# Food system integration of olive oil producing small farms: a comparative study of four Mediterranean regions

Pavlos Karanikolas[a], Teresa Pinto Correia[b], Victor Martinez-Gomez[c], Francesca Galli[d], Paola Andrea Hernandez[e], Laura Fastelli[f], Laura Arnalte-Mur[g], Maria Rivera Mendez[h], Paolo Prosperi[i] and Giannis Goussios[j]

[a] *Agricultural University of Athens, Department of Agricultural Economics & Rural Development, Athens, Greece, pkaranik@aua.gr*
[b] *Universidade de Évora/ICAAM, Instituto de Ciências Agrárias e Ambientais Mediterrânicas, Évora, Portugal, mtpc@uevora.pt*
[c] *Universitat Politècnica de València, Departamento de Economía y Ciencias Sociales, Valencia, Spain, vicmargo@esp.upv.es*
[d] *University of Pisa, Department of Agriculture, Food and Environment, Pisa, Italy, francesca.galli@for.unipi.it*
[e] *Universidade de Évora/ICAAM, Instituto de Ciências Agrárias e Ambientais Mediterrânicas, Évora, Portugal, paolaher@uevora.pt*
[f] *University of Pisa, Department of Agriculture, Food and Environment, Pisa, Italy, laura.fastelli@for.unipi.it*
[g] *Universitat Politècnica de València, Departamento de Economía y Ciencias Sociales, Valencia, Spain, lauarmur@esp.upv.es*
[h] *Universidade de Évora/ICAAM, Instituto de Ciências Agrárias e Ambientais Mediterrânicas, Évora, Portugal, mrmendez@uevora.pt*
[i] *University of Pisa, Department of Agriculture, Food and Environment, Pisa, Italy, paolo.prosperi@agr.unipi.it*
[j] *Agricultural University of Athens, Department of Agricultural Economics & Rural Development, Athens, Greece, goussios@aua.gr*

**Abstract:** *By adopting a food system approach, this study aims at examining the contribution of olive oil producing small farms (OSFs) to regional food systems, through the identification of the value chains in which OSFs are integrated, and the diversity of power structures across these chains. Drawing on data from the on-going EU H2020 project 'SALSA', a comparative study of OSFs in the Mediterranean regions of Castellón (Spain), Lucca (Italy), Ileia (Greece) and Central Alentejo (Portugal) has been carried out.*
*The four regions are highly differentiated in terms of olive faming systems, quality of the olive oil, relative importance of OSFs and small food businesses (SFBs), scale of operations, as well as interlinkages between food systems actors. Varying degrees of concentration rates were identified, as well as different modes of articulation of the local produce with national and international agri-industrial food systems.*
*Olive oil systems in the four regions are mainly export oriented, with an impressive inter- and intra-regional diversity. OSFs are related to multiple food systems (domestic, local, regional, agri-industrial, differentiated quality). OSFs present a high degree of self-provision in quality olive oil, accompanied with extended non-market exchanges, as well as own networks of customers, in the context of on-farm diversification strategies, or inter-personal relationships. Small farms can overcome some major constraints emanating from the unequal distribution of power across the value chains, through 'shortening' the distance until the final consumer; through labelling and branding; where the whole food system structure is less concentrated, and networks of OSFs-SFBs can exert effectively a countervailing power.*

***Keywords:*** *Food systems, value chains, small farms, olive oil, power, Southern Europe*

## Introduction

Despite the trend in declining number of agricultural holdings and a gradual increase in average farm size, the European agricultural sector is largely characterized by small farms, whether defined by criteria of land size, standard output, labour units or production volume (EC, 2011; Hubbard, 2009). Small farms are characterized by a strong heterogeneity and encompass a wide range of organizational and structural patterns across Europe, and around the world (Brookfield and Parsons, 2007; FAO, 2014). A spread feature is the direct involvement of family labour in farming operations (FAO, 2014; Knickel et al., 2013). Household income sources and farm production are also important for family food consumption. Different from larger and more specialised farms, family farms tend to make decisions and behave partially independently from the signals and the pressures of the market economy. Another important difference is the capacity of small farms to mobilize resources additional to those procured through market exchange, such as social capital and local knowledge (van der Ploeg, 2013). The ways in which small farms contribute to sustainability and food security is a relevant research topic, also raised by European and international authorities (FAO, 2006).

This study draws upon on-going research carried out in the context of an EU H2020 project 'SALSA' (http://www.salsa.uevora.pt/en/), whose aim is to examine and explore the distinctive contribution of small farms and small food businesses to food systems' multiple outcomes. Particularly, the food system approach should highlight the distinctive contribution of small farms and food businesses to the dimensions of food and nutrition security and other socio-economic-environmental outcomes, as well as the connections between them.

This contribution represents a preliminary output of the project, with reference to a specific product and sector, i.e. olive oil. Here, small farms play a key role, particularly in Mediterranean regions where the sector is most developed. We carry out a comparison between the relationships, processes and roles that olive oil producing small farms (OSFs) play within their particular food systems and contexts. The analysis of the way OSFs interact within food systems, combined with a perspective on the interplays across local, regional and global value chains, can help depict how the relationships between consumption, production, market integration and dependency may affect food and nutrition security (FNS) and sustainability. Hence, the study addresses the following questions: what is the contribution of OSFs to regional food systems? What are the key connections to consumption patterns? What are the main cross-cutting similarities and differences? More specifically, we examine the contribution of OSFs to regional food systems, through: i) the identification of the different value chains in which OSFs are integrated (including those partially disconnected with commercial value chains) and ii) the power structures across these chains. Data obtained from the research project is used for a comparative analysis of OSFs in case study areas situated in the Mediterranean regions of Castellón (Spain), Lucca (Italy), Ileia (Greece) and Central Alentejo (Portugal).

## Conceptual Framework

The analysis adopts a food system approach, with food systems defined as *"…all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the outputs of these activities, including socio-economic and environmental outcomes"* HLPE (2014, p.12). This definition highlights a move beyond farming and production and extends to supply chain and consumption, including the power dynamics of actors along the supply chain, nutrition and consumption patterns

and relevant institutions and governance processes. It should be noticed that the food system concept proposed by the literature generally refers to a-spatial descriptions in which distances and geography do not play an explicit role.

Our conceptual and analytical frameworks (Grando et al., 2016; Brunori et al., 2017) look at food systems as territorially-based, referencing to the specific territory in which food systems are embedded. This is because the in-depth analysis of the linkages between smaller farms and the regional food systems, in which these farms and food business are inserted, may prove useful to elucidate the outcomes of the systems. A regionalized approach recognizes the heterogeneity of small farm situations embedded in local areas (with their differing histories, cultures and geographies) on the one hand, and in the sectoral and systems perspective (with sub-systems and inter-scale relations and effects) on the other (OECD, 2016; Rastoin, 2015).

The relational configurations farmers develop with other farms and actors of the regional food system shape the properties and the outcomes of the food systems to which they are connected. For example, a high proportion of local production may be connected to global value chains or to the regional market, or stay confined in a proximity context, with differing implications for FNS and sustainability. Additionally, we consider both market and extra-market relations as relevant to study farms' connections to regional food systems, because the informal and extra-market exchanges can be particularly relevant in the case of subsistence farming (explored by Davidova et al., 2012), although, in some regions, these farms can be dependent on other markets for part of their household food needs.

The interactions relevant to study the regional food systems are not limited to the region itself: not all food products produced within a given territory are consumed within pre-defined boundaries and, conversely, not all food consumed within a region (entirely) comes from that same region. From the side of consumption, consumers can either rely on food produced locally, or imported from outside the region. They also may choose products whose supply chains are complex and geographically extended or establish contacts with alternative supply models (e.g. solidarity purchasing groups, personal direct contacts), including self-production. From the side of production, the food produced in a given region can be delivered to internal consumers as well as to external ones. Moreover, farmers and processors may be dependent on raw materials and primary products (e.g. olives) coming from other regions, distributed locally and/or re-exported.

Since cross-borders flows connect regional with external actors, the identification of a food system within a given region highlights the intersection between a multiplicity of relational configurations with influences extending beyond borders. Some external actors (for example, retailers or processors) may have a strong influence on local actors' behavior, influencing the shape and the performance of the territorial system. Fournier and Touzard (2014) distinguish between different consumption models (domestic, proximity, commodities, agro-industrial, origin, naturalist, ethic); also, Colonna et al. (2013) define various types of food systems (domestic, local, regional, agri-industrial, and differentiated quality). Each of these models/systems is based on different consumers' opinions and priorities about food product qualities and features, and is characterised by different distribution channels (or, in a broader sense, different linkages) between consumers and producers: from street markets to specialised shops, from supermarkets, to direct selling including the emergent field of online sales through the web. Unique and direct linkages between consumption and production are seldom; there are mainly combined linkages, resulting in hybrid models in which producers and consumers are engaged, which are the most frequent in reality. Hence, consumers mainly following a certain consumption model are not totally disconnected from distribution channels (and even producers) which can better be referred to other models.

Furthermore, various power dynamics between actors shape the interconnections within the food systems. Power is defined as directly related to the level of concentration and access to key assets in the hands of a limited number of actors (Cox et al., 2002). Key assets can be both physical resources (capitals, land, credit, etc.) and intangible resources (market information, knowledge, personal relationships, reputation, etc.). Actors who have exclusive access to key assets and resources, as well as market power to influence the prices, can be thought as more powerful and have the capacity to influence others in the chain. The result is a complex pattern of relations between different models in the same territory, ranging from total disconnectedness to tensions and conflicts, from synergies to integration.

The next section explains how the concepts above presented can be used and operationalized to understand the role played by small farms operating in a specific product, olive oil, connected to production, distribution and consumption systems in selected territories in the Mediterranean area.

## Methodology

### Case study sector and analytical framework

Olive oil represents a central component of the Mediterranean diet and is strongly associated with the image of Mediterranean countries throughout the world. Today, 98% of all olive oil is produced around the Mediterranean, while four Southern European countries (Spain, Italy, Greece and Portugal) account for 71% of world production, with Spain by far exceeding all other countries, holding 44% of world production (average production of the period 2008/09-2013/14, see: IOC, 2017). In these countries, the majority of farms producing olive oil are small, i.e. with a utilized agricultural area less than 5 ha: 54% in Spain, 65% in Italy, 71% in Portugal, and 84% in Greece (Eurostat, 2017).

Diverse systems have been developed in the cultivation of olive trees, usually classified as traditional or extensive, semi-intensive and super-intensive. These systems involve different agricultural techniques and genetic resources, as well as varying intensity in the use of inputs. In many cases, traditional olive systems provide landscape and habitat diversity, along with multiple benefits for the local communities. On the other hand, modern intensive systems outperform the traditional ones in terms of yields, economic outcomes and profit.

Diverse production systems correspond to diverse distribution and consumption patterns, markets and trends that characterize olive oil consumers in different territories. Wide available literature shows that the perception of olive oil varies among countries, culinary culture and way of use: it is linked to price, available information and reputation. Degree of localness, territorial linkages and direct relations with the producer also matter in strengthening local market or informal relations. Despite the literature available for the olive oil sector focusing on production or on consumption sides, there is a lack of an integrated approach that considers both sides simultaneously, including the interlinkages between food systems actors – including production, transformation and distribution – and consumption patterns on a territorial scale.

By adopting a territorial-based conceptualisation, we provide a simplified visualisation of the olive oil production, distribution and consumption systems within each specific region, according to the map provided in Figure 1, which provides an abstract representation that will be adapted to olive oil in the selected regions. The proposed visualization provides a representation of the nodes and the relative importance of the flows and of examples of subsystems which may be found in the regions. In each region, different actors are involved (producers/processors/distributors/consumers)

creating different food flows (in and out of that territory) with different intensities and quality levels. The relative weight and relevance of the different arrangements is analysed and validated case by case, through the field research carried out in each region.

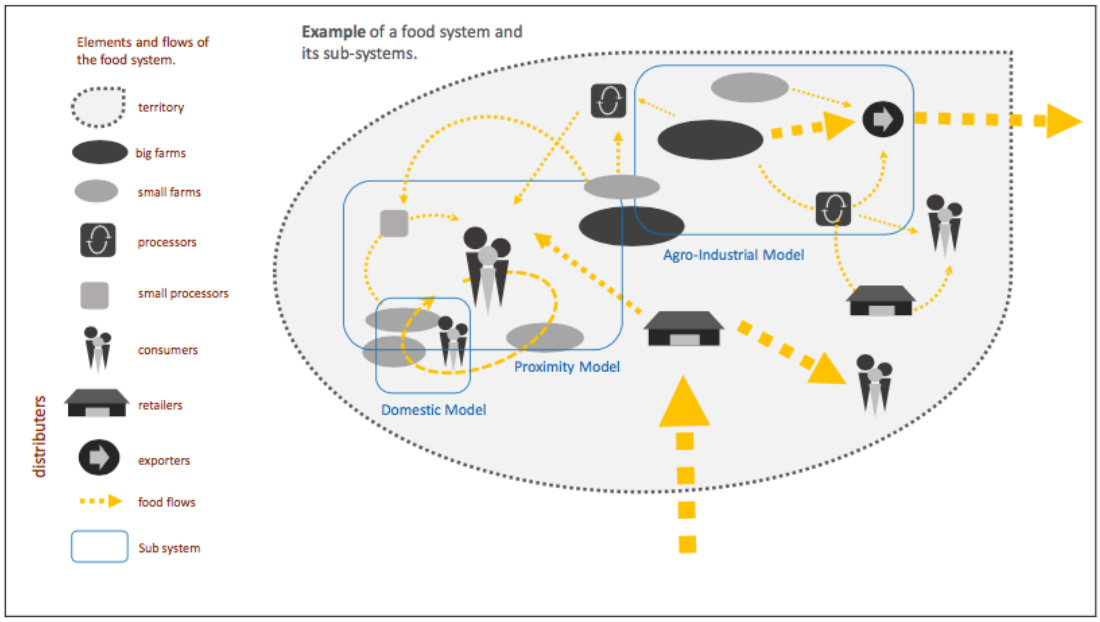


**Figure 1**. Example of territorial food system and sub-systems

## Materials and methods

The research approach chosen was a mixed-method, comprising qualitative, quantitative and discourse methods. This allowed gaining a deeper understanding in each of the case studies. The analysis was carried out according to common conceptual and analytical frameworks agreed upon by the SALSA panel of experts, and methodological guidelines that specified key questions, criteria and indicators. This way, the data that was gathered can be sufficiently comparable while at the same time being specific enough to the particular contexts.

The data collection consisted on a series of steps:

1) Desk research, with analysis of data from various sources, including official statistics and sectoral studies;
2) 44 interviews with key informants;
3) 88 interviews with small farmers producing olives for oil, as well as 12 interviews with small food businesses related to olive oil processing and/or distribution; and
4) 4 Focus group with 32 olive oil related stakeholders (food system mapping).

**Table 1:** Data sources by region

| | Castellón (Spain) | Lucca (Italy) | Ileia (Greece) | Central Alentejo (Portugal) | All Regions |
|---|---|---|---|---|---|
| Interviews with key-informants | 12 | 11 | 12 | 9 | 44 |
| Interviews with OSFs | 21 | 18 | 28 | 21 | 88 |
| Interviews with Small Food Businesses | 2 | 3 | 4 | 3 | 12 |
| Focus Groups on Olive Oil | 5 | 10 | 13 | 4 | 32 |

More detailed information on the data sources can be seen in the Appendix.

This information was synthesised into regional reports and a visual representation of the particular food systems maps (see below).

## Olive Oil Food Systems and OSFs in the four regions

### CASTELLON (Spain)

*Background Information*

Olive oil production in Castellón province is focused in three sub-regions, with OSFs located in mountainous or semi-mountainous inland areas. In the Baix Maestrat sub-region around 3,800 t of olive oil are produced in the context of a very extensive production system. The olive trees, of the local variety Farga, are large, often very old, creating a unique landscape; however, as the harvesting of olives directly from these trees is difficult, most of the olives are collected from the ground, which makes it difficult to introduce improvements in the quality of the oil. Most of the olive groves are managed by 'professional' farmers on areas of around 20 ha. Only 15%-20% of the farms (those worked part-time or by retirees) are smaller than 5 ha.

In Alto Palancia sub-region, production (1,400 t) is clearly oriented towards quality olive oil and the system is much more intense, with younger more productive trees, smaller spacing between them and, in some cases, irrigated. Although with this intensive system a professional farmer would need at least 10-15 ha to make a living from his farm, small farms of less than 5 ha prevail, representing 80%-85% of the total, and always being cultivated by part-time farmers or by retirees. The olive groves of La Plana Alta sub-region (with a production of 700 t) are in an intermediate situation from a production system point of view.

About 75% of the olives produced locally, coming from either large or small farms, are milled within the 30 cooperatives' mills. The remaining 25% goes to private mills (12-13) that are generally small and mainly used for processing oil for self-consumption at a small scale. However, there are three larger private mills, with productions comparable to the larger cooperative mills. Another common feature of all sub-regions is that the designation of origin for olive oil has not been active to date.

*Olive-oil small farms within food systems and value chains*

As regards oil *production*, the diverse climatic conditions and harvesting methods determine the type and quality of the oil produced. In the Baix Maestrat 60% of the oil produced is of lower quality ('lampante'), and it is sold in bulk via large containers to intermediary traders who sell it to refineries outside the province. In this area there is also extra virgin oil being produced, although in lower proportion than 'lampante'. Some coops emphasize the value of the high quality oil as a way of preserving the very old olive trees (up to a thousand years-old), as part of the natural heritage in this area.

In Alto Palancia and La Plana Alta, around 90% of oil produced is high quality virgin or extra virgin olive oil. This is bottled at the mills and then (a) used for self-consumption; (b) sold locally by the cooperatives' shops; (c) sold through other local shops or restaurants, or (d) sold on-line (small amount). In the case of Alto Palancia, with proportionally the largest production of extra virgin olive oil in Castellón, their commercial network is spread outside the province, supplying small shops, market

stores and some delicatessen shops mainly in Valencia province. Finally, a small volume of high quality oil from this area is also exported outside Spain.

In relation to olive oil *consumed* by the population of Castellón, estimates suggest that only 20% of that oil would be 'local' oil produced in the province. This percentage may nevertheless be much higher in inland rural areas of the province, where self-consumption and informal exchanges are common. The remaining percentage is oil purchased in supermarkets, supplied by the large distribution from other Spanish producing regions, Andalucía in particular, which are much more competitive in terms of price (consumer price can be halved) when compared to the oil produced by small farms in the province of Castellón.

The three areas exhibit strong linkages to *local and regional food systems* and, in addition, one of the areas (Baix Maestrat) shows strong bonds with national and international *agri-industrial food systems* through the bulk exports of lower quality oil for refining.

Evidence suggests that in the coming years, the development of strategies to improve the quality of the olive oil will continue to be put forward by both the cooperative mills and some private ones. Likewise, to improve the efficiency of the milling processes, tendencies of integration and collaboration among the cooperatives can be observed. It has also been pointed out the management of some small farms directly by cooperatives, as another way of optimizing costs.

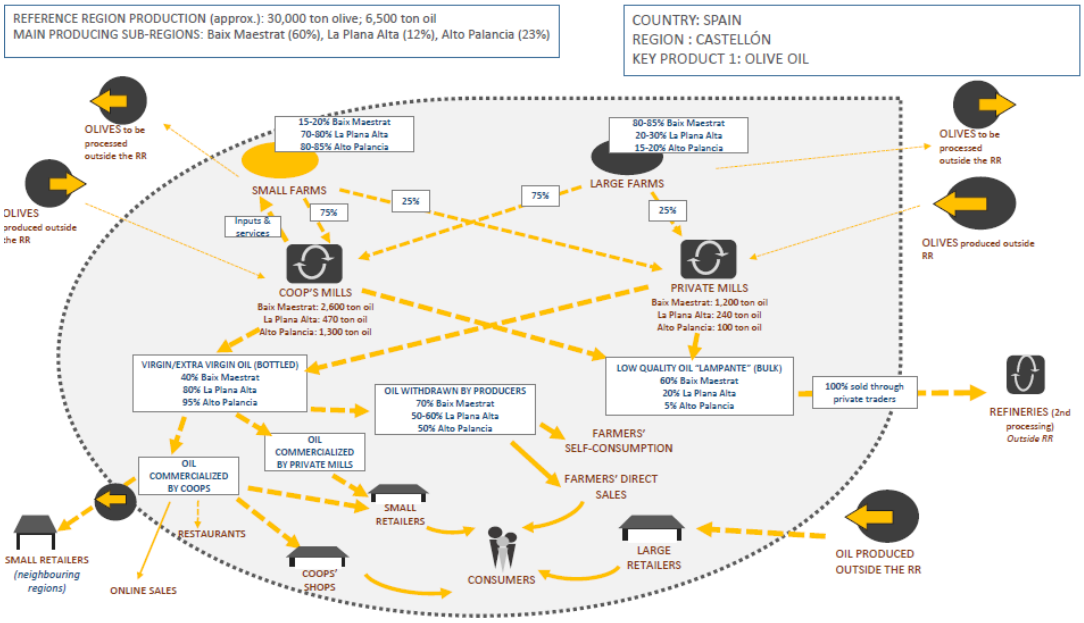


**Figure 2**. Food system map for olive oil in Castellón region (Spain)

*Power*

OSFs in Castellón are predominantly milling in cooperatives, then the collective action plays some role in concentrating supply and marketing strategies. However, not all the cooperatives are able to retain membership equally: a certain shift of OSFs to cooperatives focusing on differentiated premium schemes based on quality is appearing in the province.

In addition to the collective action, the power relationships differ quite substantially regarding the quality oil and the bulk olive oil. In the case of the quality olive oils (i.e

extra virgin or virgin), the transactions take place in local and regional markets, with limited sales to big retailers. Consumers of this type of olive oil are aware of the specificities of the oils and sometimes they stick to a certain variety or even village of origin; then, there is some room for the producers to set prices through their cooperatives. Adversely, in the bulk sales, the mills are price-takers since the volumes supplied to the industry are much less than the volumes produced in other Spanish regions (mostly Andalucía) who act as references to set prices.

**LUCCA (Italy)**

*Background Information*

Olive production in Lucca is considered extremely important under the qualitative profile and in connection with the hilly territory. OSFs produce olive oil on to 61.5% of the regional UAA. From farmers interviews, yields are on average 342 kg of olive oil per ha (with an average yield of olives into oil of 16%), which is slightly higher that the yields data available on official regional reports, referred specifically to Lucca province which indicate a production of 2.1 ton/ha of olives in 2010.

Olive oil production is mainly concentrated in small farms of the hilly areas. There are some oil mill structures outside the olive farms, of which the most important is Frantoio del Compitese.

*Olive-oil small farms within food systems and value chains*

In the Province of Lucca mills are owned and managed by specialised farms that grow olive trees, while it is rare for OSFs to own a mill. Therefore, the sales flows were designed and estimated from both oil mills and OSFs producing olives and outsourcing mill process. The main oil mill structure outside the olive farms is a cooperative mill, the Frantoio del Compitese, which attracts more than 60% of local production of olives.

The olive oil *production* is mainly sold either directly by small farms (after the product has been processed by local oil milling plants) or through on-farm shops or agri-tourism services. Sometimes, hosting tourists contributes to establishing strong informal relationships with clients, which leads to regular yearly direct sales abroad (i.e. in other regions or beyond Italy, especially Germany and other Northern EU countries). Other relevant marketing channels for extra virgin olive oil are given by solidarity purchasing groups, which informally develop and involve a number of local producers.

The flow of olive oil from the mills back to the initial olive producers still represents the largest part of the processing outcome. With regards to olive oil sales from local oil mills, it emerged that those are mainly oriented directly towards consumers and restaurants, while lower sales levels are directed to supermarkets and local groceries. Also, the local mills do not share value chain dynamics with the large-scale olive oil sector (e.g. canning industry, wholesalers, bottlers, etc.).

The tourism business network emerged as a key node within the local olive oil value chain. It represents a crucial opportunity for local OSFs and SFBs, in terms of the strong purchasing power of foreign consumers, as well as in terms of taking advantage of the local agrobiodiversity through marketing actions. On the other hand, local restaurateurs (different from agritourism caterers) do not represent relevant actors for local olive oil value chain since they prefer to purchase cheaper and low-quality olive oil.

The *domestic system* implies the household self-consumption of olive oil, direct sales to consumers and sales to local groceries, which represent the main market channels for local producers. Tourists represent an extremely important part of consumers, by

purchasing olive oil directly from producers. Moreover, agritouristic activities play a crucial role in the olive oil system of Lucca, as those include multifunctional farms producing olives for olive oil, in some cases milling olives (e.g. small farmers that carry out an agritouristic activity with a micro oil mill only for self-production), selling olive oil to their hosts and using it in their restaurant.

The role that the consumption of high quality and local olive oil can have on the health is very important, also for the *differentiated quality food system*. Some olive oil producers reported that from chemical analysis on their olive oils it resulted that such typical oils bear important healthy components (e.g. polyphenols, etc.). Still about olive oil, local producers are considered key to maintain the local agrobiodiversity.

Sales to restaurants are usually overestimated, as it emerged that local restaurateurs are more oriented to purchase cheap oil coming from outside areas, which is much cheaper, compared to local oil of high quality.

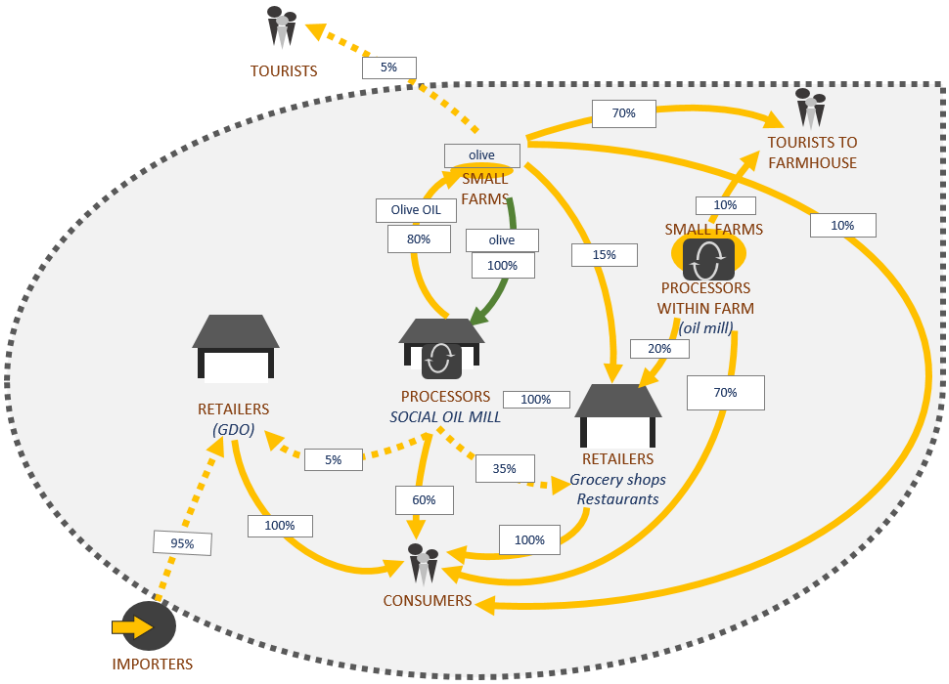


**Figure 3**. Food system map for olive oil in Lucca region (Italy)

*Power*

The lack of connection between small-scale and large-scale olive oil systems avoids direct interactions and coordination between small producers and large olive oil companies, wholesalers and big retailers. Moreover, power asymmetries between OSFs and large olive oil producers have not emerged, concerning production or market activities. However, it is acknowledged that olive oil industry is likely to indirectly affect the small-scale olive oil sector in Tuscany by means of cases of counterfeiting and alteration of the olive oil quality and origin. Such illegal activities are obviously perceived by OSFs as elements of unfair competition that is exerted by big olive oil firms building on the massive power they have throughout the whole value chain as well as on the lack of control by the authorities.

Despite the market disconnection between small-scale and large-scale olive oil production (industry), sporadic exchanges are registered between OSFs and

supermarkets. However, such isolated initiatives regularly fail due to low prices imposed by supermarkets and to the consequent exit of OSFs from the deal. In this specific case the market power of big retailers does not allow OSFs to sell their products to supermarkets. Similarly, at a local level, restaurants are generally not considered good purchasers of OSFs' olive oil, since they prefer to purchase cheaper olive oil from large-scale production.

Therefore, OSFs and small oil mills' sales are mainly oriented in contexts where there are not power imbalances affecting OSFs, such as direct sales to consumers, local groceries and tourists. However, in terms of purchasing power asymmetries, some tensions emerged concerning the price accessibility of local olive oil for local consumers due to the strong purchasing power of tourists and foreign consumers. On the other hand, tourism represents a crucial opportunity for local OSFs since the external and foreign markets are characterised by a strong purchasing power as well as by a relevant willingness to pay of foreign consumers for local produces.

## ILEIA (Greece)

*Background Information*

The production of olive oil in Ileia dates back to antiquity. Olive groves are found in all mountainous, semi-mountainous and a few plain areas, representing 41% of the utilized agricultural area of the region, while 91% of all SFs produce olive oil. The total produce of the region amounts to 28,000 t of conventional and 100 t of organic olive oil. Traditional farming system prevails, as intensive and super intensive systems for olive oil have just recently started to appear, representing a negligible area. During the last three years, the totality of the produce in the region is extra virgin olive oil (acidity level 0.2%-0.5%), while in some years 10% of the produce falls in the category of virgin olive oil (data from the oil mills of the region, gathered by the regional statistical office).

The regional olive-oil system is mainly export oriented; a small part of the total production of olive-oil (16%) is consumed within the region while the large part is exported to other countries (63.5%) and to a lesser degree sold to other Greek regions (20.5%). The totality of olives' production is processed within the region by 119 oil mills, of which 84 are also involved in the olive oil wholesale and retail sales, and 10% of them are large, i.e. processing more than 1,000 t per year.

*Olive-oil small farms within food systems and value chains*

In this region, the *domestic system* involves self-consumption, which represents 7.0% of the total olive oil production (4.5% from OSFs and 2.5% from large olive-oil producing farms); seen form the OSFs point of view, this share can reach up to 40% of the total olive oil produced within the farm. Domestic system also includes sales from OSFs to various outlets within the region, which represent significant shares of the total production of the region: to wholesalers 31%, to packaging enterprises 6%, to oil mills 2%, to general consumers in the region 2%, and to restaurants and hotels 1%. Only a few OSFs package/label their production since the quantity is limited; however, some groups of farmers have been formed, which have created their own packaged-labelled product.

The domestic system also involves a wide array of non-market exchanges, which are widespread in the region, concerning mainly olive oil, which is given to extended family members and relatives, usually living to other regions. In some cases, this share can reach up to 40% of the total farm production for olive oil. However, the respective share for all OSFs, is 1.5% of the total production of the region.

In Ileia there are no organized or formal initiatives from consumers, such as consumer cooperatives or networks. Only informal relations between OSFs and consumers have been recorder. Those relations are widespread, including the provision of various agricultural products (e.g. olive-oil and oranges) from farmers to neighbours and friends; in some cases, consumers are invited by farmers to harvest the fruits by themselves. Moreover, the share of total production which is sold directly from farmers to their own network of customers, and extended family members and friends, is much larger for OSFs than for large farms.

Various forms of sales are encountered in the context of *local food systems*: 2.5% of the total production are the direct sales from farmers to consumers, 2.0% are the purchases of local consumers from oil-mills, 1.5% are the purchases of consumers from super markets (which also import some negligible quantities), while 1.5% is the consumption of tourists in the restaurants and hotels of the region.

On the other hand, a considerable portion (20.5%) of total production is sold to consumers living in other Greek regions, thus pointing to the existence of a *regional food system*. OSFs have a significant contribution to this system (8%), while 9% is sold from wholesalers, 2% from large farms, and 1.5% from oil-mills. Interview data show that half of OSFs have established their own consumer network, while a quarter of them sell their production exclusively to their own consumer network, mostly outside Ileia.

In quantitative terms, the *agri-industrial food system* is most prevalent, as almost two thirds (63.5%) of the produce are exported from wholesalers and oil-mills; of this, 57.5% is exported in bulk mostly to Italy, while another 6.0% is packaged and exported with a brand name, mainly to the USA, China, Japan and Kazakhstan. A large number of actors are involved in this system, which is also characterized by asymmetric power relations (see below).

Additionally, there exists a *differentiated quality food system*, including an olive oil with protected geographical indication in Ileia, which covers nearly half of the total olive-groves area. In this quality product, 59 oil mills are involved, along with 11 standardizing units and 3 marketing enterprises. This PGI olive oil is produced exclusively by two local olive trees varieties, ‘Koroneiki’ and ‘Kollyreiki’, at a ratio of 90% and 10%, respectively. Owing to a number of technical issues and the lack of a promotion strategy, the production volume of Kollyreiki variety is constantly decreasing, in turn making practically impossible the production of the PGI olive oil.

The differentiated quality food system includes also relatively small quantities of organic olive oil. After the processing of organic olives, farmers store the olive oil, then they pack it to packaging enterprises and distribute it to their network of customers, in both domestic and foreign markets, only as a packaged product with their own brand name. No wholesalers or other intermediaries are involved in this chain, so organic farmers can capture a larger share of the added value compared to their conventional counterparts.

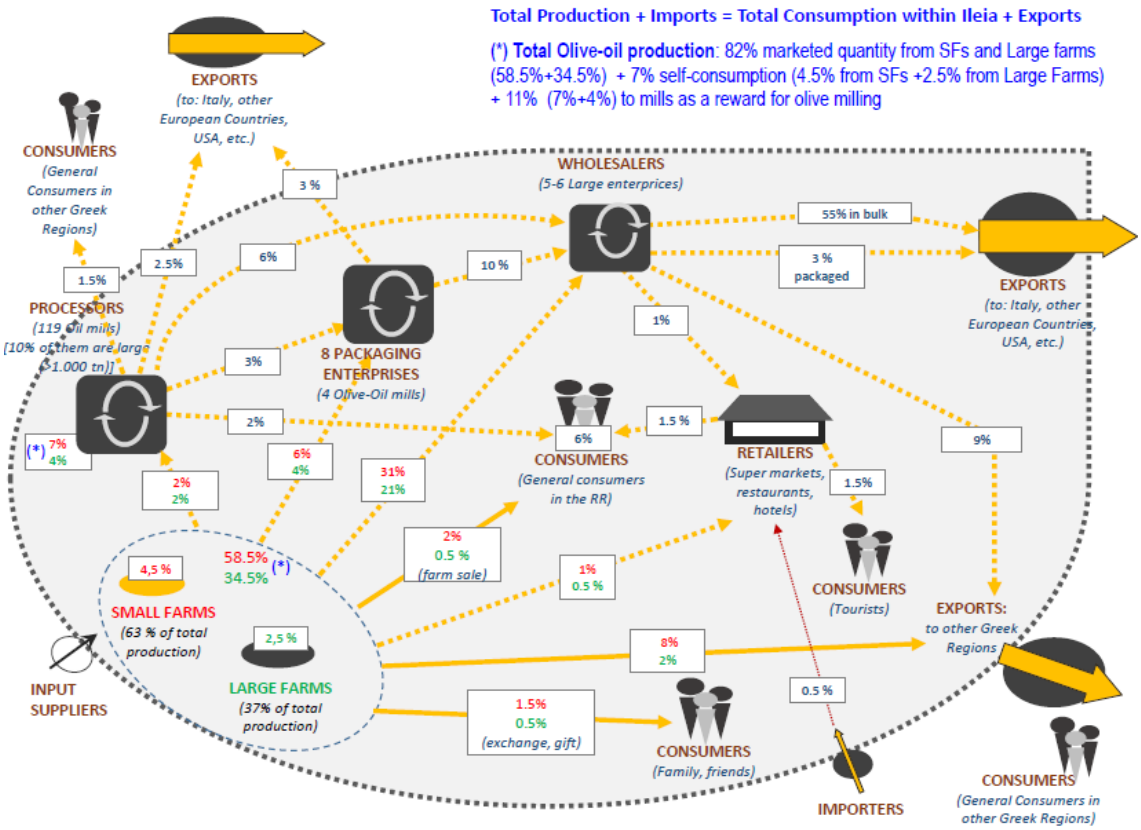


**Figure 4**. Food system map for olive oil in Ileia region (Greece)

*Power*

Although the sub-system of olive oil is less concentrated, compared to other staples' systems in the region (such as that for pickled vegetables), various power asymmetries are found in this system, with large wholesalers as the dominant players, who trade two thirds of all quantities of olive oil. Some serious implications arise from this asymmetry of power, e.g. the large wholesalers act as an oligopsony, and they usually reach an agreement for price fixing, i.e. the price in which they buy the products from producers. Also, the unequal distribution of power translates into differentiated financial potential between various actors of the chain, which in turn leads to strengthened dependence of the least powerful actors; this is evident in the provision of financial facilities (down payments in cash) from wholesalers to olive-oil mills, which then can pay the farmers.

Additionally, OSFs participate in export markets through established marketing channels of large exporting enterprises based in the region. These exporting enterprises are the dominant players within the region, nevertheless, they are very small, compared with the much larger (and fewer) Italian importers, who most of the times impose the terms of the transactions. All these asymmetries of power are perpetuated by the lack of co-ordination among the exporting enterprises, while some recent efforts for co-ordination among olive mills of the region have failed. At the level of primary production, lack of collective action by olive-oil producers, as well as of a strategy for the differentiation of the product and ensure its unique identity, result to an extreme fragmentation of farmers, who have no bargaining power and supply an undifferentiated product, thus losing added value.

## CENTRAL ALENTEJO (Portugal)

*Background Information*

In Central Alentejo (CA), around 14,494 t/yr of olive oil are produced (INE, 2016), while 763 t/yr are consumed (IAN-AF, 2016). Olive groves cover a total area of 34,001 ha (data from 2009), of which 6,744 ha belong to OSFs and 7,500 ha come from intensive production. Sixty-seventy percent of olive groves are 'traditional', e.g. extensive production with scattered trees in the plots, manual harvesting, no irrigation and seldom use of agro-chemicals, while the rest are intensive or super-intensive productions, with much higher number of trees per hectare, mechanized harvest and drop irrigation. The intensive productions are most commonly processed in mills belonging to the producer and large parts of the oil produced aims exportation. The estimated productivity index is 1,625 Kg/ha for the traditional olive grove, versus 7,000 kg/ha for the intensive olive grove. After the construction of the Alqueva Dam (2004), and its corresponding irrigation system, the area of industrial production of olives with intensive and super-intensive olive groves has increased considerably, thus reducing the relative importance of OSFs in the regional production.

OSFs are responsible for 11.5% of the total olive production in CA and would therefore have the capacity to satisfy the olive oil consumption needs of the region's population. Olives from OSFs are mainly converted into olive oil in cooperative oil mills and a small percentage is transformed into homemade style canned olives. Cooperative oil mills work mainly for small producers and private olive mills work for intensive and super-intensive olive grove farmers. Cooperatives provide technical support to OSFs, but lag behind in the promotion of a business culture able to secure a market for olive oil from OSFs. Moreover, phytosanitary care for olive trees is not provided by all cooperatives, compromising the quality of olive oil from those OSFs without specialized technical guidance. Some cooperatives diversify their income source by transforming both olives and grapes, thus taking advantage of the commercial distribution channels already set up for wine.

*Olive-oil small farms within food systems and value chains*

Field data pointed in the direction that up to 30% of the olives from OSFs are transformed into canned olives for self-consumption and/or for sale at local farmers' markets. What is not self-consumed is sold directly in *domestic* and *local food systems* by the olive grove owner under its own brand in specialty shops and at producers' markets, or sold back to the cooperative. The majority of olive oil from OSFs is embedded in a *domestic food system* for self-consumption and for non-market exchanges (e.g. given away to the extended family, friends or as symbolic payment for support with farm labour). Some olive oil is even offered as a Christmas gift to friends and neighbours. This implies that, although not entering the market for sale (e.g. in the form of gifts or exchanges) or if sold at local farmers' markets, high quality olive oil from OSFs is in fact largely consumed within the region by small farmers, extended family members, friends and consumers buying locally-produced olive oil. Therefore, domestic and local food systems contribute to small farmers household's and local FNS by guaranteeing a stable access to healthy fats available in olive oil.

Olive oil is also encompassing cooperative oil mills that sell olive oil in stores and supermarkets, and sometimes also export it. In this case, olive oil from OSFs can enter the same distribution circuit of olive oil coming from large olive farms.

Olive oil produced from traditional olive groves is argued to be of higher quality due to the varieties of the old trees, not used in intensive productions and a bet on its differentiation is a great asset to enter niche markets. Tourism is a growing industry with the capacity to promote olive oil produced by OSFs and boost traditional olive grove varieties. Tourists seek out visits, want to acquire knowledge about traditional olive oil production, and are likely interested in purchasing olive oil of higher quality. By

the same token, some small farmers choose to produce organic olives with their own oil mills to guarantee quality and *product differentiation*. This olive oil is mainly sold in local organic shops, but it can also be found in Lisbon speciality stores.

Nevertheless, a negative demographic trend in CA has followed market pressures and the absence of a secure supporting network for OSFs to invest in small scale olive production. This has led to a rising number of younger OSFs abandoning their parents' groves due to the lack of secure income or switching into a more intensive production system. As already mentioned, olive oil production in CA is mostly carried out by large-scale farms deploying intensive and super-intensive systems, while the number of OSFs is decreasing. This *agri-industrial food system* involves large scale processing companies and olive oil sales are aimed for export to specialized chain stores outside of the region.

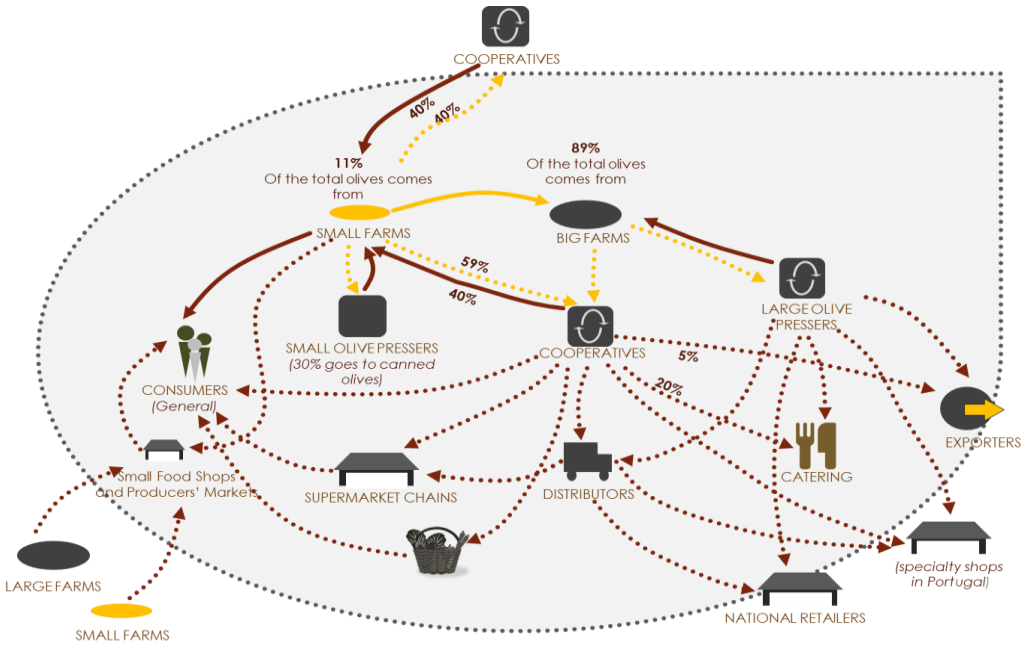


**Figure 5**. Food system map for olive oil in Central Alentejo region (Portugal)

*Power*

The level of concentration and access to financial support, technical infrastructure, knowledge and marketing channels in CA, mirrors the tensions between the various food systems in the region. Large-size and intensive farms, along with their private oil mill, dominate the territory and benefit from an expensive irrigation system developed once the Alqueva Dam was constructed. This has led to the possibility to produce olive oil in larger quantities and, therefore, become more market competitive. Large olive oil farms benefit from tourism and promote their branded products with visits to the oil mills. When olive oil is sold outside the region or exported, supermarket chains and large retailers set up the prices and decide who to buy from, as they require steady quantities and to control distribution channels.

On the other hand, regional, local and domestic food systems rely on short – and sometimes unstable – food chains and local food consumption. Access to credit to invest in infrastructure and land is tailored to farms seeking to increase productivity

mostly, which represents a risk that not all OSFs are willing to take. The advocacy capacity of OSFs in Central Alentejo to attain better olive oil prices, enter competitive markets, and claim financial support is limited. Cooperative oil mills processing olives from OSFs appear as weak actors along the food chain, lacking the technical knowledge to increase market channels for their associates. However, price, quality and marketing control is attained by a few OSFs producing differentiated (including organic) olive oil individually or collectively as entrepreneurs.

## Concluding Remarks

Olive oil systems in the four regions are mainly export oriented, as most of the oil produced is exported or sold to other national regions, ranging from 60% in Lucca, to 93% in Alentejo. Olive oil small farms in the four regions link with various markets and all kinds of food systems, i.e. *domestic, local, regional, agri-industrial,* and *differentiated quality,* most of the times integrated into more than one of these systems. OSFs in all the regions present a high degree of self-provision in quality olive oil, accompanied with extended non-market exchanges in the context of kinship and friends, as well as own (informal) networks of customers; the latter are usually based either on inter-personal relationships or on on-farm diversification strategies, such as the disposal of olive oil in the agri-tourisitc part of the farm.

The preceding analysis revealed an impressive inter- and intra-regional diversity of food systems related to olive oil. As a result of historical trajectories of the regional economies and various spatial specificities, the four regions are highly differentiated in terms of faming systems, quality of the product, relative importance of OSFs and SFBs, scale of operations, as well as interlinkages between food systems actors. Thus, intensive and super-intensive cultivating systems are already widespread in the Castellón and Central Alentejo, in contrast to Lucca and Ileia, where more extensive and traditional systems prevail. In Central Alentejo farms with intensive and super-intensive production systems are entirely mechanized, and mostly processing olives in their own mills, while olives from OSFs are mainly converted into olive oil in cooperative oil mills. In addition, the share of virgin and extra virgin olive oil to the total production varies among the regions.

As regards the articulation of the local produce with national and international agri-industrial food systems, this mainly concerns sales and exports of high quality olive oil from all regions; nevertheless, the cases of Castellón, with bulk exports of lower quality oil for refining, and Ileia, with the bulk exports of high quality oil, stand out.

Varying degrees of concentration rates have been identified across the regions. This is evident firstly, in the share of OSFs in the total number of farms and the total olive oil production, secondly, in the respective shares of small olive mills and small food businesses, and thirdly in the more or less dominant role of wholesalers/exporters.

Although there are multiple linkages among various actors in all regions, different sub-systems in terms of scale are discerned; the most noticeable case is Lucca region, where the small-scale sector of olive oil production is largely separated from large-scale producers, wholesalers, big retailers and canning industry. Moreover, while nearly all olive production is processed within the regions, small food businesses process a part which ranges between 12% in Alentejo and 95% in Castellón.

It seems that small farms can overcome some major constraints emanating from the unequal distribution of power across the value chains. This is the case e.g. when some successful coops and producer groups or OSFs with ‘enterpreneurial’ characteristics, can secure better prices. We have seen that this is achieved through product differentiation (e.g. traditional olive oil, organic olive oil); through ‘shortening’ the distance until the final consumer; and/or through labelling and branding. Similar trends

have been identified in cases where the whole food system structure is less concentrated, and networks of OSFs-SFBs can exert effectively a countervailing power. This happens mostly in Lucca, even though it might be present in the four regions. In contrast, as the case of Ileia region shows, an extreme fragmentation of both OSFs and SFBs, along with inadequate collective action and lack of coordinating activities, consolidate the imbalances of the system; consequently, the large part of an extra virgin olive oil is sold in bulk, resulting in an inability of OSFs to capture a larger share of the added value.

There might be substantial differences in the representation of the quality and value of the olive oil issuing from traditional olive groves and tree varieties, which explain the differences between the regions, in the added value of this oil in relation to oil resulting from more intensive productions. Spain and Portugal seem to be lagging behind in relation to the marketing mechanisms and capacity to obtain high prices for the oil from traditional groves, as if this oil had no particular quality. Italy and Greece seem to manage a higher valorization of this oil in the market, and make it possible for small farms to link to the market. In this way, cultural factors influence market relations and thus also the future resilience of the traditional olive groves in small farms.

The findings of this study assume more importance, when placed in a broader context, e.g. in relation to sustainability of the production systems encountered in olive oil production. As it is well-known, traditional olive trees cultivation might be maintained for self-consumption in the farm household and extended family, but in overall terms, the small-scale production faces a major challenge, the choice between intensification and abandonment (Beaufoy, 2001). Intensified olive farming is a major cause of one of the biggest environmental problems affecting the EU today, i.e. the widespread soil erosion and desertification in all southern EU countries. The expansion of irrigated olive production is increasing the over-exploitation of water resources that have already been eroded by other agricultural sectors. A precise comparison of the total amount of production factors required for the production of one litre of oil, in the traditional, the intensive and the super-intensive system, is still to be made and would bring light into the real costs associated with these different production forms. It can be assumed that such a comparison could make it possible to increase consumers' interest for small-scale traditional olive oil.

Furthermore, traditional olive production systems contribute substantially to the maintenance of agricultural biodiversity. As recent research shows, two critical factors/prerequisites for the on-farm conservation of local landraces (including olive trees varieties), are, firstly, their integration into both domestic and export markets, and secondly, the embeddedness of their products into the local culture and diet (Karanikolas, et al., 2018). Both of these features have been highlighted in this study and, therefore, with targeted strategies could help OSFs resist further marginalization.

Further study of the olive oil food systems and the multiple roles of small farms in these systems, is still to be made. In this paper we show some of the preliminary results and insights obtained in the first phase of the SALSA project. More elaborated findings are expected to be obtained in the continuing of SALSA.

## APPENDIX

**Appendix Table 1:** Detailed List with interviewees and participants per Region

| | Castellón (Spain) | Lucca (Italy) | Ileia (Greece) | Central Alentejo (Portugal) | All Regions |
|---|---|---|---|---|---|
| **Interviews with key-informants** | **12** | **11** | **12** | **9** | **44** |
| Producers' cooperatives | 8 | 1 | 1 | 4 | 14 |
| Processors (small/large) | | 3 | 1 | | 4 |
| Wholesalers | | | | | |
| Retailers | 1 | | 1 | | 2 |
| Caterers | | 2 | | | 2 |
| Slaughtering facilities | | | | | |
| Other small food business | | | | | |
| Exporters | | | | | |
| Importers | | | | 1 | 1 |
| Farm inputs suppliers | | 1 | 1 | | 2 |
| Advisory services | | 1 | | 1 | 2 |
| Agricultural administration/Ministry of Agriculture | 3 | 1 | 4 | 1 | 9 |
| Consumers' groups/organizations | | 2 | | | 2 |
| Local administrators and policy makers | | | | | |
| Political leaders and PMs | | | 1 | | 1 |
| Other programs/initiatives | | | 2 | | 2 |
| Nutritionist | | | | | |
| NGOs | | | | 2 | 2 |
| Chamber | | | 1 | | 1 |
| | | | | | |
| **Interviews with OSFs** | **21** | **18** | **28** | **21** | **88** |
| **Interviews with Small Food Businesses** | **2** | **3** | **4** | **3** | **12** |
| **Focus Groups on Olive Oil** | **5** | **10** | **13** | **4** | **32** |
| farmers | 3 | 2 | 4 | 1 | 10 |
| Producers' cooperatives | | 1 | 2 | 2 | 5 |
| Processors (small/large) | | 2 | 3 | | 5 |
| Wholesalers | | | | | |
| Retailers | | | | | |
| Caterers | | 2 | | | 2 |
| Slaughtering facilities | | | | | |
| Other small food business | | 1 | | 1 | 2 |
| Exporters | | | | | |
| Importers | | | | | |
| Farm inputs suppliers | | | | | |
| Advisory services | 2 | 1 | | | 3 |
| Agricultural administration/Ministry of Agriculture | | | 4 | | 4 |
| Consumers' groups/organizations | | | | | |
| Local administrators and policy makers | | | | | |
| Political leaders and PMs | | | | | |
| Other programs/initiatives | | 1 | | | 1 |

| | | | | | |
|---|---|---|---|---|---|
| Nutritionist | | | | | |
| NGOs | | | | | |
| Research Institutions | | | | | |

## References

Beaufoy G. (2001) EU policies for olive farming - Unsustainable on all counts, WWF and BirdLife International, www.assets.panda.org/downloads/olivefarmingen.pdf.

Brookfield, H. and Parsons, H. (2007) Family Farms: Survival and Prospects. A Worldwide Analysis. Abingdon and New York: Routledge, Taylor and Francis Group. 272 pp.

Brunori, G., Grando, St., Galli, F., Fastelli, L., and Di Iacovo, Fr. (2017) *Analytical framework and criteria for the identification of small farms and for their differentiation*, SALSA Project, WP1, Deliverable 1.2, www.salsa.uevora.pt.

Fournier, S., and J-M. Touzard (2014) La complexité des systèmes alimentaires: un atout pour la sécurité alimentaire? VertigO - *La revue électronique en sciences de l'environnement* 14 (1), May 2014.

Colonna, P., Fournier, St. and J.M. Touzard (2013) Food Systems. In Esnouf C., M. Russel and N. Bricas (Eds) *Food System Sustainability, Insights from duALIne*. Cambridge: Cambridge University Press, pp. 69-100.

Cox, A., Ireland, P., Lonsdale, C., Sanderson, J. and G. Watson (2002) *Supply Chains, Markets and Power, Mapping buyer and supplier power regimes*. New York: Routledge.

Davidova et al. (2012) Subsistence farming, incomes, and agricultural livelihoods in the new member states of the European Union. *Environment and Planning C: Government and Policy* 30: 209-227.

European Commission (EC) (2011) What is a small farm? EU Agricultural Economic Briefs, 2, Brussels.Eurostat (2017) Farm Structure Survey of 2013, Farm Structure Database, http://ec.europa.eu/eurostat/data/database

FAO (2006) Food Security, FAO Policy Brief, 2, Rome: Food and Agriculture Organization of the United Nations.

FAO (2014) Towards stronger family farms: Voices in the International Year of Family Farming, Rome: Food and Agriculture Organization of the United Nations.

Grando, St. Brunori, G., Knickel, K., Pinto-Correia T. and L-A. Sutherland (2016) Initial Conceptual framework 1.1. Small Farms, Small Food Businesses and Sustainable Food Security, Project number: 677363 Collaborative project Horizon2020.

HLPE (2014) Food losses and waste in the context of sustainable food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

Hubbard C., (2009) *Small Farms in the EU: How Small is Small?* Presentation held at the 11th EAAE-IAAE Seminar "Small Farms: Decline or Persistence, University of Kent, Canterbury, UK, 26-27th June 2009.

IAN-AF 2015-2016 (2016) Food consumption by groups - part II, for the national total, weighted value for distribution of the Portuguese population National Food and Physical Activity Survey. Retrieved on 31 January 2018, http://alvarovelho.net/attachments/article/117/Anexo%201%20-%20Tabelas%20consumo%20alimentar.pdf

INE (2016) Production of olives by place of origin (NUTS - 2002). National Institute of Statistics, Annual survey of olive oil production for the year 2016. https://www.ine.pt

IOC [International Olive Council] (2017) Olive Oil production by country, http://www.internationaloliveoil.org/

Karanikolas, P., Bebeli, P. and R. Thanopoulos (2018) Farm economic sustainability and agrobiodiversity: Identifying viable farming alternatives during the economic crisis in Greece. *Journal of Environmental Economics and Policy* 7(1): 69-84.

Knickel, K., R. Zemeckis and T. Tisenkopfs (2013) A critical reflection of the meaning of agricultural modernization in a world of increasing demands and finite resources, Proceedings 6 (1), Kaunas, Akademija: ASU Publishing Center, pp. 561-567.

OECD (2016) *Adopting a Territorial Approach to Food Security and Nutrition Policy*. Paris: OECD Publishing.

Rastoin J.-L. (2015) Editorial, Les systèmes alimentaires territorialisés : considérations théoriques et justifications empiriques [Territorialised agri-food systems: theoretical considerations and empirical justifications], *Économies et Sociétés, Tome XLIX, (11/2015), Série «Systèmes agroalimentaires»*, AG, N° 37, Isméa Les Presses, Paris.

Van der Ploeg, J.D. (2013) *Peasants and the art of farming: a Chayanovian manifesto*. Rugby, UK: Practical Action Publishing.