Quantitative assessment of economic, social and environmental sustainability of short food supply chains and impact on rural territories

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Strengthening European Food Chain Sustainability by Quality and Procurement Policy

Deliverable 7.2:

QUANTITATIVE ASSESSMENT OF ECONOMIC, SOCIAL AND ENVIRONMENTAL SUSTAINABILITY OF SHORT FOOD SUPPLY CHAINS AND IMPACT ON RURAL TERRITORIES

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WP 7.2. Final Report

on Sustainability of Short Food Supply Chains

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EXECUTIVE SUMMARY

The concept of Sustainable Development is currently setting the direction of socio-economic developments around the world. Awareness of threats related to the intensive exploitation of natural resources and the natural environment, combined with an ethical responsibility for the future generations, should become a signpost for setting out the direction and ways of conducting business activities. The broadly understood wealth of the societies and possibility of satisfying material needs of the individuals cannot neglect importance of the natural environment and social components of the sustainability paradigm.

Production and distribution of food is a hotly debated issue in the context of sustainable development concept. The most recent developments in food markets show a renaissance of traditional, direct ways of delivering food that nowadays are often linked to different production systems. It is widely believed, that Short Food Supply Chains support to a large extent sustainable and healthy farming methods which address environmental and ethical problems in food systems. A commonly shared view is, that they provide producers a greater value added, contribute to local development and are more environmentally friendly. However, to date, very little quantitative evidence exists on the impacts of various types of food supply chains. **In this study an attempt is made to quantify the economic, social and environmental sustainability of short food supply chains based on empirical research.**

SFSCs cover **a whole range of different schemes and initiatives** in the value chain which can be seen as an alternative type of governance and organizational structure to the conventional ways of food distribution. There are numerous initiatives arising with the goal of occupying market niches and/or establishing specific relations with groups of customers. This suggests, that the social factor is gaining more and more importance driving consumers choices, however still conventional supply chains have a strong position on the market.

Geographic proximity and organizational arrangements are the most commonly used criteria for classification of supply chains. On the basis of these criteria, 10 types of supply chains (including 6 – short and 4 long types of chains) have been selected in the study. Sustainability assessment has been carried out basing on the set of economic, social and environmental indicators estimated within case studies conducted in seven countries: France, Hungary, Italy, Norway, Poland, United Kingdom and Vietnam. The sample consisted of 208 food producers, mainly farmers, participating in 486 – short and long food chains.

The initial observation in our research was that individual producers participate simultaneously in several, short and long chains. This creates another dimension for **hybridity** – apart of the combination of production methods and distribution paths, producers participate in a mix of supply chains. It leads to the conclusion, that different supply chains may coexist on the market, providing options that may benefit producers, but also creating possibility of choosing from a complex market offer that satisfies different consumers expectations and needs.

Covering the whole complexity of the food supply chain for the quantitative assessments within the task 7.2. had to be restricted to the producer end of the supply chain, while customers perception and motivations were examined in the qualitative way within the task 7.1.

Our study confirmed several statements that can be found in the literature that participation in **short food supply chains is beneficial for producers in the economic dimension**. Short chains provide a relatively high Price Premium since they allow to capture a large proportion of margin, otherwise

realized by different intermediaries. This conclusion applies to all short distribution channels, product categories as well as countries.

On average participation in SFSCs resulted also in much higher Chain Value Added, although after deducting distribution costs, some chains (e.g. sales on farmers markets) were less attractive from the economic perspective. This raises the question whether producers selling through short chains are adequately compensated for the time invested in more laborious distribution. The answer is rather positive, especially in the light of a favourable for short chains self-evaluation of different chains producers participated in.

Self-evaluation of chains and self-assessment of the bargaining power of producers in the chains was a part of the social sustainability assessment. **Position of producers in the long chains is noticeably assessed as worse compared to the short chains**. Regarding self-evaluation the score for short chains is only marginally superior to long chains which suggests that SFSC don't perform much better from the producers perspective. There are some possible explanations of this phenomenon. First is, that producers select different chains in order to mitigate risks, thus they accept some of the potential weaknesses of the optional chains. Second reason could be, that within 5 components of the self-evaluation two favour long chains – greater "possibility of long term contracts" and "possibility of larger quantities sold" through long chains, while variables such as "good prices", "assured payments" and overall evaluation "I like it" worked in favour of short chains. Quite clearly short chains are for many producers a preferred option, however, especially for larger scale producers, there are also advantages of long chains.

Regarding other social sustainability indicators the results seem to confirm, that **short supply chains generate additional employment,** despite the fact, that our analyses were restricted to distribution only. **SFSCs seem to promote gender balance** due to greater employment of women in the preparation of sales and sales activities in contrast to long chains, where the role of women in distribution is rather limited. This implies, taking into account both economic and social attributes of the short chains, that they might be particularly important for small and medium scale producers who may have often a difficulty accessing long, conventional food chains (Gorton et al., 2014), especially such that offer better prices or other trading arrangement, but demand large quantities of produce to be delivered.

Turning to the environmental dimension, our study results indicate, that **SFSCs generate greater environmental externalities when we focus on Carbon Footprint**, which seem to be the most adequate to address distribution oriented environmental concerns.

Short food chains where customers come to a production place (farm) independently of each other (*pick your own, on-farm sales*) incur costs of transport and opportunity cost of their time. Home deliveries, if the farmer delivers produce to customers - provide potentially some saving in overall travel distance as round trips can be organised. In a result there would be a massive reduction in overall time taken by customers to come to collect it. In this case the producer would incur investment and running costs in transportation, however these costs normally would be transferred in price to the consumer. This makes short supply chains beneficial for producers from the economic perspective. On the other hand, consumer accepts higher purchase prices if willing to pay for convenience and specific attributes of products.

The aggregate transportation effort characteristic for short chains, especially if considering that customers would usually acquire only a few items in their overall diet, is **not efficient from the**

environmental sustainability perspective. Our findings confirm, that as stated by (Galli and Brunori, 2013), different dimensions of sustainability may not necessarily be complementary, so a trade-off between different priorities and conflicting interests may exist.

In view of the changes that have occurred in the retail sector in some European countries (eg. UK, Norway) that resulted in a domination of hypermarket and discount chains in the food market. The process of strengthening their position on the market is currently on-going in some other countries (e.g. in Poland). Thus, it might be expected that the importance of traditionally strong short distribution channels such as *on-farm sales* or traditional *local farmers' markets* will have less significance in the structure of sales channels, with the exception of modern initiatives such as "Sunday" or "breakfast" markets or various innovative forms of purchasing food by different social groups of consumers closely linked with food producers. Observations from different countries indicate at the same time that, thanks to the development of IT, online sales will grow, and with the improving welfare of large groups of societies various initiatives referring to social proximity concepts will develop.

1. INTRODUCTION

1.1. AIM OF WP7:

The main objective of the Work Package 7 – "Evaluation of the Impact of Short Food Supply Chains (SFSC) - was **to better understand the impact of Short Food Supply Chain (SFSC) on rural territories by evaluating concrete case-studies in six European countries and identifying factors that support or deter the development of SFSC**". This involves both understanding the role, motivations, attitudes and practices of actors already engaged in different types of SFSC and evaluating the impact of, and interrelation between, the chosen food chains and the social, environmental and economic dimensions, in given territories. The specific objectives of the WP were:

- 7.1 To provide an assessment of motivations, practices and organizational development of SFSC by collecting, analysing and comparing qualitative data from 12 SFSC case studies divided amongst six selected countries;
- 7.2 To provide a quantitative assessment of economic, environmental and social impacts of SFSCs.

In the current report we present the results of the task 7.2, which focuses on assessing the sustainability of Short Food Supply Chains and their impacts on local economies.

1.2. SUSTAINABILITY OF SFSC IN PUBLIC AND SCIENTIFIC DEBATE

A farmer should live as though he were going to die tomorrow, but he should farm as though he was going to live forever (East Anglia proverb, G.E. Evans, 1996, Conditions of Sustainable Agriculture).

The concept of Sustainable Development is currently setting the direction of socio-economic developments around the world. This is because every human activity inevitably interferes with nature. Thus, considering a world-wide tendency to increase the rate of economic growth it creates, with existing technology, a direct threat to the quality of the natural environment as mostly declining amounts of natural resources are exploited more intensively and often beyond their restorative limits resulting in an irreversible loss. It raises legitimate concerns about the well-being of future generations, as referred to by the definition of Sustainable Development of the Brundtland Commission (World Commission on Environment and Development, 1987). Referring to the motto for this chapter, it is worth mentioning Stern (2005) who - in a report on climate change to the UK Government - expresses the same sentiment by arguing for a social discount rate of zero or - in other words - the anticipated welfare of future generations is just as important as our own, so we should not discount the future effects of actions or no actions taken now. There is an urgency to all of this despite the narrative might come across as being just about the whims of well-off western consumers. The future increasingly depends on changes made now.

Awareness of the threats related to the intensive exploitation of natural resources and the natural environment, combined with an ethical responsibility for the future generations, should become a signpost for setting out the direction and ways of conducting business activities. The same urgency also applies to changes in the behavior of all individuals in the global society. The challenges to the political system are well illustrated by the difficulties of getting an agreement to cut greenhouse gas emissions by a significant number of the nations which signed the Paris (and subsequent

agreements) within the UN framework convention on climate change. At the level of the individual, many action slogans are either ill thought out (e.g., cutting food miles, reducing the most resource-intensive components of diets while ignoring the effect it has on the caloric intake) or are not believed. Finding development paths of the way we live, which do not compromise the needs of the present generation, but which also assure at least the current level of "quality of life" for future generations, including quality and wealth of the natural environment is a huge, urgent and long-term global task.

It should be emphasized here that "sustainability" in the general sense of the concept refers not only to the environmental dimension of the Sustainable Development paradigm. The broadly understood wealth of the individual - his place in society, the development of human capital, as well as the ability to satisfy material needs - has an equal importance in the sustainability paradigm.

In economic policy, the assessment of the effects of all decisions taken at the national level or in individual enterprises and households from the sustainability perspective, using the methods developed in cost-benefit analysis, is becoming a standard. It is imperative that effects that are not costed or valued by market mechanisms are included in such calculations. Reconciling the interests of different stakeholders (farmers, distributors and consumers) in assessing the sustainability of Short Food Supply Chains depends on up to date scientific and policy debates about SFSCs potential for economic, environmental and social costs and benefits.

The sustainability of the SFSC is a hotly debated issue, especially in the context of comparisons with long, conventional chains. According to Sisco, Blythe Chorn and Pruzan-Jorgensen (2010) a sustainable supply chain is broadly understood as one which "*manages environmental, social and economic impacts and works for good governance throughout the life cycle of products and services. The goal of a sustainable supply chain is to create, protect and grow long-term value for all stakeholders involved in the presence of products and services on the market*". It is equally important that the share out of the aggregate value added by SFSCs is acceptable as fair by all stakeholders which can lead to regulation, and measures such as fines and taxes to coerce people or subsidies, education and information to encourage behavioural change.

Assessing sustainability of supply chains is undoubtedly a "challenging task". The Foodlinks report (2013), considers a variety of food production and distribution systems and the complexity of relations with different sustainability pillars, including both complementary and competing interactions between these pillars. (Majewski, 2008, Leat et al, 2011 after Foodlinks report).

"*SFSCs can represent traditional and/or alternative ways of producing, distributing, retailing, and buying food*" (Foodlinks 2013). Most often they are part of market niches created for specific production systems or products characteristics (e.g. organic, "healthy" food, traditional or regional etc.), selected groups of consumers (e.g. urban food cooperatives) or unique marketing and retailing approaches (e.g. box schemes). Taking a geographic coverage criterion short chains may be associated with "local food chains" in which production and sales are restricted to local areas, but this may increasingly not be the case as food traceability systems are developed and provenance is increasingly valued.

The importance of the issues related to Food Supply Chains can be illustrated by a growing number of research projects and publications discussing implications of various food supply chains "*such as the fulfilment of human needs, provision of employment and economic growth, and impacts on the*

natural environment" (Yakovieva, 2009). An extensive review of publications on the subject has been presented by Kneafsey et al. (2013).

There is a common view presented in many publications that SFSCs are beneficial for producers as they can improve farm incomes but also to contribute to local economic development (EIP_AGRI 2015). Economic benefits for consumers suggested by some authors may be considered less convincing such as health effects, both positive and negative of certain foods produced in different ways.

Economic sustainability of SFSCs covers issues such as the competitiveness and viability of food chains and their actors, the efficient use of resources, contributions to the community in terms of job creation and income. It is noticeable that mostly small and medium-sized enterprises are involved in SFSC. This is because they are often less competitive in conventional chains due to their higher production costs, often due to the lack of economies of scale or different organization of production processes and higher prices. If it is possible to provide fair market access by regulation, traceability and labelling, SFSC represents a solution that may increase the profitability of small and medium sized farms or processing companies. SFSCs are often devised as collective economic initiatives in response to deteriorating market conditions, thereby "shortening" and strengthening links between local businesses and mobilizing local resources (Schermer, et al 2008). SFSC can thus contribute to the revival of the local rural economy (Rosset 1999, Peters 2012).

According to Kneafsey et al (2013) "*the majority of papers briefly reported that SFSCs were 'beneficial' for the environment but then did not provide any further qualitative or quantitative evidence to substantiate the claims made*". Some authors state, however, that because of smaller scale (volumes) the environmental performance of short chains may not be so positive. One of the goals for the creation and operation of short supply chains is to shorten the distance that food has to travel to the consumer, which reduces so called food miles. The concept of "food miles" is now seen as an unrepresentative measure of the environmental sustainability of food supply systems (Edwards-Jones, 2010) and a more informative Carbon Footprint is commonly used for assessing Greenhouse Gases emissions from production and transportation processes. This latter approach is more capable to net out additional logistical costs by any savings in production costs gained through trade or more suitable (energy efficient) production conditions which coincidently may capture additional out of season price benefits.

Regarding the social sustainability dimension there is a strong evidence of growing social acceptance of short food supply chains. Social sustainability of SFSCs refers to their contribution to equity or fairness among food chain actors and the viability of local communities. It is much rooted in trust, fair and personal relations, solidarity and shared values between consumers and producers who are more likely to meet and have a first-hand experience of what food is bought who is buying, what are consumers' preferences. Consumers may learn how the food they buy was produced built a trust and confidence based on a good relationship with the producer. It could be easier to establish fairness in direct relationships between producers and consumers by means of more individual interaction than is the case with impersonal large supermarkets. To conscious consumers it is easier to understand the true cost (and perhaps observe externalities) of food production, making it easier to pay a producer that is known and trusted. The role of middlemen in adding value may also be more easily recognized in an observable short chain. and thus, their receipt of a fair return may be more likely (Renting et al 2003). SFSC may also contribute to the revitalization of local

communities. The value and importance of the product and its origin gives rise to a sense of pride, social cohesion and belonging to a certain area and community (Peters 2012).

SFSC are claimed to provide producers with a higher share of the value added, contribute to local development, have lower food miles and carbon Footprints. However, to date, very little quantitative evidence exists on the impacts of various types of food supply chains. IPTS and Kneafsey et al. (2013) summarizing recent research on SFSCs **acknowledge, that there is a need for more rigorous, quantitative assessment of socio-economic and environmental impacts of SFSC.** Of the studies which do present supporting evidence, most of the evidence is qualitative, and based on perceptions and experiences.

In this study an attempt is made to quantify the sustainability of short food supply chains based on empirical research. It is important to emphasize, that conclusions about sustainability of SFSCs greatly depend on the definitions of the short supply chains and the scope (length) of the chain that may include the production phase as well as transportation and food consumption stages. This study is confined to the distributional stages of food chains.

1.3. TYPES OF SFSC

Historically, traditional food deliveries based on direct supplies or sales in physical market places were the forerunner of today's short food supply chains. Markets through the centuries acted as links between cities and the countryside and became "strategic outlets" by the 18th century, whilst continuing to maintain an important social function (Yunna et al., 2016). As Yunna states, "their role naturally decreased with the industrialization of Europe and the development of long-distance transportation, urbanization and technical advances" (Yunna et al., 2016). These processes resulted with the development of long, logistically sophisticated mass distribution systems that have dominated most industries, including, although probably to a lesser extent, that of food supply.

The most recent developments in food markets show a renaissance of traditional, direct ways of delivering food that nowadays are often linked to different production systems. Short Food Supply Chains are often the initial means to support sustainable and healthy farming methods which address environmental and ethical problems in food systems. The building of new and 'alternative' food chains often challenge the 'conventional' food system as being unsustainable, unethical and static. (EIP-AGRI 2015). Yakovieva et al. (2009) adopt a definition "**of the food supply chain that comprises the following stages: agricultural production, food processing, food wholesaling, food retailing and food catering".** This, definition includes production systems as an important part of the sustainability of SFSCs along with interactions with end uses such as catering and consumption patterns.

Geographical proximity is a common way of defining the "shortness" of food supply chains. Another similar perception is of "local food systems" in which food is produced no matter by which production method and is consumed locally within a relatively small area. Local chains are still functioning although it should be noted that they may lose importance. In the Polish case they are facing growing competition from discount stores offering relatively good quality food. Continued migration also results in more food consumers moving further away from places where the food (fresh or raw materials for processing) is produced.

Combining different attributes of production methods (mainly organic) with the various ways consumers are involved in organizing food supplies (urban cooperatives, box schemes etc.) demonstrate how SFSCs in new ways can challenge both conventional production methods and

distribution systems. Foodlinks (2013) presents examples of such concepts such as: "'Alternative food chains', after (Ilbery & Maye, 2005), 'Alternative food networks' after (Goodman & Goodman, 2009) or 'Sustainable food chains' after (Roep & Wiskerke, 2006). Some newer types of food chains may also be perceived as a means of re-establishing social relationships between producers and consumers (social groups) (Foodlinks 2013 after Lamine, 2005; Wittman et al, 20012).

Despite all the above nuances for defining short food supply chains, basically two criteria are used in the literature: **distance** between the point of production and the point of sale, which is considered the main criterion for distinguishing local food chains (LFC), and the **number of intermediaries** in the food chain between the producer of raw materials (farmer) and the end consumer.

Kneafsey et al. (2013), understand Short Food Supply Chain in their study as "*characterized by "(...) a minimal number of intermediaries between the producer and the consumer; they include many types of organization schemes, from community-supported agriculture (where consumers support producers), on-farm direct sales, sales by farmers at the place of consumption (farmers' markets, delivery schemes, etc.) or sales to collective catering systems (schools, hospitals, etc.)*".

Some authors, in addition to proximity and number of intermediaries, emphasize the closeness of the relationship between producers and consumers along with other specific social aspects. This makes the actual meaning of SFSC different for various social groups, institutions or regional contexts. It is based on certain characteristics and associated values of farming systems and consequently is often assumed as a means for restoring the authenticity of production and consumption (Wittman and al., 2012) An example of the incorporation of social aspects into the definition of an SFSC is the proposition of the European Rural Development Regulation (1305/2013) where "a 'short supply chain' means a supply chain has a limited number of economic operators, committed to co-operation, local economic development, and close geographical and social relations between producers, processors and consumers. This regulation also stresses the importance of social relationships between the people involved in the food chain in defining the quality of collaboration in the operation of SFCs. A Commission delegated regulation (11.03.2014) stipulates that support for the establishment and development of short supply chains shall cover only supply chains involving no more than one intermediary between farmer and consumer (Article 11). (after EIP-AGRI 2015).

Marsden et al. (2000) in an important insight for the adoption of information technology noted that "*it is not the number of times a product is handled or the distance over which it is ultimately transported which is necessarily critical, but the fact that the product reaches the consumer embedded with information*" Marsden et al 2000).

Marsden and later Renting (2003) proposed three main types of SFCs, which create some form of "relationship" between consumer and producer of food. Based on the number of intermediaries, organizational arrangements and the physical distance they distinguished:

- *Face-to-face SFSCs:* consumer buys a product directly from the producer on a face-to-face basis, allowing for authenticity and trust in the personal interaction (e.g. on-farm sales, farm shops, farmers' markets, Pick-Your-Own).
- *Proximate SFSCs:* products are produced and sold in a given region of production. Consumers are aware of the "local" nature of the goods at retail level (e.g. consumers' cooperatives, community supported agriculture).

- *Spatially extended SFSCs:* information about the place of production and the producer is transferred to consumers. The value and importance of the product is thus delivered to s who are outside the region of origin and who may have little or no knowledge of that region (e.g. certification labels, restaurants, public food procurement) (Renting et al 2003).

In the Kneafsey et al. report (2013) a number of SFSCs that are used by producers in the EU countries are listed (table 1).

Table 1. Overview of types of SFSC in the EU

Short Food Supply Chains	
Sales in proximity	***On Farm Sales:*** - Farm shops - Farm based hospitality (e.g. table d'hote, B&B) - Roadside sales - Pick-Your-Own
	Off Farm Sales – commercial sector: - Farmers' markets and other markets - Farmer owned retail outlet - Food Festivals / tourism events - Sales directly to consumer co-operatives / buying groups - Sales to retailers who source from local farmers and who make clear the identity of the farmers.
	Off Farm Sales – catering sector: - Sales to hospitals, schools etc. The catering sector institution in this case is understood as the 'consumer.'
Sales at a distance	***Farm Direct Deliveries:*** - Delivery schemes (e.g. veg box)
	Farm Direct Deliveries: - Delivery schemes - Internet sales - Specialty retailers

Source: Kneafsey M. et al. (authors), Santini F. (ed.), Paloma S. G. (ed.), Short Food Supply Chains and Local Food Systems in the EU. A State of Play of their Socio-Economic Characteristics, JRC. Luxemburg 2013, s. 28.

Bringing the social aspects into the SFSC definition adds a third criterion to physical (geographical) distance and number of intermediaries between producer and consumer, although some authors present the latter as "social distance or social proximity" (Foodlinks 2013). It seems, that in order to capture the complexity of short chains in a clearer way distinguishing 3 Proximities to define SFSCs would be justified, where:

- physical (geographical) proximity refers to the distance of transportation measured with food miles of the product from production place to the final consumer;
- organizational proximity expressed by the number of intermediaries in the chain (zero or maximum 1);
- social proximity which "*implies communication between producers and consumers, that give producers the possibility to control information given to final consumers and to receive feedback from them, regarding not only the name of the producer, food quality features or farming practices but also the ethical and social values of the process*" (Galli and Brunori 2013).

Giving recognition to a variety of concepts and interpretations of Short Food Supply Chain we would like to emphasize that this study focuses on the distribution phase of food chains. Sustainability of different production systems was analyzed in depth in many research projects with the use of qualitative and quantitative approaches, but there are very few comprehensive quantitative analyses of various distribution schemes. Farmers despite all the specificities of production systems use similar or the same distribution channels. Likewise, farmers who have chosen specific production systems may use various routes available for transferring food from the farm gate to the end consumer. The expression hybridity is used in some publications in the context of the co-existence of "alternative" and conventional food chains (Le Velly, R.; Dufeu, I. 2016) In our study the term "hybridity" is used to distinguish production systems with multiple distribution channels which will be demonstrated in the research sample.

2. METHODOLOGICAL APPROACH

Sustainability assessment has been carried out in seven countries: France, Hungary, Italy, Norway, Poland, United Kingdom and Vietnam, on a sample of 208 food producers, mainly farmers, participating in several – short and long food chains. Farms constitute the majority of objects selected for the research sample. In case of Norway and the United Kingdom a group of fishmongers has been also added to the sample because of importance of the fish industry in the food sector in these countries. It should be emphasized here that although unlike other research objects in the sample fishmongers' activities are not agricultural land based, but they participate in the same set of distribution channels as sampled farms. In order to make the descriptions of the methodological assumptions and analysis of results as transparent as possible we will be referring to farm businesses most often, however, is necessary results related to the group of fishmongers will be discussed separately.

The case study method has been used as a general research approach. The method is sometimes being associated with in-depth examination of individual cases (objects) in qualitative types of research, however it can be also successfully applied in quantitative analyses of large samples of research objects.

The procedure applied in our study is in line with suggested by Tellis (1997);

1. Design the case study protocol (determining requirements, planning the survey and data collection requirements);
2. Conduct the case study (preparing for data collection, distributing survey questionnaire, conducting interviews);
3. Analyze case study evidence;
4. Develop conclusions, recommendations, and implications based on the evidence.

In the planning phase, the key methodological assumptions have been made regarding general strategy of conducting the case study (selection of categories of products and producers sampling approach), creation of the list of indicators to be calculated for the economic, environmental and social sustainability assessments and construction of the survey questionnaire. The questionnaire has been tested prior to the start of the research in several pilot surveys conducted in France (Locavorium sample) and in Poland (Korycin cheese sample).

The main goal of the survey was to identify chains in which farmers participate delivering their products and to collect data required for calculating indicators chosen for chains quantitative sustainability assessments. The starting point for the survey was to select farm businesses or fishmongers that participate in at least one of the short supply chains.

Detailed description of the methodological approach will be provided in the successive sub-chapters.

2.1. TYPOLOGY OF FOOD SUPPLY CHAINS

There are several types of supply chains that may be distinguished depending on the final destination of the produce (type of client or end consumer), type and number of intermediaries in the chain or type of products (raw materials or processed foods). **It was assumed for our study that single farmers may belong to several chains** that differ not only in the length measured by the distance and the number of intermediaries, but also type of intermediaries in the chain (e.g. wholesalers, small retail outlets, large hypermarket chains). We call the phenomenon of participation of the producer in several chains for distributing specific product "**chain hybridity"**.

Based on literature review and practical experience several "short" and "long" types of chains were taken into consideration in the study as presented in table 2. In accordance with the most common criterion all chains with 0 or 1 intermediary between the producer and the end consumer were classified as "short", whilst other chains with more than 1 intermediary were classified as "long".

Table 2. Short and Long Food Supply Chains selected for the study

Short food supply chains (SFSC):	Long food supply chains (LFSC):
a) Direct on-farm sales: pick your own	g) On-farm sales to intermediaries
b) Direct on-farm sales: sales to individual consumers	h) Sales to wholesalers or on wholesale markets
d) Direct off-farm sales: Internet deliveries	i) Sales to retail chain (2 intermediaries)
e) Direct off-farm sales: delivery to consumer	j) Sales for processing
f) Direct off-farm sales: on farmers markets (fairs)	
c) Sales to small retail outlets (1 inter-mediary)	

Source: own elaboration.

Our assessments were limited to distribution stages of the broadly understood food systems related to physical movement of products from the farm (producer) gate to the end consumer. Production systems were not a subject for the analyses.

Within selected chains various specific sub-types could be distinguished. However, considering complexity of supply chain types, some simplifications were necessary in order to provide a manageable analysis and presentation platforms. Therefore, in the category "sales to small retail outlets" different forms of deliveries through an off-farm retail point were included, such as HoReCa and, in the case of the French sample, in AMAP (association for maintaining peasant farming, a system close to Community Supported Agriculture) or the cooperative AlterConso, based in Lyon .

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The producer's and chain perspective have been considered regarding economic and social indicators. In the calculation of the two key environmental indicators – Food Miles and Carbon Footprint also travels of consumers have been also accounted for. Participation of producers or intermediaries transporting goods to retail outlets depending on the chain, and travels of consumers to purchase foods are illustrated in a graphic form on the diagram 1.

Figure 1. Participation of producers or intermediaries and consumers in selected Food Supply Chains

Chain	Producer Gate	yellow = Consumer Travel; green = Product Travel			
Short chains					
a. Pick your own	**Producer**				**Consumer**
b. On-farm sales to individual consumers	**Producer**				**Consumer**
d. Direct sales - Internet deliveries	**Producer**				**Consumer**
e. Direct sales – delivery to consumer	**Producer**				**Consumer**
f. Direct sales on farmers' markets (fairs)	**Producer**				**Consumer**
c. sales to retail shops (1 intermediary)	**Producer**			**Retail Shop**	**Consumer**
Long chains					
g. On-farm sales to intermediaries	**Producer**	**Intermediary**	**Wholesalers**	**Retail Shop**	**Consumer**
h. Sales to wholesalers or wholesale market	**Producer**	**Wholesalers**		**Retail Shop**	**Consumer**
i. Sales to retail chain (2 or 3 intermediaries)	**Producer**	**Producers Group**	**Logistics Centre**	**Hyper-market Store**	**Consumer**
j. Sales for processing	**Producer**	**Processor**			

Source: own elaboration.

Short food supply chains are those marked with letters 'a' to 'f.' There are no intermediaries in the chains: pick your own and (a), on-farm sales (b), Internet deliveries (d) delivery to consumer (e) and sales on farmers' markets and food fairs (f). There is one intermediary in sales to retail shop (c).

In the group of 'long' chains ('g' to 'j'), which serve in the study as a reference for comparisons with SFSCs, there are four distribution channels with two or more intermediaries. Three intermediaries may be identified in the chains 'on-farm sales to intermediaries (an agent purchasing product - wholesaler or wholesale market – retail outlet)' and 'sales to retail chain (farmers' co-operative – logistic center – hypermarket),' both of which are commonly used in the fruit market in Poland.

Chains analyzed in the study can be divided into three categories depending on participation of consumers in transporting food:

- Consumer only involved *(pick your own and on-farm sales*);
- Producers only involved (*Internet deliveries* and *delivery to consumer);*
- Producers and intermediaries delivering food to retail outlets, consumers transporting on the "last mile" *(all the remaining chains).*

Sales for processing, if applicable, are also included as one of the long chains but only for the reason of balancing the farm sales with production. Since there are several paths on which food may reach consumers, as it is in the case of products that may be delivered directly to the end consumers,

a specific study would be required to calculate indicators reflecting distribution of processed foods, which is beyond the scope and capacity of this project. That is why *Sales for processing* are shown in some of the summaries of results, yet are not considered in our study in comparisons of "short" and "long" chains.

2.2. RESEARCH DESIGN – SELECTION SELECTION OF PRODUCTS, FARM SURVEY

Data were collected from 208 businesses, including fishmongers in Norway and the United Kingdom (table 3).

Table 3. Number of farm businesses and fishmongers in the research sample

Country	France	Hungary	Italy	Norway	Poland	United Kingdom	Vietnam	Total
Number of businesses	**22**	**39**	**22**	**16**	**57**	**35**	**17**	**208**
of which:								
- Farms	*22*	*39*	*22*	*14*	*57*	*15*	*17*	*186*
- Fishmongers	*-*	*-*	*-*	*2*	*-*	*20*	*-*	*22*

Source: own elaboration.

It should be emphasized that the sample formally can't be considered representative for the whole population on farms across respective countries. Attempting to select a fully representative sample would require specific data on population of farm businesses with at least one case of participation in short channel and such database doesn't exist. Probably even more important is, that such an attempt would be beyond capacities of the project. Nevertheless, a large sample provides a possibility for a deep insights into coexistence of short and long chains and allows for drawing conclusions valid for a substantial part of the sector. Selection of producers was made on the basis of their engagement in SFSC and we tried to capture different supply chains to assess comparisons in sustainability.

Another selection criterion was the category of the product. Preliminary assumption was, that in each of the countries at least 2 product categories will be represented in case studies. The detailed breakdown of product categories in the sample across countries is presented in the table 4. Vietnam sample of vegetable is in addition to what was originally planned.

Table 4. Total number of chains used by producers in distribution of products in the sample across countries

Category of product	Country							
	France	Hungary	Italy	Norway	Poland	United Kingdom	Vietnam	Total
Fruits	8	34	0	0	95	0	0	137
of which:								
- apples	*8*				*34*			*42*
- soft fruits		*34*			*40*			*74*
- dried plums					*21*			*21*
Vegetables	22	8	34	8	23		26	121
Fish&Seafood				4		43		47
Cheese	31	3	32	2	28			96
Meat	4	2		14		27		47
Honey		32						32
Other (eggs)				6				6
Total	**65**	**79**	**66**	**34**	**146**	**70**	**26**	**486**

Source: own elaboration.

Farm survey was conducted in the period November 2017 - November 2018. For interviewing producers, the Farm Survey questionnaire has been constructed in the form of a self-calculating Excel file, allowing to calculate all the indicators for an individual business immediately after all requested data are provided. The questionnaire contains the following parts of the survey:

- Business description (labour, production structure, means of transportation, etc.);
- Sales information (quantities sold to different chains, prices, locations and distances to final destinations);
- Specific distribution related data (amounts transported in single deliveries, labour inputs, costs of packaging, other distribution costs);
- Self-assessment of bargaining power and chains evaluation;
- LM3 data – expenses required for estimating local multiplier;
- Estimation of sustainability indicators.

In addition to data collected from the survey there were several assumptions made required to estimate food miles and carbon Footprint for long supply chains and consumers transportation.

Prior to the surveys the questionnaire has been tested in the pilot surveys conducted by the Ecozept team in France (Locavorium initiative) and in Poland (Korycin cheese).

2.3. SUSTAINABILITY INDICATORS

For the quantitative assessments of economic, environmental and social sustainability of supply chains, the set of indicators selected from the Methodological Handbook developed within the framework of Work Package 3 has been proposed. The indicators have been adapted to the specifics of the Food Supply Chains analysis to the extent it was necessary. The general description of selected indicators is presented in table 5.

Table 5. Indicators of economic, environmental and social sustainability of SFSC

ECONOMIC SUSTAINABILITY INDICATORS	
Price difference Farmgate [EUR**]**	Shows the difference between the average farmgate price in the chain and the average farmgate prices in the region in accordance with the formula below: $$\boldsymbol{Price\ difference\ Farmgate} = Average\ Farmgate\ Price\ in\ the\ chain\ recived\ by\ farmer\ \left(\frac{euro}{kg}\right) - Average\ farmgate\ to\ retail\ price\ in\ the\ region\ \left(\frac{euro}{kg}\right)$$
Price Premium [%]	It is the relation: $$\boldsymbol{Price\ premium} = \frac{Price\ difference\ Farmgate\ (euro/kg)}{Average\ farmgate\ to\ retail\ price\ in\ the\ region\ (euro/kg)}$$
Chain value added [EUR**] and Chain value added [%]**	Chain value added (euro/kg) = Price difference Farmgate – Distribution costs; $$\boldsymbol{Chain\ value\ added}\ (\%) = \frac{Chain\ value\ added\ (euro/kg)}{Average\ farmgate\ to\ retail\ price\ in\ the\ region\ (euro/kg)}$$ Distribution costs contain: costs of transportation, packaging, market fees and similar payments and distribution related labor input. Costs of own labor were calculated at the per hour rates paid to hired labor.
Chain margin	***Chain margin (%)*** *= 100% - Average hypermarket (retail)* p*rice in the region / Average Farmgate price in the region*
ENVIRONMENTAL SUSTAINABILITY INDICATORS	
Food Miles Total [km/kg**]**	It reflects how distance measured in kilometres travelled both by the products as transported from the farm by farmer or intermediaries and the consumers after purchasing goods, which is accounted for every kilogram of the product. Food miles have been estimated both: for the distribution stage from farmgate to retail outlet ("*food miles product")* and transportation by consumer ("*food miles consumer").* Taking into account different purchasing patterns coefficients that may reduce number of food miles have been introduced: - *coefficients of "return way" if the means of transportation are fully or partially loaded on the return;* - *coefficients of "passing by", if consumers do shopping when travelling for different purposes*;* - *coefficient of the share of the product in total load transported to the selling point or in total amount of goods transported by consumers.* $$\boldsymbol{FOOD\ MILES\ Total} = Food\ Miles\ Product\ \left(\frac{km}{kg}\right) + Food\ Miles\ Customer\ \left(\frac{km}{kg}\right)$$ * estimated on the basis of findings from surveys in WO 7.1. qualitative assessment or assumed based on expert knowledge

Carbon Footprint	The Carbon Footprint (CFP) expressed as an oxygen dioxide equivalent (CO_2) represents emissions of Greenhouse Gases (GHG) in the process of transportation. In our study CFP is estimated based on the number of calculated Food Miles. For all means of transportation used *fuel consumption (l/kg)* is multiplied by the *Carbon Footprint (CFP) coefficient [Defra 2009]*. For all transportations that require the use of cooling system *fuel consumption* was increased by the coefficient proposed by Tassou et al. [2009] $$\boldsymbol{Carbon\ Footprint} = Fuel\ consumption\ \left(\frac{l}{kg}\right) * CFP\ coefficient\ (CO_2/\text{kg})$$
SOCIAL SUSTAINABILITY INDICATORS	
Labour to production ratio [h/kg]	Reflects the number of hours worked used in respective chains in the distribution processes including preparing products for transportation, loading, transporting and selling by producer (farmer). $$\boldsymbol{Labour\ to\ production\ ratio} = \frac{\left(\begin{pmatrix} man\ hours\ used\ for \\ preparing\ for\ sale \\ per\ one\ delivery \end{pmatrix} + \begin{matrix} man\ hours \\ used\ for\ transport \\ and\ selling \end{matrix}\right) * \begin{matrix} Number\ of \\ deliveries \end{matrix}}{volume\ of\ sales\ in\ the\ channel\ (kg)}$$
Gender equality [%]	Represents the share of hours worked by women in distribution processes (see above). $$\boldsymbol{Gender\ equality} = \frac{\begin{matrix} hours\ worked\ by\ women\ in\ distribution\ processes \\ in\ respective\ chains \end{matrix}}{total\ labour\ input\ for\ distribution\ (h)} * 100\ \%$$
Bargaining power	Estimated based on self-assessment by business managers surveyed evaluating their position in the chain on the basis of the following criteria: 1. position in the channel (the extent to which they can influence "things"); 2. level of trust in relations with other chain participants; 3. relations with other farmers (producers) participating in the same chain; 4. relations with the customers.
Chain evaluation	Measure based on self-evaluation of factors which may have influence of the perception of how attractive the chain is for the producer. The attractiveness of the chain has been rated in relation to the following factors: 1. Prices achieved in the chain; 2. Possibility of selling large quantities of produce; 3. Level of labour requirements according to the process of preparing for sale and transportation; 4. possibility of making long term contracts; 5. regular and assured payments; 6. general level of satisfaction ("how much do you "like" this chain?"). The Likert scale 1 (poor) to 5 (excellent) has been used.

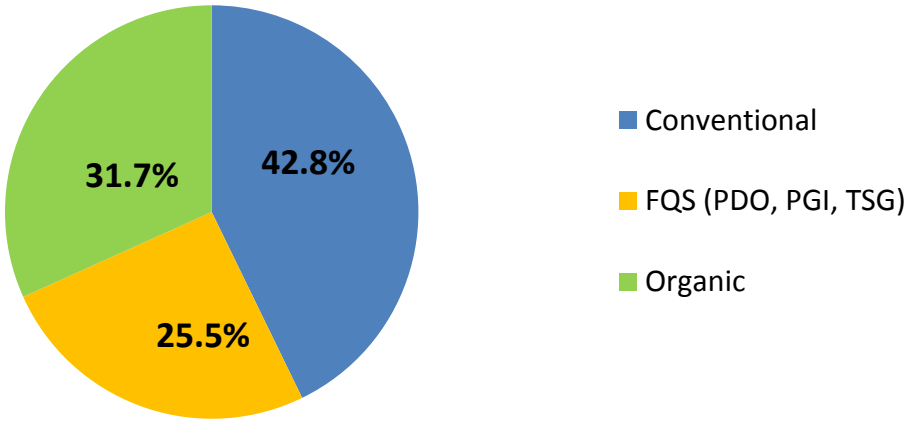
Source: own elaboration.

3. RESULTS

3.1. CHARACTERISTICS OF THE SAMPLE

Data has been collected from the sample of 208 businesses, consisting of 186 farms and 22 fishmongers (in Norway and the United Kingdom). About 57% of farms possess a certificate of organic production or Food Quality Scheme products. In the remaining 43% of farms conventional production systems are used (figure 2).

Figure 2. Farm structure according to certification systems [%]



Source: own elaboration.

The average farm size in the sample (calculated without the fishmongers) was 38,7 ha (table 6). The largest farm businesses in the sample have been selected for the farm survey in the United Kingdom (215 hectares of Agricultural Land), followed by Italian (about 80 ha), French and Norwegian farms (about 30 ha). Surveyed farms in other countries are noticeably smaller because of different historical and economic reasons. In Vietnam the farms in the sample can be classified as peasant, semi-subsistence. In Hungary, where agricultural sector is dominated by very large former state and cooperative farms, individual family operated holdings that have been selected for the survey are small. What is more, part of the Hungarian sample consisted of honey producers, who own small plots of land, thus decreasing the average. Finally, the Polish agriculture is characterized by a fairly fragmented farm structure. The average family farm size in Poland is very similar to the mean in the sample. Standard deviation of the average farm size indicates a strong variation, especially in some country samples, where large farm holding with more than 500 hectares, up to 1200 hectares in the UK sample can be found.

Although it was not a farm selection criterion, most of the farmers kept livestock (all farms in Vietnam). The highest average livestock herd was represented by Italian farms (191 Livestock Units), producing milk for processing to Parmigiano Reggiano cheese.

Table 6. General characteristics of the sample

Country	France	Hungary	Italy	Norway	Poland	United Kingdom	Vietnam
Number of businesses	22	39	22	16	57	35	17
Including: - **Farms** - **Fishmongers**	22 -	39 -	22 -	14 2	57 -	15 20	17 -
Area of Agricultural Land per farm [ha]							
Mean	31.40	5.80	80.89	30.62	14.54	214.83	0.32
Standard Deviation	64.3	6.5	123.8	28.0	12.1	299.3	0.4
Coefficient of Variation [%]	205	112	153	106	83	139	128
Farms with livestock [%]							
Share of farms in the sample	50	45	62	88	63	40	100
Livestock Units per farm (LU) [for farms with livestock only]							
Mean	22.9	2.7	191.8	47.2	8.3	26.5	3.8
Standard Deviation	95.5	4.6	414.3	80.6	11.5	38.3	2.2
Coefficient of Variation[%]	417	170	216	171	138	144	57
Education level of business managers [structure in %]							
Primary and secondary [%]	32	82	32	13	66	63	65
Tertiary* [%]	68	18	68	88	34	37	35
Employment							
Total number of Annual Working Units AWU	112.6	79.7	144.1	82.4	280.1	261.9	9.4
AWU per business farm	5.1	2.0	6.6	5.2	4.9	7.5	0.6
Hired labour [% of AWU]	62.8	26.2	54.9	66.7	43.5	80.5	0.0
Share of women in AWU [%]	48.0	53.0	30.0	41.8	47.0	26.3	44.8
Number of years as a business manager [years]							
Mean	15.1	26.4	27.5	18.1	25.0	25.5	18.5
Standard Deviation	9.4	17.6	13.8	10.8	9.2	11.4	15.2
Coefficient of Variation[%]	62	66	50	59	37	45	82

** based on ISCED/Eurostat classification*

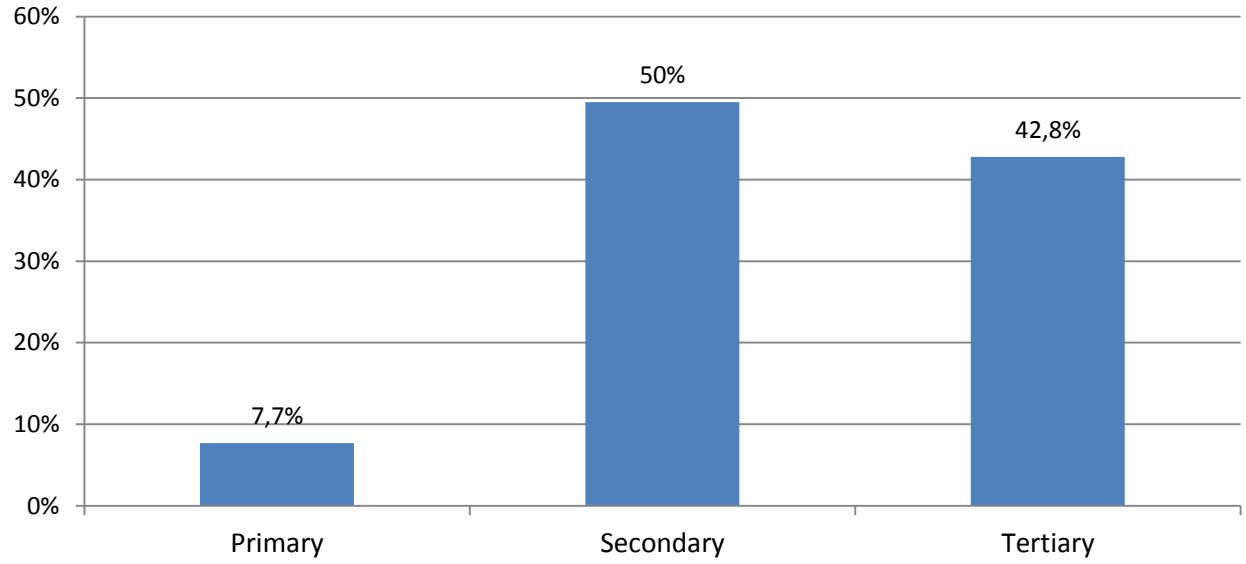
Source: own elaboration.

The labour resources and employment differ strongly in the sample, depending on farm size, type of production and scale of operations in fishmonger businesses. Total labour resources expressed in Annual Work Units1 per business unit ranged on average from 0,6 AWU in Vietnam to 7,5 AWU in the UK (table 6). The share of hired labour in total labour resources was substantial (58% on average), except Vietnamese farms operated exclusively on a part time basis by family staff. The relatively high proportion of hired staff in the total resources can be explained by the fact that in the sample there are represented numerous farm businesses that require large labour inputs (e.g. fruit and vegetable grower, cheese and processed meat producers) as well as the UK fishmongers almost

entirely relying on the hired labour (81%). Structure of labour resources is presented also in figure 3.

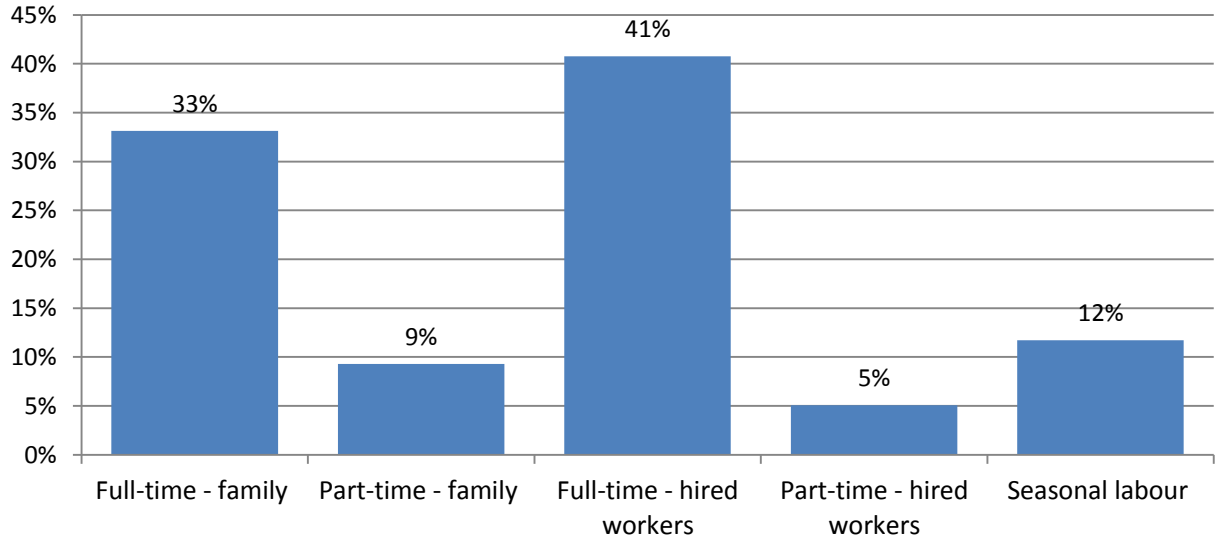
Business owners (mostly farmers), on average had long periods of experience as business managers - from 15 years in France to 27 in Italy on average. When it comes to the level of education, on average 50% of business managers had a secondary level of education, and 42% tertiary (higher). In some countries the share of managers with tertiary education was higher than 50% of the sample. This was the case in France, Italy and Norway.

Figure 3. Education of business managers in the full sample [%]



Source: own elaboration.

Figure 4. Employment structure [% AWU]



Source: own elaboration.

Farmers (and fishmongers), participated in all 10 chain types originally distinguished in the Farm Survey Questionnaire (table 7). Nearly 52% of the volume of sales was sold through long food supply chains (LFSC) - mainly to hypermarket chains (21%), and about 32% through short food supply chains - of which the most popular were deliveries to retail shops. The structure of sales

across categories of products and chain types is presented in the table 8. It can be observed that the largest volumes of almost all products are sold to LFSC. SFSC sales are less in volume, but there is a large diversity of short chains in which producers participate. The point is that SFSCs, largely locally oriented are not sufficient to absorb the whole production and especially bigger scale producers tend to diversify the distribution channels. This is also because the demand for food goes with the consumers, who continuously migrate away from food production areas to large urban agglomerations.

As regards the number of chains used by farmers, most of them (65%) were short food supply chains (table 9). The most commonly used was the chain *"on-farm sales to individual consumers"*, with 115 businesses visited by individual consumers out of 208 in the sample. The likely explanation is that almost 60% farms represented organic or other Food Quality certifications attracting not only local customers but in some cases tourists (e.g. Kaszubska Strawberry, Dried Plums in Poland, Parmiggiano Regiano in Italy), as well as other, passing by customers (table 9a).

In the sample there were 2,33 chains used on the average by a single producer. In the extreme cases producers participated in up to 5 chains, both short and long.

Table 7. Sales by supply chain for the full sample

Supply chains		Volume and market share		Producer engagement across chains	
		[tonnes]	[%]	Number of chains	Producers [%]
Short chains	a. Pick your own	16.3	0.1	3	0.6
	b. On-farm sales to individual consumers	855.9	5.9	115	23.7
	c. Sales to retail shops	2,920.1	20.0	71	14.6
	d. Direct sales - Internet deliveries	148.2	1.0	28	5.8
	e. Direct sales - delivery to consumer	176.7	1.2	28	5.8
	f. Direct sales on farmers' markets	313.1	2.1	73	15.0
	Total	**4,282.15**	**30.3**	**318**	**65.5**
Long chains	g. On-farm sales to intermediaries	2,280.3	15.6	46	9.5
	h. sales to wholesalers / wholesale market	2,328.1	15.9	61	12.6
	i. Sales to retail chain	3,013.9	20.7	29	6.0
	Total	**7,622.2**	**52.2**	**136**	**28.1**
Other chains	j. sales for processing	2,558.5	17.5	32	6.4
	Total sample	**14,611.13**	**100**	**486**	**100**

Source: own elaboration.

Table 8. Participation in short and long food supply chains [number of producers]

	Apples	Cheese	Dried plums	Eggs	Fish & Seafood	Honey	Meat products	Strawberries	Vegetables	Total
Short chains	9	66	8	5	36	23	39	37	95	318
Long chains	21	27	13	1	10	9	6	29	20	136
Total	42	96	21	6	47	32	47	74	121	486

Source: own elaboration.

As the country structure is concerned, 4 countries (France, Hungary, UK and Vietnam) are characterized by a larger share of volume sold through short food supply channels - mainly through local retail shops. In case of Italy and Poland, large share of product volume went also to processing 38% and 30% respectively. It concerned mainly apples, cheese and vegetables in these countries. When we take the chains distribution across countries, in all cases except Poland, SFSC have the largest share in the total number of chains used in the country (table 10). In Poland it is due to the importance of sales to processing and wholesale markets.

Table 9. Structure of sales by volume across supply chains and countries [%]

	Country	Norway	France	Hungary	Italy	Poland	UK	Vietnam	Sample
Short chains	a. Pick your own	-	0.1	-	-	-	0.5	-	**0.1**
	b. On-farm sales to consumers	9.3	2.7	16.3	14.7	1.3	11.2	1.7	**5.9**
	c. sales to retail shops	5.2	47.2	1.4	3.6	1.2	51.1	67.2	**20.0**
	d. Direct sales - Internet deliveries	0.1	0.3	0.3	4.2	0.2	1.6	-	**1.0**
	e. Delivery to consumer	0.1	1.7	23.9	1.5	0.2	1.8	-	**1.2**
	f. Sales on farmers' markets	0.1	2.1	31.5	2.4	1.3	2.7	-	**2.1**
	Total	**14.8**	**54.1**	**73.3**	**26.4**	**4.2**	**68.9**	**68.9**	**30.3**
Long chains	g. Sales to intermediaries	8.7	0.2	8.7	12.9	31.8	-	19.8	**15.6**
	h. Sales to wholesale market	67.6	3.8	17.9	22.9	7.4	25.1	11.4	**15.9**
	i. Sales to retail chain	5.9	42.0	-	-	26.9	5.9	-	**20.7**
	Total	**82.2**	**45.9**	**26.7**	**35.8**	**66.1**	**31.0**	**31.1**	**52.2**
Other chains	j. Sales for processing	3.0	-	-	37.8	29.7	0.02	0.0	**17.5**
	Total sample	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: own elaboration.

Table 9a. Structure of sales by volume across supply chains and categories of products [%]

Chains	Category of product									
	Apples	Cheese	Dried plums	Eggs	Fish & Seafood	Honey	Meat products	Strawberries	Vegetables	Total
a. Pick your own	-	13	-	-	1		-	-	-	-
b. On-farm sales to consumers	1	13	3	2	13	14.7	9	10	2	6
c. sales to retail shops	15	5	-	-	49		22	12	17	20
d. Direct sales - Internet deliveries	-	4	2	1	2	4.8	-	-	-	1
e. Delivery to consumer	1	2	-	-	2	7.3	-	1	1	1
f. Sales on farmers' markets	-	4	25	-	-	0.5	15	9	3	2
g. Sales to intermediaries	33	12	3	-	3	72.8	-	12	1	16
h. Sales to wholesale market	4	23	29	96	26	-	35	43	13	16
i. Sales to retail chain	28	4	39	-	6	-	12	4	36	21
j. Sales for processing	17	33	-	-	-	-	6	9	27	18
Total	100	100	100	100	100	100	100	100	100	100

Source: own elaboration.

Table 10. Number of producers engaged across supply chains by country

	Norway	France	Hungary	Italy	Poland	United Kingdom	Vietnam	Total
	Number *Share*	Number Share	Number Share	Number Share	Number Share	Number Share	Number Share	Number Share
Short chains	24 *(71%)*	52 *(80%)*	61 *(77%)*	53 *(80%)*	54 *(37%)*	56 *(80%)*	18 *(69%)*	318 *(65%)*
Long chains	8 *(24%)*	13 *(20%)*	18 (*23%)*	10 *(15%)*	66 *(45%)*	13 *(19%)*	8 *(31%)*	136 *(28%)*
Other chains	2 *(6%)*	- -	- -	3 *(5%)*	26 *(18%)*	1 *(1%)*	- -	32 *(7%)*
Total sample	**34** *(100%)*	**65** *(100%)*	**79** *(100%)*	**66** *(100%)*	**146** *(100%)*	**70** *(100%)*	**26** *(100%)*	**486** *(100%)*

Source: own elaboration.

3.2. CHAIN CHARACTERISTICS BY TYPES

Table 11. Characteristics of food supply chains analysed in the study*

Chain Type	Chain description		
a. Pick your own	**Farm**	**=>**	**Consumers**
General characteristics	Specific chain for field grown fruits and vegetables. It is a type of farm gate marketing strategy where the emphasis is on customers doing the harvesting themselves. This type of purchase might be preferred by consumers who like to select fresh, high quality products themselves and buy them at a lower prices. **This chain is also attractive for farmers experiencing shortage or high costs of labour.**		
Country specifics			
France	This type of chain is very rare in France. When it is used, it's rarely a major part of the production that is sold this way. There are no French cases in the sample.		
Hungary	In Hungary the "pick your own" approach is often used in several fruit farms (most often strawberry and apple) and these farms are usually selling their products only through "pick your own" minimizing the harvesting cost. However, other farmers do not like this approach, as unprofessional harvest could damage the plants and the following year's yields.		
Italy	In Italy, this type of chain is almost non-existent, except possibly for purchases by close acquaintances of the farmer. Therefore, it concerns very limited quantities which make it more appropriate that the "customer" picks the produce, instead of the farm worker. Moreover, no money may be exchanged for the "picked your own" produce. Procurement of this type occurs a bit more frequently in medium-sized open field operations where "customers" are allowed to pick up the produce which will not make it to the market because misfit (i.e., avoiding food wastage). Again, very little money may exchange hands in these pick-your-own chains.		
Norway	In Norway this activity was more widespread in former days. Nowadays some farmers offer this to their customer especially producers of berries (strawberries) and corn. Traditionally this was popular for consumers as a way to save money, however, now consumers also do this as a nice activity getting to visit a farm and have the pleasure to pick / harvest their own food.		
Poland	In Poland practically very rare, except family members visiting farms of their relatives, sometimes tourists. There are no such cases in the Polish sample.		
UK	In the UK, there are some small family business farms that offer consumers this option, which strongly promotes local, seasonal and organic / sustainably grown produce. Pick your own is not a new concept in the UK and is most common in the horticultural sector, for seasonal fruits. It is popular among some consumers, especially as type of family activity at the weekend / summer tourism, but it is not representative of the farming sample.		
Vietnam	No farmers in Vietnamese sample use this channel. However, this type of chain is often offered for tourists on fruit farms (e.g. strawberry, rambutan, longan or mangosteen). This activity is not common in vegetable farms.		

Chain Type	Chain description		
b. On-farm sales to individual consumers	**Farm**	**=>**	**Consumers**
General characteristics	It is a type of farm gate marketing strategy where customers come to the farm for shopping (eg. farm shop). This type of purchase might be preferred by consumers who like to buy quality products directly from the farm, also by people passing-by who occasionally stop for shopping (e.g. toursists).		
Country specifics			
France	In France, this type of chain is used by more than half of the farmers who sell by SFSC (Recensement de l'Agriculture, 2010). Yet the amount of product sold this way is small compared to direct sales on farmers market for example. As in Poland, it is mostly used by local consumers. There is not always a formal farm shop. In the French sample, many goat cheese producers have a formal shop, while the vegetable farmers producers not.		
Hungary	This type of chain is not often used as the farmers do not have the capacity to provide regular opening hours. However, in special regions of Hungary this is an important sales channel. On temporary basis (e.g. during harvest season, festivals etc.) this could be a sales channel, mainly targeting local consumers (knowing the farmer personally) and tourist visiting the region of production. Products the most often sold through this channel are wines, processed products fo a long storage (e.g. honey in jars) or seasonal fruits (e.g. water melon).		
Italy	In Italy, this type of chian is quite well developed, for the two products taken into consideration in the survey, and for the Parmigiano Reggiano PDO in particular. Both for Parmigiano Reggiano PDO and for salad tomatoes on-farm shops are formal shops and almost no transaction occurs under the counter. Parmigiano Reggiano PDO shops do benefit from favourable location along busy commuters or touristic roads. This, paired with the popularity of the product, ensures the on-farm shop substantial revenues from this chain type. Nonetheless, not every Parmigiano Reggiano PDO dairies have an on-farm shop. Regarding salad tomatoes, customers may come from close-by on purpose, rather than passing by on the road.		
Norway	In Norway this chain had almost disappeared some decades ago, however, it has got new interest today with an increased emphasis on local food among consumers. Few people visit farm shops on a regular basis, however, it has become popular in typical touristic areas where farmers sell regional specialties and fresh produce direct from the farm shop.		
Poland	In Poland this type of chain is rather rare, however it depends on the region and categories of products. Most frequently local inhabitants and tourists staying in the area are the clients. In the most cases farmers sell their products irregularly on an individual basis, with no formal arrangements like a farm shop. There were several "on-farm sales" identified in the Polish sample, however only 1 farm, out of 64, had a formal farm shop.		

UK	In the UK, on-farm sales have been growing in popularity in the last few years. The most representative case would be a family business farm with own farm shops (and butcher) which sells, in addition to farm produce, other locally sourced products. Such farms are more frequently located in accessible locations (close to main roads, within reasonable driving distance of a town/city) and often diversify their activities by having a restaurant, accommodation (B&B or campsite), gift-shop and other forms of agri-tourism (e.g. cooking classes, horse riding, etc.). Smaller farms may also engage in informal sales for visitors passing by, typically eggs, honey, preserves, etc.
Vietnam	In Vietnam individual consumers in this type of chain are usually neighbours or relatives of the farmers. They come to farms to buy organic vegetables directly from the farms on individual basis without any arrangements. The quantity of this client constitutes a small part in total quantity of the farm. There were 5 "on-farm sales to individual consumers" identified in the Vietnamese sample.

Chain Type	**Chain description**		
d. Direct sales - Internet deliveries	**Farm**	**=>**	**Consumers**
General characteristics	After order is made by consumer, product is collected from the farm and delivered by a courier company. It was assumed in the study that typical structure of delivery process in this chain consists of the following links: - product is picked-up at the farm by a courier with a small size car (Van) and transported to the collection point; - product is transported with a heavy load vehicle to destination towns (another collection point) in domestic locations and abroad. In cases of air of sea transportation overseas an airport or seaport can be the collection point. - Finally, courier delivers product with a small van to the end consumer.		
Country specifics			
France	This type of chain is really rare in France. Some internet deliveries exist, but they don't use a private courier and the delivery is rarely made at the consumer's home (like in many box schemes). No farmers in the French sample use this channel.		
Hungary	It has a growing importance but still very limited in terms of volume. Usually box delivery schemes have internet sites.		
Italy	Internet sales are quite popular in Italy, due to – in particular – the market innovation brought about by a few major on-line retail platforms, which has paved the way to the involvement of brick-and-mortar retailers with this supply chain (although sometimes retailers have their own fleet of vehicles to deliver their products/items). Regarding the Internet delivery of the products considered in this WP, internet delivery of Parmigiano Reggiano PDO is much easier than of salad tomatoes, and it is quite well developed both in and outside Italy. In some cases, the Internet deliveries type of chain is employed to deliver both Parmigiano Reggiano PDO and salad tomatoes to Solidarity Purchasing Groups (Gruppi di Acquisto Solidale) which have put in their orders online.		

Norway	This way of distribution is increasing in Norway and especially farmers with specialty products such as cheese, processed meat etc. make use of this channel. However, recent figures show that in 2018 only 14 percent of Norwegian consumers have ordered food from Internet (including supermarkets, food baskets etc.) and only one percent of the purchases was direct from producer (national survey, unpublished).
Poland	Internet sales are gaining popularity in Poland with respect to almost all categories of products. There is a growing number of large retailers adding online-sales to their portfolio. This chain is also becoming more and more popular among farmers who may offer for sale both, fresh and processed products. There are a few producers in the Polish sample who in the period of 3-5 years after starting internet sales now deliver even up to about 30% (in the single case) of their production with the use of this chain.
UK	Internet sales are also gaining in popularity in the UK (e.g. organic box schemes, specialist meat supplies). Home delivery can be arranged via a food courier or, if the address is on a specific and pre-defined delivery route, directly by the farmer. Nonetheless, most of the small producers engaging in internet sales indicate that consumers are required to collect the produce directly from the farm, at a local farmers' market or via an intermediary collection point (effectively a box scheme). Internet deliveries from middle-large sized farms typically rely on intermediaries, such as distributors/wholesalers, taking advantage of better transportation and logistics.
Vietnam	This type of chain is new to Vietnam and not very popular in food sector. Only the most innovative farmers try to introduce on-line sales.

Chain Type	**Chain description**		
e. Direct sales - delivery to consumer	**Farm**	**=>**	**Consumers**
General characteristics	Product is transported by the farmer to the end consumer, no intermediaries involved. Consumer does not travel.		
Country specifics			
France	This type of channel (home deliveries and rounds) is less frequent than market sales or retailer shops for example in France. No farmers in the French sample use this channel.		
Hungary	Used only for selling products within a limited radius to regular consumers of mainly small scale farmers.		
Italy	Direct sales with deliveries to the consumer with the producer vehicles take place when the producer wants to take care of the long-term relationship with certain "historic" customers. The latter are often Solidarity Purchasing Groups (Gruppi di Acquisto Solidale) or restaurants or catering businesses. This chain type can be employed if the producer is delivering more than one product to the same final individual consumer, who has put in an online order for several products which could be sold by a Parmigiano Reggiano PDO dairy shop (i.e., Parmigiano Reggiano PDO cheese, butter, ricotta, salame, wine, oil and other quality food items) or by a farmer producing salad tomatoes (i.e., a variety of vegetables). These fairly large and varied orders may be delivered by the producer with his/her vehicles.		
Norway	n.a.		

Poland	This chain is used by rather small scale farmers, who deliver their products (mainly such as fruits and vegetables) to individual customers in neighbouring towns. Sometimes farmers organize occasionally a group transport (eg. once a week, month) where one representative delivers products to consumers.
UK	This chain is not common practice in the UK, with some minor exceptions, e.g. some small-scale farmers who may engage, on an occasional basis, in direct delivery to their neighbours or their loyal customers living nearby (e.g. refer to the previous description regarding internet sales).
Vietnam	In general, this chain is not common in the food sector in Vietnam. Most farmers still do not have enough resources to deliver food directly to individual customers. Some famers may sell directly to consumers delivering by a courier company.

Chain Type	**Chain description**		
f. Direct sales on farmers market (or fairs)	**Farm**	**Farmers market**	**Consumers**
General characteristics	Product is transported by farmers to farmers' market where usually farmers or hired workers sell products themselves on a stand – consumers travel to the farmers market. Regardless of being strongly pushed out by large retailers, especially by retail chains offering fair quality of fresh fruits and vegetables, they remain a permanent element of the market recognized by consumers as a source of more healthy, fresh and ”trustworthy” source of food. Farmers markets may function also as a tourist attraction.		
Country specifics			
France	Direct sales in markets is the second most frequent SFSC used by farmers and often a more significant part of their turnover comes from it (comparing with on farm sales). This type of chain have been existing way before the SFSC trend, it’s been decreasing continuously for fifty years, but has been growing again for a couple of years. Many producers add to a range of products with retail. In the French sample, most of the farmers use this channel, It’s partially due to the fact that our first recruitment’s base of the interviewees was the farmers market.		
Hungary	Farmers market is the most relevant SFSC in Hungary. Hundreds of farmers markets were operating in Hungary in 2018, mainly in (bigger) towns or in the heart of important agricultural producing regions. Typical farmers market is opened once a week in the season (smaller markets closes after Christmas until springtime), however the most important and biggest markets are opened twice ore even more times a week. The opening hours of the smaller farmers market is usually adjusted according to the other farmers market in the region (no parallel opening hours in neighbouring settlements).		

Italy	Farmers' markets and town markets, in general, remain quite popular places to purchase fresh produce and food, in Italy. Consumers use them to search for quality products and produce, as well as to obtain information on the products and how to consume them. Farmers' markets are a very viable channel to sell both Parmigiano Reggiano PDO and salad tomatoes in Italy. Both dairy farmers and processors as well as tomato grower are likely to participate in farmers' and city markets selling a range of products from the farms. Food fairs and other events showcasing the gastronomic culture are very important in Italy and constitute an important source of income for producers. Both the Parmigiano Reggiano PDO and the table tomatoes benefit from two respective festivals: on the one hand the "Open Dairies" days (Caseifici Aperti) and the Tomato Fest allow consumers to get more acquainted with the two products, knowing the production methods better and understanding the different product/cultivar characteristics. These events may provide producers with additional marketing opportunities.
Norway	Regular open air markets almost disappeared from Norwegian towns and cities during the 1970-ies and 1980-ies. At the beginning of 2000, with support from the government, the national farmer cooperative union together with other farmer organizations established the Farmers Market organization in Norway. Today Farmers markets are present in about 20 towns and cities throughout the country, however, with varying success. However, food fairs and – festivals have become popular and especially in the larger cities they are visited by thousands of people (including tourists).
Poland	Farmers' markets traditionally were and continuously are a significant source of fresh agricultural produce for consumers. Farmers markets are functioning on a regular basis in towns. They are usually open once or twice a week, but they may also exist as everyday selling place on a permanent basis in some locations. Traditional "farmer's markets" exist almost in all smaller towns (province level) although for a number of years already the share of farmers and amount of typical agricultural produce and processed food offered is systematically decreasing. This is mainly because of a growing number of discount stores that offer relatively good quality, including fruits and vegetables, at the attractive price. Increasingly less food is sold on the markets, on the benefit of other goods like clothes, some equipment, etc. While in smaller towns farmers sell their products at farmers markets themselves (personally), in larger cities this role is taken over by intermediaries (brokers) who buy goods from farmers or wholesalers for re-sale on local markets. There is a relatively new feature observed in Poland – gaining popularity and growing number of farmers-like markets offering specialty food (e.g. organic, traditional) and different types of events (food fares, breakfast Sunday markets).

UK	Farmers' markets in the UK have grown in popularity since the 1990s and, according to recent figures, there are thought to be over 750 in the country. They are typically organized outdoor in market squares, with monthly / bimonthly frequency. Most of the traders are typically primary producers, or family members, who operate on a 50-mile radius (around 80km) and attend multiple markets on a regular basis. Minor exceptions include specialist retail suppliers / wholesalers selling fresh local produce. Most of the consumers are returning customers to the same producer, motivated by the desire to purchase local, fresh, seasonal, higher quality and 'distinguishable' food products. However, farmers' markets remain 'niche' and marginal compared to mainstream retail channels, with typical consumers alienated by price and convenience factors. That said, farmers' markets offer consumers access to 'niche' products. For example, Wagyu beef is only available through one specific farmers' market in the North-East. Products such as goat, kid and other types of game are not widely consumed in the UK and are, therefore, not available in supermarkets or retail outlets. As consumer trends towards healthier (leaner) meats grow, farmers' markets, and online sales channels are the only way of obtaining such products in the UK. To some extent, the increasing presence of arts and crafts in various farmers' markets has contributed to attracting more tourists and passers-by.
Vietnam	No farmers in Vietnam's case study use this chain, but it is quite popular in rural areas. Vegetable farmers usually sell directly to customers in wet market or free market organized by these farmers. In large cities, food fairs and festivals have become popular and they are visited by thousands of people (including tourists). Farmers come to food fairs to sell vegetables and food directly to customers. In Ho Chi Minh city and Ha Noi capital, there are some weekly or regular food fairs organized by the government or other organizations. These food fairs support food cooperatives or farmers with certified products, allowing to sell food of a better quality at higher prices (e.g. "Green Market" *["Phien cho xanh tu te"]*, Weekend Markets).

Chain Type	**Chain description**			
c. sales to retail shops (1 intermediary)	**Farm**	**=>**	**Retail shop**	**Consumers**
General characteristics	Product is transported by farmers to local shops in larger villages or small towns in a relatively close proximity to their farm location. Consumers travel to the retail outlets.			
Country specifics				
France	In France, famers can sell to different retail shops: from the small towns' shops to big supermarkets. The latter are trying to use this type of distribution as a communication strategy to benefit from the "local trend". It's the 3rd most frequent SFSC in terms of producers involved. This type of chain is used by some producers in the French sample.			
Hungary	The role of independent food shops (without centralized supply chain) is quickly decreasing, therefore this opportunity of sale is quite limited for small scale producers. However, independent small scale groceries still exist in high number, therefore in case of several fruit and vegetable products this channel could remain somewhat relevant.			

Italy	Food retail shops in towns and cities are disappearing, largely because of the ever-rising role of super- and hyper-markets, which often constitute a more convenient one-stop-shopping opportunity for consumers who might be hunting for a bargain or feel cannot spend much for grocery shopping. Food retail shops often remain the sole procurement opportunity in (very) small villages or town. Otherwise, they may be able to survive the competition specializing in the sale of high-quality products, often at a premium price. In turn, these types of shops are an important source of revenue to the dairy and table tomatoes producers, mainly due to the higher margin per kilo of product they may be able to get selling here. Ensuring that significant output volumes are sold in this chain may require the producer to deliver to several shops, potentially distant from each other, increasing the costs of participating in this chain.
Norway	Three large retail chains are dominating the food market in Norway, thus, smaller, independent shops are rare and mostly in the form of specialty food stores such as butchers, fish shops, bakeries, organic food stores, delicatessen food stores etc. Some of the producers in this study deliver their products to these types of niche food stores.
Poland	For a number of reasons this chain is becoming less and less popular. The number of small shops is diminishing, high transportation costs allow for profitable supply only to the nearest locations and a growing number of large-scale retailers (hypermarket chains, discount stores) offering a relatively good quality products attracts many consumers who in the past were buying fresh agricultural produce (mainly fruits and vegetables) from small retail outlets. Direct deliveries by farmers are also less attractive for owners of small shops who rather hire specialized companies or individual traders who supply them with products purchased in larger quantities on wholesale markets – this is relevant especially for large towns, because of long distances from farm locations.
UK	Local farm shops are typically family-run and provide a variety of (seasonal) home-grown food, and in some case imported products well. Organic-health food stores are relatively new initiatives. It is common for these types of places to also have a café/restaurant on site. However, most producers are not involved in such activities.
Vietnam	In Vietnam this chain is quite popular. Clients of farmers in the sample are *retail shops* located in Ho Chi Minh city (located in the distance of about 110 km) or retailers at *wet markets* located in the local area, which is located about 1 km far away from the farms. This chain is usually used by organic farmers who have formal or informal contracts with retailers contracts. The transportation of vegetables can be described as follows: - If retail shops are clients. Vegetables are transported from farms by farmers with motorbikes to pre-processing & packaging houses or bus stations. Then vegetables are picked up at this point by transportation service (paid by retail shops) with a 3-tonne truck and transported to the shops. Clients in this type regularly purchase vegetables under agreements with the price fixed, delivery location, delivery time, payment time, payment form, and various requirements of quality. This type of chain is used by 11 farmers in the Vietnam's case, especially growing organic vegetables. - If retailers at wet market are clients. Vegetables are transported by farmers with motorbikes to wet markets. This type of chain is rather rare because these are traders who usually collect vegetables from farms to wet market. There was only one farmer selling to retailers *at the wet market*" identified in the Vietnam's case.

Chain Type	Chain description				
g. On-farm sales to intermediaries	**Farm**	**Intermediary**	**Wholesalers**	**Retail Shop**	**Consumers**
General characteristics	An intermediary (agent, wholesaler, retailer) purchases and transports product from the farm with the use of own means of transportation. This is usually an initial link of the long chain, from which product is delivered to a wholesaler (wholesale market) or another type of intermediary (e.g. exporter, logistic center) and in some cases directly to retail outlet. There may be no difference in the distance compared to deliveries made by farmer, but transportation by intermediary, not the farmer, likely involves use of larger means of transportation. Consumer adds his travel to retail shop.				
Country specifics					
France	This kind of supply chain is important in France for many specialized, medium or big size producers (cooperatives are important actors in the food sector, and the contract with them may include the sales of inputs). In the milk, wine, meat and cereal sector, they are prominent. However, they rarely work with SFSC producers, who are smaller producers and have small volumes of production. So they tend to sell their products in ways that grant them higher price. Also, the SFSC market gardener produce many different vegetables (up to 50) in order to have variety to sell directly. We don't have this type of chain case in French sample.				
Hungary	Quite common for durable agricultural and food products ready for long transportation. Honey produced by small scale beekeepers is usually collected (and exported afterwards) by wholesalers, in bulk packing (e.g.: barrels).				
Italy	This chain type is important for both products in Italy, especially for the medium-large size producers. Especially for the supply chain of the Parmigiano Reggiano PDO intermediaries may also be exporters. Parmigiano Reggiano PDO intermediaries may manage voluminous orders and employ heavy load trucks to transport the product from the dairy to the warehouse of the intermediary or to the destination. Because the output levels of salad tomatoes producers appear smaller than the one of Parmigiano Reggiano PDO producers, tomatoes may be transported with smaller vehicles than those employed for moving the Parmigiano Reggiano PDO.				
Norway	Producers of vegetables, potatoes etc. may have contracts with larger wholesalers who purchase and transport the produce from the farm. Some of the farmers in this study make use of this channel (e.g. cabbage).				
Poland	It is still quite common, used for all categories of products in the Polish sample. Intermediary can be an agent, wholesaler, producers group and even individual middleman. Apples, which are traded mainly in large quantities are transported usually with heavy load vehicles. Different means of transportation can be used for other products, depending on quantities and destinations.				

UK	The importance of this market chain varies by branch of production. For milk, sales are typically on contract with the purchaser undertaking transport from the farm. In other cases, such as lamb, farmers still largely transport live animals to an auction mart for sale. Seasonally, on-farm sales to intermediaries tend to increase. For example, over the Christmas period, there is an increased demand for turkey and other poultry (grouse, pheasant) not commonly eaten year-round which are often sold through this channel in relatively high quantities.
Vietnam	This chain is also quite popular. Clients in this type of chain are *traders* collecting vegetables at farms or *retail shops* located in Ho Chi Minh city which is about 110 km far away from the farms. The transportation of vegetables may be described as follows: - If traders are the clients. Vegetables are picked up at farms by traders with motorbikes and transported to wet markets. This type of client purchases vegetables without contract or prior agreement. Traders usually collect vegetables from farms without immediate payment, and then after 5-7 days farmers are paid the price offered (decided) by traders. There were 7 "on-farm sales to *traders*" identified in the Vietnamese sample, including 4 conventional farms and 3 organic farms. - If retail shop is the client. Vegetables are picked up at farms by transportation service (paid by retail shops) with a 3-tonne truck and transported to the shop. This type of client regularly purchases vegetables under clear arrangements regarding price, delivery location, delivery time, payment time, payment form and requirement of quality. This type of chain is similar to chain "c – sales to *retail shops*" but the farmer does not have to transport their products because the pre-processing & packaging is done on his farm. Such a farm (farm 1) identified as "on-farm sales to *retail shops*" in the Vietnamese sample is a leader of the farmers group producing organic vegetables.

Chain Type	**Chain description**				
h. sales to wholesalers or wholesale market	**Farm**		**Wholesalers**	**Retail Shop**	**Consumers**
General characteristics	Farmers transport products to wholesale markets or specialized wholesalers acting as "middleman" in the chain linking farmers with other buyers downstream the chain. According to the United Nations Statistics Division, "wholesale" is the resale (sale without transformation) of new and used goods to retailers, to industrial, commercial, institutional or professional users, or to other wholesalers, or involves acting as an agent or broker in buying merchandise for, or selling merchandise to, such persons or companies. Wholesalers frequently physically assemble, sort and grade goods in large lots, break bulk, repack and redistribute in smaller lots. While wholesalers of most products usually operate from independent premises, wholesale marketing for foodstuffs can take place at specific wholesale markets where all traders are congregated (Wikipedia).				
Country specifics					
France	In the French sample, we have a few producers (goat cheese only) who sell their product to wholesaler. For example, some producers of our sample deposit their products halfway to another producer, and the carrier is also halfway to retrieve it. The most known wholesale market in France is Rungis.				

Hungary	Wholesale markets are the most important place for transaction for bigger scale producers in Hungary and also the most important sales channel for traders and big scale buyers. In Hungary four bigger wholesale markets operate in the capital and in three other big cities (county capitals): Budapest (3.480.000 m^2), Szeged (1.400.000 m2), Debrecen (floor area not available) and Miskolc (25.000 m2). The Budapest wholesale market has not only national but also regional importance.
Italy	Wholesalers and wholesalers' markets are very important types of chains for both Parmigiano Reggiano PDO and salad tomatoes. Parmigiano Reggiano PDO is sold through wholesalers to exporters or super- or hyper-markets. Wholesalers have their own storage facilities and trade the cheese in whole wheels. Wholesale markets may be more relevant for salad tomatoes producers. The local (Parma) wholesale market is instrumental in supplying those grocers which are not looking for a specific quality to the point of establishing a long-term relationship with a specific table tomatoes farmer (i.e., the latter would likely deliver the product with its vehicles to the shop). Delivery to the wholesale market may occur with different vehicles, according to the amount produced and ready to be sold.
Norway	**n.a.**
Poland	There are 2 forms of wholesale operations: a. Wholesale as a middle man, where goods purchased from producers in large quantities are stored and re-sold to retailers. In general wholesalers trade mainly with packed, processed foodstuff that can be stored for a longer period. In the sample only some cheese and dried plums producers were selling their products to wholesalers. b. Wholesale markets – a physical area, often simply under open sky, where farmers and other food producers (also importers) meet with buyers. Such markets are established in all the largest Polish towns, usually they are open 24 hours a day and 7 days a week. The buyers are mainly: - owners of small fruit and vegetables stands at bazaars, usually coming to the wholesale market every day; - traders (additional intermediary in the chain) supplying individual retail shops with fruits and vegetable mainly; - middle man (wholesalers) from different towns in the region transporting larger quantities of products to their locations for sale to local retailers. A vast majority of farmers in the Polish sample sells their products at wholesale markets as one of the few chains they use.
UK	The importance of *wholesale markets* varies by type of farming. Overall, wholesale markets are declining in importance as the share of produce sold by independent retailers' declines and contracting becomes more important. However, *wholesalers* (as intermediaries) remain important. For example, most arable farmers sell to grain trading companies or co-operatives, which undertake storage, drying and transportation.

Vietnam	In Vietnam, client in this type of chain are *traders or collectors* collecting vegetables at farms. Vegetables are transported by farmers from farm to a collection point (e.g. boat landing), then vegetables are transported by traders or collectors from this point to wet markets by motorbikes. This type of client purchases vegetables under no formal arrangements. Traders usually collect vegetables from farms without payment, then after 5-7 farmers are paid the price decided by traders. This type of chain is similar with chain "g – on-farm sales to *traders*" but the farmer has to transport products from farm to the collection point (e.g. boat landing). There was only 1 farm producing conventional vegetables identified as "sales to *traders*" in the Vietnamese sample.

Chain Type	**Chain description**				
i. sales retail chain (2 intermediaries)	**Farm**	**Producers group**	**Logistic center**	**Hypermarket Store**	**Consumers**
General characteristics	There are two basic logistics systems in use in supplying retail chains: deliveries directly to individual outlets or to logistic centers, from where all assortments are transported to stores (hypermarkets) with the use of own means of transportation of the chains. Consumer travels as well – usually for greater distances than the distance to the shop nearest to consumers' place, they purchase larger quantities of goods.				
Country specifics					
France	We don't have information about this type of chain.				
Hungary	The Hungarian food retail sector is heavily dominated by hypermarkets (e.g.: Tesco, Auchan), supermarkets (e.g. SPAR) and discounters (Aldi, Lidl and PennyMarket). They only deal with suppliers that can guarantee a high quantity with the stable quality standard. Single farmers usually cannot fulfil all these criteria so they have to cooperate with others or to sell to another intermediary.				

Italy	Supermarkets and, later on, hypermarkets, have appeared on the retail scene in the '60s in Italy. Early on, they were national brands/chains only. In particular, a couple were "private" enterprises (i.e., Esselunga and Rinascente) while other two were purchasing cooperatives (i. e., COOP, CONAD). Later on, starting in the '80s, French retailers entered the Italian market (i.e., Auchan and Carrefour), before opening the way to the German discounters (i.e., LIDL and ALDI). Super- and hyper-market chains are the main shopping destination of the Italian consumer. Supplying modern retail chains may be somewhat challenging, because of the large quantities of product/produce that the retail chains require producers to deliver them. In turn, this appears somewhat more likely for some of the producers of Parmigiano Reggiano PDO than for farmers producing salad tomatoes. Parmigiano Reggiano PDO may be purchased directly from medium to large scale producers by modern retail chains and delivered to the respective retail platforms. Otherwise, hyper-, super-markets purchase from intermediaries which aggregate supply and may also portion and pre-pack it. Table tomatoes are sold to hyper- and super-markets through the work of the CSO intermediary/wholesaler in Bologna. It is tasked with the duty to receive deliveries, evaluate the quality and prepare the shipment for the retailer logistic platform.
Norway	The Norwegian market is dominated by three major retail chains (hyper-/supermarkets) with 95-99% market share. There is a process of vertical integration where to a greater extent the retailers now own the wholesalers and processors upstream in the value chain. Thus, it is difficult to become supplier to retail chains, however, some niche producers, e.g organic products, deliver to retail chains (e.g. organic poultry).
Poland	First hypermarket chains moved to Poland in the beginning of the 90s (e.g. Carefour, Auchan, Tesco, Real). In the next decade chains of discount stores (e.g. Biedronka – belonging to the Portuguese consortium Jeronimo Martins, Lidl) entered the retail sector. They offer easy shopping at competitive prices that attract a large number of consumers. In the year 2015, the top 5 retailers captured about 40% of the food market, growing from 26% in 2010. Small, independent retailers lose market share – down to 20% in 2005. Initially retail chains were focusing mainly on processed foods. Fresh produce (fruits, vegetables) were present in the offer, but because of a relatively poor quality they were not selling well. Nowadays, due to selection of suppliers, better treatment of fresh produce and as a result improved quality, hypermarkets and smaller scale retail chains became highly competitive also on fresh produce market. Although it is difficult to become supplier to retail chains some larger size producers in the sample participate in this chain.

UK	The UK possesses a concentrated food retailing sector. Grocery sales are dominated by the 'big four': Tesco, Sainsbury's, Asda and Morrisons, accounting for over 70% of market share. Two 'hard discounters', Aldi and Lidl, account for further 12% of total sales. The 'Big four' food retailers typically operate both large supermarket/ hypermarket stores as well as smaller, convenience outlets. Although there is generally little differentiation in the product range offered across regions, most stores have introduced locally sourced alternatives to standard supermarket products, e.g. eggs, milk, preserves as well as some fresh meat and seafood products. Similarly, sales of British seasonal vegetables and fruit (mainly apples, pears, berries) in supermarkets have increased, with some stores offering 'seasonal veggie boxes' and 'perfectly imperfect' range, to promote British fresh / seasonal produce and reduce food waste. Supermarkets represent, by far, the main food-shopping venue for most consumers, who typically seek for convenience and competitive prices. Organic sales through the multiple retailers fell sharply after the financial crisis of 2008-9, with retailers typically reducing the shelf space given over to certified organic produce. More recently, organic sales through multiple retailers are growing. Supermarket procurement is centralised with each retailer having buying teams for the main product categories (e.g. fruit and vegetables, meat, dairy). Suppliers have to meet the retailers' own standards and volume requirements. Some suppliers are unable to meet the volume and quality standards required, or satisfy minimum requirements regarding margin, availability, information, standards, shelf-life, and differentiation. Farmers who do not have an arrangement with a retail chain tend to sell through live animal auctions.
Vietnam	This chain is not represented in the Vietnamese sample, although it is quite common for large farmers or producer groups (cooperatives). Large hypermarkets (Metro, Coopmart, Big C, AEON Mall) usually sign contracts for delivery of food that define prices, quantity, quality standards, payments and time of delivery. Food is transported to logistic centres of supermarkets, from where it is further delivered to individual supermarkets. Vietnam's food retail market is incredibly attractive and strongly developing. This type of chain (the linkage between large farmers and supermarkets) is significantly supported by the government, universities and institutions and various organizations such as FAO, Seed To Table.

Chain Type	**Chain description**		
j. sales to processing	**Farm**	**Processing**	**Not considered in the analysis**
General characteristics	Product is transported by farmer to a collection point or directly to processing plant (usually larger quantities) without any intermediaries. Is greater than the distance to the shop nearest to consumers' place.		
Country specifics			
France	In France, a similar type of chain exist, for example in dairy industry. The "cooperatives laitières" use their own mean of transportation, to collect the milk in the different farms to processing to cheese or yoghurt. There is no producers in the French sample who participate in this chain.		

Hungary	The food processing industry in Hungary only welcome reliable product lines in terms of quantity and quality. Several fruits (e.g.: sour cherry and apple) and field vegetables (e.g.: tomato, pea, bean, sweet corn etc.) are usually industrialized and produced by large scale producers, sold directly to processors. Other relevant but labour intensive inputs (e.g. paprika for paprika paste and dried paprika powder) are usually produced by small scale producers, also directly contracted with processors (usually in monopolistic position).
Italy	Further processing in the Parmigiano Reggiano PDO case relates mainly to the further processing of by-products of the production of the hard cheese. In fact, the cream removed from the milk delivered in the evening is further processed into butter (either by the dairy or sent to a specialist producer which packages it and returns it to the dairy to sell it in the dairy shop). Other products include ricotta, ice creams and yogurt , which may be produced at the dairy, sent out for processing and returned to the dairy or sold for processing, depending on the machinery and equipment available at the dairy. Some quantities of Parmigiano Reggiano PDO and of wheels which have not passed the inspection are sold for grating into either genuine grated Parmigiano Reggiano PDO or into grated cheese mixes. Usually, the processor takes delivery of the raw material at the farm using either its own trucks or sending a vehicle from a specialised logistic company.
Norway	Allmost all meat producers deliver their animals to larger abattoirs for slaughtering. Due to hygienic regulations and high costs small scale or on farm slaughtering are rare. The producers who want to sell their own meat products to consumers take back the carcasses from the slaughter house and either cut and process the meat themselves or cooperate with local butchers about processing and packaging of the meat. Several of the producers in the study process and distribute their meat products this way and sell direct to the consumer from the farm, at farmers markets, through specialty shops etc.
UK	This market chain varies according to the product category and farm size. For arable and milk production it is unusual for farmers to transport output to a processing point (without intermediaries). Dairy farms, for example, typically sell their milk via farmers' co-operatives or private companies for manufacturing dairy products, with the buyer undertaking transport. For beef, some farmers sell directly to abattoirs where they would transport their animals to a slaughterhouse. Smaller producers of meat (beef, lamb, pork) rely on abattoirs to slaughter their animals before processing on-farm. The farm is often responsible for transporting the live animals and collecting the carcasses post slaughter. For example, in the North-East, there are no slaughter houses in Northumberland – meaning local small-scale farmers have to make a round trip of up to 200 km to have their animals slaughtered in Country Durham before they can process the meat for sale. In the case of small poultry producers, the meat is typically processed entirely on-farm.
Vietnam	No farmers in Vietnamese sample use this chain. In general, this type of chain is common for shrimp, fish and meat products, but not for vegetables and fruits.
yellow = Consumers Travel	
green = Product Travels	

Source: own elaboration.

3.2.1. SPECIFIC INITIATIVES DESCRIPTION

Introducing the social proximity component to the Short Food Supply Chains concept results with a number of initiatives that shape in a non-conventional way relations between actors within the chain. In terms of flow of goods distributed through the chain these initiatives do not significantly differ from traditional distribution channels, however they create a specific image of in a sense unique solutions. In this chapter several such initiatives have been briefly described.

FRANCE

"Locavorium" is a shop located near Montpellier (5 kilometres away) in which only local products are sold. The concept of the shop is based on direct supplies by farmers (the shop is the only intermediary between farmers and consumers) and proximity - the majority of products come from within a radius of 50 km around the shop (the maximum distance allowed is 150 km). The project started in 2014 and the shop opened in November 2015. The investment reached 250 000 € and was financed by bank loans, grants and crowd-funding with the use of the PickandBoost platform.

Locavorium is the first shop of its kind in France. The idea of the shop owners was to build on the image of farm shops considering proximity, traceability, ethics etc., however with a very wide range of products, which in the typical farm shop run by farmers themselves is unlikely to be provided. Initiative to establish Locavorium came from individual entrepreneurs and farmers may become partners, but not owners of the shop. Farmers are the only suppliers. The innovative feature of Locavorium is that customer can find all they need in the shop, from fresh food to hygiene or cleaning products, so that after shopping there, they don't need to go in a conventional supermarket to complete their purchase.

"Locavor": in this system, there are four stakeholders (farmers, organizer, central company, customers). The central company provides the website and the ordering system. The organizer contacts the central company to have a page on the website and get the documentation to create a "Locavor". He's in charge of finding farmers and customers willing to participate. Customers can order products from the farmers on the website. They collect the products in a delivery place once a week. The organizer and the central company both get 8% of the product's price. This company had spread rapidly in France during the last years.

"**La ruche qui dit Oui**" (The Hive saying Yes): A different company, the structure is similar to Locavor.

"AMAP" ("Association pour le Maintien d'une Agriculture Paysane", that is "Association to Maintain Peasant Agriculture") is a supply system similar to "Community-Supported Agriculture" (CSA) in the United States under inspiration of Japanese Teikei. Producers supply once a week (box scheme) a group of consumers, who subscribed for 6 months paying the required fee. The delivery takes place in an association, a library, a school etc. Consumers are asked to help in the distribution, e.g with unloading the truck, sorting out vegetables delivered by farmer etc. There are no intermediaries between farmers and consumers. Deliveries are made generally from 5 to 7 p.m, and the content of the box is decided by the farmer. In most AMAPs

there is only one type of the box available (mostly vegetables), but sometimes it's possible to order extra food (generally meat or cheese). The food is mostly organic.

"Alterconso" is a small cooperative in Lyon which supplies 700 families every week with food delivered by local producers. This is the chain with 1 intermediary. There 8 employees in the cooperative and products are is provided by around 40 producers. Like in the AMAP, consumers subscribe to box schemes for 6 months. Alterconso offers different types of boxes that consumers may choose for 6 months period: fruits, vegetables, bread, dairy products and snacks (herbal tea, local cakes...) in different sizes (small, medium, big). Consumers have no choice regarding the content of the box which is decided each time by farmers. Many consumers subscribe for different boxes, but mostly for fruits and vegetables. Alterconso is bigger than most AMAPS and distribute products through 13 delivery points in Lyon where consumers come to collect their boxes.

Although the expression "box" is used actually there are no packed, ready to take away boxes. Consumers bring their own bags and collect from different crates products in quantities according to the delivery list. The only packed are fragile foods, like strawberries or meats.

There are three delivery systems used, as illustrated by the diagram below. The options are as follows:

- farmers come and deliver their products to the cooperative's place.
- farmers do half the transport, and meet the cooperative's truck somewhere in the countryside to transfer products from a truck to another
- the cooperative come to the farm to collect the products.

Option	Farm	in between place*	cooperative's place	distribution point	consumer's home
Option 1					
Option 2		blue and red			
Option 3					

*** = not systematic**

Source: own elaboration.

Transportation made by farmer (blue), by the cooperative (red), by the consumer (green). If the cooperative provides transportation and collects products from farms farmer pay a differentiated depending on the distance. There are some producers who provide the storage for the cooperative, and they don't pay the transportation fee.

Alterconso promotes organic "peasant agriculture".

"**Croc'Ethic/arbralégumes".** These two associations were created in Lyon, their members are friends of Alterconso's. They function quite similarly.

ITALY

Notable initiatives among the Parmigiano Reggiano PDO producers which have a dairy shop we can list the case of the "Società Agricola Valserena" dairy farm and processor which makes Parmigiano Reggiano PDO exclusively out of the milk of the "Bruna Italiana" breed of dairy cows. This breed of cows is particularly resilient and accustomed to the climate and territory in the Parma area. Furthermore, it provides the dairy with a high-quality milk with very distinctive organoleptic characteristics, which give the cheese a unique taste and texture. The "Società Agricola Valserena" was established back in 1879 and is the oldest cheesemaker in the Parmigiano Reggiano PDO area of production. Daily production is 14 Parmigiano Reggiano PDO wheels, all out of the high-quality milk of the roughly 260 Bruna Italiana milk cows, bred on the farm of the Serra family which follows all the farm and dairy operations very closely. Since 2005, the production of Parmigiano Reggiano PDO from the Bruna breed of cows of the "Società Agricola Valserena" is certified also by the Consorzio Disolabruna® which regulates the quality requirements and provides the associated label. Furthermore, the "Società Agricola Valserena" has been granted the GM-free certification. They sell their product also abroad (in the UK, in particular).

Another notable case among the Parmigiano Reggiano PDO producers is the "Ciaolatte" dairy farm which has been certified organic since 1998. The "Ciaolatte" dairy farm run by the Peveri family was among the early adopters of the organic production methods and this has helped it securing also the organic certification for Switzerland, ensuring "Ciaolatte" is one of the main suppliers on the Swiss market. The organic milk produced by the family dairy farm is processed into 9 Parmigiano Reggiano PDO wheels of cheese every day by the cheese master, who is the youngest male in the Peveri family (and one of the youngest cheese masters). Moreover, the "Ciaolatte" dairy farm was among the first dairies to supply "Solidarity Purchasing Groups (Gruppi d'Acquisto Solidale, GAS)", based in Milan, at the onset of this form of organising SFSCs.

The "Orti di Santa Flora" producers of, inter alia, salad tomatoes, are highly committed to sustainability (economic, environmental and social), which they pursue relying on organic production methods, drip irrigation and delivering customer purchases by bike to those living in a certain area. Similarly, the "Agricola Anzola" – established back in 1928 in the Reggio Emilia province has been producing organic salad tomatoes embracing the innovative technology of hydroponic cultivation.

NORWAY

Consumer cooperative: Vestfold Kooperativ

'Vestfold Kooperativ' is a consumer-initiated cooperation for local distribution of organic food established in 2015 in Vestfold County south of Oslo. The cooperative distributes organic vegetable-, meat-, grain- and dairy products directly from producer to consumer within the local area. The cooperative is situated in a region which has – in a Norwegian context - favorable agricultural land, with a large share of vegetable production – a majority of which is distributed nationally. Vestfold Kooperativ is organised as a non-profit cooperative, run and owned by the members. By cutting intermediaries, the cooperative aims at providing a fair price for the farmers as well as lower costs for

members. Another main aim is to lower the environmental impact by less transport, packaging and food waste. Food is mainly sourced from diversified and small-sized local farms, some of which have facilities for processing, such as a flour mill, bakery, dairy, cheese production and meat processing. The 'Vestfold Kooperativ' has around 150 members, and about 30 of these order frequently. Members pre-order bags of vegetables, meat or dairy from a mobile payment application widespread in Norway called "Vipps". Deliveries are made twice a month on two centrally placed pick-up places.

POLAND

Local organic food market "BioBazar" is a Short Food Supply Chain (SFSC) initiative started in 2010 by MyEcolife Company, owned by BioBazar's inventors. The launch of Biobazar was inspired by the rise of similar organic markets in other countries – their success was a motivating factor for creating a similar place in Warsaw. BioBazar is situated in the premises of the former historic Norblin factory (which formerly produced plated and metal parts) at the Żelazna Street in Warsaw. In the post-industrial atmosphere, in buildings 100 years old, next to vintage machinery stalls, consumers can buy organic fruits, vegetables, dairy products, meats, cheese, preserves, fish, cakes and pastries, juices, bakery products, delicatessen, oils and many more. Apart from food products, other organic products such as cosmetics and cleaning products are also offered at the market. Consumers can have a cup of Fair Trade coffee or a cup of tea there or participate in workshops of cooking. Organizers give priority to organic producers and verify their organic certificates. However, if such products are unavailable, it is possible to sell non-organic products such as fish from sustainable fisheries or aquacultures. Initially, the market was open on Saturdays but due to increased interest of customers, it is currently open three times a week: on Wednesdays, Fridays and Saturdays. This is a unique place for locals, suppliers of organic products and tourists.

UK

Meat producers selling through SFSC in the North-East & North-West England were chosen as the first case study. In line with the research objectives, the main strategy consisted in identifying primary producers involved in SFSC and, specifically, in direct selling. It is worth noting that most of the UK meat producers, and in the North, sell through live auctions / abattoirs. Direct sales to final consumers is much less common and these producers tend to be small-scale. As such, the surveyed producers are not 'representative' of the UK farm population. It is for the same reason that most of the selected farms are typically excluded from the Farm Business Survey in England / Farm Accountancy Data Network across Europe, due to their limited economic size (e.g. standard output).

Therefore, the recruitment of producers was based on convenience and snowball sampling, i.e. via attendance at nearby farmers' markets (e.g. Newcastle, Tynemouth, Hexham, Morpeth, Carlisle, Kendal, Brampton, Barnard Castle), local food festivals, or other local acquaintances. Most of these meat producers engage in multiple market channels: direct sales (on-farm, online sales, farmers' markets and food festivals, etc.), via one intermediary (box schemes, local farm shops, restaurants) or multiple middlemen (wholesalers, livestock market,

supermarkets, etc.). Moreover, the typical 50-mile (approx. 80 km) radius rule of farmers' markets implies that several producers can attend different markets within the same month.

Fishmongers in North-East England were chosen as second case study. While some fishers (the primary producers) in the North-East of England do occasionally sell locally (to small-scale local fishmongers), much of their catch goes through the North Shields fish market for international sale. Therefore, surveying fishmongers was deemed a more appropriate strategy in identifying SFSCs.

The recruitment of fishmongers was based on convenience sampling, i.e. desk research identifying fishmongers of varying size and product category which engaged in multiple market channels. The sample covered most of the North-East (e.g. Amble, Berwick, Craster, Hartlepool, Newcastle, North Shields, Scarborough, Seahouses, Sunderland). All the fishmongers surveyed engage in multiple market channels: direct sales (their own store or website), via one intermediary (predominantly local or national restaurants), or to multiple intermediaries (wholesalers for international sale). Some fishmongers have their own fishing boats or direct relationships with local fishers, and many have diversified their primary activities into their own restaurant or café, selling their own produce. This is typically the case for fishmongers producing 'regional' foods such as the Craster Kipper, or those conducting their own processing (e.g. smoking fish, picking crab meat, harvesting oysters). Producers of shellfish products, such as scallops and oysters, engage exclusively in direct sales to consumers online and/or to UK restaurants (predominantly in Edinburgh / London), while those selling other locally harvested shellfish (cockles, whelks) engage in multiple intermediary channels – mainly wholesalers servicing EU markets (e.g. Spain and France).

VIETNAM

Vietnamese survey is conducted with 17 farmers producing organic vegetables (including RAT and ORGANIC) and conventional vegetables at Ba Tri District, Ben Tre province. These farms are usually very small-scale, dispersed, and separated with average area of 0.3 ha and average vegetable area of 0.1 ha and average productivity of 4.33 tonnes/ha/month. Most of these farmers have livestock – beef cattle and goats and use the manure from them for fertilizing. Fertilizers used for organic vegetables are manure from beef cattle, fish fertilizer and trichoderma fungus. Pesticides for organic vegetables are made of natural products such as alcohol, garlic, chilli. In addition, these farms usually grow fodder grass for feeding livestock, some farms also grow corn and paddy as well. Vegetables usually transported for clients and consumed almost daily. Farmers spend about 2-3 hours per day on primary processing and preparing for delivery.

The main markets of SFSC and organic vegetable are food retail stores with good display and maintenance systems. The organic vegetable farmers usually have fixed agreements or contracts with the buyers. The prices of organic vegetables at farm gates and retail shops are relatively high in Vietnam. The end-users of organic vegetable are often rich people with the care of health. Therefore, the SFSC and organic food farmers may obtain higher and more stable incomes even when the cost of labour is high and the productivity is low.

3.2.2. COUNTRY SPECIFIC REGULATIONS ON SFSC, DIRECT SALES THAT HAVE AN IMPACT ORGANIZATION OF THE CHAIN

FRANCE

Since the late 1990's, there has been a renewal of SFSC, among which the AMAPs were most famous. In subsequent years, others forms of SFSC have appeared. Two of the main objectives were to reinforce the link between producers and consumers and to get more added value (for the producers). Various structures have promoted the development of SFSC (agricultural associations, the chambers of agriculture, agricultural unions, etc.).

At the European level, rural development projects are financed by LEADER ("*Liaison Entre Actions de Développement de l'Économie Rurale"*). Regions, departments or towns also developp or fund some projects.

In 2009, the French Ministry of Food, Agriculture and Fishing set up a working group aiming at elaborating a plan of action to foster SFSC: "Action plan to develop SFSC", known as Barnier's plan. The participants were the structures involved in developing SFSC (associations, unions, the chambers of agriculture…). This group has defined SFSC as a chain with zero (direct sale) or one intermediary and no more, without mentioning the distance between the producer and consumer. Some SFSC have always existed (markets, on farm selling…) but they were not conceived as a specific kind of sale.

In regulatory terms, the "hygiene package", consisting of several legislative acts adopted by EU, including the Regulation (EC) No 852/2004 which means that operators have to be registered with the competent authorities. This regulation concerns the whole for food sector, including farmers, who must follow to rigorous hygiene standards.

However, the producers of animal products adhere to the regulation EC n°853/2004, which precise an obligation of certification and include technical specifications. They can have a derogation if they meet certain criteria (selling directly their products, quantities limitations, and distance of sales).

No matter the type of production, farmers are responsible for the sanitary quality of their products.

ITALY

The legal basis of the SFSC in Italy is the Legislative Decree No. 228 dated May 18th 2001 that introduced the concept of multifunctionality. In particular, it introduced a new definition of agricultural entrepreneur that is the one who pursues not only the cultivation and/or breeding, but also activities directed to the handling, conservation, processing, marketing and exploitation of products obtained **mainly** by farmers' activity within their farms.

The word "mainly" means that the farmer can integrate the supply with food produce not directly produced, but bought by others, even if with some limitation. The word, in fact, indicates that the production in sales should come for the most part from the own agricultural activity. The meaning of this expression, however, changes according to the agricultural sector to which the food products belong.

If the producer integrates his/her supply with food products of the same agricultural sector to which his/her own direct production belongs, the "prevalence" is calculated with a quantitative criteria: in other words, food in sales should come for the most part in volume (+50%) from the production of the farmer.

Instead, if the food produce that integrates the direct production of the farmers belong to a different agricultural sector, then the criteria that defines the "prevalence" is the worth, calculated on the revenues coming from the sale. In this case, a farmer can sell also food produce bought by other provided that the related revenues are lower than the revenue from the sale of food directly produced.

Dealing with the issue of the prevalence, a great novelty came into force on January 2019 (Law No. 145): if the food-product that integrates farmer's production (to be sold directly to consumer) belongs to a different agricultural sector than the one of the firm itself, then this product must come from **another farmer**.

Before that date, instead, a farmer could integrate his/her own supply with foodstuffs bought from any other subject, not necessarily an agricultural entrepreneur. This novelty, thus, allows that all food product sold directly by farmers is produced by farmers. Coldiretti, that established the biggest network of short supply chain in Italy, introduced this rule since the beginning of its initiatives, in 2009, allowing farmers to integrate, respecting the rule of the prevalence, their supply just with foodstuff coming from other farmers, members of the same network.

A further push to the development of the short supply chain on agricultural product has been introduced in 2013 when farmers were allowed to sell also ready-to-consumption products that could be eaten in the same retail premises, even if without the waiting service.

It is based again on the legislative decree n. 228/2001 the inclusion of the e-commerce among the forms that the direct sale of agricultural products can take.

Start-up of direct sale activity. To start-up the activity of direct sale of the agricultural products in public spaces o private spaces open to the public, it is sufficient that the farmer sends a communication to the Municipality where the farms is located, without to wait the authorization from it. A simplified procedure valid also for the direct itinerant sale (Law decree n.5/2012, article 27). For direct sale made on open spaces within the area of the farm and made during exhibitions, fairs, festival, religious, political, promotional, and charity events, no communication of start-up are required (Law-decree No. 69/2013, article 30-bis).

Workforce engaged. The legal framework does not envisage any limit to the engagement of the employees in the sales activity. This last, in fact, is considered at all agricultural activity thus all the staff can perform that role.

Fiscal aspects. Farmers benefit of a special system of tax burden calculation, which does not follow the general trade rules. This system is applied to the production phase so as to the handling, processing, and commercialization and it is valid for those food products not directly produced by the farmers, even in the respect of the "prevalence" rule.

Farmers' market (FM). With reference to this particular form of short supply chain, the main (but not the only) law that regulates them is the Law No. 296/2006 that defines minimum requires that these FMs should have. The main ones are:

- Municipalities are the competent authorities; they control and manage FMs in compliance with procedural guidelines. The Municipality can establish a new FM or give the permission to private subjects, like farmers' organization, who ask it. In this last case, it is still mandatory the respect of the municipal guideline.
- Just legally registered farmers can participate in a FM
- Farmers who intend to participate to a FM should be based on the regional territory of the Municipality or in the area defined by the Municipality.
- Farmers must sell mainly their own produce; they can integrate the supply with others' products provided that they come from the same region or from the territory indicated in the municipal guideline.
- Within FMs, it is possible to process food, to organize cultural activities, demo days, training linked to the rural world.

HUNGARY

In Hungary the most relevant SFSC is the farmers market and it is well regulated by the government.

The most important legislation concerning the sale of small scale farmers was set up a in 2010 (52/2010 (IV.30.) decree of the Ministry of Agriculture and Rural Development. According to the decree, a registered small scale agricultural producer can sell his/her

- fresh vegetable and fruits, honey and living fish in the farm and in every farmers market of Hungary (including temporary markets and fairs) to the final consumers, while in the county of the farm, in Budapest and within a 40 km radius to the HORECA sector;
- basic animal products (e.g.: milk, egg, meat of poultry and rabbit), homemade foodstuff (e.g.: cheese, fruit juice, salami) and fish in the farm and in a farmers market of the farm's county, in Budapest or within 40 km radius to final consumers and to the HORECA sector
- carcase meat (own raised and in registered slaughterhouse slaughtered pork, goat, sheep, beef, ostrich and emu meat) to the final consumer in the farm, and in the farm's county, in Budapest or within 40 km radius to the HORECA sector.

As the farmers market is usually the place for transactions between the producer and the final consumer, table 12 well describes the several possibilities of the farmers in the farmers market with different locations. Therefore, we can say, that by law fresh fruit and vegetable, honey and living fish are the three main important product categories of the farmers market, as there is no restriction concerning the distance between the farm and the farmers market. Due to food safety reasons, carcase meat is not allowed to be sold directly from producers to consumers in a farmers market, though often official butchers are selling these kind of products to whom this restriction does not apply. In-between, the basic animal products (milk,

egg, poultry and rabbit meat etc.) and homemade foodstuffs (cheese, processed meat products, jam, fruit juice etc.) and fish can be sold in farmers market close to the production area and in Budapest, where the biggest demand in the country appears.

Table 12. Products allowed to sell for small scale producers via different farmers market

Location/Products	Fresh fruit and vegetable	Honey	Living fish	Basic animal products	Home made foodstuff	Fish	Carcase meat
Farmers market within 40 km radius of the farm	+	+	+	+	+	+	-
Farmers market in the county of the farm	+	+	+	+	+	+	-
Farmers market in Budapest	+	+	+	+	+	+	-
Farmers market in Hungary (including temporary markets and fairs)	+	+	+	-	-	-	-

Source: own composition based on the legislation.

NORWAY

Few measures are directed explicitly for direct sale of products from farmers to consumers. One exception is organic food products where producers may apply for governmental funds aimed at strengthening alternative sale channels for organic food products.

Sale and distribution of fish is strongly regulated in Norway. The fish sale distribution act states that first-hand sales of wild live marine resources shall take place through or with the approval of a fish sales association. A fish sales association is a sales co-operative owned by the fishermen through their professional organizations. The law allows sales cooperatives to set minimum prices for first hand sales of wild marine resources. The purpose of the minimum price is to obtain a fair distribution between fish and industry of income from the market. In practice this means that fishermen are not allowed to sell their catch direct to consumers. All distribution have to go through the sales association. However, exemptions are made were there are no landing facilities in the near vicinity such as for instance in the inner parts of the Oslo fiord. Here the fishermen are allowed to sell direct from the boat to consumers.

POLAND

Currently, a number of support instruments for SFSCs are available at the European level. Actors of SFSCs have access to various types of support, including financial support for investments, research, advisory services, certification and training.

As the short food supply chains are a multi-step process, efficiency of public policy is higher when measures of support are framed within wider collective and territorial projects. The most interesting and successful examples of public support are shown in the projects lining SFSCs with activities connected to the development of local products, public procurement and creation of tourist routs. A number of measures is provided by the EU Rural Development

Program supporting this kind of activities. The two examples are LEADER ("*Liaison Entre Actions de Développement de l'Économie Rurale"*) and National Rural Networks (*Krajowa Sieć Obszarów Wiejskich*), which have the most important role in supporting SFSCs in Poland.

In the case of SFSCs, and especially sales on farmers markets, it is important to recall the Polish Law related to sales and direct delivery of food products. According to regulations changed in 2016 (*Regulation of November 16, 2016, about changing certain laws to facilitate the sale of food by farmers)* farmers may sell their produce directly to consumers, not only fresh, but also processed food products. The latter was not possible before. Regulations are, however, quite restrictive. Farmers must meet certain, rigorous conditions. One of the examples is that direct sales can only take place when the products are manufactured at home without employing hired workers to produce them. In addition, when selling processed products, the obligatory requirement is, that a minimum half of the raw materials come from the producers' own farm.

Farmers have the opportunity to deliver food to a wide range of channels, beginning from farm shops, farmers markets, fairs, but also directly to stores, collective catering establishments, school canteens, as part of agro-tourism and via the Internet. The new regulations also state that sales up to 20,000 PLN (ca 5000 EUR) are exempted from the taxation. However, if this amount is exceeded, then the tax is 2% of the turnover[2]. Some farmers complain about rigidity of the new regulations. One of the key critical points is that the new Law allows farmers to produce and sell processed food only on the very small and local scale. Increasing the scale, above a relatively low limit, requires establishing a company, which for still small size farms is not profitable because of additional, financial charges (e.g. taxes, social security payments, bookkeeping costs etc.).

UK

Support measures and SFSC

Different types of support measures, including rural grants and payments, are available to farmers, business owners, food businesses, or enterprises of the rural community, as part of the Rural Development Programme for England, which is targeted at improving the environment, increasing the productivity of farming, and growing the rural economy.

As part of the agri-food co-operation scheme (AFCS), funded through the 2014-2020 Rural Development Programme for England (RDPE), agri-food cooperation schemes and innovation aid to SMEs are available to improve the competitiveness and sustainability within the agri-food sector. Specific RDPE Growth Programme grants which relate to business development, food processing, and rural tourism infrastructure, and aimed at creating jobs and growth in the rural economy, are funded by the European Agricultural Fund for Rural Development (EAFRD), as part of the European Structural Investment Funds. The Countryside Stewardship and Environmental Stewardship schemes provide funding for farmers and land managers to make environmental improvements. Support for farmers to

[2] Family farms in Poland (not registered as company) pay an agricultural tax, which is calculated basing on the flat rate per ha of agricultural land possessed by farmer. The tax is not related to the value of production sold or profit obtained by a farmer. Farmers are not obliged to book-keeping.

convert to organic farming can be achieved via the following: the Countryside Stewardship scheme, rural grants and payment, organic conversion grants, organic land management grants. A further funding support within the RDPE is the LEADER programme, aimed at supporting Local Action Group (LAG) projects that create jobs, contribute to business growth and benefit the rural economy[3]. These types of Community-Led Local Development (CLLD) initiatives also concern fisheries communities, where innovative and sustainable challenges can be addresses as part of Fisheries Local Action Group (FLAGs), funded by the European Maritime and Fisheries Fund in England.

Despite the aforementioned support measures and government attempts to increase farmers' engagement in downstream food processing and retailing, as a way of diversifying their operations, capturing additional added value, creating jobs and securing the future of their farming operations, only a minority of producers directly engage in sales to end consumers. Independent retailers, including farmers' markets and other short supply chain arrangements, account for less than 2% of total grocery sales in the country. Regarding the seafood industry, independent retailers, including fishmongers, represent about 7% of sales (Seafish, 2017), although engagement in SFSC is even less pronounced and, to a large extent, does not encompass primary fishers.

In the UK, the farmers' market movement initially started in the 1990s because of poor farm prices, leading to many (smaller) family farms seeking a viable alternative route to market their produce (Latacz Lohmann and Foster, 1997; Holloway and Kneafsey, 2000). This trend was also reinforced by increasing consumer concern towards food safety and quality, exacerbated by various food scares including Bovine Spongiform Encephalopathy (BSE), salmonella, genetically modification (GM), dioxins, the horse meat scandal, listeria and severe acute respiratory syndrome infected meat (Whitworth et al., 2017). Outcomes of these food safety problems included an institutional response to better regulate the sector and ensure that food sold is fit for human consumption as well as greater interest, on the part of some consumers, in the traceability of food production (Wales et al., 2006).

Based on recent figures from the National Farmers' Retail and Marketing Association (FARMA)[4], there are thought to be over 750 FMs nationwide. In 2002, FARMA launched a national certification scheme, to support farmers' markets and local foods in the UK and provide customers with a clear understanding of which markets are 'real'. Although by 2016 approximately 200 FMs were certified in the UK by FARMA, it appears that not all farmers' markets are registered, especially in the North-East of England. The key criteria for certification are: the producer must be the person selling at the market; produce has to come from within a designated area; produce and ingredients should come from as local a source as possible (FARMA, 2016). Some traders at farmers' markets are certified organic producers but this is not a requirement. Producers and SMEs' memberships to regional food groups are also common but vary in importance across the country. Regional food groups previously

[3] A LAG, which comprises people from the local community and the local public and private sector, has full autonomy on deciding which projects to fund in their local area.

[4] FARMA is a not-for-profit association which was originally set up to represent farmers and organisations, such as farmers' markets and farm shops, selling their produce directly to consumers. It also provides advice on how best to establish and promote farmers' markets.

received government financial support but this largely ceased following the abolition of regional development agencies in 2012. Some regional food groups, established previosuly using government support, survive as self-financing entities.

Regarding the fishing sector, this is characterised by a traditional long and complex supply chain, with historic buyer-seller relationships in several regions. For instance, in the North-East, the industry is typically dominated by a few large buyers who exert significant monopsony power. Due to their strong and long-lasting market presence, as well as their large-scale distribution and logistics capacity, they often represent the main market channel for the majority of local fishers, ensuring the full sale of their daily catch. The payment system, typically on a weekly basis, guarantees constant cash inflows and security of income for the fishers. Except for some entreprenurial fishers / family businesses, direct to consumer sales are thus not common, except for minor supply to local restaurants, or informal sales to consumers passing by the harbour. These are typically subject to specific arrangements (e.g. fish species and type of existing contracts with wholesalers).

Regulations and standards

All producers are regulated by Environmental Health and Trading Standards and are thus responsible for complying with various regulations on food safety and hygiene, trading standards, certifications and food labelling, consumer protection, and other legal requirements. Although it is a producer's responsbility to comply with relevant EU, UK and local regulations, FARMA and farmers' markets often provide advice and support on communicating new pieces of legislation and standards. As most regulations are one-size-fits all, the implementation of new compliance requirements can be particularly costly for small businesses, as for instance changes in food labelling, food assurance schemes, etc. Specific to the fishing industry, and as part of the EU Common Fisheries Policy (CFP), the main regulations encompass quota controls and decommissioning schemes, which aim to reduce fishing efforts from UK fisheries (e.g. demersal or bottom trawling) to improve the sustainable management of fish stocks and lower the ecosystem impact. These measures have often been criticised by small UK fishing vessels due to the competition faced, with large/foreign-owned vessels holding the largest fishing quotas. To some extent, the increase in shellfish landings into the UK may partly be explained by diversion of fishing activity into this sector, in which there are often fewer restrictions. For shellfish, quotas currently only apply to nephrops (langoustines). Another factor in the perceived increase is improved reporting. A large proportion of shellfish landings are made by vessels 10 metres or under in length, for which there is no statutory obligation to complete a fishing logbook or landing declaration.

Numerous pieces of legislation govern the sale of food, with several codes of practice also produced by the Government and specific to the food industry. Although local authorities are responsible for the enforcement of regulations on food standards, safety and hygiene, the legislative regulations are set by the UK Government and the EU. Legislation covers all parts of the food production and distribution chain, thus including production, processing, packaging and labelling, distribution, importing, retailing, catering.

Domestic food law adheres to the EU legislation (Regulation (EC) No 178/2002), which provides general principles of food safety and law which food businesses must comply with. This pertains to the delivery of 'safe' food on the market, with specific provisions on food safety, presentation (e.g. labelling and advertising, which must not mislead consumers), traceability, imports/exports, product withdrawal, recall and notification to competent authorities in case of non-compliance with food safety requirements. In England, the two main regulations include: a) the Food Safety and Hygiene Regulations 2013 which, in addition to certain provisions included in EC Regulation 178/2002, also covers domestic food hygiene legislation (including the microbiological safety of food); b) the General Food Regulations 2004, which amended the UK Food Safety Act 1990 to bring it in line with EC Regulation 178/2002[5].

In the case of 'distance' selling without face-to-face contact with the consumer, e.g. delivery via online selling or mail order, food businesses also need to comply with specific food safety and food hygiene laws. Some legal requirements are provided by Trading Standards Departments, with safety considerations regarding temperature as set out by the environmental health department, as well as specific laws, such as Consumer Contracts (Information, Cancellation and Additional Charges) Regulations 2013[6]. Moreover, the Electronic Commerce (EC Directive) Regulations 2002 also applies to businesses selling products online. Specific to farmers' markets, there are also additional laws which encompass planning permissions and consents, fire safety requirements, licenses for food businesses' stalls (approval requirements for producers of milk and dairy products, eggs, meat and meat products, fish and fish products), food safety and hygiene (in line with strict European laws previously mentioned and Food Hygiene (England) Regulations 2006), as well as food labelling including weights and measures legislation.

VIETNAM

In Vietnam, the concept of short food supply chain is quite new to both farmers, policy makers, and researchers. A more popular concept is the global value chain. Thus, there are not many studies nor policies supporting short supply chains directly. However, the direct sales are encouraged strongly by the government and there is an interest among farmers. A popular model or short chain type is agricultural cooperative (or farmer groups) with sales agreements with retail companies or stores by official or non-official contracts. The agricultural cooperatives or farmer groups are supported by the government or projects to apply new farming methods and obtain quality certificates (such as Viet GAP, ORGANIC). In an agricultural cooperative or farmer group, they may have common activities of marketing, collecting, primary processing, and transporting.

Moreover, most of vegetable farms in Vietnam are very small, dispersed, and separated, thus, it is difficult or impossible for wholesalers or store systems to buy from too many separated

[5] The Food Standards Agency is the independent UK government agency responsible for enforcement support and advice on food safety and food hygiene across the country. For further details on domestic and EU regulations refer to: www.food.gov.uk/business-guidance/general-food-law

[6] This generally applies to all goods sold by distance selling, and includes rules regarding safety, record keeping, product withdrawal / recall, good hygiene, labelling and information, cancellation rights, etc. More info available at: www.legislation.gov.uk/uksi/2013/3134/pdfs/uksi_20133134_en.pdf

farmers. As the results, Vietnam's government, farmers, and agribusiness enterprises consider agricultural cooperatives or farmer groups as a key solution to sustainably develop agricultural sector and increase the incomes of farmers in the medium and long terms. The central government has significant interest and support to cooperative with various policies and projects to enhance building and developing agricultural cooperatives or farmer groups.

3.3. SUSTAINABILITY INDICATORS

3.3.1. ECONOMIC SUSTAINABILITY

In each country, as well as across all short chain types, sales through short chains resulted in better prices achieved by producers, as the average values of "price premium" and "chain value added" indicate (table 13). The average Price premium in SFSC was 72,2% whereas 16,7% in LFSC. Even greater was the difference in the level of Chain Value Added (CVA). In the case of short chains it was mainly due to price gains.

Visibly better economic performance of short chains is characteristic to all countries. It should be noted that in Vietnamese sample of farms price premium for long, as well as CVA for both types of chains were negative. The most likely reason is almost complete dependence of farmers in the sample on intermediaries and relatively high transportation costs, including estimated distribution related cost of labour.

Table 13. Price Premium and Chain Added Value in short and long supply chains across countries [%]

	Volume of sales (tonnes)	Total sample	France	Hungary	Italy	Norway	Poland	UK	Vietnam
Price Premium [%] – summary: types of chain									
Short chains	4430.4	72.2	90.2	61.7	61.0	53.1	54.6	124.4	4.2
Long chains	7622.2	16.7	19.8	12.0	16.7	11.4	17.5	37.2	-12.6
Price Premium [%] – summary: production and certification schemes									
Conventional	9927.6	56.2	119.0	59.0	47.6	26,7	24.3	116.9	-
FQS (including organic)	4683.5	39.7	34.8	37.1	65.4	42.4	44.6	56.2	-2.7
Chain Added Value [%] – summary: types of chain									
Short chains	4430.4	38.7	34.4	15.4	26.5	28.8	33.7	106.6	-16.8
Long chains	7622.2	1.0	-10.2	-2.5	0.3	6.0	4.5	29.1	-51.6
Chain Added Value [%] – summary: production and certification schemes									
Conventional	9927.6	17.1	22.4	22.5	16.2	8.7	15.0	98.7	-63.7
FQS (including organic)	4683.5	16.6	18.5	-6.0	31.4	23.0	27.5	43.6	-21.6

Source: own elaboration.

More details on particular chains can be found in the Annex (tables 1-10). In sales on farmers markets and pick-your-own the price premium was the highest, due to the fact, that prices paid by consumers were almost 2 times higher compared to the average farm gate prices in sales to retail chain. These channels remained profitable even after including costs of labour

and other distribution costs. However, because of the small share in total sales or small scale of production these benefits had no significant impact on overall situation of individual producers. Chain Value Added was the highest in cases of sales to farmers markets (57,7%) and pick-your-own sales (54,7%). Regarding the latter, there were only 3 cases of pick-your-own sales in two countries - that is why these single observations do not provide any solid basis for more general conclusions.

Similar relations between economic results for short and long chains were identified across product categories represented in the sample (table 14 and tables 1-10 in the Annex), especially regarding Fish&Seafood and Meat categories, mainly in the UK and Norway.

Table 14. Price Premium and Chain Added Value across supply chains and categories of products [%]

	Apples	Cheese	Dried plums	Eggs	Fish & Seafood	Honey	Meat products	Strawberries	Vegetables	Total
Price Premium [%]										
Short chains	50	37	53	81	122	48	91	74	79	72
Long chains	15	16	8	23	48	-8	-5	26	12	17
Chain Added Value [%]										
Short chains	23	4	31	44	108	26	73	50	24	38.7
Long chains	-1	1	3	20	41	-16	-15	11	-21	1.0

Source: own elaboration.

3.3.2. ENVIRONMENTAL SUSTAINABILITY

There were two environmental sustainability indicators assessed in the study – Food Miles and Carbon Footprint. Food Miles is an indicator used to measure distance the food is travelling from where it was produced to its final destination, usually the consumer. It is related to Carbon Footprint as an intermediate phase in CFP estimation. As a stand-alone indicator has a limited value, although it is informative and simple in interpretation.

As expected it varies significantly between chains (table 15).

The highest value of Food Miles characterises chains with the highest level of participation of consumers in transportation linked with smallest quantities transported (pick-your-own, on farm-sales). The third largest is the Food Miles indicator for sales on farmers markets, due to relatively small quantities transported and the location of markets in a relatively long distance both, from the producer place and the final destination of the consumer. Moderately high were values of Food Miles representing long chains sales in hypermarket chains, through wholesalers or intermediaries despite large distances travelled by products to retail outlets. This is because

of transporting large quantities in heavy good vehicles, resulting in relatively small distances per unit of transported goods.

Table 15. Food Miles across food supply chains

Chains	Volume of sales [tonnes]	Share in total volume of sales	Average amount in one delivery [kg]	Average distance per delivery [km]	Average distance per delivery - Producer [km]	Food Miles [km/kg] TOTAL	Share of Food Miles Consumer	Share of Food Miles Producer
a. Pick your own	16.3	0.11%	0.6	3.5	0.0	1.69	100.0%	0.0%
b. On-farm sales to consumers	855.9	5.86%	1.6	5.9	0.0	3.61	100.0%	0.0%
c. Sales to retail shops	2920.1	19.99%	274.0	123.4	82.3	0.17	49.7%	50.3%
d. Internet sales	148.2	1.01%	2.7	0.4	0.4	0.08	31.3%	68.7%
e. Delivery to consumer	176.7	1.21%	54.4	90.0	90.0	0.61	22.5%	77.5%
f. Sales on farmers markets	313.1	2.14%	154.8	179.4	67.9	0.97	88.2%	11.8%
g. Sales to intermediaries	2280.3	15.61%	1160.2	246.7	91.5	0.13	50.4%	49.6%
h. Sales to wholesale market	2328.1	15.93%	904.1	515.8	380.1	0.37	64.0%	36.0%
i. Sales to retail chain	3013.9	20.63%	3832.4	2310.2	624.0	0.30	80.3%	19.7%
j. Sales for processing	*2558.5*	*17.51%*	24362.2	158.5	158.5	0.01	64.9%	35.1%
Summary: types of chains								
Short chains	4430.40	30.32%	6.9	8.3	2.1	0.91	90.8%	9.2%
Long chains	7622.20	52.17%	2768.6	1320.1	600.3	0.27	69.2%	30.8%
Processing	2558.50	17.51%	24362.2	158.5	158.5	0.01	64.9%	35.1%
Summary: production and certification schemes								
Conventional	9927.60	67.95%	0.39	18.6	3.4	0.39	84.2%	15.8%
FQS (including organic)	4683.50	32.05%	0.98	125.5	29.7	0.98	82.7%	17.3%

Source: own elaboration.

The lowest Food Miles characterise Internet sales connected with courier deliveries. Even though quantities delivered to long distances were small, parcels delivered constituted small proportion of the assumed load transported by specialized courier companies that resulted with the low values of the indicator.

On average Food Miles for short chains were more than three time greater compared to long chains. Although relations between the chains are similar, there is no the same pattern regarding value of Food Miles across countries (table 16).

The UK and Vietnam results are two exceptions to the trend since Food Miles for long chains are significantly greater than those for short food supply chains. This is because of the UK fishmongers sales of medium quantities of seafood to wholesalers in far located British towns, but also abroad, have a significant impact. Similarly in Vietnam the reason is long distance transports of relatively mild quantities to the capital of the country.

Table 16. Food Miles across food supply chains and countries [km/kg]

	France	Hungary	Italy	Norway	Poland	UK	Vietnam
	FOOD MILES [km/unit] TOTAL	FOOD MILES [km/unit] TOTAL	FOOD MILES [km/unit] TOTAL	FOOD MILES [km/unit] TOTAL	FOOD MILES [km/unit] TOTAL	FOOD MILES [km/unit] TOTAL	FOOD MILES [km/unit] TOTAL
a. Pick your own	0.7	-	-	-	-	1.9	-
b. On-farm sales to consumers	0.9	0.6	8.1	2.1	1.5	1.2	0.5
c. Sales to retail shops	0.1	-	1.2	0.7	1.0	0.1	0.2
d. Internet sales	0.03	0.01	0.1	0.03	0.2	0.1	-
e. Delivery to consumer	0.02	0.2	1.7	1.4	0.4	1.0	-
f. Sales on farmers markets	1.5	0.3	1.0	0.9	1.2	0.8	-
g. Sales to intermediaries	0.3	0.1	0.04	-	0.1	-	0.4
h. Sales to wholesale market	0.6	0.3	0.4	0.1	0.2	0.7	0.2
i. Sales to retail chain	0.1	-	-	0.02	0.5	-	-
j. Sales for processing	-	-	0.002	0.0	0.01	-	-
Food Miles [km/kg]							
Short chains	0.2	0.3	4.9	1.5	1.1	0.3	0.2
Long chains	0.2	0.21	0.28	0.07	0.29	0.58	0.31
Processing	-	-	0.002	0.004	0.01	-	-

Source: own elaboration.

The key environmental sustainability indicator is Carbon Footprint expressing amount of CO_2eq emitted to the atmosphere as an equivalent of Greenhouse Gases (GHP) calculated per 1 kilogram of the product (table 17).

Similar to relations in the values of Food Miles per kilogram of products, the value of Carbon Footprint for short chains is greater (0,266 kg CO_2 eq/kg) than for long chains (0,146) although the difference between values of the CFP is much less. This is because, while consumers contribute to the value of Food Miles, they drive small cars that consume relatively less fuel, thus their contribution to CFP for short chains is less significant.

Table 17. Carbon Footprint (CFP) for supply chains in the sample

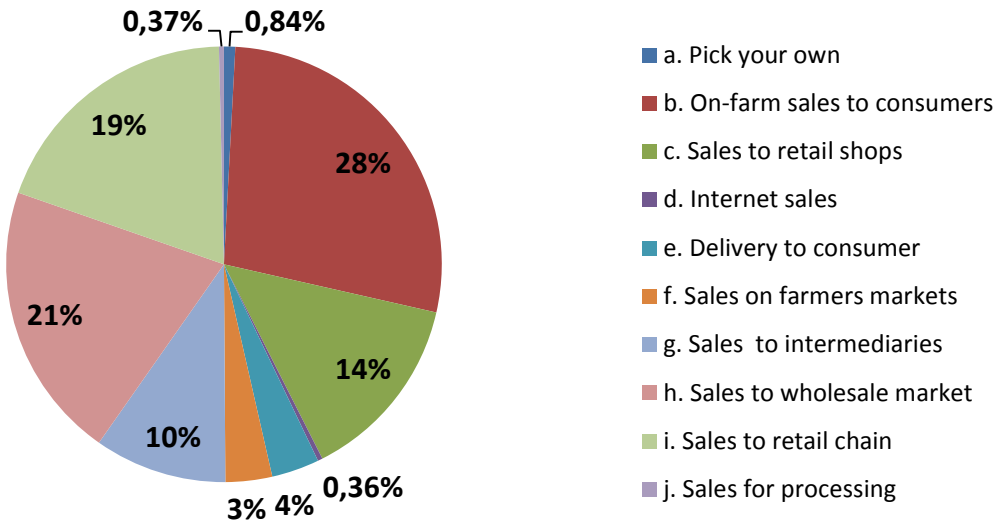
	Volume of sales [tonnes]	Structure of sales [% of volume]	Total Carbon Footprint [kg CO_2/ chain]	Total Carbon Footprint [kg CO_2/kg of product]	CFP Producer [kg CO_2/kg]	CFP Consumer [kg CO_2/kg]	Share of CFP producer [%]	Share of CFP consumer [%]
a. Pick your own	16.3	0,1%	19742.7	1.211	-	1.211	-	100.0%
b. On-farm sales to consumers	855.9	5,9%	654832.7	0.765	-	0.765	-	100.0%
c. Sales to retail shops	2920.1	20,0%	330442.5	0.113	0.083	0.030	73.5%	26.5%
d. Internet sales	148.2	1,0%	8395.0	0.057	0.057	-	100.0%	-
e. Delivery to consumer	176.7	1,2%	83693.8	0.474	0.474	-	100.0%	-
f. Sales on farmers' markets	313.1	2,1%	81813.6	0.261	0.114	0.147	43.8%	56.2%
g. Sales to intermediaries	2280.3	15,6%	232339.2	0.102	0.059	0.043	57.9%	42.1%
h. Sales to wholesale market	2323.1	15,9%	486764.8	0.210	0.167	0.043	79.5%	20.5%
i. Sales to retail chain	3018.9	20,7%	455915.4	0.151	0.060	0.091	39.7%	60.3%
j. Sales for processing	2558.5	17,5%	8735.2	0.003	0.003	-	100.0%	-
CFP according to type of chain								
Short chains	4430.4	30,3%	1178920.3	0.266	0.084	0.182	31.5%	68.5%
Long chains	7622.2	52,2%	1175019.5	0.154	0.092	0.062	59.8%	40.2%
Processing	2558.5	17,5%	8735.2	0.003	0.003	-	100.0%	-
CFP according to certification system								
Conventional	9927.6	67,9%	1441678.4	0.145	0.062	0.083	42.6%	57.4%
FQS (including organic)	4683.5	32,1%	861239.9	0.184	0.087	0.097	47.4%	52.6%

Source: own elaboration.

It is worth noting that there is no significant difference if CFP values for conventional and quality certified production systems. This is because producers from both production systems tend to diversify distribution channels and participate basically in the same types of chains, including long and short. Because of slightly greater quantities transported in an average delivery the CFP for long chains is about 20% lower.

As presented in the figure 5 *on farm sales* contribute most (27.7%) to the total value of Carbon Footprint despite their relatively low share in the total volume of sales (5.9%). In the case of this chain a large number of consumers is transporting small quantities of produces in single purchases. Long chains generate about 50% of CFP, but their share in the volume of sales is nearly 70%. It could be explained by more effective use of means of transportation (larger quantities transported, larger vehicles, utilisation of return-way transport).

Figure 5. Structure of total Carbon Footprint across supply chains



Source: own elaboration.

Table 18. Carbon Footprint (CFP) for supply chains by countries

	France	Hungary	Italy	Norway	Poland	UK	Vietnam
	CFP	**CFP**	**CFP**	**CFP**	**CFP**	**CFP**	**CFP**
a. Pick your own *Share of consumer*	0.147 *(100%)*	-	-	-	-	1.422 *(100%)*	-
b. On-farm sales to consumers *Share of consumer*	0.304 *(100%)*	0.098 *(100%)*	0.999 *(100%)*	2.198 *(100%)*	0.301 *(100%)*	0.431 *(100%)*	0.123 *(100%)*
c. Sales to retail shops *Share of consumer*	0.136 *(22%)*	0.112 *(27%)*	0.274 *(11%)*	0.226 *(13%)*	0.173 *(17%)*	0.076 *(39%)*	0.052 *(58%)*
d. Internet sales *Share of consumer*	0.027 *(0%)*	0.002 *(0%)*	0.061 *(0%)*	0.012 *(0%)*	0.077 *(0%)*	0.050 *(0%)*	-
e. Delivery to consumer *Share of consumer*	1.172 *(0%)*	0.101 *(0%)*	0.438 *(0%)*	0.194 *(0%)*	0.119 *(0%)*	0.198 *(0%)*	-
f. Sales on farmers' markets *Share of consumer*	0.308 *(48%)*	0.193 *(76%)*	0.189 *(78%)*	0.179 *(82%)*	0.320 *(46%)*	0.260 *(56%)*	-
g. Sales to intermediaries *Share of consumer*	0.144 *(30%)*	0.091 *(47%)*	0.082 *(52%)*	0.186 *(23%)*	0.101 *(42%)*	-	0.084 *(51%)*
h. Sales to wholesale market *Share of consumer*	0.308 *(14%)*	0.086 *(50%)*	0.104 *(42%)*	0.107 *(40%)*	0.129 *(33%)*	0.426 *(10%)*	0.078 *(55%)*
i. Sales to retail chain *Share of consumer*	0.131 *(70%)*	-	-	0.146 *(63%)*	0.136 *(67%)*	0.469 *(19%)*	-
j. Sales for processing	-	-	0.002	0.013	0.004	0.092	-
Total sample *Share of consumer*	0.166 *(40%)*	0.126 *(59%)*	0.206 *(81%)*	0.314 *(79%)*	0.009 *(53%)*	0.241 *(38%)*	0.063 *(57%)*
Short chains *Share of consumer*	0.183 *(26%)*	0.140 *(61%)*	0.645 *(89%)*	*1.46* *(95%)*	0.252 *(59%)*	0.154 *(71%)*	0.054 *(60%)*
Long chains *Share of consumer*	0.145 *(60%)*	0.087 *(49%)*	0.096 *(45%)*	0.12 *(39%)*	0.118 *(53%)*	0.434 *(12%)*	0.082 *(53%)*

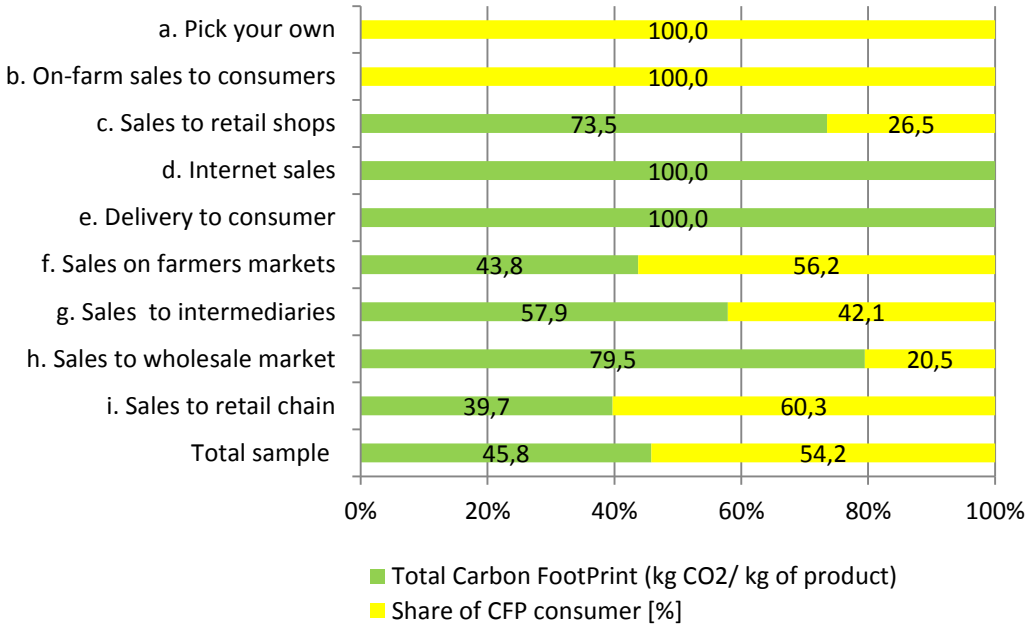
Source: own elaboration.

Cross country comparisons of Carbon Footprint (table 18) across chains basically confirm general relations in the values of CFP observed in the whole sample. There are differences in the value of indicators, that may result from various product dependent characteristics as quantities purchased, distances travelled by producer and consumers due to locations of producers and retail outlets. For the same reasons proportions between CFP values for analysed chains may differ. As in the whole sample, Internet sales are characterised by the lowest CFP per kilogram of product, while *on-farm sales* and *sales on farmers markets* have the greatest impact on GHG emissions.

In total, short chains in all countries except the UK and Vietnam generate greater CFP per unit of product than long chains. In the case of the UK sample this is because a large part of the sample were fishmongers, located in a very close physical proximity to consumers, thus the consumers travels and transportations were exceptionally short. Differently, in the case of Vietnam, end consumers locations were very far from places of food production, what resulted with the high values of the both, Food Miles and Carbon Footprint.

In total sample, proportions in the share of producers and consumers in generating Carbon Footprint are similar (figure 6). On average consumers generate about 55% of GHG emissions, however shares of consumers and producers (including intermediaries) differs depending on the type of the chain, as illustrated on the figure 6.

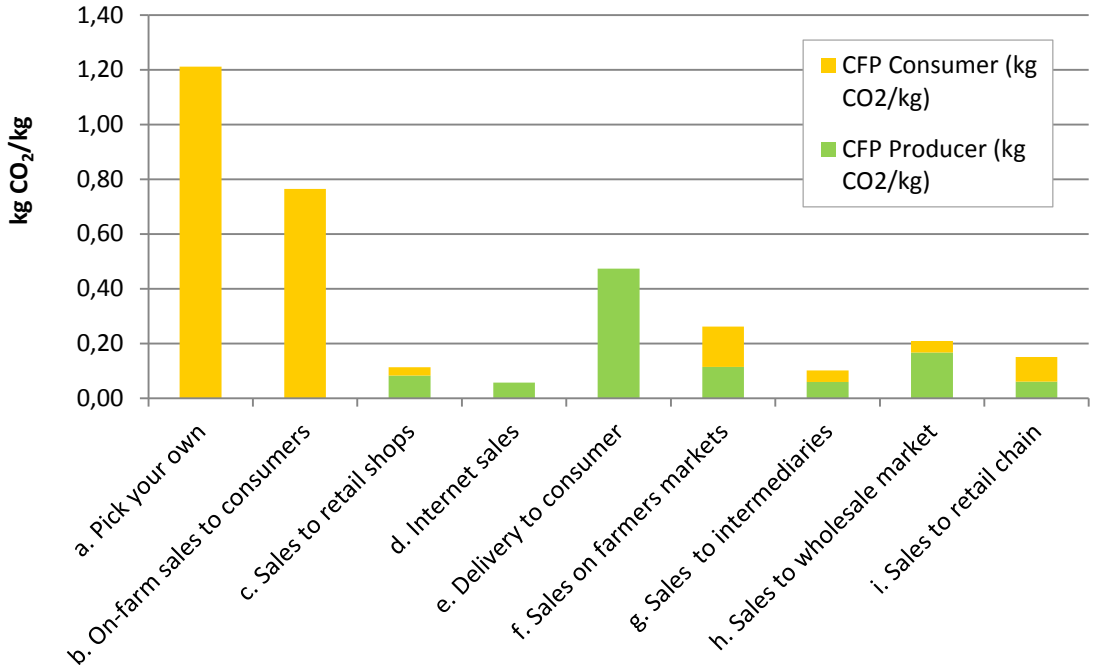
Figure 6. Share of producer and consumer CFP [%] across supply chains in the total sample



Source: own elaboration.

These results show, that GHG emissions in distribution processes should not be analysed irrespective of participation of both – consumer and producers of food that belong to all segments of the food chain.

Figure 7. Level of producer and consumer CFP [%] across supply chains in the total sample



Source: own elaboration.

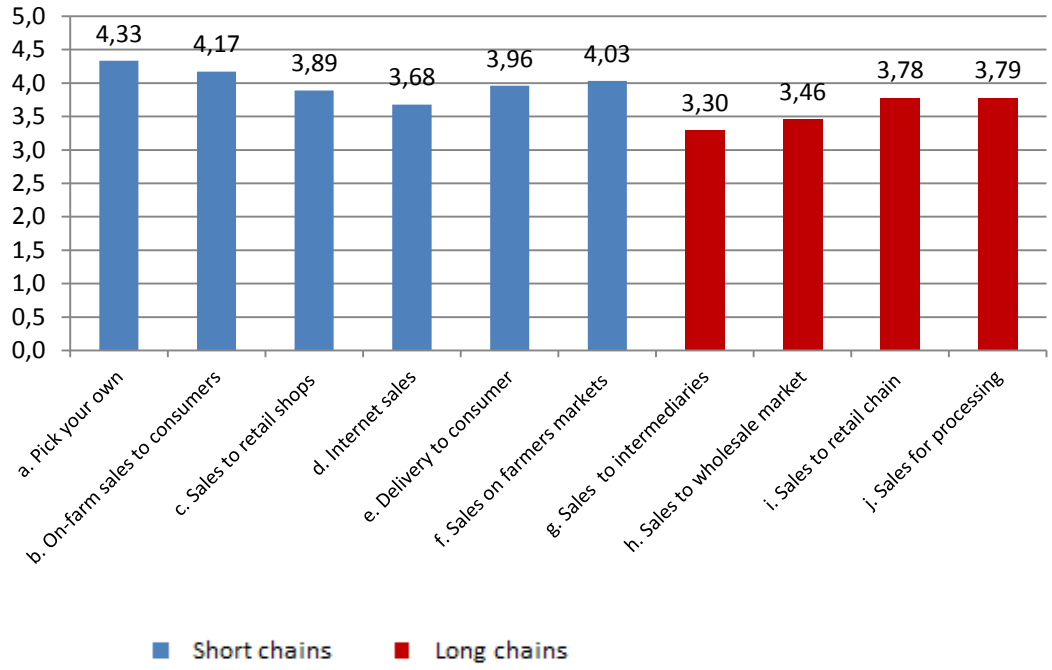
The reason for the relatively high consumer contribution to generating CFP (figure 6 and 7) in the case of almost all chains, (with the exception of *internet deliveries* and *direct delivery to consumer*) is the fact that consumers usually buy small quantities of products using for transportation most frequently passenger cars. Even if we take into account that consumers travel relatively short distances emissions from this type of transportation per unit of the product are very high. This is particularly evident in the case of *on-farm sales* and *pick-your-own* chains, where consumer is responsible for all the distance travelled by product, which makes optimizing transport in terms of quantities transported impossible. It should be emphasized that in our estimates the distances travelled by individual consumers were strongly reduced through several assumptions made regarding shopping when passing-by (e.g. tourists, consumers travelling home from work, etc.) or buying products other than specific type of food. The adequate assumptions were based partially on information collected from surveyed producers but also from consumers interviewed for qualitative analyses with the task 7.1. of the work package.

3.3.3. SOCIAL SUSTAINABILITY

Self-assessment of bargaining position in the chain

Bargaining position in the chain was estimated based on self-assessment by business/farm managers of their position in the chain on the basis of the following criteria: position in the channel (the extent to which they can influence "things"); level of trust in relations with other chain participants; relations with other farmers (producers) participating in the same chain; relations with the customers. For the evaluation the Likert's scale was used, with the range of marks from 1 ("poor") to 5 ("excellent"). Results of evaluation are presented on the figure 8 and in the table 19.

Figure 8. Bargaining position in the food supply chain by self-assessment



Source: own elaboration.

Table 19. Bargaining position in the chain by self-assessment

	Volume of sales (t)	Sample	France	Hungary	Italy	Norway	Poland	UK	Vietnam
Short chains	4430.4	**4.0**	4.1	4.1	4.0	4.6	4.1	3.7	3.8
Long chains	7622.2	**3.5**	3.2	2.8	3.2	3.7	3.8	3.2	3.3

Source: own elaboration.

Bargaining position in the chain is visibly perceived as higher in the case of short, comparing to long food supply chains. This can be observed both, in the general sample average, as well as by country. As the chain type is concerned, not surprisingly in all SFSC channels where the farmer has a direct contact with consumer, his position in chain is evaluated higher than in case of sales through long chains. Surprisingly *internet sales* scored the worst although it seems it is the rapidly growing distribution channel. The cause is probably that some

producers may have experienced difficulties with operating system new for them and lack of direct relations with customers. To some extent this conclusion may be supported by the highest score for sales on farmers markets, where the producer is in the position of a retailer.

Among the long chains the worst, according to producers self-evaluation is their position in the chain *sales to intermediaries*, to a large extent because of the feeling that producers are "exploited" by intermediaries as stated by some producers in the survey. The highest score, which may be considered also surprising, characterizes sale to hypermarket chains. This is against a certain stereotype, but again there were several producers who during the survey emphasized the hypermarket chains are nowadays trustful business partners, offering possibility of purchasing large quantities of produce at reasonable prices.

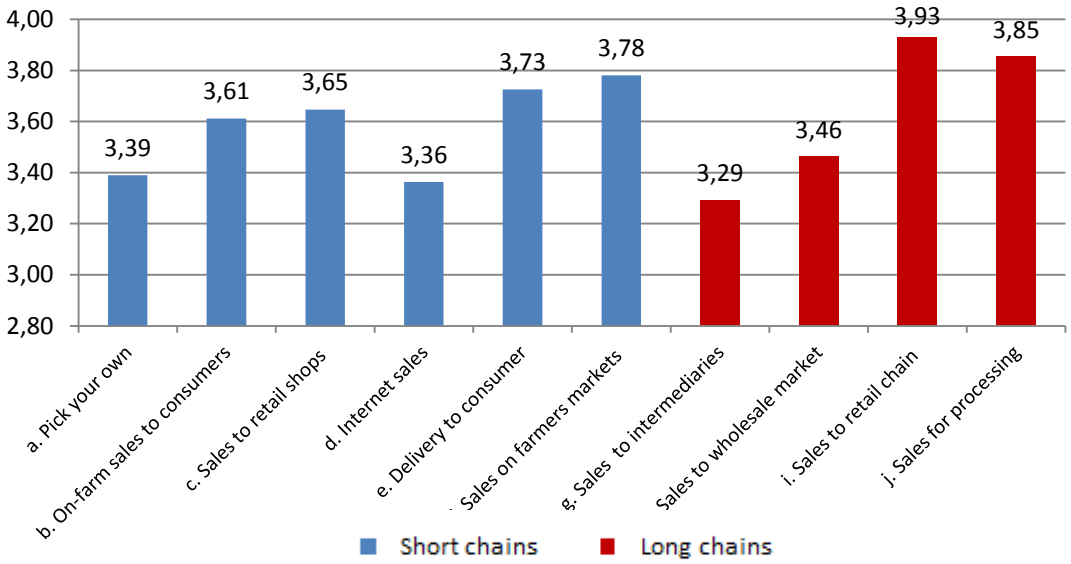
Self-evaluation of the chain

Chain evaluation indicator was based on self-evaluation of factors which may have influence the perception of how attractive the chain is for the producer. The attractiveness of the chain has been evaluated on the basis of the following criteria:

- prices achieved in the chain;
- possibility of selling large quantities of produce;
- level of labour requirements according to the process of preparing for sale and transportation;
- possibility of making long term contracts;
- regular and assured payments;
- general level of satisfaction ("how much do you "like" this chain?").

Similarly as in the case of self-assessment the Likert's scale was used.
Results of evaluation are presented on figure 9 and in the table 20

Figure 9. Average chain evaluation indicator



Source: own elaboration.

Table 20. Chain evaluation across supply chains by country

	Volume of sales (t)	Sample	France	Hungary	Italy	Norway	Poland	UK	Vietnam
Short chains	4430.4	**3.6**	3.6	3.7	3.8	4.1	3.7	3.5	2.9
Long chains	7622.2	**3.5**	3.2	3.4	3.5	4.1	3.7	3.6	2.1

Source: own elaboration.

There is almost no difference in the result of evaluation of short and long chains both in the whole sample (3.6 versus 3.5 on average) and across countries. It could be attributed to the fact that some of the evaluation criteria act "in opposition" to each other (Table 21).

Table 21. Chain evaluation indicator by different evaluation criterions

	GOOD PRICES	LARGE QUANTITIES	LABOUR REQUIREMENTS	POSSIBILITY OF LONG TERM CONTRACTS	REGULAR AND ASSURED PAYMENTS	I LIKE IT	CHAIN EVALUATION
Short chains	**4.15**	2.79	3.22	2.86	**4.35**	**4.44**	3.64
Long chains	2.98	**4.29**	3.21	**3.07**	4.03	3.45	3.50

Source: own elaboration.

For example the criterion of prices achieved in the chain favours short food supply chains, whereas possibilities of long term contracts and large quantities favours long channels.

In general SFSC are better evaluated according to prices obtained in the chain (which goes in line with better price premium for SFSC evaluated earlier) and regular and assured payments (due to the fact that consumer pays usually immediately after the purchase). Farmers mainly positively evaluate selling in the short chains, which they express by higher scoring for the parameter "I like it". On the other hand, such criterions as possibility of selling large quantities and possibility of making long term contracts are evaluated better in case of long channels due to objective reasons.

When we take into account the differences among particular chains, it could be observed that some of short chains - pick-your-own and internet sales were evaluated much lower than the others. Details of this evaluation can be found in annex in the table 21. Generally speaking, pick-your-own and internet sales chains were poorly evaluated due to small quantities bought by consumers and occasional character of these purchases, comparing to the other short chains. On the opposite, sales to retail chain and processing was evaluated high on average, mainly due to appreciation of large quantities sold and regular and assured payments received by farmers.

Labour to production ratio

Labour to production ratio reflects the number of hours worked in respective chains in distribution processes, that include preparing products for transportation, loading, transporting and selling by producer (farmer). Labour resources needed for sales process differ across chains (table 22).

Table 22. Labour to production ratio across supply chains by country and by products [hours/kg]

Chains	Volume of sales (tonnes)	Sample	France	Hungary	Italy	Norway	Poland	UK	Vietnam
Short chains	4430.4	**0.057**	0.028	0.122	0.225	0.093	0.045	0.025	0.151
Long chains	7622.2	**0.003**	0.003	0.028	0.003	0.001	0.003	0.002	0.064
	Apples	**Cheese**	**Dried plums**	**Eggs**	**Fish & Seafood**	**Honey**	**Meat products**	**Strawberries**	**Vegetables**
Short chains	0.02	0.22	0.05	0.06	0.03	0.10	0.08	0.08	0.03
Long chains	0.001	0.01	0.02	-	0.003	0.01	-	0.02	0.003

Source: own elaboration.

In almost all short food supply chains the ratio is much higher, comparing to long chains, regardless the country and the product type. It may be attributed to different factors. Certainly the amount of produce per delivery matters most significantly. In the SFSCs products are usually individually packed for final consumers what requires much more time for preparation of particular delivery. Second factor affecting difference among short and long chains is direct responsibility of producer for sales to final consumer, which in case of the longer chains is taken over by intermediaries (retail). In case of short chains producer spends time for transportation and selling on farmers markets or wholesale markets. Even in cases of chains which don't involve transportation by the producer (*pick-your-own, on-farm sales)*, servicing the consumer may be also producers time consuming.

As presented in the table 23, greater engagement of women in sales through short food supply chains may be observed.

Table 23. Gender equality [%] across supply chains by country

	Volume of sales (tonnes)	Full sample	France	Hungary	Italy	Norway	Poland	UK	Vietnam
Gender equality [%]									
Short chains	4,430.4	**30.0**	32.7	35.3	31.2	30.7	51.3	16.6	36.5
Long chains	7,622.2	**25.0**	29.3	54.0	1.2	7.7	29.7	7.0	36.6

Source: own elaboration.

The gender equality ratio that represents the share of hours worked by women in sales and distribution processes is greater in short chains in most of the countries, except Hungary (mainly due to a large share of very small honey farms, involving mainly men as a labour force) and Vietnam (all part time farms in the sample, with equal contributions of labour from men and women). The labour input by women was the greatest on farms selling through farm shops, sales on farmers markets and sales of products that require portioning and packaging (e.g. cheeses, meats).

3.4. LM3 CALCULATIONS FOR SHORT AND LONG FOOD SUPPLY CHAINS

One of the goals of task WP 7.2 was to assess whether farmers participating in short supply chains have a different impact on a local economy than farmers participating mainly in long supply chains. In order to do this the Local Multiplier 3 (LM3) which was originally developed by the New Economics Foundation was used. The model works by tracking empirically 3 generations of spendings. For each round, the amount of spending that is retained within the local area is measured. Applying a simple formula one receives an LM3 ratio (more detalis below).

A local economy is usually defined as a geographical area but there is no consensus on what distance between places of production and consumption could be considered "local" (Martinez et al., 2010). In the United States it can be up to 400 miles (2008 Farm Act), which is the distance designating the average size of a European country.

For European conditions it was decided to designate "local" as a "municipality" (commune) which in the EU standard of administrative units is the NUTS5 level. Taking into account that surveyed farms are spread across large territories we made an assumption that each farm is located in the center of the circle symbolizing a virtual municipality. The radius of the circle has been considered the distance farmer travels for "local" activities within the borders of the circle.

Two optional sizes of the area are considered as "local" in the study:

- **version A** –A radius of 7,5 kilometers will designate an area of approximately 176,71 square kilometers (π*7.5^2 = 176.71). In most European countries this is about size of the average municipality.
- **version B** –A radius of 15 km, covers an area of 706.86 square kilometers, which is about the size of a typical European NUTS4 region, 4 times larger than a municipality in the version A.

In the analysis, farmers expenditure within the A or B radius was considered "local", beyond the radius – non-local.

143 farmers in the sample provided detailed information on their expenditure and where it had been spent. Data required for LM3 calculation were not collected in Vietnamese sample, because of specific conditions for farming and distribution in this country. There were also a number of farmers in other countries who refused to share this information.

The farms were further split into 2 catagories depending on the share of farm sales through short and long food supply chains. In the sample of 143 farms about 60% (84 farms) were characterised by a greater share of sales to short supply chains.

Results of the LM3 estimations

For version A - the locality understood as within 7.5 km radius.

Table 24. Local Multiplier (LM3) for farms using a high share of short supply chains, local within 7.5 km radius

GREATER SHARE OF SHORT SUPPLY CHAINS		Local Suppliers/Payroll		Non Local Suppliers/Payroll	
	Round Totals €	In Area €	Out Area €	In Area €	Out Area €
Revenues (R1)	**39 939 066.42**				
Direct Spend (R2)		12 389 456.33			9 172 364.49
Payroll + other direct costs		6 442 001.80			11 935 243.80
Total local spending (R2)	**18 831 458.13**	18 831 458.13			21 107 608.29
Local Re-spending (R3)		7 904 473.14	4 484 983.19	2 940 660.06	6 231 704.43
Payroll/Costs Re-spending (R3)		4 294 667.87	2 147 333.93	3 978 414.60	7 956 829.2
Total Local Spending (R3)	**19 118 215.66**	12 199 141.00	6 632 317.12	6 919 074.66	14 188 533.63
Total Spending Impact	**77 888 740.21**	49 862 057.26		6 919 074.66	
LM3	**1.95**	**2.65**		**1.25**	
	Local multiplier (LM3)	**Local Supplier LM3**		**Non-Local Supplier LM3**	

Source: own elaboration.

Interviewed farmers who used predominantly short supply chains generated a total revenue of 39,939,066.42 € (Table 24). They spent locally (R2) in total 18,831,458.13€ (47% of the revenue), of which 12,389,456.33 € for local purchases of goods and services and 6 442 001.80 € for workers and own local, private expenditure. The local R2 spendings have been re-spend at the R3 round – 12,199,141.00€ in total.

At the same time, some of the money that was at the R2 round spent out of the area generated expenditure within the local area of 6 ,919,074.66 €.

Local Multiplier (LM3) was calculated as follows:

+ Farmers revenues (39 939 066.42) (Round 1)

+ Local spend for suppliers (18,831,458.13) (Round 2)

+ local suppliers respending (12 199 141.00) (Round 3)

+ non local suppliers local spend (6 919 074.66) (Round 3)

= 77 888 740.21 (total spending impact)

Total spending impact divided by the initial revenue of farmers gives the following multiplier result:

$$\frac{77\ 888\ 740.21}{39\ 939\ 066.42} = 1.95$$

The multiplier of 1.95 (LM3) means that each euro of the farmers' revenue has resulted in spending of 1.95 euro within the local economy.

Table 25. Local multiplier (LM3) for farms using a high share share of long supply chains, local within 7.5 km radius

GREATER SHARE OF LONG SUPPLY CHAINS		**Local Suppliers/Payroll**		**Non Local Suppliers/Payroll**	
	Round Totals €	**In Area €**	**Out Area €**	**In Area €**	**Out Area €**
Revenues (R1)	**20 277 504.84**				
Direct Spend (R2)		3 706 120.36			5 672 984.98
Payroll + other direct costs		3 547 419.60			7 350 979.90
Total local spending (R2)	**7 253 539.96**	7 253 539.96			13 023 964.88
Local Respending (R3)		2 364 504.79	1 341 615.57	1 818 758.98	3 854 226.00
Payroll/Costs Respending (R3)		2 364 946.40)	1 182 473.20	2 450 326.63	4900653.27
Total Local Spending (R3)	**8 998 536.81**	4 729 451.19	2 524 088.77	4 269 085.62	8 754 879.26
Total Spending Impact	**36 529 581.61**	19 236 531.11		4 269 085.62	
LM3	**1.8**	**2.65**		**1.26**	
	Local multiplier (LM3)	**Local Supplier LM3**		**Non-Local Supplier LM3**	

Source: own elaboration.

Carrying out the same calculations for farms with a greater share of long supply chains gives a result of LM3 equal 1.8 (Table 25). This means that the farmers using mainly **long supply chains have a slightly smaller impact on local economy** (of NUTS5 size) than the farmers with higher share of short supply chains, as 1 euro of revenue has resulted in 1.8 euro in the local economy. This arises as they spend only about 36% of their total revenue on local supplies as opposed to 47% of short chain producers. It is worth mentioning that on farms with predominantly short supply chains labour costs constituted 14% of direct spend, while in the case of predominantly long supply chains, it was only 11%.This finding may be affected by the differences in the size of the two categories of business. The short chain farmers had a larger mean revenue per farm of 475,465€ and hence unpaid family labour may have been less than on the smaller long chain farmers who had a mean revenue of 343,686€.

For version B – the locality understood as within 15 km radius.

Enlarging the radius for the area results in the increased share of spendings considered "local" (table 26, 27).

Table 26. Local multiplier (LM3) for farms using a high share of short supply chains, local within 15km radius

GREATER SHARE OF SHORT SUPPLY CHAINS		Local Suppliers/Payroll		Non Local Suppliers/Payroll	
	Round Totals €	**In Area €**	**Out Area €**	**In Area €**	**Out Area €**
Revenues (R1)	**39 939 066.42**				
Direct Spend (R2)		15 073 459.84			6 488 360.98
Payroll + other direct costs		11 691 346.80			6 685 898.80
Total local spending (R2)	**26 764 806.64**	26 764 806.64			13 174 259.78
Local Respending (R3)		9 616 867.38	5 456 592.46	2 080 168.53	4 408 192.45
Payroll/Costs Respending (R3)		7 794 231.20	3 897 115.60	2 228 632.93	4 457 265.87
Total Local Spending (R3)	**21 719 900.04**	17 411 098.58	9 353 708.06	4 308 801.46	8 865 458.32
Total Spending Impact	**88 423 773.10**	70 940 711.86		4 308 801.46	
LM3	**2.21**	**2.65**		**1.17**	
	Local multiplier (LM3)	**Local Supplier LM3**		**Non-Local Supplier LM3**	

Source: own elaboration.

When the local economy was assumed to have a size of a NUTS4 district (radius 15 km), more direct expenditure occurs locally given the larger area. The local multiplier (LM3) for farms with a greater share of short supply chains in this case equals 2.21, (cf 1.95 in smaller local economy) (table 26). This ratio means that impact of generating 1 euro of the revenue is multiplied up by 2.2 times. The multiplier effects incorporating local supplier expenditure rises to 2.65 (than same value as for smaller areas) and the impact of purchases from outside suppliers spending money locally is slightly less.

The multiplier (LM3) for farms with a greater share of long supply chains equals 2.22 (Table 27). This result shows a different pattern than stated in the analysis for the municipality with the smaller, 7.5 km radius.

Table 27. Local multiplier (LM3) for farms with greater share of long supply chains, local within 15km radius

GREATER SHARE OF LONG SUPPLY CHAINS		Local Suppliers/Payroll		Non Local Suppliers/Payroll	
	Round Totals €	**In Area €**	**Out Area €**	**In Area €**	**Out Area €**
Revenues (R1)	**20 277 504.80**				
Direct Spend (R2)		6 956 128.85			2 422 976.49
Payroll + other direct costs		6 762 471.80			4 135 927.60
Total local spending (R2)	**13 718 600.65**	13 718 600.65			6 558 904.09
Local Respending (R3)		4 438 010.21	2 518 118.64	776 806.26	1 646 170.23
Payroll/Costs Respending (R3)		4 508 314.53	2 254 157.27	1 378 642.53	2 757 285.07
Total Local Spending (R3)	**11 101 773.54**	8 946 324.74	4 772 275.91	2 155 448.80	4 403 455.29
Total Spending Impact	**45 097 878.99**	36 383 526.04		2 155 448.80	
LM3	**2.22**	**2.65**		**1.16**	
	Local multiplier (LM3)	**Local Supplier LM3**		**Non-Local Supplier LM3**	

Source: own elaboration.

The impact of farms with greater share of long supply chains on the economy of NUTS4 area is slightly higher. The difference, however, may be considered negligible (2.22 compared to 2.21 in the case of 7.5 km radius).

Concluding, there is no clear indication that short food supply chains may have a significantly more impact on the local economy (table 28).

Table 28. Local multiplier (LM3) depending on the size of the locality and the length of supply chains

	Local within 7.5km radius	Local within 15km radius
Predominantly short supply chains	1.95	2.21
Predominantly long supply chains	1.8	2.22

Source: own elaboration.

To some extent this is a consequence of hybridity of chains in which farmers participate. There are also other likely factors, such as concentration in the sector of suppliers of agriculture with means of production resulting with growing distance from farm locations, as well as more non-local hired labour, including a large number of foreign workers.

SUMMARY OF RESULTS

The main results of the sustainability assessment are presented in the table 29.

Table 29. Sustainability Indicators across food supply chains

	ECONOMIC		ENVIRONMENTAL		SOCIAL			
	Price premium [%]	Chain Added Value	Food Miles [km/kg]	Carbon Footprint (kg CO_2/ kg of product)	Labour to production	Gender equality	Bargaining power	Chain evaluation
a. Pick your own	96.7%	54.7%	1.7	1.211	41.9%	0.0%	4.3	3.4
b. On-farm sales to consumers	70.5%	40.1%	3.6	0.765	15.7%	32.2%	4.2	3.6
c. Sales to retail shops	61.9%	23.2%	0.2	0.113	1.6%	25.4%	3.9	3.6
d. Internet sales	70.4%	35.8%	0.1	0.057	24.7%	25.1%	3.7	3.4
e. Delivery to consumer	70.4%	24.4%	0.6	0.474	4.3%	17.9%	4.0	3.7
f. Sales on farmers markets	85.1%	57.7%	1.0	0.261	6.5%	49.9%	4.0	3.8
g. Sales to intermediaries	5.3%	-10.6%	0.1	0.102	0.2%	23.3%	3.3	3.3
h. Sales to wholesale market	23.5%	5.4%	0.4	0.210	0.5%	24.9%	3.5	3.5
i. Sales to retail chain	20.6%	10.3%	0.3	0.151	0.2%	26.7%	3.8	3.9
j. Sales for processing	21.0%	8.6%	0.01	0.003	0.1%	30.2%	3.8	3.9
Total sample	53.3%	26.2%	0.4	0.162	1.9%	0.0%	3.8	3.6
according to type of chains								
Short chains	72.2%	38.7%	908.9	0.266	5.7%	30.0%	4.0	3.6
Long chains	16.7%	1.0%	273.3	0.146	0.3%	25.0%	3.5	3.5
Processing	21.0%	8.6%	9.7	0.003	0.1%	30.2%	3.8	3.6

Source: own elaboration.

SFSCs are **economically more beneficial** for farmers. In each country, as well as across all short chain types, sales through short chains resulted in better prices achieved by producers, as the average values of "price premium" and "chain value added" indicated. It seems that **„long supply" channels generate less negative environmental impacts per unit** of production measured by food miles and carbon Footprint. On average Food Miles for short chains were more than three time greater compared to long chains. Relations between values of the CFP across chains reflect proportions in the Food Miles. On average consumers generate about 55% of GHG emissions, however shares of consumers and producers (including intermediaries) differs depending on the type of the chain. As social indicators are

concerned, producers perceive **SFSC as giving them greater bargaining power**. This can be observed both, in general sample average, as well as by country. Findings suggest that **SFSC are more labour intensive**. Labour resources needed for sales process differ across chains. In almost all short food supply chains they are much higher, comparing to long food channels. These differences can be noticed regardless the country and product type. However the higher labour input is offset by the **greater price premium**. The **chain value added** which reflects price premium decreased by additional costs of labour and packing in particular chain, in case of SFSC is higher than in case of long chains.

CONCLUSIONS

SFSCs cover **a whole range of different schemes and initiatives** in the value chain which can be seen as an alternative type of governance and organizational structure to the conventional distribution of food. There are numerous initiatives arising with the goal of occupying market niches and/or establishing specific relations with groups of customers. Recognizing that the social factor is gaining more and more importance driving consumers choices, still traditional forms of supply chains have a strong position on the market.

Geographic proximity and organizational arrangements are the commonly used criteria for classification of supply chains. On the basis of these criteria, 10 types of supply chains have been selected in the study, subject to the economic, environmental and social sustainability assessments.

The initial observation in our research was that individual producers participate simultaneously in several, short and long chains. This creates another dimension for **hybridity** – apart of the combination of production methods and distribution paths, producers participate in a mix of supply chains. It leads to the conclusion, that different supply chains may coexists on the market, providing options that may benefit producers, but also creating possibility of choosing from a complex market offer that satisfies different consumers expectations and needs.

Covering the whole complexity of the food supply chain would be challenging and interesting, but for the quantitative assessments the scope of the task 7.2. within the Work Package 7 had to be restricted to the producer end of the supply chain, while customers perception and motivations were examined in the qualitative way within the task 7.1. It should be emphasized here that customers on the market have much more choice of different food suppliers who provide a rich, complex offer, that includes not only quality and prices of food, but also ways in which the food is delivered to the individual customer. Consumers may also easily switch from one to another supply chain, as well as purchase food using a combination of chains and retail outlets. On the contrary, a farmer who has decided to choose a specific distribution channel cannot freely change the choice, at least not in the short term.

Dealing with the variety of supply chains and different initiatives that arise we decided to restrict our analyses to six short and four long types of chains that are the most typical and commonly used by producers in the countries participating in the case study.

Our study confirmed several statements that can be found in the literature that participation in **short food supply chains is beneficial for producers in the economic dimension**. Short chains provide a relatively high Price Premium since they allow to capture a large proportion of margin, otherwise realized by different intermediaries. This conclusion applies to all short distribution channels, product categories as well as countries.

On average participation in SFSCs resulted also in much higher Chain Value Added, although after deducting distribution costs, some chains (e.g. sales on farmers markets) were less attractive from the economic perspective. This raises the question whether producers selling through short chains are adequately compensated for the time invested in more laborious

distribution. The answer is rather positive, especially in the light of a favorable for short chains self-evaluation of different chains producers participated in.

Self-evaluation of chains and self-assessment of the bargaining power of producers in the chains was a part of the social sustainability assessment. **Position of producers in the long chains is noticeably assessed as worse compared to the short chains**. Regarding self-evaluation the score for short chains is only marginally superior to long chains which suggests that SFSC don't perform much better from producers perspective. There are three possible explanations of this phenomenon:

- producers select different chains in order to mitigate risks, thus they accept some of the potential weaknesses of the optional chains;
- within 5 components of the self-evaluation two favor long chains – greater possibility of long term contracts and larger quantities sold through long chains, while variables such as "good prices" and overall evaluation "I like it" worked in favor of short chains. Quite clearly short chain is for many producers a preferred option, however, especially for larger scale producers, there are also advantages of long chains.
- Observing developments on the market it seems to be fair to state, that a strong competition forces organizations managing long supply chains to improve trade conditions for producers.

Regarding other social sustainability indicators the results seem to confirm, that **short supply chains generate additional employment,** despite the fact, that our analyses were restricted to distribution only. **SFSCs seem to promote gender balance due to greater employment of women** in the logistics activities in contrast to long chains, where the role of women in distribution is rather limited. This implies, taking into account both economic and social attributes of the short chains, that they might be particularly important for small and medium scale producers who may have often a difficulty accessing long, conventional food chains (Gorton et al., 2014), especially such that offer better prices or other trading arrangement, but demand large quantities of produce to be delivered.

Turning to the environmental dimension, our study results indicate, that **SFSCs generate greater environmental externalities when we focus on Carbon Footprint**, which seem to be the most adequate to address distribution oriented environmental concerns.

Short food chains where customers come to a production place (farm) independently of each other (*pick your own, on-farm sales*) and so incur costs of transport and opportunity cost of their time. Home deliveries, if the farmer delivers produce to customers - provide potentially some saving in overall travel distance as round trips can be organised. In a result there would be a massive reduction in overall time taken by customers to come to collect it. In this case the producer would incur investment and running costs in transportation, however these costs normally would be transferred in price to the consumer. This makes short supply chains beneficial for producers from the economic perspective. On the other hand, consumer accepts higher purchase prices if willing to pay for convenience and specific attributes of products.

The aggregate transportation effort characteristic for short chains, especially if considering that customers would usually acquire only a few items in their overall diet, is not efficient from the environmental sustainability perspective. Our findings confirm, that as stated by (Galli and Brunori, 2013), different dimensions of sustainability may not necessarily be complementary, so a trade-off between different priorities and conflicting interests may exist.

One of the objectives of the study was to assess impact of Short Food Supply Chains on local economies. There is no clear indication that SFSCs may have a significantly more impact on the local economy. This is mainly due to a hybridity of chains in which farmers participate, concentration processes in the sector of suppliers of agriculture with means of production resulting in a growing distance between food producers and their suppliers, as well as a high share of non-local hired labour in total labour resources. This statement should be treated with some caution, however, because farm surveys do not provide enough data for full inference. The estimation of the impact of different production systems and distribution channels should be the subject of more in-depth studies.

In view of the changes that have occurred in the retail sector in some European countries (eg. UK, Norway) that resulted in a domination of hypermarket and discount chains in the food market, and currently occur in other countries (eg Poland), it can be expected that the importance of traditionally important short distribution channels such as *on farm sales* or traditional *local farmers' markets* will have less significance in the structure of sales channels, with the exception of modern initiatives such as "Sunday" or "breakfast" markets in various innovative forms. Observations from different countries indicate at the same time that, thanks to the development of IT, online sales will grow, and with the improving welfare of large groups of societies various initiatives referring to social proximity concepts will develop.

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ANNEX

Table 1. Sustainability indicators – France

	ECONOMIC		ENVIRONMENTAL		SOCIAL			
	Price premium [%]	Chain Added Value [%]	Food Miles [km/kg]	Carbon Footprint (kg CO_2/ kg of product)	Labour to production [%]	Gender equality [%]	Bargaining power	Chain evaluation
a. Pick your own	-19.0%	-25.0%	0.7	0.147	1.0%	0.0%	5.0	3.0
b. On-farm sales to consumers	61.3%	21.5%	0.9	0.304	7.3%	44.5%	4.4	3.5
c. Sales to retail shops	132.5%	28.6%	0.1	0.136	2.3%	26.8%	3.9	3.7
d. Internet sales	54.5%	46.0%	0.03	0.027	1.9%	50.0%	3.4	2.8
e. Delivery to consumer	50.7%	162.9%	0.02	1.172	0.2%	5.5%	3.7	3.2
f. Sales on farmers markets	71.7%	29.0%	1.5	0.308	12.4%	45.5%	4.3	3.9
g. Sales to intermediaries	25.0%	4.2%	1.5	0.144	1.8%	49.3%	3.8	3.4
h. Sales to wholesale market	22.8%	-28.9%	0.6	0.308	2.7%	25.8%	2.9	3.0
i. Sales to retail chain	6.3%	-3.3%	0.1	0.131	0.1%	33.3%	2.8	3.0
j. Sales for processing	-	-	-	-	-	-	-	-
Total sample	76.2%	25.5%	**0.2**	0.166	1.7%	0.0%	4.0	3.5
CFP according to type of chains								
Short chains	90.2%	34.4%	0.2	0.183	2.8%	32.7%	4.1	3.6
Long chains	19.8%	-10.2%	0.2	0.145	0.3%	29.3%	3.2	3.2
Processing	-	-	-	-	-	-	-	-

Source: own elaboration.

Table 2. Sustainability indicators – Hungary

	ECONOMIC		ENVIRONMENTAL		SOCIAL			
	Price premium [%]	Chain Added Value [%]	Food Miles [km/kg]	Carbon Footprint (kg CO_2/ kg of product)	Labour to production [%]	Gender equality [%]	Bargaining power	Chain evaluation
a. Pick your own	-	-	-	-	-	-	-	-
b. On-farm sales to consumers	60.7%	32.9%	0.6	0.098	22.0%	26.1%	4.1	3.5
c. Sales to retail shops	33.0%	0.0%	-	0.112	9.0%	72.7%	3.5	3.7
d. Internet sales	46.5%	22.1%	0.01	0.002	7.4%	55.1%	3.2	3.1
e. Delivery to consumer	51.8%	-68.9%	0.2	0.101	11.8%	23.8%	4.1	3.8
f. Sales on farmers markets	74.4%	40.0%	0.3	0.193	7.5%	60.8%	4.0	4.0
g. Sales to intermediaries	-0.8%	-10.5%	0.1	0.091	1.7%	62.7%	2.7	3.6
h. Sales to wholesale market	45.4%	18.2%	0.3	0.086	3.3%	51.9%	3.1	2.9
i. Sales to retail chain	-	-	-	-	-	-	-	-
j. Sales for processing	-	-	-	-	-	-	-	-
Total sample	50.4%	11.3%	**0.3**	0.126	9.7%	0.0%	3.7	3.6
CFP according to type of chains								
Short chains	61.7%	15.4%	0.3	0.140	12.2%	35.3%	4.1	3.7
Long chains	12.0%	-2.5%	0.2	0.087	2.8%	54.0%	2.8	3.4
Processing	-	-	-	-	-	-	-	-

Source: own elaboration.

Table 3. Sustainability indicators – Italy

	ECONOMIC		ENVIRONMENTAL		SOCIAL			
	Price premium [%]	Chain Added Value [%]	Food Miles [km/kg]	Carbon Footprint (kg CO_2/ kg of product)	Labour to production [%]	Gender equality [%]	Bargaining power	Chain evaluation
a. Pick your own	-	-	-	-	-	-	-	-
b. On-farm sales to consumers	60.1%	16.2%	8.1	0.999	30.0%	36.0%	4.1	4.0
c. Sales to retail shops	43.0%	23.4%	1.2	0.274	2.4%	0.1%	3.8	3.8
d. Internet sales	64.9%	-0.7%	0.1	0.061	33.8%	18.0%	3.8	3.5
e. Delivery to consumer	49.8%	20.2%	1.7	0.438	0.5%	0.5%	4.1	3.6
f. Sales on farmers markets	71.8%	60.3%	1.0	0.189	1.5%	38.9%	3.9	3.8
g. Sales to intermediaries	11.3%	-1.9%	0.04	0.082	0.6%	1.6%	3.6	3.7
h. Sales to wholesale market	19.0%	1.3%	0.4	0.104	0.1%	0.0%	3.1	3.4
i. Sales to retail chain	-	-	-	-	-	-	-	-
j. Sales for processing	68.0%	18.4%	-	0.002	0.0%	0.0%	4.0	4.0
Total sample	54.6%	22.2%	**1.4**	0.206	6.1%	0.0%	3.9	3.8
CFP according to type of chains								
Short chains	61.0%	26.5%	4.9	0.645	22.5%	31.2%	4.0	3.8
Long chains	16.7%	0.3%	0.3	0.096	0.3%	1.2%	3.2	3.5
Processing	68.0%	18.4%	-	0.002	0.0%	0.0%	4.0	4.0

Source: own elaboration.

Table 4. Sustainability indicators – Norway

	ECONOMIC		ENVIRONMENTAL		SOCIAL			
	Price premium [%]	Chain Added Value [%]	Food Miles [km/kg]	Carbon Footprint (kg CO_2/ kg of product)	Labour to production [%]	Gender equality [%]	Bargaining power	Chain evaluation
a. Pick your own	-	-	-	-	-	-	-	-
b. On-farm sales to consumers	63.2%	40.7%	2.1	2.198	8.9%	38.1%	4.8	4.2
c. Sales to retail shops	18.6%	-1.4%	0.7	0.226	10.0%	18.6%	4.3	4.1
d. Internet sales	92.0%	91.5%	0.03	0.012	0.0%	80.0%	4.0	3.3
e. Delivery to consumer	0.0%	-94.4%	1.4	0.194	13.0%	50.0%	5.0	4.0
f. Sales on farmers markets	138.0%	108.5%	0.9	0.179	19.1%	40.5%	5.0	4.2
g. Sales to intermediaries	0.0%	-45.3%	-	0.186	1.0%	0.0%	4.0	4.0
h. Sales to wholesale market	3.4%	-1.8%	0.1	0.107	0.0%	15.5%	3.8	4.1
i. Sales to retail chain	51.5%	51.0%	0.02	0.146	0.0%	50.0%	3.5	4.3
j. Sales for processing	0.0%	-0.9%	-	0.013	0.1%	0.0%	4.1	4.5
Total sample	40.2%	21.7%	**0.3**	0.314	1.5%	0.0%	4.4	4.1
CFP according to type of chains								
Short chains	53.1%	28.8%	1.5	1.462	9.3%	30.7%	4.6	4.1
Long chains	11.4%	6.0%	0.1	0.118	0.1%	7.7%	3.7	4.1
Processing	0.0%	-0.9%	-	0.013	0.1%	0.0%	4.1	4.5

Source: own elaboration.

Table 5. Sustainability indicators – Poland

	ECONOMIC		ENVIRONMENTAL		SOCIAL			
	Price premium [%]	Chain Added Value [%]	Food Miles [km/kg]	Carbon Footprint (kg CO_2/ kg of product)	Labour to production [%]	Gender equality [%]	Bargaining power	Chain evaluation
a. Pick your own	-	-	-	-	-	-	-	-
b. On-farm sales to consumers	61.0%	37.1%	1.5	0.301	4.6%	55.9%	4.4	3.8
c. Sales to retail shops	29.5%	16.6%	1.0	0.173	2.4%	35.8%	3.8	3.5
d. Internet sales	49.2%	22.7%	0.2	0.077	9.6%	64.0%	3.7	3.5
e. Delivery to consumer	90.5%	78.1%	0.4	0.119	2.9%	51.4%	4.0	3.8
f. Sales on farmers markets	61.7%	40.5%	1.2	0.320	5.6%	50.4%	4.0	3.8
g. Sales to intermediaries	13.2%	3.8%	0.1	0.101	0.1%	50.2%	3.7	3.4
h. Sales to wholesale market	22.3%	5.7%	0.2	0.129	1.7%	25.7%	3.8	3.6
i. Sales to retail chain	15.3%	3.8%	0.5	0.136	0.1%	28.9%	3.9	4.0
j. Sales for processing	13.0%	8.4%	0.01	0.004	0.1%	37.6%	3.8	3.8
Total sample	30.4%	16.0%	**0.2**	0.090	0.4%	0.0%	3.9	3.7
CFP according to type of chains								
Short chains	54.6%	33.7%	1.1	0.252	4.5%	51.3%	4.1	3.7
Long chains	17.5%	4.5%	0.3	0.118	0.3%	29.7%	3.8	3.7
Processing	13.0%	8.4%	0.01	0.004	0.1%	37.6%	3.8	3.8

Source: own elaboration.

Table 6. Sustainability indicators – United Kingdom

	ECONOMIC		ENVIRONMENTAL		SOCIAL			
	Price premium [%]	Chain Added Value [%]	Food Miles [km/kg]	Carbon Footprint (kg CO_2/ kg of product)	Labour to production [%]	Gender equality [%]	Bargaining power	Chain evaluation
a. Pick your own	154.5%	94.6%	1.9	1.422	50.0%	-	4.0	3.6
b. On-farm sales to consumers	135.4%	118.3%	1.2	0.431	8.0%	10.3%	3.7	3.2
c. Sales to retail shops	75.5%	71.0%	0.1	0.076	0.1%	11.2%	3.8	4.0
d. Internet sales	110.0%	85.7%	0.1	0.050	17.4%	45.0%	3.9	3.4
e. Delivery to consumer	136.3%	131.7%	1.0	0.198	4.2%	0.5%	3.5	3.9
f. Sales on farmers markets	149.9%	123.6%	0.8	0.260	4.8%	48.4%	3.9	3.3
g. Sales to intermediaries	-	-	-	-	-	-	-	-
h. Sales to wholesale market	30.1%	21.7%	0.7	0.426	0.0%	4.0%	3.1	3.5
i. Sales to retail chain	123.0%	117.9%	-	0.469	1.0%	10.0%	4.0	4.3
j. Sales for processing	129.0%	4.4%	-	0.092	63.0%	0.0%	3.0	3.5
Total sample	108.2%	90.8%	**0.4**	0.241	1.8%	0.0%	3.6	3.5
CFP according to type of chains								
Short chains	124.4%	106.6%	0.3	0.154	2.5%	16.6%	3.7	3.5
Long chains	37.2%	29.1%	0.6	0.434	0.2%	7.0%	3.2	3.6
Processing	129.0%	4.4%	-	0.092	63.0%	0.0%	3.0	3.5

Source: own elaboration.

Table 7. Sustainability indicators – Vietnam

	ECONOMIC		ENVIRONMENTAL		SOCIAL			
	Price premium [%]	Chain Added Value [%]	Food Miles [km/kg]	Carbon Footprint (kg CO_2/ kg of product)	Labour to production [%]	Gender equality [%]	Bargaining power	Chain evaluation
a. Pick your own	-	-	-	-	-	-	-	-
b. On-farm sales to consumers	11.2%	-50.8%	0.5	0.123	26.3%	39.7%	3.8	2.3
c. Sales to retail shops	1.5%	-3.7%	0.2	0.052	14.8%	36.4%	3.9	3.1
d. Internet sales	-	-	-	-	-	-	-	-
e. Delivery to consumer	-	-	-	-	-	-	-	-
f. Sales on farmers markets	-	-	-	-	-	-	-	-
g. Sales to intermediaries	-14.4%	-55.0%	0.4	0.084	7.3%	30.5%	3.0	2.1
h. Sales to wholesale market	0.0%	-28.3%	0.2	0.078	5.0%	50.0%	4.8	2.3
i. Sales to retail chain	-	-	-	-	-	-	-	-
j. Sales for processing	-	-	-	-	-	-	-	-
Total sample	-1.0%	-27.5%	**0.2**	0.063	12.4%	0.0%	3.7	2.6
CFP according to type of chains								
Short chains	4.2%	-16.8%	0.2	0.054	15%	36%	3.8	2.9
Long chains	-12.6%	-51.6%	0.3	0.082	6%	37%	3.3	2.1
Processing	-	-	-	-	-	-	-	-

Source: own elaboration.

Table 8. Price premium [%] across supply chains by countries

	Volume of sales (tonnes)	Price premium in full sample	France	Hungary	Italy	Norway	Poland	UK	Vietnam
a. Pick your own	16.3	96.7	-19.0	-	-	-	-	154.5	-
b. On-farm sales to consumers	855.9	70.5	61.3	60.7	60.1	63.2	61.0	135.4	11.2
c. Sales to retail shops	2,920.1	61.9	132.5	33.0	43.0	18.6	29.5	75.5	1.5
d. Internet sales	148.2	70.4	54.5	46.5	64.9	92.0	49.2	110.0	-
e. Delivery to consumer	176.7	70.4	50.7	51.8	49.8	0.0	90.5	136.3	-
f. Sales on farmers' markets	313.1	85.1	71.7	74.4	71.8	138.0	61.7	149.9	-
g. Sales to intermediaries	2,280.3	5.3	25.0	-0.8	11.3	-29.0	13.2	-	-14.4
h. Sales to wholesale market	2,323.1	23.5	22.8	45.4	19.0	3.4	22.3	30.1	0.0
i. Sales to retail chain	3,018.9	20.6	6.3	-	-	51.5	15.3	123.0	-
j. Sales for processing	2,558.5	21.0	-	-	68.0	0.0	13.0	129.0	-
Total sample	**14,611.1**	**53.3**	**76.2**	**50.4**	**54.6**	**40.2**	**30.4**	**108.2**	**-1.0**
Short chains	4430.4	72.2	90.2	61.7	61.0	53.1	54.6	124.4	4.2
Long chains	7622.2	16.7	19.8	12.0	16.7	11.4	17.5	37.2	-12.6

Source: own elaboration.

Table 9. Price premium [%] across supply chains by types of products

	Apples	Cheese	Dried plums	Eggs	Fish & Seafood	Honey	Meat products	Strawberries	Vegetables	Total
a. Pick your own	-19	-	-	-	155	-	-	-	-	97
b. On-farm sales to consumers	77	31	46	104	134	45	72	68	69	71
c. Sales to retail shops	18	30	-	0	64	-	57	33	96	62
d. Internet sales	88	42	54	92	122	47	80	-	88	70
e. Delivery to consumer	88	45	-	-	136	52	64	86	43	70
f. Sales on farmers' markets	28	47	59	-	185	60	136	99	81	85
g. Sales to intermediaries	4	10	13	-	-29	-8	-	16	4	5
h. Sales to wholesale market	23	15	7	23	48	-	-6	32	22	23
i. Sales to retail chain	17	33	7	-	123	-	0	40	10	21
j. Sales for processing	-5	68	-	-	129	-	0	15	47	21
Short chains	50	37	53	81	122	48	91	74	79	72
Long chains	15	16	8	23	48	-8	-5	26	12	17

Source: own elaboration.

Table 10. Chain Added Value [%] across supply chains by country

	Volume of sales (tonnes)	Sample	France	Hungary	Italy	Norway	Poland	UK	Vietnam
a. Pick your own	16.3	54.7	-25.0	-	-	-	-	94.6	-
b. On-farm sales to consumers	855.9	40.1	21.5	32.9	16.2	40.7	37.1	118.3	-50.8
c. Sales to retail shops	2920.1	23.2	28.6	0.0	23.4	-1.4	16.6	71.0	-3.7
d. Internet sales	148.2	35.8	46.0	22.1	-0.7	91.5	22.7	85.7	-
e. Delivery to consumer	176.7	24.4	162.9	-68.9	20.2	-94.4	78.1	131.7	-
f. Sales on farmers' markets	313.1	57.7	29.0	40.0	60.3	108.5	40.5	123.6	-
g. Sales to intermediaries	2280.3	-10.6	4.2	-10.5	-1.9	-45.3	3.8	-	-55.0
h. Sales to wholesale market	2323.1	5.4	-28.9	18.2	1.3	-1.8	5.7	21.7	-28.3
i. Sales to retail chain	3018.9	10.3	-3.3	-	-	51.0	3.8	117.9	-
j. Sales for processing	2558.5	8.6	-	-	18.4	-0.9	8.4	4.4	-
Short chains	4430.4	38.7	34.4	15.4	26.5	28.8	33.7	106.6	-16.8
Long chains	7622.2	1.0	-10.2	-2.5	0.3	6.0	4.5	29.1	-51.6

Source: own elaboration.

Table 11. Carbon Footprint (CFP) for distribution chains in the sample – Norway

	Volume of sales [tonnes]	Total Carbon Footprint [kgCO_2/ chain]	Total Carbon Footprint [kg CO_2/kg of product]	CFP Producer [kg CO_2/kg]	CFP Consumer [kg CO_2/kg]	Share of CFP producer [%]	Share of CFP consumer [%]
a. Pick your own	-	-	-	-	-	-	-
b. On-farm sales to consumers	85.6	188160.1	2.198	-	2.198	-	100.0%
c. Sales to retail shops	48.2	10877.6	0.226	0.196	0.030	86.7%	13.3%
d. Internet sales	1.4	16.4	0.012	0.012	-	100.0%	-
e. Delivery to consumer	0.5	96.9	0.194	0.194	-	100.0%	0.0%
f. Sales on farmers' markets	0.7	122.0	0.179	0.032	0.147	18.1%	81.9%
g. Sales to intermediaries	80.0	14844.5	0.186	0.143	0.043	76.9%	23.1%
h. Sales to wholesale market	622.9	66573.3	0.107	0.064	0.043	59.8%	40.2%
i. Sales to retail chain	54.8	7981.7	0.146	0.055	0.091	37.5%	62.5%
j. Sales for processing	27.5	359.1	0.013	0.013	-	100.0%	-
CFP according to type of chain							
Short chains	136.3	199273.0	1.462	0.070	1.392	4.8%	95.2%
Long chains	757.7	89399.5	0.118	0.072	0.046	60.6%	39.4%
Processing	27.5	359.1	0.013	0.013	-	100.0%	-
CFP according to certification system							
Conventional	170.0	15079.3	0.089	0.043	0.045	48.9%	51.1%
FQS (including organic)	1673.0	562984.0	0.335	0.072	0.263	21.6%	78.4%

Source: own elaboration.

Table 12. Carbon Footprint (CFP) for distribution chains in the sample – France

	Volume of sales [tonnes]	Total Carbon Footprint [kg CO_2/ chain]	Total Carbon Footprint [kg CO_2/kg of product]	CFP Producer [kg CO_2/kg]	CFP Consumer [kg CO_2/kg]	Share of CFP producer [%]	Share of CFP consumer [%]
a. Pick your own	2.7	397.0	0.147	-	0.147	-	100.0%
b. On-farm sales to consumers	77.6	23546.1	0.304	-	0.304	-	100.0%
c. Sales to retail shops	1342.2	182849.5	0.136	0.106	0.030	78.0%	22.0%
d. Internet sales	9.3	245.9	0.027	0.027	-	100.0%	-
e. Delivery to consumer	47.7	55890.1	1.172	1.172	-	100.0%	-
f. Sales on farmers' markets	59.3	18246.0	0.308	0.161	0.147	52.3%	47.7%
g. Sales to intermediaries	5.3	758.3	0.144	0.101	0.043	70.3%	29.7%
h. Sales to wholesale market	106.7	32879.9	0.308	0.265	0.043	86.1%	13.9%
i. Sales to retail chain	1193.4	156201.0	0.131	0.040	0.091	30.2%	69.8%
j. Sales for processing	-	-	-	-	-	-	-
CFP according to type of chain							
Short chains	1538.7	281174.7	0.183	0.135	0.047	74.1%	25.9%
Long chains	1305.4	189839.2	0.145	0.058	0.087	40.0%	60.0%
Processing	-	-	-	-	-	-	-
CFP according to certification system							
Conventional	1757.2	265570.0	0.151	0.075	0.076	49.9%	50.1%
FQS (including organic)	1086.9	205444.0	0.243	0.169	0.073	71.5%	28.5%

Source: own elaboration.

Table 13. Carbon Footprint (CFP) for distribution chains in the sample – Hungary

	Volume of sales [tonnes]	Total Carbon Footprint [kgCO_2/ chain]	Total Carbon Footprint [kg CO_2/kg of product]	CFP Producer [kg CO_2/kg]	CFP Consumer [kg CO_2/kg]	Share of CFP producer [%]	Share of CFP consumer [%]
a. Pick your own	-	-	-	-	-	-	-
b. On-farm sales to consumers	28.6	2802.2	0.098	-	0.098	-	100.0%
c. Sales to retail shops	2.5	281.7	0.112	0.082	0.030	73.2%	26.8%
d. Internet sales	0.6	1.4	0.002	0.002	-	100.0%	-
e. Delivery to consumer	42.0	4245.1	0.101	0.101	-	100.0%	-
f. Sales on farmers' markets	55.4	10681.2	0.193	0.046	0.147	23.9%	76.1%
g. Sales to intermediaries	15.4	1390.4	0.091	0.048	0.043	52.5%	47.5%
h. Sales to wholesale market	31.5	2697.8	0.086	0.043	0.043	49.8%	50.2%
i. Sales to retail chain	-	-	-	-	-	-	-
j. Sales for processing	-	-	-	-	-	-	-
CFP according to type of chain							
Short chains	129.0	18011.5	0.140	0.054	0.085	38.9%	61.1%
Long chains	46.9	4088.2	0.087	0.044	0.043	50.7%	49.3%
Processing	-	-	-	-	-	-	-
CFP according to certification system							
Conventional	123.5	15883.0	0.129	0.041	0.088	31.7%	68.3%
FQS (including organic)	228.2	28316.4	0.123	0.062	0.060	51.1%	48.9%

Source: own elaboration.

Table 14. Carbon Footprint (CFP) for distribution chains in the sample – Italy

	Volume of sales [tonnes]	Total Carbon Footprint [kgCO2/ chain]	Total Carbon Footprint [kg CO2/kg of product]	CFP Producer [kg CO2/kg]	CFP Consumer [kg CO2/kg]	Share of CFP producer [%]	Share of CFP consumer [%]
a. Pick your own	-	-	-	-	-	-	-
b. On-farm sales to consumers	289.9	289616.6	0.999	-	0.999	-	100.0%
c. Sales to retail shops	70.7	19348.7	0.274	0.244	0.030	89.0%	11.0%
d. Internet sales	82.6	5063.7	0.061	0.061	-	100.0%	-
e. Delivery to consumer	29.4	12876.5	0.438	0.438	-	100.0%	-
f. Sales on farmers' markets	48.0	9053.6	0.189	0.042	0.147	22.1%	77.9%
g. Sales to intermediaries	254.2	20857.0	0.082	0.039	0.043	47.6%	52.4%
h. Sales to wholesale market	451.5	46730.3	0.104	0.060	0.043	58.4%	41.6%
i. Sales to retail chain	-	-	-	-	-	-	-
j. Sales for processing	744.0	1530.6	0.002	0.002	-	100.0%	-
CFP according to type of chain							
Short chains	520.6	335959.0	0.645	0.071	0.574	11.1%	88.9%
Long chains	705.7	67587.4	0.096	0.053	0.043	55.1%	44.9%
Processing	744.0	1530.6	0.002	0.002	-	100.0%	-
CFP according to certification system							
Conventional	1863.2	376268.0	0.202	0.036	0.166	17.9%	82.1%
FQS (including organic)	2077.3	433885.9	0.232	0.055	0.177	23.1%	76.9%

Source: own elaboration.

Table 15. Carbon Footprint (CFP) for distribution chains in the sample – Poland

	Volume of sales [tonnes]	Total Carbon Footprint [kgCO_2/ chain]	Total Carbon Footprint [kg CO_2/kg of product]	CFP Producer [kg CO_2/kg]	CFP Consumer [kg CO_2/kg]	Share of CFP producer [%]	Share of CFP consumer [%]
a. Pick your own	-	-	-	-	-	-	-
b. On-farm sales to consumers	79.4	23932.3	0.301	-	0.301	-	100.0%
c. Sales to retail shops	73.4	12728.4	0.173	0.143	0.030	82.7%	17.3%
d. Internet sales	12.4	948.2	0.077	0.077	-	100.0%	0.0%
e. Delivery to consumer	9.5	1134.7	0.119	0.119	-	100.0%	-
f. Sales on farmers' markets	79.5	25405.1	0.320	0.173	0.147	54.0%	46.0%
g. Sales to intermediaries	1911.5	193317.5	0.101	0.058	0.043	57.6%	42.4%
h. Sales to wholesale market	445.7	57650.1	0.129	0.086	0.043	66.8%	33.2%
i. Sales to retail chain	1615.5	218990.6	0.136	0.045	0.091	33.0%	67.0%
j. Sales for processing	1786.6	6808.6	0.004	0.004	-	100.0%	-
CFP according to type of chain							
Short chains	254.2	64148.6	0.252	0.104	0.149	41.0%	59.0%
Long chains	3972.6	469958.1	0.118	0.056	0.062	47.2%	52.8%
Processing	1786.6	6808.6	0.004	0.004	-	100.0%	-
CFP according to certification system							
Conventional	3417.5	272309.2	0.080	0.038	0.041	48.0%	52.0%
FQS (including organic)	2595.9	268606.1	0.067	0.031	0.037	40.2%	59.8%

Source: own elaboration.

Table 16. Carbon Footprint (CFP) for distribution chains in the sample – UK

	Volume of sales [tonnes]	Total Carbon Footprint [kgCO_2/ chain]	Total Carbon Footprint [kg CO_2/kg of product]	CFP Producer [kg CO_2/kg]	CFP Consumer [kg CO_2/kg]	Share of CFP producer [%]	Share of CFP consumer [%]
a. Pick your own	13.6	19345.6	1.422	-	1.422	-	100.0%
b. On-farm sales to consumers	293.6	126627.7	0.431	-	0.431	-	100.0%
c. Sales to retail shops	1335.7	101877.2	0.076	0.046	0.030	60.7%	39.3%
d. Internet sales	42.1	2119.5	0.050	0.050	-	100.0%	-
e. Delivery to consumer	47.7	9450.6	0.198	0.198	-	100.0%	-
f. Sales on farmers' markets	70.3	18305.7	0.260	0.113	0.147	43.6%	56.4%
g. Sales to intermediaries	-	-	-	-	-	-	-
h. Sales to wholesale market	656.8	279607.0	0.426	0.383	0.043	89.9%	10.1%
i. Sales to retail chain	155.2	72742.2	0.469	0.378	0.091	80.6%	19.4%
j. Sales for processing	0.4	36.9	0.092	0.092	-	100.0%	-
CFP according to type of chain							
Short chains	1803.0	277726.3	0.154	0.045	0.109	29.3%	70.7%
Long chains	812.0	352349.2	0.434	0.382	0.052	88.0%	12.0%
Processing	0.4	36.9	0.092	0.092	-	100.0%	-
CFP according to certification system							
Conventional	2579.0	614050.8	0.238	0.151	0.087	63.3%	36.7%
FQS (including organic)	2651.8	646174.0	0.325	0.118	0.208	43.0%	57.0%

Source: own elaboration.

Table 17. Carbon Footprint (CFP) for distribution chains in the sample – Vietnam

	Volume of sales [tonnes]	Total Carbon Footprint [kgCO_2/ chain]	Total Carbon Footprint [kg CO_2/kg of product]	CFP Producer [kg CO_2/kg]	CFP Consumer [kg CO_2/kg]	Share of CFP producer [%]	Share of CFP consumer [%]
a. Pick your own	-	-	-	-	-	-	-
b. On-farm sales to consumers	1.2	147.9	0.123	-	0.123	-	100.0%
c. Sales to retail shops	47.4	2479.3	0.052	0.022	0.030	42.4%	57.6%
d. Internet sales	-	-	-	-	-	-	-
e. Delivery to consumer	-	-	-	-	-	-	-
f. Sales on farmers' markets	-	-	-	-	-	-	-
g. Sales to intermediaries	14.0	1171.5	0.084	0.041	0.043	48.7%	51.3%
h. Sales to wholesale market	8.0	626.4	0.078	0.035	0.043	44.9%	55.1%
i. Sales to retail chain	-	-	-	-	-	-	-
j. Sales for processing	-	-	-	-	-	-	-
CFP according to type of chain							
Short chains	48.6	2627.2	0.054	0.022	0.032	40.0%	60.0%
Long chains	22.0	1797.9	0.082	0.039	0.043	47.4%	52.6%
Processing	-	-	-	-	-	-	-
CFP according to certification system							
Conventional	17.3	1288.4	0.075	0.032	0.043	42.4%	57.6%
FQS (including organic)	53.4	3136.7	0.058	0.024	0.033	41.6%	58.4%

Source: own elaboration.

Table 18. Chain evaluation of supply chains by different criterions [Likert scale 1-5]

	GOOD PRICES	LARGE QUANTITIES	LABOUR REQUIREMENTS	POSSIBILITY OF LONG TERM CONTRACTS	REGULAR AND ASSURED PAYMENTS	I LIKE IT	CHAIN EVALUATION
a. Pick your own	4.67	1.67	3.67	1.50	4.00	4.33	3.39
b. On-farm sales to consumers	4.31	2.45	3.28	2.61	4.32	4.54	3.61
c. Sales to retail shops	3.92	3.07	3.17	3.34	4.27	4.07	3.65
d. Internet sales	3.86	2.39	3.00	2.46	4.14	4.39	3.36
e. Delivery to consumer	4.21	3.39	3.07	2.92	4.52	4.36	3.73
f. Sales on farmers' markets	4.17	3.03	3.31	2.98	4.50	4.68	3.78
g. Sales to intermediaries	2.64	4.20	3.18	2.50	3.78	3.49	3.29
h. Sales to wholesale market	2.97	4.15	3.03	3.20	4.15	3.25	3.46
i. Sales to retail chain	3.54	4.71	3.61	3.77	4.18	3.82	3.93
j. Sales for processing	2.87	4.65	4.00	3.42	4.55	3.63	3.85
	3.74	**3.33**	**3.27**	**2.96**	**4.27**	**4.11**	**3.62**

Source: own elaboration.

Table 19. Gender equality [%] across supply chains by country

	Volume of sales (tonnes)	Full sample	France	Hungary	Italy	Norway	Poland	UK	Vietnam
a. Pick your own	16.3	0.0	0.0	-	-	-	-	0.0	-
b. On-farm sales to consumers	855.9	32.2	44.5	26.1	36.0	38.1	55.9	10,3	39.7
c. Sales to retail shops	2,920.1	25.4	26.8	72.7	0.1	18.6	35.8	11.2	36.4
d. Internet sales	148.2	25.1	50.0	55.1	18.0	80.0	64.0	45.0	-
e. Delivery to consumer	176.7	17.9	5.5	23.8	0.5	50.0	51.4	0,5	-
f. Sales on farmers' markets	313.1	49.9	45.5	60.8	38.9	40.5	50.4	48.4	-
g. Sales to intermediaries	2,280.3	23.3	49.3	62.7	1.6	0.0	50.2	-	30.5
h. Sales to wholesale market	2,323.1	24.9	25.8	51.9	0.0	15.5	25.7	4.0	50.0
i. Sales to retail chain	3,018.9	26.7	33.3	-	-	50.0	28.9	10.0	-
j. Sales for processing	2,558.5	30.2	-	-	0.0	0.0	37.6	0.0	-
Gender equality [%]									
Short chains	4,430.4	**30.0**	32.7	35.3	31.2	30.7	51.3	16.6	36.5
Long chains	7,622.2	**25.0**	29.3	54.0	1.2	7.7	29.7	7.0	36.6

Source: own elaboration.