good Practices easier for end-users to search and also makes thematic trends easy to identify. In the next phase each of the partners carefully selected the possible Good Practice cases using the characteristics outlined. The cases were chosen according to the criterion that each case should delineate a single Good Practice from a SFSC. Information was gathered using a variety of tools such as interviews, observational research, and document analysis gathered through desk research. All the empirical data was gathered, analysed and structured according to the specified predefined themes (products, institutional/organisational/systems, governance, and sales).

The study analyses 'trends and patterns' in the Good Practices collected. The repository of Good Practices, which is for the use of end-users, is designed to enable end-users to search for information by a range of search criteria, such as Hot Topics, sector, 'needs' etc. through their own lens. The paper, therefore, does not suggest that trends in the particular collection of SKIN Good Practices are indicative of areas of greater or lesser potential, but rather has sought to present an illustration of the content of a repository, which will be differently interacted with and interpreted by different users.

Results

The results are based upon findings from the collection of Good Practices and analyses thereafter (SKIN, 2017a). It is important to note that the collection of Good Practices is not statistically representative and nor were they intended to be. They were collected to highlight successful 'shining' examples of SFSCs in a European context. In total 105 Good Practices were collected in Phase 1 of the project and are analysed. The Good Practices identified are unlikely to be exhaustive, nor statistically representative of the number or geographical distribution of Good Practices in SFSCs. Nevertheless, they provide a representation of a diversity of SFSC contexts.

Good Practices by Country

The project partners primarily collected Good Practices from SFSCs within their own countries. Nonetheless, there were some instances of Good Practices identified in other nations such as the Ukraine and the USA. There were also examples of SFSCs collected by one project partner in another partner's region; for instance, in Ireland a Spanish SFSC that supplies a national retailer was profiled. In total 10 SFSCs were studied from Austria, 9 from Belgium, 7 from Czech Republic, 5 from Denmark, 6 from France, 9 from Hungary, 10 from Ireland, 8 from Italy, 5 from Poland, 5 from Serbia, 2 from Slovakia, 7 from Spain, 7 from The Netherlands, 9 from the UK, 5 from the Ukraine and 1 from the USA (Figure 1).

Good Practices by Hot Topic

Within these Good Practices, Hot Topics relating to the 'Product' thematic module were most prevalent with 566

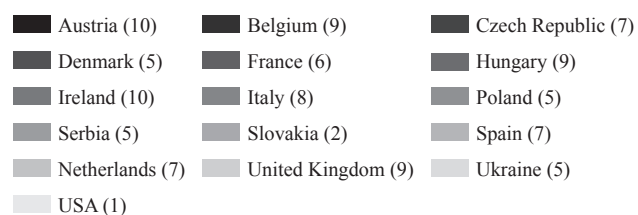
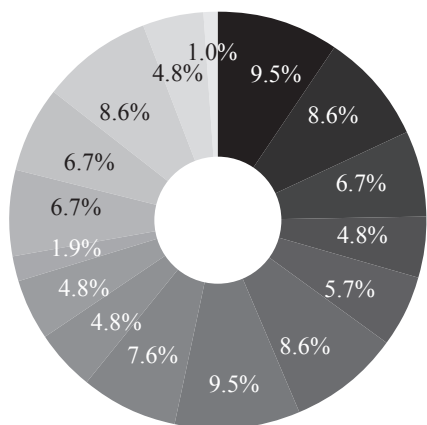


Figure 1: Geographical distribution of Good Practices.

Source: own composition

examples, followed by ‘Sales’, ‘Organisational/Institutional/System’, and ‘Governance’ with 243, 180, and 135 respective examples collected. Here, a total 1124 Hot Topics (micro categories) were identified. It is worth noting that Good Practices could relate to more than one Hot Topic, and all Hot Topics to which the Good Practices relate are listed below. Hence, the 105 Good Practices were relevant to 1124 Hot Topics (i.e. an average of approx. 5 Hot Topics were identified as relevant to each Good Practice).

The most represented Hot Topic elicited from the 105 Good Practices collected was ‘contractual agreements between producers/between chain partners’ with 59 instances documented. ‘Ways in which value is added to the products’, ‘logistics and distribution’ and ‘reliable distribution’ were all also highly represented throughout.

Good Practices: product types

Dairy products were the most frequently represented category of product from the Good Practices studied (Figure 2). The majority of dairy products featured were cheese (27), followed by milk (19). Meat products also frequently featured: mostly beef (22) and pork (17). Conversely, poultry meat infrequently featured but there were seven examples of eggs. Fruit and vegetables featured prevalently; fish featured in 14; and there were 11 cereals represented. Alcoholic beverages included wine (8) and beer (3). Honey and spices (saffron) were less ubiquitous but represented an interesting deviation from the more familiar product types associated with SFSCs. The category of ‘other’ represents a SFSC that creates syrups, elixirs, tinctures and bitters for beverages and another which produces salt products.

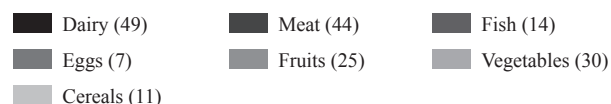
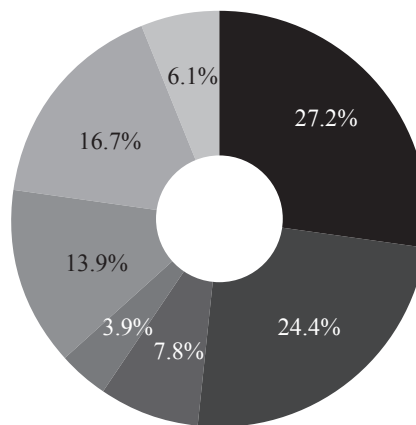


Figure 2: Food products featured in the collection of Good Practices.

Source: own composition

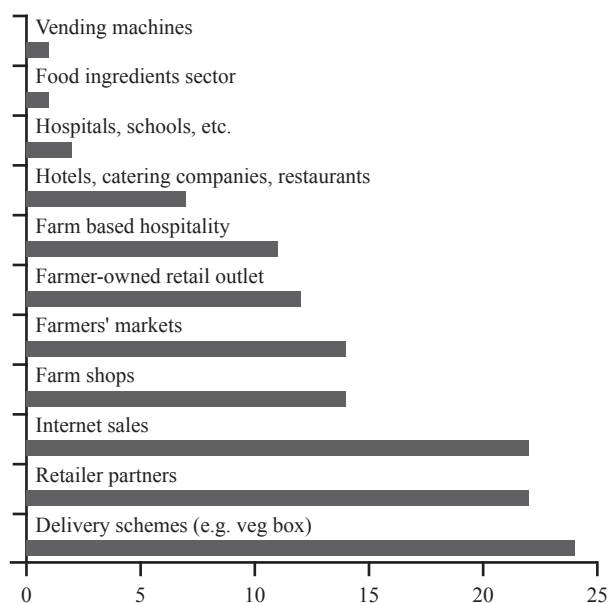


Figure 3: The quantity of Points of Sale (POS) related to the Good Practices collected. Red indicates on-farm POS, whereas blue represents off-farm POS.

Source: own composition

Points of sale: trends in Good Practices

All 105 Good Practices involved SFSCs with off-farm sales, though 25 of these include on-farms sales (Figure 3). On-farm sales were comprised almost equally between farm shops/farm collection, and through farm-based hospitality. Of the 25 Good Practices that sold produce on-farm, only 9 had exclusive on-farm points of sale. The most popular method of off-farm sales was delivery schemes, followed closely by internet sales and sales to retailers. Other off-farm sale pathways such as farmers markets and farmer owned

Table 1: Analysis of *Good Practices* according to *Hot Topic*.

<i>Hot Topic Parent Category</i>	<i>Subcategory of Parent Hot Topic</i>	<i>Hot Topic</i>	<i>No. Good Practices relating to Hot Topic</i>		
Products	Valorisation	Novel approach to product development/multi-actor, co-design approach	33		
		Novel product or product range	25		
		Ways in which value is added to the products	49		
	Branding & Labelling	Innovative way of communication e.g. novel labelling		37	
		Quality Value	Gourmet, superior taste, different taste	19	
	Nutritional value		19		
	Freshness		29		
	Healthiness		15		
	Social Sustainability	Connection between producers and consumers		45	
		Trust, sense of community		22	
		Community pride & animation		3	
		Community education		17	
		Recognition of producers		18	
		Consumer empowerment		2	
		Well-being		11	
	Economic Sustainability	Profiling gender and age data of those involved in food firms/farms/SFSCs		0	
		Profitability		12	
		Generating local employment		28	
		Reduced economic uncertainties		12	
		Training and coaching initiatives		9	
		Synergies with other sectors e.g. tourism		16	
		Markets/events/initiative for multiple producers locally		7	
		Preservation and valorisation of small farms		12	
		Environmental Sustainability	GHG emissions		21
			Energy use and carbon footprint		22
	Ecological soundness of production methods		42		
	Food Miles		23		
Food Waste			18		
Learning & Empowerment	Learning transfer between actors		17		
	Organisational/ Institutional/ System	Networking along the supply chain and in the region		23	
		Reduction in dependence of powerful actors in the chain		24	
		Process Innovations	Achievement of efficiencies through collaboration		37
			Logistics and distribution		56
			Management of small product quantities		23
Governance	Internal	Decision-making structures	41		
		Contractual agreements between producers/ between chain partners	59		
		Group Spirit	24		
		Mediator/facilitator	8		
	External	Enabling government policies and regulatory frameworks	3		
Sales	Variety	Collaborative hubs	26		
		Effective ordering systems	25		
	Efficiency	Online shop	19		
		Reliable distribution	56		
		Proximity (spatial)	17		
		Proximity (spatially extended)	6		
	Connection	Social media		28	
		Meet the producer' brokerage events		14	
		Collaborative hubs		22	
		Reconnection and relationships		30	

Source: own composition

retail outlets were also well represented. On the other hand, there were few cases of off-farm sales to hotels/caterers/restaurants and to hospitals or schools. The use of vending machines as an avenue for off-farm sales was an interesting example of an innovative measure to increase food access. Most of the short chains are not involved in cooperation explicitly but there were 19 cases of what could be categorised as collaborative initiatives between producers.

Discussion and Conclusions

Good Practices were disseminated by the SKIN project to create the basis for solidarity and accelerated food system transformations. The SKIN project provided a selection of innovative practices in an effort to share approaches that work so that small food producers can identify what is appropriate for their unique circumstances. SKIN aims to stimulate innovation in the SFSC through the sharing of the Good Practices collected as well as other observations made throughout the lifecycle of the project. The discussion that follows offers overarching insights and trends related to SFSCs from project findings that are applicable to the Good Practices collected.

Conducting on-site visits to Good Practice farms in the context of the SKIN project; it was evident that even prize-winning farms cannot be excellent in everything they do (SKIN 2017c). During visits to SFSCs, the project consortium learned of the difficulties farmers face with regard to the regulation of their activities. Most notably, this was in terms of restrictions on what they can sell in their on-farm shops, the burden of compliance with food hygiene laws and even the number of hours or days on which they could operate the sales and marketing side of their business. The reality for many producers is that if they want to improve their margins by selling direct to consumers, they face a variety of constraints which limit the extent of their ability to sell, and provided added value services such as on-farm restaurants (SKIN 2017c).

Evidently, one of the producers ran an on-farm restaurant, which proved to be very popular in summer-time. It could accommodate over 100 people and occupied a significant area of real estate. Regulations require that the farmer limit its activities to two weeks a year, meaning that it never fully benefits from opportunities to earn extra revenue during holiday periods where people were more able to travel to combine a farm-visit with a restaurant experience. The farmer was obliged to see running the restaurant as a marketing expense, rather than a revenue opportunity.

Over the course of the project lifecycle the SKIN consortium visited a number of on-farm shops. During these excursions it was observed that despite the excellent produce and professional displays, the shops were often hard to reach, open for only a limited number of hours a week, arguably at times that are not very consumer-friendly and offered a limited range of produce. The overall impression is that the sales activity would not be accessible to a significant number of customers, lacked the convenience that the majority of modern consumers require and given the limited range of product available in the shop, provided limited incentive for

shoppers take spend extra time and fuel to make the journey out of town to shop on-farm.

Many of the producers visited had professionally made glossy brochures, rudimentary web-sites and arrange of prizes and certificates prominently displayed in the shop. Nevertheless, it was striking that the marketing material was very “old-school” in terms of its imagery. In most cases, it was found to be based on nostalgia dominated by variations on the husband, wife and their children running through a meadow with their dog. There is no doubt that such marketing material will resonate with a certain clientele, but it seems very much out of touch with the wider world of retail and the needs of a modern consumer.

Following-up on the site visits SKIN partners examined the on-line activities of these farms and their efforts advertising or selling online sales. However, these efforts are often ineffective. The producers for the most part said that they achieved very little if any sales on-line and they were unable to say if their web-site has visitors or if people came to their shop based on the web-experience.

Many services already exist to support agricultural producers. Typical farm advisory or extension services focus on providing support in the adoption and improvement of sustainable-efficient production. Many also provide support to farm businesses in dealing with administration related to the CAP payment system. However, the over-riding impression is that there is a deficiency in the range of services supporting the basic business development of small farmers, especially in the area of sales, marketing and distribution.

The above made observations are anecdotal but they are significant in that they are made with respect to farms that are visited on the basis that they represent Good Practice. The reality is that good practice in production does not always go hand in hand with good practice in managing a business that is capable of growth based on good performance in key business functions such as sales, marketing and distribution. Farms that were very successful in sales were the exception. The best example observed over the course of the SKIN project was the case of Appelen Roes, a Belgian producer of apples, pears and derived products. This case is featured on the SKIN website. It is notable for detailing the transformation of a traditional producer, selling to intermediaries with low margins, no market power and limited options for growth, into a very successful direct-to-consumer business with three shops, based on a modern and constantly evolving approach to sales and marketing. The manager of Appelen Roes was categorical in his assessment of what it takes to be good in sales and marketing, and pointed out that it requires considerable effort and a set of skills that are very different from those needed to be a good producer. Although the case of Appelen Roes provides proof that it is possible for a producer to considerably increase revenues by selling directly to customers, it calls into question the number of small farms that can reasonably hope to go down this route.

Farms run by open-minded entrepreneurial families with adult children could do this, if some of those involved were to dedicate themselves to developing strong capabilities in modern methods of sales, marketing and distribution. The approach of Appelen Roes for example involves ‘experience

marketing' with on-farm events attracting hundreds of thousands of people every year. It involves a school outreach program that effectively reminds mothers of the merit of fruit in the daily diet of a child. It also makes very good use of social media and maintains a colourful and dynamic web-site that is regularly updated with relevant content.

Not all producers will manage to make this transition, and should they even try, it is not at all obvious where they can go or what they should do, to learn the skills they need to succeed. For the vast majority of producers' other approaches will be required. The SKIN Foresight study provided many clues as to what form these might take (SKIN, 2017c). In particular it drew upon the recent waves of innovation that are disrupting retail, transport and delivery in many parts of the world. These disruptions are being driven by the emergence of new platform-based businesses such as Deliveroo, Uber Eats and Amazon Fresh. The SKIN survey of Good Practice also uncovered cases which appear to expand the options available to farmers interested in direct sales.

These SFSC visits included innovative point-of-sale technologies such as vending machines and kiosks. One of the Kiosks we visited in Austria used the honour system. It was unmanned, product was placed on shelves and priced, and customers could come at any time of the day or night to buy (assuming there was produce available). They were trusted to pay the correct amount and should they need change, they simply wrote this into a book, on the understanding that they would pay the balance at a later date. This worked surprisingly well and provided a sales channel at reasonable cost due to the lack of overhead in terms of labour and technology to run the shop. Another entrepreneur used a similar system, but in their case the product was enclosed in a locked transparent box that would open as soon as the customer paid for the product using an automated payment system. This approach is clearly more expensive due to the cost of technology but the entrepreneur was very encouraged and expected to break even on his investment in less than one year. Simple vending machines, selling products such as fresh milk and bread outside of hours were also observed. In one case the milk vendor targeted the transition to glass, and accommodated people who brought their own bottles. The system filled bottles instead of selling cartons and managed to tap into awareness of a trending topic of plastic pollution and the waste associated with excessive packaging.

It is hard at this stage to gauge the overall success of these systems. Many new ideas enjoy an early boost due to the novelty effect. For new POS systems the big question is how to keep them filled with produce. A consumer might try for novelty and develop the habit of buying those products via that channel, but as soon as they find themselves going to a kiosk with no product available to buy, they will quickly lose their enthusiasm. This is a double failure from the producers' perspective in that they lose out on sales they should have made but missed, and disappoint their customers who might be tempted to bad-mouth them, eroding the good will created by the convenience of a novel off-farm sales channel.

The success of the novel POS, and the extent to which it helps to boost the revenues of producers will depend on how well the work of distribution and logistics is handled. This is not easy for perishable products, but on the other hand

lots of progress has been made in the area of home delivery for both groceries and hot meals. The focus of effort for big retailers has been in solving what is known as the 'last mile' problem in delivery. Farmers will also have to solve the 'first mile' distribution problem, how to get small batches of product from a number of farms, to a central depot from which their product can be dispatched to consumers. All kinds of solutions are being tested out right now, including solutions based on the experience of companies such as Amazon, Uber and dedicated meal delivery system such as Deliveroo.

These subjects are far too vast and dynamic to adequately treat in this paper. They will be treated elsewhere. The overall message is one of hope for short food supply chains, in that there are many lessons to be learned from the range of case studies covered in the SKIN project and many to be learned from the ongoing disruption of the retail sector. These point to new and innovative ideas for the systems that may prove decisive in boosting the revenues of producers in short food supply chains.

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