MED-LINKS

Data-enabled Business Models and Market Linkages Enhancing Value Creation and Distribution in Mediterranean Fruit and Vegetable Supply Chains (MED-LINKS)

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CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

CSP	Conditions-Strategies-Performances
DEA	Data Envelopment Analysis
EOSC	Export Oriented Supply Chain
FV SCS	Fruit and Vegetables Supply Chain System
GPP	Green Public Procurement
SCS	Supply Chain System
SFSC	Short Food Supply Chain

EXECUTIVE SUMMARY

This deliverable deals with the "Report on Supply Chain Systems definition and Cluster identification" within task "Structure and linkages of supply chain systems" in WP1 "SME competitiveness and consumer attitude in FV supply chain systems" of MED-LINKS project. This report presents a theoretical model developed for the analysis of supply chain systems of fruit and vegetables in the Mediterranean region, including the drivers determining their organisational characteristics, the internal relationships and dynamics, and the related performance. The analysis targets the clusters of firms that represent the structural components of each supply chain system. Clusters of fruit and vegetables production in the Mediterranean partner countries are defined and delimited at geographical and economic level. The theoretical model identifies an inventory of selected reference indicators that will subsequently be needed to assess, in the following task 1.2, the specific variables to assess the supply chain systems' external and multidimensional drivers, strategical choices and competitiveness.

The main contributions to Sustainable Development Goals (SDGs) of the activities performed and the results obtained are outlined at the end of the report.

1. Introduction

1.1. Aims of Task 1.1 and Deliverable 1.1.

The objective of this task is to develop a theoretical model for the analysis of supply chain systems of fruit and vegetables in the Mediterranean region, including the drivers determining their organisational characteristics, the internal relationships and dynamics, and the related performance. The analysis will target the clusters of firms that represent the structural components of each supply chain system. Clusters of fruit and vegetables production in the Mediterranean partner countries are defined and delimited at geographical and economic level. More specifically, in task 1.1 the theoretical model will identify an inventory of selected reference indicators that will subsequently be needed to assess, in the following task 1.2, the specific variables to assess the supply chain systems' external and multidimensional drivers, strategical choices and competitiveness.

1.2. Methodology

The three Med-Links Supply Chain Systems for fruit and vegetables in the Mediterranean are defined through stakeholders and experts' elicitation on key issues and opportunities of local supply chain systems. The theoretical model is developed in order to identify the multiple external drivers of supply chains systems as conditions that characterise the structure and the strategical behaviour of the related fruit and vegetables clusters and that, in turn, trigger the consequent performance in terms of competitiveness. The theoretical framework is built on the approach of sectors developed in the industrial organization and management literature that categorises the building blocks of main conditions, strategies, and performance that shape the functioning dynamics of supply chain systems' clusters. Representative experts for each cluster are interviewed on relevant insights and functioning schemes of the specific supply chain systems in order to build an inventory of general indicators that articulates from the main building blocks of conditions, strategies and performance of fruit and vegetable cluster dynamics.

2. Three types of supply chain systems

According to the MED-LINKS project proposal, a supply chain is composed by a set of stakeholders (i.e. farmers, processors, wholesalers, retailers, etc.) who act based on patterns of product flow that drive a product from the producer to the retailer. Supply chain systems have spatial and governance boundaries, a specific structure and specific goals. They include a number of stakeholders, their activities, the resources employed, and information exchanges across the process of turning the primary inputs into the final products. This systemic process requires adapted institutional arrangements that define rules and agreements (i.e. regulations, contracts, etc.) among the actors.

The MED-LINKS project covers three types of fruit and vegetables supply chain systems (FV SCS) in five Mediterranean countries. These types of FV SCS differ regarding the number of actors involved in the supply chain, the arrangements established between them, and the spatial flow of the goods exchanged.

Supply chain systems	Actors	Institutional arrangements	Geographical area
Short Food Supply Chain	Local producers, Limited number of intermediaries, Organised consumers' networks, Producer associations	Direct selling to consumers (e.g. farmers' markets) and to intermediaries (e.g. local shops)	Local
Green Public Procurement	Regional producers, Municipalities, Regional governments, Certification bodies	Tendering, horizontal coordination	Regional/National
Export Oriented Supply Chain	Coordinated small-scale producers, International logistics, Export agents, Certification bodies	Label based contracts, horizontal & vertical coordination,	International

2.1. Short Food Supply Chains

In the European context, Short food supply chains (SFSC), according to Article 2 of Regulation (EU) No 1305/2013 (on support for rural development by the European Agricultural Fund for Rural Development, EAFRD) are defined as supply chains "*involving a limited number of economic operators, committed to cooperation, local economic development, and close geographical and social relations between producers, processors and consumers*". This type of FV SCS emerged among small-scale farmers in response to the demand for local, high quality and sustainable agricultural products.

The key categories of stakeholders in SFSC are farmers and consumers. Moreover, the EU definition of short food supply chains is complemented by Article 11 of European Commission Delegated Regulation (EU) No 807/2014 supplementing the Rural Development Regulation, which specifies 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*".

Types of SFSC can be generally classified as 1) direct sales by individuals, 2) collective direct sales, and 3) partnership initiatives (European Parliament, 2016). Direct sales implicate a direct transaction between farmer and consumer, on the farm or outside, for example at farmers' markets. Farm products can also be supplied to consumer at home through basket or box schemes. Direct sales can also comprise on-line shopping. Collective direct sales involve producers who cooperate to sell their products collectively to individuals or consumer groups. Sales can take place on a farm, in local outlets, in local food festivals or fairs. In some cases, local producers can coordinate horizontally to supply local public procurement. Partnership initiatives of SFSC between producers and consumers involve a written agreement between partners. These kinds of partnerships can implicate arrangements such as different forms of community-supported agriculture.

The UNIDO (2020) diagram below (Fig.1) helps to illustrate the different dynamics that SFSC can present.

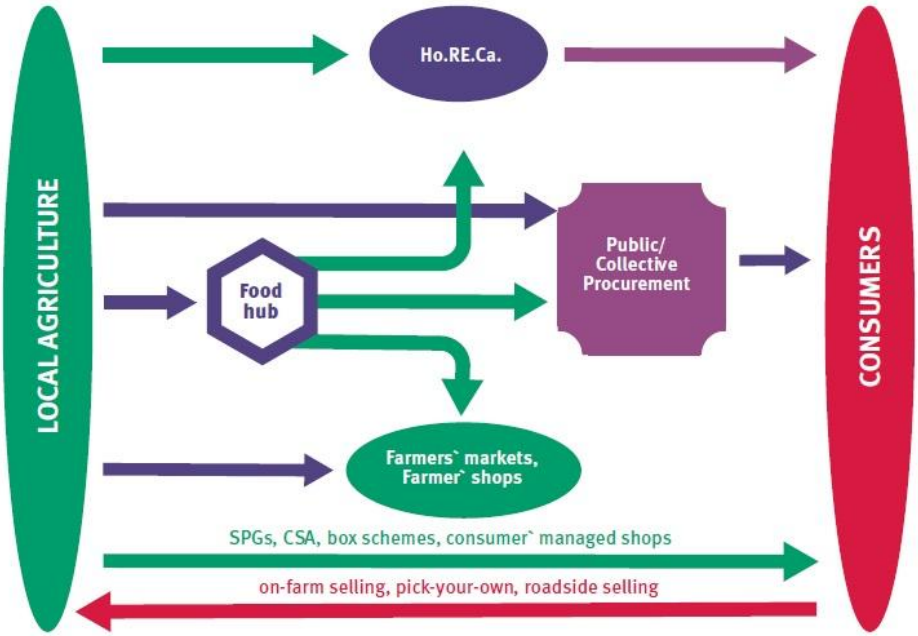

Figure 1 Various paths creating different SFSC types, source: UNIDO 2020

*Ho.RE.Ca. Hotel, Restaurants, Catering

2.2. Green Public Procurement

Green public procurement (GPP) is defined by the European Commission as "*a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured*" (https://ec.europa.eu/environment/gpp/what_en.htm). As mentioned above, in some specific local contexts, GPP may be considered as a SFSC (UNIDO 2020) where farmers sell their product directly to public institutions' collective catering.

GPP involves the participation within the supply chain systems of a number of actors that are not only specifically active in the production, processing, distribution and retail activities, but they are institutional stakeholders and certification bodies. In fact, local and regional institutions represent the purchasers in this SCS and work in coordination with local authorities and governments (e.g. municipalities). In these cases, the certifications of quality of products play a key role for producers and suppliers that aim to sell their products to public purchasers.

2.3. Export Oriented Supply Chain

Export oriented supply chains (EOSC) are those international supply chains that need to cope against significant barriers to the commercialization of small productions. This highly institutionalized way of commercializing fruit and vegetables requires sophisticated arrangements between the actors of the supply chain system. Global food supply chains are increasingly dominated by large multinational food companies and trade is increasingly regulated through standards (Maertens et al. 2012). The sustainability standards in global agrifood supply chains typically cover environmental issues and labour conditions (Meemken et al. 2021). In a trade environment where grades and standards have become instruments of competition in differentiated product markets, there are three strategic responses identified by Reardon et al. (2001) for agribusiness firms and farms based on the size of their business: (1) to create private standards and private certification, labelling, and branding systems for large firms and multinationals; (2) to lobby governments to adopt public standards similar to those in export markets in developed regions for medium-large domestic firms; (3) to ally with public and non-profit sectors to form standards and certification systems to access export markets and to bring institutional change to non-tradable product markets for small firms and farms.

3. Supply chain systems' functioning dynamics: a theoretical framework linking external drivers, strategies and performance

A description of the FV SCS's characters and the analysis of the socioeconomic and biophysical environment that influences actors' strategies, provide a base to reflect on the strategies adopted by supply chains and the consequent performance that will be then developed. The conditions in which supply chains develop, determine the linkages between their actors. The actors of the supply chain adopt strategies to overcome limitations, barriers and risks imposed by their socio-economic, biophysical and institutional environment. These interrelations are mapped and inventoried using an adapted *Conditions-Strategies-Performances* (CSP) model (Fig. 1) modified from Grando et al. (2020), Rastoin and Ghersi (2010), and originally from the Porter's (1981) Structure-Conduct-Performance framework in the field of economics and management of industrial organizations. The CSP model is based on the idea that the supply chains develop strategies based on their own characteristics and the conditions around them. The outcomes of those strategies are translated into performance and unintended consequences. Eventually, performance would -in turn- influence actors' characteristics and how they are conditioned, and so on.

3.1. Med-Links Value-Management CSP framework

The causal dynamics that shape the functioning of a supply chain system under the adapted Med-Links CSP framework is strongly connected to the management of value in the supply chain system itself. External and internal conditions influence factors and resources that can be applied to generate strategies in terms of production, distribution, marketing, consumption, institutional arrangements and organisational partnerships. In a nutshell, external and internal conditions influence the strategical way in which the value is created and proposed across a supply chain system. In turn, according to the Med-Links CSP framework, the strategic management of value creation and proposition will have an

impact on the multidimensional aspects of performance that are represented by economic, environmental and social benefits and costs, and that therefore characterise the way value is finally captured. To better understand what value creation, proposition and capture represent, we propose the following definition from previous literature. Value creation consists of structural, operational, and relational activities that allow a supply chain system to produce and to provide services and products (Richardson, 2008), and it reflects the resource organization needed to carry out the activities that produce and bring value to customers and stakeholders. Value proposition is what a supply chain system offer to potential customers and target markets (Richardson, 2008), and it reflects the capability to articulate business relationships and to make customers and stakeholders aware of the value created. Value capture is what the investment should return back (Morris et al., 2005) in economic, as well as social and environmental terms, and it reflects the capability to actually get and retain the value first "created" and then "proposed" to customers and value chain's stakeholders. Thus, tenets from value management are integrated in the CSP causal model to grasp relevant variables and indicators to analyse and assess, within MED-LINKS supply chain systems of fruit and vegetables, the drivers determining their characteristics, the internal relationships and dynamics, and the related performance (Fig. 2).

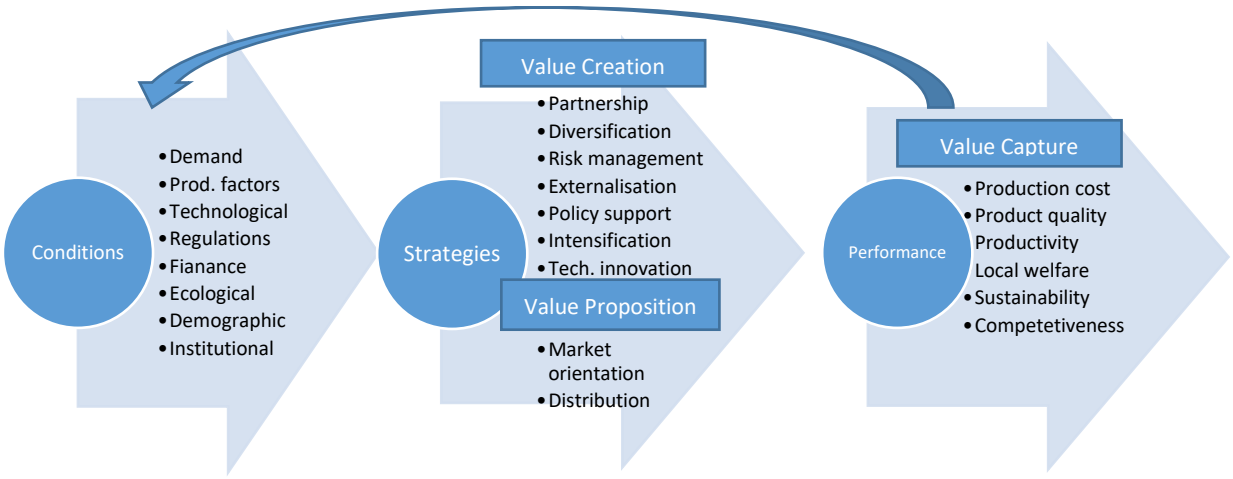

Figure 2 MED-LINKS Value-Management CSP Model of supply chain systems' causal dynamics

4. External drivers shaping the characteristics of a supply chain

External drivers are the set of conditions that characterise the business environment in which supply chains actors carry out their activities and that they cannot control directly. These conditions influence supply chain system strategies and performance. External drivers vary in the politico-geographical level at which they are defined. Some conditions are mainly or exclusively relevant to the local level, others act at a national or even global scale. Therefore, not all external drivers might apply completely to all the three types of FV SCS. Nevertheless, the list of external factors presented here will allows to identify the most appropriate indicators relatively to five Med-Links supply chain systems in the

Mediterranean area. Building in part from Grando et al., (2020), we structure external conditions in categories that feature the firm's business environment at local and regional level.

4.1. Demand

The demand category represents the demand patterns of the agricultural goods that the consumers are willing to pay for the price offered by the market. In the context of fruit and vegetables there are quality measures that determine the price and consequently the demand for the related products. The fresh fruit and vegetables demand patterns in the region and the capacity of the local FV SCS to respond to that demand will characterise the business environment of producers and supply chain actors.

4.2. Production factors

The three principle production factors in agriculture, land, labour and capital, are considered as the conditions that determine the agricultural production. Issues relative to the type and quality of these factors (e.g. soil quality, skilled workforce) and the costs that are incurred, condition the farms' production.

4.3. Ecological

There are some agricultural production factors that are not controlled by the producers. Among them, ecological factors such as temperature and precipitation are the most remarkable. Issues such as climate change has generated problems to this sector of production. Taking into account the future damages of these climatic condition pushes the actors of the supply chain (specially the farmers) to adopt strategies to encounter the challenges that are raised.

4.4. Technological availability

Technological conditions for the management of the product flow and information flow refer to the changing and continuously evolving array of technological devices and methods that are potentially available to producers and supply chain actors. The accessible technologies and infrastructures to the actors of the supply chain system provide them with a range of possibilities to organise the product processing and the transfer from the producers to the retailers. The logistical infrastructure such as transport and storage facilities are key features of agri-food supply chain management.

The transparency of a transaction is highly related to the extent of technology employed for the communication on product quality and price. The supply chain actors' access to information related to the transaction of goods would decrease the information asymmetry and allows them to choose the most efficient path in the supply chain.

4.5. Regulation and policy

Tools are established by institutions and authorities to manage markets and to create incentives for the market actors where the market fails to do so. This is the case also for environmental issues. The goal of these interventions is to allocate the resources more efficiently and to increase the welfare of citizens. The tools available to the governments consist of rules, standards, quotas, property rights, taxes, subsidies and financial support.

4.6. Socio-demographic

Socio-demographic dynamics comprise the evolution of the social and demographic aspects in society. Urbanization, new lifestyles and values are issues that influence the way food products are offered. Beside the consumers' demographical characteristics which determine the demand patterns, the social and demographic characteristics (educational level, age, values, etc.) of those who are engaged in the supply chain determines the capacity to respond to the market demand.

4.7. Socio-institutional

Socio-institutional elements involve formal and informal norms of practice that shape a safe environment for the economic activities of SCS. Absence of fraud and illegal activities, efficiency of administrative procedures, social capital (in the sense of networks and attitudes to cooperation), and presence of monitoring and control instruments are key elements that affect the transaction costs in a supply chain system.

4.8. Finance and risk

Finance and risk aspects comprise conditions that regulate the financial and insurance markets. The absence of financing institutions and risk sharing instruments (i.e. insurances) would encourage producers to search for cooperation with other actors. Securing a regular cash flow, avoiding natural risks and price volatility may be some of the features of a suitable financial and risk sharing solutions for FV SCS's actors.

5. Strategical choices of supply chain systems

Supply chain systems, in order to survive in the competitive market, adopt strategies to correspond to the conditions surrounding them. In the long term, these strategies would shape the characteristics of the supply chain systems regarding the length (number of actors involved in the FV SCS), location of sale and the market linkages (arrangements that persist over time with repeated transactions). Strategy represents the application of choices on parameters such as price, quality, business size, marketing, research and development, contracts, etc. The strategies the actors opt for depend also to their capacity of handling the situation. Two producers might decide differently despite facing the same conditions. However, to overcome the competitiveness of the agro-food market, for the Med-Link project purpose we may count two main categories of strategies for the actors of FV SCS. The first category of strategies addresses all activities targeting value creation (i.e. adding value to products through marketing, partnerships, innovation, diversification, etc.). The second category of strategies involves all tasks carried out by the actors of the supply chain with the objective of value proposition (e.g. certifications, logistics, distribution, communication, etc.).

5.1. Value creation

Value creation consists of structural, operational, and relational activities that allow to produce and to provide services and products (Richardson, 2008). It reflects the resource organization needed to carry out the activities that produce and bring value to customers. In a competitive condition, the main strategy a firm may apply is to reach higher levels of efficiency. In a quantity-oriented business environment, the objective would be to produce more from the quantities of production factors available. The producers may intensify their production and the logistic firms get more specialized to

reach this objective. To obtain higher levels of efficiencies, firms recourse to technological innovation in production, logistics and communication. Technological innovation has been long the most emphasized strategy for the improvement of a supply chain for improving quantitative flows but also to guarantee and increase quality aspects. Managers tend to use high tech to monitor and manage the inventories and sales of products. In addition, digitalizing contracts reduces transaction costs and increases transparency in the supply chain. However, apart from intensification, other novelties are also introduced into the market by the actors of the supply chain to enjoy higher prices and to benefit from new markets. Differentiating a product from already available products in the market, brings about larger margins of benefit. This objective can be reached by improving the quality of product, processing the products and offering new packaging. Small-scale firms who have difficulties competing with low prices of services and products offered by larger firms and cannot offer innovative products that require high levels of research and development, may still opt for diversification and multi-functionality. Having a large product portfolio allow small-scale firms to reduce risk and have a more stable business. Finally, multi-functionality of supply chain actors searches value creation in recreational activities, agro-tourism and catering.

To what concerns the originality of a product or the declared quality, moral hazard is a relevant problem in the market when the quality of productions cannot be verified by consumers. Certification bodies, as tier institutions, have introduced labels for products of high quality who respect certain defined standards. This communication between producers and consumers through labels has reduced somehow the asymmetric information in the agro-food market. The markets that small-scale farmers are usually attracted to require high quality of products as its main requisites. Those producers who opt for voluntarily quality standards schemes would consequently improve their overall quality of production. Besides tendering for procurements to municipalities for collective restaurants require certified high quality foods.

To profit from economies of scale, actors of a supply chain tend partnership. Most food markets demand a relatively stable procurement of goods. Small-scale producers need to cooperate in associations or cooperatives to be able to take part in such markets by creating value. The required institutions that enables such transactions are shaped in time among actors who are willing to give up some freedom of decision-making in exchange of stability of sales. Adherents of cooperation share benefits and also losses. Production contract is a tool for risk management where producers share risk with upstream and downstream supply chain actors. Future and forward contracts are also market-based risk management instruments which aim to hedge against price volatility of the market. Risk-sharing schemes are getting more common in agricultural sector where individual farms pay contributions to external enterprise for the compensation against eventual risks.

When the costs of carrying out an activity in cooperation with other members is relatively high, the firms opt either for internalisation or externalisation (subcontracting). By internalising of supply chain activities (i.e. production, processing, logistics, sales, …) the enterprise takes care of a range of services otherwise handled by other enterprises. Contrary to internalisation, externalisation transfers the responsibility of certain services to other actors through contracts.

Public institutions intervene in the upstream or downstream of the agricultural commodities' supply chain to achieve food security, improve nutrition and promote sustainable agriculture. Governments

not only set the general framework in which the producers and agro-food companies interact, but also sometimes participates as a partner supporting the production, marketing and trade.

5.2. Value proposition

Value proposition is what an enterprise offer to potential customers and target markets (Richardson, 2008). It reflects the capability to make customers aware of the value created. The consumption patterns change and with that the actors of the supply chain need to adapt new marketing strategies which correspond to the new demands of market. Emerging environmental concerns and sanitary issues related to agricultural products have created new demands among the consumers and thus new markets that correspond to this concern are created. Those supply chains that can guarantee having the least environmental footprints can enjoy from this market. Products produced under certain circumstances are valorised by consumers. In this regard, products issued from traditional practices, organic farming and from geographical proximity are categorised as high value products. In addition, social issues related to the production and marketing of products such as working conditions, fairness of share of benefits among the actors of the supply chain and inclusion/exclusion of certain communities are raised by consumers and a fair solution is requested.

The distribution channels of fruit and vegetables attempt to create a trust environment between the consumers and the actors of the supply chain. Tracing the product to its producer and assuring that the activities carried out for its production had little or no negative impacts on the environment and the society is among the most common strategies in this regard.

6. Performance

The expected outputs from the good application of strategies are identified as performance. In terms of business functioning, performance is characterised by the extent to which value is captured (value capture) in the cluster of the supply chain system. The main categories in where the results of the strategies of the FV SCS may be sought are the following.

6.1. Value capture: cost structure and revenue streams

Value capture is what the investment should return back (Morris et al., 2005) in economic - as well as social and environmental – terms. In a competitive market, economic indicators of success are reached mainly by two main results: selling the products at high prices and reducing the costs to the lowest level possible. A new adopted strategy should not affect negatively some actors for the sake of some others. A fair distribution of value created would act as an incentive, creating a more favourable condition for the actors of the supply chain system (refer to Fig. 1, feedback loop). Value capture also comprise performance variables that are not directly economic, such as environmental and social values.

7. Identification and description of Mediterranean local clusters and supply chain systems

Building on the rationale developed and illustrated through the Med-Links CSP framework, local clusters and related supply chain systems have been explored in Egypt, France, Greece, Italy and Morocco to provide information and data on their structure and functioning, and then the conditions, strategies, and performance that characterise their activity. For each cluster, partners have conducted interviews with at least 2-3 key informants/experts through a provided questionnaire that represented the common methodological guidelines to follow for key informants and expert interviews, according to the theoretical framework proposed for task 1.1 and to its objectives (Tab. 1).

Table 1 Number of experts interviewed

	Public technical advisory services	Academia/ Research	Producers' organisation/ Associations	Private sector	Total per country
Egypt	3	2	2	-	7
France	-	-	2	1	3
Greece	-	1	-	1	2
Italy	1		2	-	3
Morocco	2	-	1	-	3
Total per sector	6	3	7	2	**18**

Source: Partners' team leaders of the Med-Links project

7.1. Cluster Egypt

7.1.1 Orange SFSC (Egypt)

Activity of the cluster/s of firms within the related supply chain system/s

Citrus production in Egypt is strongly characterized by orange production. Egypt ranked the first country in the world for orange export 2021. The total planted area in oranges 2020 and 2021 was adding to 168,000 hectares (ha). Most of the area planted with oranges is located in reclaimed lands which account for 60 percent of the total area. Plantations in the Nile Delta region account for 40 percent of the total orange planted area. Orange is the major citrus species crop in Egypt, representing about 80 percent of the total cultivated citrus area (USDA 2020). Since the pandemic, the consumption of oranges and orange juice have increased locally. This enables local food supply chains to develop a local processing and distribution system. Organic and "Demeter" farmers have started the production for the local processing company ISIS organic, and were able to increase their local impact.

Geographical location	Types and number of actors of the cluster	Actors of the Supply Chain System (EOSC, SFSC, GPP)	Products and services provided	Locations of production, processing, distribution, retail, consumption
Orange cultivation is located mainly in the governorates close to Cairo and delta region where the Mediterranean climatic condition is the best for growing.	Dominant companies and farms in this cluster can be classified as large size for ex Elbana company with 2500 feddan in cultivation and tanta station for packaging as the biggest one in Egypt.	Government, Farmers, NGOs, packaging and distribution companies	single product: Orange as fruit for local market purpose.	Produced: Egypt Processed: Egypt (Packaging) Distributed, sold and consumed mainly in: Egypt

Conditions influencing the activity of the cluster within the supply chain system

Marketing forecasts indicate that fresh oranges in domestic consumption will increase by 4 percent to reach 1.55 million metric tons (MMT). Increase in local consumption is attributed to higher production, and increased utilization of fresh oranges by consumers amid the COVID-19 pandemic due to its high content of vitamin C. In the marketing year of 2020/21, utilization of oranges by the processing sector is forecast to grow by 4.4 percent from the previous marketing year. USDA attributed the increase in consumption to higher demand by consumers amid the COVID-19 pandemic and an increase in orange processing – from 300,000 MT to 335,000 MT – due to increased demand for orange juice (Tab. 2).

Table 2 Orange production and demand in Egypt

Oranges, Fresh Market Year Begins Egypt	2018/2019 Oct 2018		2019/2020 Oct 2019		2020/2021 Oct 2020	
	USDA Official	New Post	USDA Official	New Post	USDA Official	New Post
Area Planted (HECTARES)	162000	162000	168000	168000	0	168000
Area Harvested (HECTARES)	150000	150000	140000	140000	0	145000
Bearing Trees (1000 TREES)	12650	12650	13000	13000	0	13910
Non-Bearing Trees (1000 TREES)	9900	9900	10000	10000	0	10000
Total No. Of Trees (1000 TREES)	22550	22550	23000	23000	0	23910
Production (1000 MT)	3600	3600	3000	3200	0	3400
Imports (1000 MT)	0	0	0	0	0	0
Total Supply (1000 MT)	3600	3600	3000	3200	0	3400
Exports (1000 MT)	1700	1700	1500	1375	0	1500
Fresh Dom. Consumption (1000 MT)	1540	1540	1200	1490	0	1550
For Processing (1000 MT)	360	360	300	335	0	350
Total Distribution (1000 MT)	3600	3600	3000	3200	0	3400
(HECTARES) ,(1000 TREES) ,(1000 MT)						

Source: USDA 2020

Even though the planted area is remaining the same, domestic consumption of oranges and orange juice is increasing in 2020 and 2021. As the pandemic continues globally, orange and orange juice needs will stay high. The conditions to produce and process locally are attractive and economically valuable.

Strategies adopted by the cluster within the supply chain system

The Egyptian Med-Links partners are focussing on alternative cultivation and processing methods in order to strengthen the local organic supply of oranges and orange juice. Next to healthy soil development and the support of healthy nutrition, organic and biodynamic farming methods guarantee an increased income for local orange farmers compared to conventional. The local distributor ISIS is running campaigns for healthy and organic oranges and orange juice in order to promote the local consumption.

Performance obtained by the cluster within the supply chain system

Organic orange production is promoted on the local market. New growers and companies are encouraged to enter the market. New innovations are adopted in harvest methods like canopy shakers which saves money and time. With increasing the cultivated land, no of labour increased so the cluster offers a lot of job opportunities.

7.1.2 Medicinal and aromatic plants EOSC (Egypt)

Activity of the cluster of firms within the related supply chain system

As for cultivated areas, they are medium (not so small less than 2 feddans[1] since the farmer prefers to cultivate wheat for family consumption and berseem for animal consumption, nor too large as to exceed 12 feddans). EU is the main market for the most important Egyptian herb and spices followed by the USA in some cases and some other countries in other cases. Russia, also, is one of the main markets. Beni-Sueif governorate is producing 25% of medicinal and aromatic plants produced in Egypt.

Geographical location	Actors of the Supply Chain System (EOSC, SFSC, GPP)	Products and services provided	Locations of production, processing, distribution, retail, consumption	Main forms of coordination between actors
The cultivation of herbs and spices in Egypt is in the following governorates (mainly in upper Egypt): Assiut, Minya, Beni Suef, AlFayoum, Alminia, Sinai and Aswan	Farmers, NGOs, academic research, processors and retailers.	single product : The most important MAPs produced in Egypt are fennel, marjoram, basil, mint, chamomile, thyme, anise, caraway, spearmint, hibiscus, calendula and geranium	Produced: Egypt Processed: Egypt, EU, Canada, US Distributed: Egypt, EU, Canada, US Sold and Consumed (destination markets) :The EU market is considered the largest market for importing H&S from Egypt, especially Germany, Netherlands and France	Around 6 companies are controlling the market and the others are small companies. Small holders contracted farmers to big farms

Conditions influencing the activity of the cluster within the supply chain system

The Egyptian medicinal and aromatic plants' (MAPs) business environment is characterised by the existence of forming funds and associations for producers and processors to participate in so as to get to know each other better and build trust, besides insuring the crops and protection against fluctuation in prices. A lack of agricultural and economical awareness is observed in herbs and spices' farms, which make many producers fail in this area since herbs and spices need a lot of knowledge in cultivation, harvest and post-harvest procedures, especially in drying and storage. Transportation after harvest is performed in an inappropriate manner. Huge amounts of products are transported by personal vehicle to save money, which leads to the escape of a high percentage of essential oils. There are several agricultural practices that decrease the percentage of oil in the herbs, like ignorance about the ripeness of chamomile which leads to lower percentage of oil in it, and the fact that leaving aside the geranium after harvest increases the oil in it. The enormous post-harvest losses of horticultural produce amount to the equivalent of 11 per cent of Egypt's total plant production. Post-harvest techniques, especially as related to grading, packaging, storage and drying are carried out inexpertly. Farmers use solar drying (leaving them in the sun, on a drying area, in the crates or even on the ground) for long amounts of

[1] 1 Feddan = 4200 m²

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time which leads to exposure to dust, microbes and mechanical damage. Even processing (drying) places are insufficiently equipped. To what concerns the organic production, one of the most important obstacles to its development is the use of pesticides and chemical fertilizers by neighbouring farms of those willing to convert to organic farming. It is observed that it's hard to convince farmers to convert to organic farming and abandon the conventional way.

Climate change could have negative or positive impact depending on the varieties, for example in chamomile with high temperature it grows better. With regards to land tenure, currently, land-rental charges mirror the value of the crops being produced, thus exploiting those farmers taking additional risks in producing high-value crops. This is particularly harmful to landless smallholders. Financial services for smallholders are lacking and should include the financing of: production inputs, row and high tunnels, drip-irrigation equipment suitable for a smallholder, and field packaging. It is also observed that the local pharmaceutical industry makes hardly any use of these raw materials. In fact, the companies generally use imported extracts from Europe instead of utilizing more than 1,000 domestic plant species with pharmaceutical and cosmetic potential.

Strategies adopted by the cluster within the supply chain system

Within this business environment, increasing available distribution channels is considered necessary to increase the number of herbal medicine shops across Egypt and abroad. There is growing demand for organic herbs and spices in the EU. Consumer sales of organic products now amount to about one and a half percent of total EU sales of herbs and spices. Furthermore, government starts to set regulations for organic agriculture and prevent importing harmful pesticides. There is also an increasing availability of distribution channels. Building good relationships between producer and processor through a win-win relationship, partnership, sustainability, honesty, clarity and transparency is considered necessary for the viability of the business. As for the technology used, large and medium companies have modern equipment, trained labour to some extent, and several expansions and agreements with companies in Germany and Italy to develop the existing production lines is in progress.

Performance obtained by the cluster within the supply chain system

Competition in the food sector is strong and quality requirements are high. Most of the herbs and spices are imported for industrial use and will be further processed and packaged in consumer or catering packs by the European food-processing industry. During the last two years, local processors have also started to deal with some associations, especially in Beni Suef and Fayoum. Competitiveness is positive in this cluster and leads to consumer satisfaction eventually. The social aspect is very significant in the Sekem community, for example in the farm you can find hospitals, schools and training centres which help farmers form the neighbourhood.

Self-organization and governance are based on building capacity at the governorate, district and village levels, empowering civil society organisations and water users associations to assume more responsibility in environmental issues and promoting coordination between stakeholders and the

communities and between the different sectors to achieve policies coherence. Emphasis here is on low cost technological applications for water saving, renewable energy, sustainable agriculture and food security. There is a particular need for technological solutions for soil improvement and protection against desertification, maintaining the irrigation and drainage network and water pollution abatement.

7.2. Cluster France

7.2.1 Fruit & Vegetables, GPP (France)

Definition and description of cluster of firms

The cluster identified for the French case study is composed of 30 farmers with an average farm size of 7 hectares, producing fruit and vegetables in the Occitanie region, and by the connected value chains actors such as their producer association (also functioning as a wholesaler), buyers, and the Montpellier wholesale market centre (i.e. Marché d'Intérêt National-MIN, Mercadis). In the following sections the main actors of the fruit and vegetables supply chain composing the French case study are defined.

Farmers: A covered market of 100 square meters in the MIN is dedicated to the local producers to sell their fresh products three times a week. This market is open only to professional customers who have an activity in the domain of food sector (i.e. restaurants, shops, *etc.*). About 30 farmers from four departments of the Occitanie region (Hérault, Gard, Lozère, Aveyron) participate in this market, with the majority of producers from the Hérault department (Fig.3). The average distance of supplying farms from this market is 35 kilometers. The farms have an average size of 7 hectares. Their juridical status are mainly individual farms with few Agricultural Assemblies on a Shared Farm (GAEC[2] in French) and a few Agricultural Farm with Limited Responsibility (EARL[3] in French). The GAEC status combines 2 to 10 farmers allowing them to valorize and market the products of their associated farm, whereas the EARL farm can be set up even by a single person as a legal enterprise.

Farmers' Association: "Producteurs d'Occitanie" (PO) (literally Producers of Occitania), founded in November 2018 and located at MIN, is an organization that facilitates the marketing of small and medium farms. This association is composed of 40 producers with farm size ranging between 1 and 40 hectares, with the objective of allowing farmers easier access to various professional markets with a fair remuneration and procuring local and seasonal food to the greatest number of buyers looking for local products. The association is equipped with an office, a cold storage room and warehouse (of around 40 m2) at the MIN and 2 vans for the collection and transport of the products. A onetime membership fee of 200 Euros is required and a 100 euro for annual subscriptions. However, at this initial stage of the association, not all of the farmers benefiting from the association's services are paying their share of membership. In fact, the three employees of the association have adopted the strategy of convincing the farmers to join the association by assuring them their services even without receiving certain membership fees for the first year.

[2] Groupement Agricole d'Exploitation en Commun
[3] Exploitation Agricole à Responsabilité Limitée

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Montpellier wholesale market: Mercadis, is one of the 17 French National Wholesale Markets (Marché d'Intérêt National-MIN) established in 1965 in Montpellier. This market gathers services related to food marketing such as wholesales, logistics, processing and packaging on a ground of ten hectares. It is managed by a private company called Somimon-Mercadis, which has given the name of Mercadis to the market among the public. The market is located in a large commercial area in south of Montpellier. About 50% of MIN's product flow are consumed in the Occitanie region. Although products coming from other regions are also commercialized through this market to fill in the gap of seasonality and local demand, nevertheless, around 40% of all products handled in this wholesale are produced in south of France. A total annual transaction of 140 million euros takes place between 220 enterprises composing the MIN (Mercadis 2019) among them 18 wholesalers, 12 packed and prepared food sellers, and 7 processors of fruit and vegetables can be identified as actors active in the supply chain of fruit and vegetables in the MIN. Around 500 direct employees are active in this market. There are around 3000 buyers who purchase their required agricultural products directly from this market (ibid).

Municipality of Montpellier Metropole: The city of Montpellier with a population of almost 300 thousand habitants (INSEE 2019) is the capital of Montpellier Méditerranée Métropole which is composed of 31 communities with a total population of 510 thousand people (Montpellier3M 2017). Montpellier is among the French cities with a rate of population growth of higher than 1% per year (INSEE 2019) (9300 people per year). Montpellier is a signatory city of the Milan Urban Food Policy Pact. The director of the MIN is the deputy mayor and responsible for the urban agricultural and food policies of the municipality. She has a close collaboration with the manager of the MIN. The public collective restaurants (i.e. school canteens) are managed by the municipality.

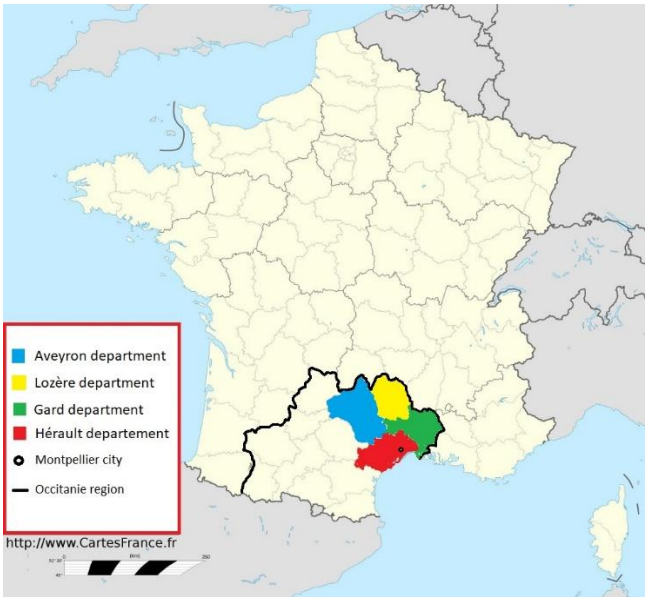

Figure 3 Location of region, departments and city of the cluster

Activity of the cluster of firms within the related supply chain system

The cluster is active in fruit and vegetable production, processing, logistics and trade. Farmers are coordinated in the above-mentioned producer association PO that gathers their production and place

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them in the market for buyers. In addition to this commercial function, other services are provided by the PO are production planning based on customer demand, logistics and packaging, training on agronomic practices. These activities are to correspond to the demand of fruit and vegetables of the public and private collective restaurants beside supplying the other customers.

Geographical location	Types and number of actors of the cluster	Actors of the Supply Chain System (EOSC, SFSC, GPP)	Products and services provided	Locations of production, processing, distribution, retail, consumption	Main forms of coordination between actors
- Region: Occitanie - Province: Hérault -Territory: South of France -Municipalitites : Montpellier - Main municipalities: Montpellier	- Farmers: 30	- Farmers: 30 - Processors:7 - Distributors: 1 -	- Fruit and vegetables	- Production: 4 departments in Occitanie-France - Processing: Montpellier-MIN - Distribution: OP - Retail: Shops, restaurants, … - etc.	- Wholesales market - Producers' market - Producers' organization

The producers' association functions as a food hub where the professional customers are procured with the products gathered from the local producers. They provide the professionals customers (i.e. restaurants, shops, etc.) with their required fruit and vegetables with a single bill. The PO markets an annual amount of 250 tons of fruit and vegetable.
15 members of the association, who own a relatively large farms, supply large retailers and 15 other members practice on-farm direct sales. Their share of product being sold through the association may increase as the association grows older and the trust is fostered likewise. The wide range and the diversity of the products offered by the local producers allows the association to supply the local professionals active in the food sector (such as restaurants, shops, hotels, etc.) particularly those who are interested specifically in local products. They also take care of processing of the fruit and vegetables according to the order of customers and benefiting from the logistics available at MIN. This organization seems to have the potential to bid for public procurement tenders due to its capacity of providing a large range of local fruit and vegetables through pooled logistics and benefiting of economies of scale. Nevertheless, in these initial years of their activity, the association did not participate in any public tenders.

Conditions influencing the activity of the cluster within the supply chain system

The city of Montpellier prepares and distributes on average 15400 meals per days (Stephan 2021). The public collective restaurants are subject to the codes of public market. The European Union's Code of Public Procurement set the overall framework of procuring food stuff in all European countries. However, for those contracts below the EU threshold of 750 000 euros net VAT tendering procedures are set based on national procurement laws (EU 2014). The French policy opted for an allotment of calls for bids into more specific group of products (e.g. "apples", "rice of Camargue") to facilitate the participation of small-scale local producers. Today there are 74 groups of products in the public market proposed by Montpellier Metropole.

Based on the national regulations, from January 2022 the public collective restaurants have to procure 50% of their ingredients from the local and high quality agricultural products. 20% of this amount needs to be provided from organic products. Although the criteria of seasonal and local produces have been removed from the EU GPP requisites for green public food procurement (European Commission, 2019), but the regional policies still favour agricultural products coming from farms in the proximity of the city. This policy is to support the economic viability of small-scale production in the region. Nevertheless, the main restriction pointed out by the manager of Mercadis is the consumer-oriented governance regime applied for the management of MIN in Montpellier. Mercadis is institutionally attached to Montpellier Metropole. Its president is the deputy mayor of Montpellier. This managerial position turns this market into a platform to supply food to the urban consumers. This consumer-oriented perspective is reflected in the governance of this wholesale market. It puts the consumers in priority regarding to the producers. According to interviewed expert, a regional governance might have had another perspective, that which is more concentrated on the producers rather than consumers. The departmental and regional authorities are more accustomed to deal with matters concerning the organization and planning of production. According to the interviewed expert, if the MIN was governed by the regional authority it would have taken into consideration a larger perspective of issues which would have comprehended the issues related to production beside the issues relative to consumption. However, on the other hand, the close collaboration with Municipality of Montpellier Metropole may also facilitate the procurement of fruit and vegetables for the collective restaurants. The municipality supports MIN in what concerns; 1) the transport of goods from the Mercadis to the city, 2) short food supply chain, and 3) supplying food charity organisations (Montpellier 2021).

The Mediterranean climate in the southern region of France creates a high level of bio-diversity and favours the production of different varieties of fruit and vegetables. However, with regards to the production factors and the natural resources, the soil quality is relatively low. A reduction in number of farmers in the region is remarkable. This reduction of number of producers in the region is reflected also in the number of producers present in the MIN's producers' floor which has declined from 65 producers in 2008 to 40 producers today. This fact is mainly due to the lack of intergenerational renewal within farms. Smaller number of local producers would favour the supply of food stuff from other regions or even the import from other countries. This reality would affect negatively the procurement of local food if the trend continues. The rate of replacement is 65% (i.e. 65 installations for 100 departures) in Occitanie (89% for Hérault) (Chambre d'Agriculture Occitanie 2017). However, European Union's, national and regional financial supports for the instalment of young farmers has to improve this rate of replacement. According to the manager of Mercadis, transport companies have a major power in deciding the sequence of activities of FV supply chain. The proceeding of an order depends to the availability of fleet. Thus, they are those who decide when the product can be delivered to the customers. Therefore, it seems logic that the wholesalers and other enterprises to equip themselves with transport as one of their logistical property. The public awareness regarding health issues raised in the previous decades concerning the agricultural products have evoked a more precise decision making procedure among the consumers. The surface of organic agriculture and those on conversion in France has been doubled in the years between 2014 to 2018 (from about one million hectares to more than two million hectares) (Agence Bio 2020). However, it is difficult to distinguish between the sanitary issues consciousness and environmental knowledge of consumers as the most important driver of this change. It is interesting to note that the circulation limitations raised by the Covid had triggered the activity of the producers' association.

Strategies adopted by the cluster within the supply chain system

The wholesalers of the MIN are appointed for the provision of fruit and vegetables to the collective restaurants. Apparently, they are better positioned compared to the producers' association and single producers in handling quantities of food and respecting the quality norms appropriate for public tenders. They have also the capacity to transform agricultural products in conformity with the demand of collective restaurants. The strategies of the municipality of Montpellier concerning the collective restaurants are; 1) reducing school canteens' waste by donating non-used meals and ingredients to charities and 2) favouring the procurement of local and seasonal products. The objective of the city is to procure 100% of the required ingredients for school restaurants (till 2026) from local and/or organic products (Stephan 2021). To reach these objectives, the public actors in collaboration with private entities have developed several software/applications for a better management of collective restaurants (Optigede 2021). In addition, there exists some national platforms and organizations for the promotion of local and bio products. The farmers present at the producers' floor can benefit from a virtual platform (bocal.montpellier3m.fr) developed by Montpellier Metropole and the neighbouring communities to commercialize their local and organic products. A regional platform developed by cooperatives of organic producers with the objective of reaching collective restaurants is mangerbiosudouest.mbim.fr. Another website to be mentioned, Agrilocal.fr facilitates the acquisition of all kinds of agricultural goods from small-scale local producers specifically for the use in collective restaurants.

Among the more conventional communicational tools, there is a monthly catalogue communicating the origin of the products at producers' floor published by Mercadis on behalf of the local producers. The buyers can trace the products by the name of the producer, the name of the municipality and its distance to Montpellier which are specified for each product in the list. Quality labels are also indicated for the producer who have received such certifications. Diversity of the products at the producers' floor is considered as an asset by the manager of the MIN. The different varieties of agricultural products supplied by small-scale producers are appreciated in the producers' market. As an example, there are 40 varieties of tomatoes offered at this market. This is while the maximum number of varieties a well-known French hypermarket offers reaches 15 varieties of tomatoes. Valorising the local varieties would conserve the biodiversity of agricultural products in the region. 9 quality labels are present today on MIN, among them the French labels of "Organic Product", "Red Label", "A product of a high environmental value" are the most present. Quality labels facilitates the access to public market. However, being granted with quality labels is not a requisite condition to access the green public market. The contracting authorities may refer to the technical specifications of the eco-labels but they cannot refrain the suppliers who are not granted the labels from the market as long as they satisfy the technical requirements identified for that certain product (Ferrandino 2016). Nevertheless, the producers are willing to have further quality certifications and to apply traceability systems (e.g. certifying food miles) to assure the freshness, proximity and quality of products in the eyes of consumers/clients and to benefit from larger shares of profit margins of the market. In this regard, the MIN organises occasional promotional campaigns to valorise the products of the local producers, particularly those certified with quality labels.

Based on Article 9 bis of "Internal Regulation of MIN-Montpellier" (Mercadis 2019) the manager of MIN has the responsibility to ensure a fair competition at the MIN regarding the location of each enterprise. In line with this regulation, to guarantee an environment where all enterprises would have the same power in the market place, and to avoid certain enterprises to take lead regarding the power

in the market, another strategy of valorising the products of the local producers has been set up by the MIN by giving a central location to the producers' market. This location is easily accessible by the customers and there are plenty of parking places close to the producers' floor. Local producers present at producers' floor jointly with some other farmers in the region have regrouped in a producers' organization (Producteurs d'Occitanie-OP). The association has adopted the strategy of planning the production of vegetables of their members by anticipating the demand of the market and proposing the production to its members. The objective is to supply the market with local products all over the year. For this end, the OP needs to register the production of its members and the orders of its clients. The record keeping is realized using an Excel/pivot tables.

They opted a collective marketing strategy to better correspond to the market's demand. This objective is to be reached by bringing together the production of a number of farmers through pooled logistics. In addition, PO is planning to apply his own logo on the fruit and vegetable boxes. A uniform packaging would foster the image of the association among the customers. In November 2021, a French national charity organisation has directly signed a convention with the PO and Montpellier Metropole to receive an annual amount of 140 tonnes of fresh/local products at market price with the objective of ensuring a fair price for producers. This initiative has been encouraged by the municipality of Montpellier to provide the twenty thousand beneficiaries of Resto du Coeur with healthier food (Herault-tribune 2021). These kind of long term contracts will further facilitate planning the production of vegetables for the PO. By this convention, the "Restos de Coeur" is committed to purchase the production of local producers in a distance less than 50 Km through the PO. The PO supports the organisation of producers in order to correspond to this new demand. The PO helps in planning the production for reaching higher volumes and assuring a diversity of the supplied fruit and vegetables. The MIN assures the traceability of the products and their respect of terms of contract. The processing of fruit and vegetables is the point of strength of MIN. A food processing centre has been created in 2017 comprising seven processing enterprises of which five of them treat fruit and vegetables. Agriviva is a vegetable processing factory that provide school and public canteens with local products within a 250 km perimeter around the processing workshop.

Performance obtained by the cluster within the supply chain system

The school canteens prepare offers meals to 22 thousand families in Montpellier (Stephan 2021). The Municipality aims for the 100% procurement of quality and local food for its collective restaurants. The city has already attained the objectives set by national law through procuring 51% of its agricultural products from sustainable products of which 28% of it are organic (Stephan 2021).
The producers' association markets an annual amount of 250 tons of fruit and vegetables supplied by local producers. Its activities, especially that of pooling logistics, contributes to cost reduction in marketing the fruit and vegetables. The intermediation of the OP has facilitated the transfer of market signals between customers and producers, eventually inducing a more coherent production to market demand. The OP advices its members to plan their production in a way to fill-in the market seasonal shortages to supply local food in a larger period of time. As an example, 15 hectares of uncultivated land owned by a member of the OP has gone under carrot production during the season when none of the local producers dedicated their land to this product so that OP can supply the market with local carrots. In addition to this, the new convention signed between a charity organization and the PO this year enables a better planning of local vegetable production.

Since 2011, the MIN, has had partnership with food aid organizations (i.e. Resto du Coeur, Banque alimentaire, …) to distribute food items among the less favoured population. It contributes an annual amount of almost a hundred tons of fruit and vegetables, of which 69 tons of it are local products, to charities which distributes free meals to least affluent section of the population (Mercadis 2019).
The MIN includes several projects to recover food losses and waste. The actions implemented by the MIN regarding recycling the waste has converted 73% of the waste produced on the market into four products: compost, animal feed, wood & cardboard (Montpellier3M 2017).

7.3. Cluster Greece

7.3.1 Vegetables SFSC & Cherry EOSC (Greece)

Definition and description of cluster of firms

The cluster for the Greek case consists of about 120 small-scale cherry and vegetable producers from the region of Central Macedonia, Greece who have low levels of technological sophistication and limited institutional capacity and support. Two groups of farmers are involved in the cluster:

- The members of an agricultural cooperative that produces and sells cherries to foreign markets (export-oriented supply chain – EOSC – having as a main destination European markets), also using local short food supply chain conduits for selling products to local (farmers') markets.
- Farmers who distribute vegetables (tomatoes, eggplants, zucchini, onions, leeks, peppers, spinach, carrots, lettuce, cabbages, pea, etc.) through short food supply chains (SFSCs), i.e., in farmers' markets in the city of Katerini.

In the cluster also participate buyers at farmers' markets and advisors. The term "advisors" describes persons who offer scientific and financial agronomic support to farmers. In the case of the first group, there is a cooperative form of coordination, whereas farmers who distribute their products through short food supply chains operate as independent units, without a central coordination mechanism. According to the two interviewed experts, farmers participating in the two clusters are small-scale producers, who face difficulties in handling structural problems of Greek agriculture, namely the fragmentation of farm land and the different climatic conditions in the regions where the plots are located.

Activity of the cluster of firms within the related supply chain system

In the case of the cherry producers, there is an emphasis on product quality, which is essential for continuing to cover the high requirements of foreign markets. The supply chain under consideration is based on contracts with exporters and there is a distance between producers and consumers (both retailers and households which represent the end-users). The actors located in the middle of the chain connect the two groups and provide information essential for the operation of the system. For the interviewees, the striking feature that keeps the system functional is the quality of the products, since it is a decisive success attribute. Although the quality is also important for short food supply chain systems, the interviewees emphasized the trust that consumers feel toward farmers' markets. However, the variety of products sold in these markets, along with the absence of functional quality control strategies, make it difficult to keep high quality standards every season, whereas the price fluctuations jeopardize farmers' income.

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Geographical location	Types and number of actors of the cluster	Actors of the Supply Chain System (EOSC, SFSC, GPP)	Products and services provided	Locations of production, processing, distribution, retail, consumption	Main forms of coordination between actors
- Region: Central Macedonia - Province: Pieria	- Farmers: about 120 - Advisors: about 4 - Consumers: hardly estimated number - Middle supply chain actors (only for EOSC)	- Farmers: no data available - Processors: no data available - Distributors: no data available	- Farmers: Cherries (first group), vegetables (second group) - Advisors: Financial or agronomic support - Middle supply chain actors (for EOSC): Information flow, market penetration	- Production: Pieria (Central Macedonia) - Distribution: European markets (for EOSC), local markets (SFSCs) - Retail: European markets (for EOSC), local farmers' markets (SFSCs)	- Cooperatives: A cooperative organization, based on election and democratic decision-making procedures - SFSCs: Farmers act as independent units. However, the function of farmers markets is based on regulations posed by local authorities.

Conditions influencing the activity of the cluster within the supply chain system

The interviewees mentioned that the Common Agricultural Policy affects the operation of both groups of farmers. The emphasis of the European policy frameworks to the reduction of the environmental footprint of agriculture reduces small-scale farmers' ability to exploit funding opportunities, thus eliminating their attempts to further modernize their farms. In their view, the inability of small-scale producers to meet the requirements posed by CAP has the potential to exclude them from farming in the future. On the other hand, according to respondents, the impacts of climate change on the production are already evident. Farmers face difficulties in predicting the needs of their cultivars, whereas extreme climatic events, which have major effects on the productivity and the quality of the products, are frequent. In addition, problems related to soil quality and water availability are expected to further press the production of both cherries and vegetables in the future.

However, there is a high demand for both product categories, which ensures the viability of farm enterprises, at least in the short- and middle-term. Consumers are willing to buy from local markets, especially from producers with whom they are connected with strong relations. Such a bonding, which is not evident in the case of EOSC, is what keeps functional the SFSCs, despite the low technological level of the farms. In the case of EOSC, cherry producers have a higher technological status, lacking however the infrastructure needed to adopt high-tech equipment. The transition to a digitalized form of farming seems to be a leap rather than a step for those farmers. The small size of farms reduces the opportunity to buy new, digital technologies, especially for farmers who distribute their products through SFSCs. For the cooperative that sells cherries in European markets through EOSC, the ability to adopt intelligent farm technology (like drones or sensors) is higher, if sharing practices are properly promoted. Nevertheless, for that group, the cost of workers used in manual harvesting and other farm practices defines the profit margins. In the case of SFSCs, the farm family offers the main part of the

work needed at the farm level. For the two experts, something that is expected to pay-off in the future is the transparency of the production processes. As they noted, the EOSC are based on traceability systems, which ensure a threshold of transparency. However, there is a lack of control procedures for SFSCs. Hence, although consumers know the producers of the food they buy, and despite the fact that cultivation is in many cases based on traditional practices, the information offered on the production process is limited.

Strategies adopted by the cluster within the supply chain system

For the cooperative scheme of the cherry farmers, there is a close collaboration and a functional and well-defined partnership. However, vegetable farmers lack such a clear collaboration strategy. The interviewees mentioned that collaborations are also evident in that group, however what initiates the development of alliances is external conditions. For instance, when extreme weather conditions destroy a farmers' production, the practice of buying from another farmer (potentially at lower prices than those in central markets) is common. Nevertheless, farmers do not have clear risk mitigation and risk management strategies. As one participant explained, farmers develop rather vague strategies to address mainly economic risks without, however, allocating specific resources to monitor, minimize, and control risks. It also seems that there is a gap between what scientists and farmers understand as risks, probably owing to the dysfunctional relationship between the two groups and the inability of scientific and research organizations to build trust-based relationships with the farming population.

As already mentioned, in SFSCs farmers operate as independent units, despite the fact that between competitors (farmers selling at farmers' markets) there is a high level of social capital. In the case of cherry producers, the farmers operate as members of a larger unit, having still different ways of practicing farming. Nevertheless, the closer collaboration with advisors makes things easier for them. Hence, the vertical integration of production activities and a potential turn to the processing of their products seems to be easier for EOSC than for SFSCs' farmers. However, the latter group has wider margins of improvement and better possibilities to engage in different marketing strategies, like open farms and other agritourism activities or catering services. However, interviewees agreed that cultural obstacles (especially for older farmers) and unanticipated risks (like the disruptions caused during the COVID pandemic) put obstacles to the transition to multifunctional farms. Nevertheless, quality labels (which are absent today) are considered as a functional strategy for sustaining the existence of both groups in the future. However, there is a need to enhance the connection with research and academic institutes to achieve a clear focus on the production and labelling of quality products. Such a connection can also facilitate the promotion of technological innovation, which is limited so far. The recent national policies for the promotion of agroforestry systems that also concern cherry trees are expected to offer a boost to technological innovation in the group of cherry producers.

Performance obtained by the cluster within the supply chain system

About competitiveness, the respondents agreed that the productivity is generally high, and the quality has been improved during the last years for both supply chains but production costs also remain considerable. The lack of financial resources, partly owed to the Greek economic crisis, inhibits the

modernization of farms. Risk mitigation plans exist only in some farms, depending on the management strategies used by farm owners. About the social aspects associated with the two distribution systems, cherry production helps local communities by offering employment opportunities to community members and engaging migrant workforce. On the other hand, SFSCs reconnect consumers with producers, thus covering their specific needs and wants. Both systems offer fair working conditions to workers but only SFSCs provide equal opportunities to women farmers. On the contrary, in the EOSC, women farmers are partially invisible. Regarding the environmental impacts, vegetable production, being more intensive, has a relatively high environmental footprint. However, the short distribution schemes used reduce the food miles and, therefore, the extra environmental costs associated with distribution.

Finally, the issue of governance presents some differences between the two groups. In the case of cherry production, the cooperative governance increases the competitiveness of the scheme and the negotiation power, especially for small-scale producers. Nevertheless, the absence of explicit mechanisms of governance control, may lead to inequalities between cooperative members and different levels of decision-making power. For the case of SFSCs, the lack of a clear governance structure increases the competition between clusters' members. However, the social capital between producers is generally high, allowing the functional collaboration between them.

7.4. Cluster Italy

7.4.1 Fruit & Vegetables SFSC (Italy)

Definition and description of cluster of firms

The short food supply chain under investigation is coordinated by the most important Farm Union in Italy (Coldiretti) through the Campagna Amica Foundation. The initiative adheres to a reconnection perspective aiming to re-localising processes of both production and consumption, within a so-called interpersonal world of production (Fonte 2008; Storper 1997). In literature, this perspective is considered a reaction to the place-less economy supported within the globalized agrifood supply chain. More precisely, the Campagna Amica Foundation tries to link rural and urban areas, by connecting responsible consumers and local producers, within the idea of Zero KM farmers' markets. The main objectives of the short food supply chain governed by the Campagna Amica Foundation are:

- ✓ linking urban and local consumers with vegetable local producers;
- ✓ promoting and stimulating new patterns of consumption grounded on fresh and seasonal products from farms located in the vegetable district;
- ✓ boosting a reduction in environmental impact, by stimulating the consumption of Zero Km products.
- ✓

Innovativeness of this simple innovation resides in the new institutional arrangement where Campagna Amica acts as supporting structure able to reduce transaction costs through setting up the "rules of the game".
Farmers have a good level of education with a prevalence of high school diplomas (mostly in agriculture) and, in some cases, also a degree (not only in agriculture, but also in other disciplines). More recently, thanks to the support of rural development policies, a generational renewal has been realized, with the entrance of young and motivated entrepreneurs. Mostly important, the majority of the new young farmers are women.

Activity of the cluster of firms within the related supply chain system

The farmers' market is located in the city of Latina and is made up of 50 local farms, 20 of which are fruit and vegetable farms. Farm's size is variable, ranging from small-size to larger size. In the largest farms half of the land apply set-aside, by introducing crop rotation. Usually, farmers sell seasonal products, according to the prescription of the "Campagna Amica" farmers market; main requirements are:

- to sell either their own products or products of other farms adhering to Campagna Amica;
- to be licensees of the brand "Campagna Amica" and to respect the rules of production.

As far as services provided are concerned, in the farmers' market there is a person in charge of managing the market. Other than selling fresh and local products, farmers' market organizes initiatives, events, takes care of the relationships with customers and institutions and sanitary inspections. Particular attention is devoted to the selection of potential farmers to be admitted, who must comply with the regulation.

Geographical location	Types and number of actors of the cluster	Actors of the Supply Chain System (EOSC, SFSC, GPP)	Products and services provided	Locations of production, processing, distribution, retail, consumption	Main forms of coordination between actors
- Region: Lazio - Province: Latina - Territory: southern Pontino plain - Main municipalities: Terracina, Fondi and Latina	Fruit and vegetable producers	- 20 farmers - Campagna Amica Foundation	Seasonal fruit and vegetables only The management of the market organizes also other activities, like cultural and social events	All phases are realized within the vegetable district	Campagna Amica Foundation is the managing institution of the market, which foster coordination and interaction among them

Conditions influencing the activity of the cluster within the supply chain system

Regulation and policy

The farms are subject to the mandatory regulations on food safety starting from the HACCP manual which for some companies, especially the fruit and vegetable ones, is in a reduced form (it is simpler). Moreover, products are mainly fresh and local products coming from the same farms or from other local farms but adhering to the Campagna Amica Foundation.

The farms are obliged to delegate the Farm Union Coldiretti regarding accountancy and tax payment. This allows to strictly monitor the farm's activity.

Demand conditions

In the last period, farmers' market has evidenced an increase in the consumption, boosted also by the pandemic of Covid 19. As a matter of fact, the consumer has increasingly appreciated the farmers' markets of Campagna Amica Foundation, being them synonymous with guarantee of product, territoriality, genuineness, wholesomeness, cultural products. Moreover, as evidenced in a recent survey conducted by the Coldiretti in 2020, vegetables are the main voice of consumption, with 68% of purchases. Therefore, the consumption of a product from a farmers' market implies a reconnection between producer and consumer and an exchange of not only products, but also the local tradition, local culture and the historical memory. The setting up of the price fork (range between the minimum and the maximum price) is periodic and takes into account the prices applied in the market of the same territory: more precisely, Campagna Amica prices of the main vegetables in 10 retailers in the province of Latina are gathered by Campagna Amica. Each adherent to the farmers' market is allowed to sell at higher prices only in cases of higher quality products, originated from specific productive processes.

Technological availability

The technological availability of farms depends on the type of farm. More precisely, technologies range from very simple methods of production (also artisan in some cases) to highly technological ones. A growing transition towards modernised systems is evident also in vegetable sector working in the short supply chain; for instance, new tractors and machineries have replaced the older ones. With few exceptions, precision farming tools are not adopted and digital solutions are rare.

Labour forces are mainly family workers and the distribution of labour is decided at family level. In many cases, seasonal workers are hired, to satisfy the high demand in summer time.

Financial constraints and insurance provisioning

Financial constraints are relatively low, even in the pandemic period the Foundation has granted the working of the market and allowed to secure farms' income. As far as risk is concerned, some farms, especially the larger ones, have forms of insurance, but not all farms have tools of risk management tools.

Ecological and socio-institutional conditions

The farm's agricultural practices have a positive impact on the environment because many farmers in the vegetable sector, in addition to zero-kilometre products, are adopting sustainable agricultural practices and, some of them, organic production too. Usually, no intensive agricultural practices or intensive fertilization methods are applied, but natural products are used.
In Campagna Amica farmers' market phenomena of criminality and corruption are not observed.

Strategies adopted by the cluster within the supply chain system

The strategies adopted by the farms adhering to the Campagna Amica farmer market are framed within a re-grounding process of the farming activity into the rural contexts. These strategies are well coordinated and addressed by the Farm Union, through a rigorous code of practices and a continuous support for the farmers.
More precisely, they aim to reconfigure valorisation approaches, through valorising territorial proximity, which is a synthesis of geographical proximity and organizational proximity (Torre, Traversac, 2016). Multifunctional role of farming in the SFSC is drawn on the biodiversity preservation, promotion of local tradition and culture, sustainable method of agricultural production. Therefore, degree of multifunctionality seems relatively high, in account of the role of the short supply chain, like selling fresh and local products, transferring contextual knowledge and the historical memory of products. Moreover, Zero Km strategy presents positive environmental externalities, then supporting the environmental function of the farming activity.
A small share of farms has started producing fourth-range products, so increasing the added value and reaching higher levels of profits, through retaining higher added value shares. Products may also be sold with additional services, live packaging or wrapping. Distribution strategies are promoted and supported by the manager of the farmer market, like organizing events, cultural and promotional activities in the market. All farms of the market receive funds and support from both pillars of the Common Agricultural Policy, thanks to the support of advisors and agronomists of the Farm Union. The role of Farm Union is fundamental, both in supporting the governance and the management of the market and in providing services to farmers, like support to the financial accountancy. A rigorous inspection of the farmers' activity is also provided, with the purpose of maintaining high level of reputation and, consequently, to grant the credibility of commitment towards consumers.

Performance obtained by the cluster within the supply chain system

From our interview, SFSC points out positive performance and reveals the sustainability of Campagna Amica Farmer's Markets, which can be underlined from various points of view.

As far as economic sustainability is concerned, the economic impact of the short food supply chain is positive for both the farmers (who gain higher prices with respect to conventional distribution channels, due to the lack of intermediaries) and the consumers (paying very often reduced or similar prices with respect to modern distribution channels). Our key informant evidences that, thanks to the farmer market, farm's financial stability in the district is increasing. Moreover, performance registered in the farmer market are surely positive in terms of both productivity and quality. As far as the productivity in concerned, an annual growth of 20% can be evidenced, while the quality has known a huge increase of 80%. Positive trend in vegetable demand has boosted impact on the farm income. The level of the price is not always higher with respect to supermarket and is granted by quality attributes of local products. As a matter of fact, freshness is highly appreciated by local consumers. Moreover, farmer market reveals a positive impact on local community, by preserving its cultures and traditions. Purchasing food at a farmer's market may represent a social innovation, thanks to the direct connection between consumer and producer sharing contextual knowledge and removing informational asymmetries.

From a social point of view, positive impacts are registered too. First of all, short food supply chain allowed the survival of many small-size farms, so contributing to the reservation of the levels of employment in the local economy. Another relevant social and cultural impact concern the support of local/regional identities, which empower the degree of multifunctionality of the farming activity.
At family farm level, higher levels of self-esteem are revealed, thanks to a better distribution of the labor among family members.

As far as the environmental impact is concerned, it is important to underline how farmer market is a Zero Km initiative, which contributes to reduce the environmental impact of transport, with respect to the global value chains. Moreover, local products are fresh and cultivated through sustainable and agronomically sound agricultural practices, which provide positive environmental externalities.

7.4.2 Fruit & Vegetables EOSC (Italy)

Definition and description of cluster of firms

Export oriented supply chain

The area under study belongs to the fruit and vegetable district located in the province of Latina, in the region Lazio of Italy. It is a cluster of enterprises which has been officially recognized by the regional government according to the national law on agrifood quality districts (228/2001). Following analysis will focus on the vegetable sector, which represent the most relevant sub-sector.

Farming structure in the official statistics

Data considered are drawn on the last census of the Italian agriculture and the triennial farm survey conducted according to the European regulation n. 1166/2008. From the dataset, structural information has been consulted with the purpose of identifying main socioeconomic farms' characteristics. Last survey refers to 2016.
According to the last census of the Italian agriculture, in this district are located fruit and vegetables farms, which cover a percentage of both farms and utilized agricultural area (UAA) equal to 50% (figure

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4). Therefore, the relevance of district is clear in terms of both enterprises and covered land. As evident from the figure, a dynamic process of restructuring in the farming sector is at stake, with a systematic increase in both the farm's size and the available land. This process has seen the loss of a large number of farms during the last four decades.
The productive structure is made up of small family farms, with an available average size less than 3 hectares. The fragmentation of the productive structure has boosted aggregation processes, with an increasing recourse to producers' organization to compete on national and international markets.

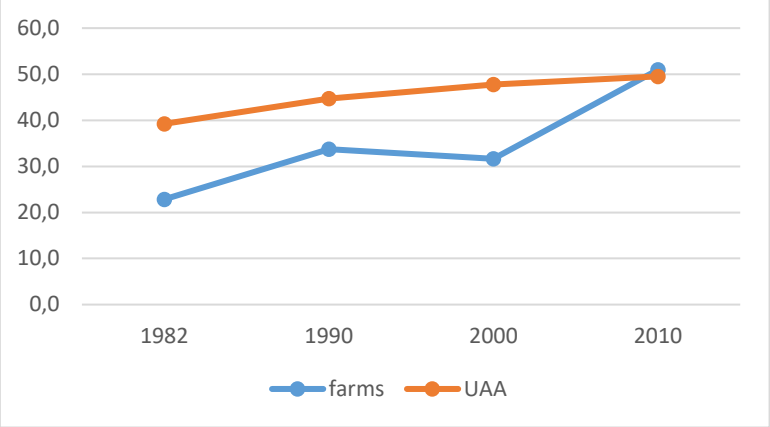


Figure 4 Farms and UAA in the vegetable sector in the province of Latina (%) – 2010, Source: Istat, 2010

More than 60% of aforementioned farms (2,211) are highly specialized in the vegetable sector, producing vegetable on 70% of the available UAA. Nonetheless, to get an idea about how fragmented the sector is, it is to be underlined that 33% of farms holds less than 1 hectare, while 82% is less than 5 hectares. The average age of the farmer is relatively old, with almost 75% of farms managed by more than 40 years old entrepreneurs. Moreover, the entrepreneurs are not well educated, with a prevalence of average and elementary level of education. Marketing channels privileged by more than 80% of farms consist of the products' transfer to either the processing enterprises or the trade companies. In many cases, farmers transfer their products to a local wholesaler, the fruit and vegetable market located in Fondi (one of the biggest in Europe), which serves the fruit and vegetable production in central-southern Italy. The 2016 survey of the Italian institute of Statistics reveals some changes in the fruit and vegetable sector, with a double percentage of farms whose size is more than 5 hectares. As a matter of fact, almost 37% of farm works on available lands more than 5 hectares. Furthermore, a comparison between percentage of farms according to the farm's size and percentage of standard output (SO), which is an indicator of the economic conditions, points out interesting insights. Being SO the average monetary value of the agricultural output at farm-gate price, figure 5 clearly evidences how largest farms holds higher percentages of the values created at farm level. More precisely, 37% of farms retain almost 83% of standard output, while, on the other side, 20% of farms have a 2% of incidence in terms of standard output. The data set provides information concerning the marketing channels, evidencing how a small percentage of farms, about 5%, is export oriented, retaining a percentage of SO of 10%. In the following part of the report, we concentrate our attention on the export-oriented farms of the agribusiness, by reporting the results of our in-depth interviews with the two key informants.

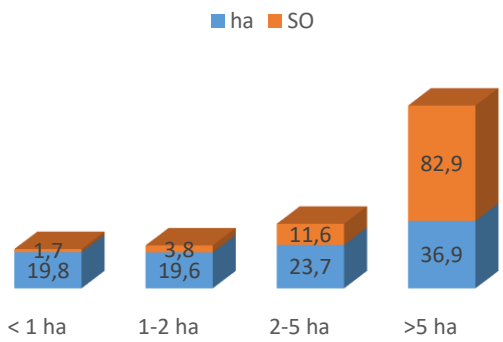


Figure 5 Farms' size (ha) and standard output (SO) in the vegetable sector in the province of Latina (%) – 2016, Source: Istat, 2016

Activity of the cluster of firms within the related supply chain system

The farms in this district are mainly oriented towards both national and international markets, with a special reference to the European Union. Export oriented strategies are mainly "exclusive", in that all products are exclusively exported and only small quantities are sold at national/regional level. These strategies are carried out in vegetable larger farms. As a matter of fact, export oriented farms are required to implement long terms strategies aiming to plan production. Moreover, the strong international competition boost phenomena of price-costs squeeze (van der Ploeg, Marsden, 2008), which reduce the profitability of the farming activity. As a consequence, export-oriented farms are more structured, counting on available agricultural areas of around 15-20 hectares. Nonetheless, the possibility of gathering a critical mass of product has brought about a significant presence of cooperatives and producers' organization, which may provide products with services, like processing, packaging, etc., allowing to retain more added value. According to data provided by the Italian Ministry of agriculture, in October 2021, 25 recognized fruit and vegetable producers organizations are registered.

The propensity towards international markets entails the compliance with regulatory issues and certification standards at international level. This brings about a more coordinated supply chain, where coordination mechanisms boost hybrid forms of governance, like contractual arrangements and/or vertical and horizontal integration, with the purpose of reducing internal uncertainties and transaction costs. As far as products involved in the EOSC, main exported vegetables are raw vegetables, like carrots, radishes, kohlrabi, long white turnips, round turnips; to lesser extent, aubergines, chards and spinach are also exported. Many international buyers purchase products from this territory in account of climatic reason, in order to secure vegetable provisioning all over the year. The main export market is Germany, but other European (western, like France, Holland and Switzerland, and eastern, like Czech Republic, Hungary and Poland) and non-European countries are privileged destinations. In the last decades, many Producer Organizations are organizing themselves towards the production of fourth range products, with the aim to export significant share of added value fourth range products, mainly baby spinach, valerian, already wrapped and washed; the latter are exported to the countries of central and northern Europe.

Geographical location	Types and number of actors of the cluster	Actors of the Supply Chain System (EOSC, SFSC, GPP)	Products and services provided	Locations of production, processing, distribution, retail, consumption	Main forms of coordination between actors
- Region: Lazio - Province: Latina - Territory: lowland - Main municipalities: Fondi, Latina, Terracina	- Farmers: 2,761 vegetable farms; 1,493 farms with more than 70% of vegetable surface (Istat, 2016) - producers' organizations: 25 (Mipaaf, 06.10.2021)	According to the mode of entry international markets	PRODUCTS: cabbage, carrots, radishes, kohlrabi, long white turnips, round turnips; to lesser extent, aubergines, chard and spinach - SERVICES: cooperative also process and provide packaging and distribution activities	- Production: district of Latina - Processing: either district or out of district - Distribution: out of district, mainly European markets - Retail: international markets	- Cooperatives with farmers located in the district - Producers' organizations - Contractual arrangements with trade agencies

Conditions influencing the activity of the cluster within the supply chain system

Regulation and policy

External conditions play a relevant role in addressing the strategies within the vegetable district. From our interviews, regulatory framework has surely affected the strategies of farms, cooperatives and producers' organizations, in terms of compliance with regulation in destination countries. In order to understand which regulations companies adhering to the EOSC must comply with, it is necessary to distinguish different types of regulations: a) mandatory, b) voluntary but regulated by public institutions and c) voluntary and regulated by private institutions.

In the fruit and vegetable sector, mandatory legislation concerns food control (HACCP), traceability, and safety at work, so they are all the basic regulations that companies must comply with. As for exports, there are voluntary certifications that are subject to public control, such as organic, geographical indications like PGI (protected geographical indications) and PDO (protected designation of origin) certifications. The markets of central and northern Europe are less interested in GIs, because local producers are not able to satisfy the need for a critical mass. Likewise, organic vegetable production is limited to very small businesses. More precisely, in the province of Latina, we have two or three farms producing and exporting organic products to central and northern Europe. The third certification required is voluntary and privately certified, such as Global Gap, IFS / BRC, which are standards covering all stages of production, from pre-harvest activities such as soil management and plant protection product application to post-harvest produce handling, packing and storing. Despite

they are voluntary and privately managed certifications (private control bodies), they are highly requested all across the markets of central and northern Europe. As a matter of fact, they may represent an entry barrier, because they are sometimes very binding. This is because the control of residues in products is the weak point of food control, food healthiness and food safety and it is mandatory to get the GLOBAL GAP certification. This is why each producer for each type of product he confers must be controlled. Recently, another important regulation has been introduced which is the Global GAP-GRASP standard, concerning the social conditions of workers to be secured.

As said before, main export market in Europe is Germany, also acting as a hub to Eastern countries. Nonetheless, direct channels have been created whereby the products go directly to Poland, or the Czech Republic or Hungary. Similarly, direct marketing channels have started being activated, then bringing about "shorter" EOSC. In the new EOSC, Germany no longer acts as hub exporting in other European countries, but farms of the district start having direct contact with the destination markets. This implies a shift in the international markets entry mode, as we will see in the following section. Likewise, exports to France and England are more direct. Working in international food supply chain involves risks of bargaining power, which is relatively stressed by the relative low demand elasticity for vegetable products. Low demand elasticity is evident at consumption and distribution channel levels. This calls for raising the strategic skills of farmers with the aim of planning the required production, so avoiding risks of price fall and loss of production.

Demand conditions

As said before, demand elasticity is relatively lower with respect to the vegetable products. However, due to favourable climate conditions, the potential for exporting vegetable produced within the district are relatively high. For instance, the German distributors are particularly oriented towards vegetables produced in the district, because this allows distributing vegetables all over the year. Moreover, some products are specific of this area of origin and represent a unique product which is particularly required on European markets. This is the case of kohlrabi, whose consumption has grown in recent decades and which represent a sector of specialization of the vegetable district.

Vegetables are usually sold within a defined price range at the consumption level. This means the price is not a relevant choice variable for final consumers. Moreover, the quantity of sold vegetables is relatively stable and eventual overproduction are not taken by the retailers: this means production planning is strategic for the farm's survival. The setting up of prices is negotiated between the distributors and the producers, despite the relatively low producers' contractual power. Prices are set up weekly with the big retailers, despite producers in many cases would like to have a seasonal price. In some cases, producers cannot cover the costs of production and are obliged to accept the customers' decision due to their low contractual power.

Technological availability

Technological equipment in the vegetable district is not really developed and widespread at farm level. Therefore, mature technologies are privileged and new innovations struggle to be adopted. For instance, as far as farm level is concerned, Agriculture 4.0 seems not widely developed and the innovation is limited to product and less to process innovation. Precision farming systems are adopted on tractors and on some machines. Moreover, there are sensors detecting the temperature in storage refrigerators, but if the farmer has not software that continuously records the temperature thus demonstrating the storage temperature of the temperature-controlled structures, and if there is no

process in which the 'product innovation, innovation itself does not develop. As a key informant has pointed out, instead of adopting precision farming tools, the main innovation which has been introduced is a generalized recourse to the greenhouse production, with the aim to mitigate the impact of weather conditions and climate change. Therefore, innovation has regarded the new generation of greenhouses and, with reference to the exports, the adoption of traceability systems able to comply with the current regulation. These systems have implied the hiring of dedicated and skilled personnel. Digital technologies, such as barcodes and controlled traceability, are widespread in manufacturing processes. These digital technologies are not diffused at farm level because they are not yet mature in this field and not because of a financial problem.
In general, innovation adoption is constrained by a set of factors, deeply recognized in literature (Gow and Gow, 2002; Vecchio et al., 2020, etc.) which can be synthesised in the following:

- Familiarity with innovation.
- Perceived complexity.
- Sociodemographic barriers.
- Lack of adequate skills.

The limited diffusion of new technologies is also attributable to the need for skilled advisors distributed across the territory. For instance, there are some satellite diagnostic systems, but without field technicians able to interpret the data, this system does not work properly.
Against this background a vicious circle emerges: very often the property of new technologies is in the hands of multinational corporations and they do not find convenient to engage advisors all around the districts, so limiting the propensity to spread out these innovations.
The introduction of new technologies is also constrained by the availability of skilled workers. Within the vegetable district of province of Latina, a large number of workers is made up of non-European and low-skilled workers, with no adequate education. As we have seen from official statistics, low level of education and business culture involves also the entrepreneurs and this may affect also the relationships with other actors of the supply chain.

Financial constraints and insurance provisioning
From a financial point of view, farms located in the vegetable district present relatively low financial problems, thanks to solid structures. Being a relevant sector with high impact on local economy, farmers are provided with great availability of support by financial intermediaries, which are also involved in co-funding projects financed within the framework of rural development policies. As a matter of fact, EU rural policies represent a fundamental tool to support the farm's financial stability and to cover production risks through the adoption of the insurance tools. Nonetheless, recently introduces tools for covering the various dimensions of risks in farming activity are not well exploited, like the IST (income stabilization tool). Adverse weather insurance is quite widespread and is also subsidized. There are also commercial risk insurances, which are connected to cases of missed payments. Almost everyone has credit insurance.

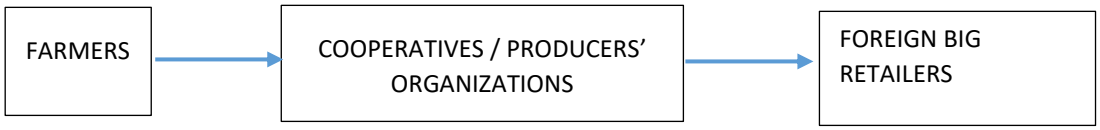
Strategies adopted by the cluster within the supply chain system

Within the vegetable district in the province of Latina, different strategies have been identified concerning different modes of entry international markets. More precisely, by recalling Barnard et al.'s (2016) classification, three modes have been identified in our empirical research.

Modes of entry international markets

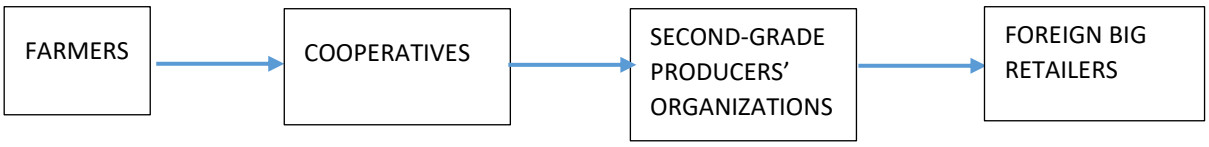
The export-oriented supply chain involves the largest farms, which are more structured and prepared to face up the international markets and the critical mass of product able to boost international marketing approaches. Moreover, price competition at international level requires also cost leadership approaches, that these farms are able to sustain, with respect to the smallest farms. More precisely, the average dimension of export-oriented farms depends on the type of production: open field agricultural activity is managed by farms of about 15-20 hectares, while greenhouse farms work in farms of 6-8 hectares. Higher dimensions allow the farms to pursuit scale economies and to set up marketing scale economies. Moreover, supply concentration is secured through the development of cooperatives and producers' organizations. Three modes of entry international markets characterize the supply chain:

MODE 1 – In the first mode, farms are organized in cooperatives/producers' organizations serving big foreign retailers according to international quality standards (like Global Gap, BRC, IFS).



MODE 2 – Mode 2 of entry is relatively different from the first one, in that the EOSC is more structured: farmers are still organized in cooperatives, but they adhere to second-grade producers' organizations in the first mode, farms are organized in cooperatives serving big foreign retailers according to international quality standards (like Global Gap, BRC, IFS).

Both mode 1 and mode 2 of entry international markets are examples of a direct exporting approach to international markets. In this case the farmers and farmers' associations directly manage the export of their products, which may boost higher profits. However, in order to enter the international market, it is necessary to face relatively high entry barriers, in terms of local regulations, inspections, quality compliance, etc.



MODE 3 – Mode 3 of entry is an indirect way of exporting. As a matter of fact, the supply chain is more articulated, in that producers' organizations or cooperatives (or second-grade producers' organizations) ask for the intermediation of a trading company or an export management company, with the purpose of managing the logistics of exporting. As posited by Barnard et al. (2016), it is a low-risk strategy, bringing about less profit margins. Mode 3 of entry provides farmers with benefits in terms of higher knowledge of export procedures by trading/export management company. Moreover, trading/export management companies boast stable relationships with local distributors which makes transactions more fluid. This brings about a sensible reduction of transaction costs.

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As far as products supplied are concerned, we have already mentioned different typologies of products, ranging from raw vegetables to fourth-range products, which hold higher shares of added value. In case of adhesion to cooperatives and/or producers' organizations, the organism is in charge of providing farmers with technical assistance and support for mandatory certifications.
Nonetheless, producers' marketing strategies are limited and avoid branding strategies, because big retailer prefer to sell the products with their own brands. Moreover, no diversification strategies are implemented, because vegetable production is highly specialized and conducted through practices of sustainable intensification. As far as logistics is concerned, externalisation of logistic services prevails. Farmers rely on third parties because they have no means of their own. As a consequence, collaborative logistic networks seem to emerge, aiming to secure the efficient working of the supply chain, which is of paramount importance for these perishable products. Nevertheless, the articulation of the supply chain has limited the possibility to directly connect with large-scale distributors. As a matter of fact, no longer direct contacts with big retailers has transformed the farm's room for manoeuvre into passive strategic action. Therefore, new contractual arrangement alongside the value chains have furtherly reduced the farms' "visibility", then feeding mechanisms of disconnection between producers and utilizers. This new strategic configuration may have implications as in cases of promotional activities carried out by the distributors: for instance, due to an overproduction of radishes last year, promotional activities were launched. This promotional activity is meant to be replaced every year, regardless the effective level of radish production, like an automatism which is not related to the producer's potential. Thus, new institutional arrangements may put at risk the solidity and stability of the farming activity in the province.

Performance obtained by the cluster within the supply chain system

In recent years the level of competiveness seems relatively good, thanks to a set of both aforementioned external and internal conditions. An increase in the productivity has been registered in recent years, thanks to the increase in the greenhouse production. The economic results of the farms working in the vegetable district in the province of Latina are attributable to strategies of both cost leadership and certified quality, providing international markets with high added value products. Moreover, high levels of competitiveness are granted through efficient distribution channels, where the role of logistic services has gained ground, due to the perishable nature of the products. On the other side, pressures on farmers' incomes are attributable to the contractual arrangements penalizing the weakest part of the agrifood supply chains, like the farmers. As far as social impact is concerned, horticultural sector is relevant to the local community as it has a social role in household income. According to our key informant (but these are not official statistics), the social repercussions are also considerable in terms of job creation: the district employs around 15,000-20,000 people or more, in terms of direct employment, not counting indirect employment, and produces an income of over 1 billion euros from export of fruit and vegetables. If we consider the related activities (e.g. mechanical tools, etc.) the income easily doubles. Almost 30%-40% of the provincial economy revolves around this fruit and vegetable sector, because out of a population of 500,000 inhabitants already 20,000 to 30,000 families live directly from agriculture. Then, social impact is very significant.

Furthermore, there is a relevant issue to be underlined, in terms of social impact, which refers to the adoption of certification schemes concerning labour legislation on safety of working conditions, right

remuneration and contribution. As a matter of fact, good agricultural practices are not just about products, but also about people: Global GAP-GRASP certification scheme involves a commitment to workers' health, safety, and welfare, whose main points are:

- Employees' representation.
- Complaint procedure.
- Self-declaration on good social practices.
- Access to national labour regulations.
- Work contracts.
- Payslips and wages.
- No children at work.
- Access to quality education.
- Time recording system.
- Working hours.

A final element impacting on social dimension is also the growing involvement of immigrant workers as entrepreneurs. More precisely, through phenomena of ethnic entrepreneurship, also female entrepreneurs started running farm business in the district, so reducing the social gap of immigrant workers.

From an environmental point of view, it has to be considered that vegetable production is realized through intensive specialized agricultural method, despite the growing adoption of sustainable intensification approaches. Moreover, adherence to quality standards and certification schemes led to greater attention to the environment and to the introduction of sustainable agricultural practices. Actually, in order to get these certifications, farmers have to comply with certain environmental requirements (waste management, water use, use of pesticides and fertilizers, the healthiness of food). As a consequence, they have introduced methods that guarantee the sustainability of production, then bringing about reduced negative impact on the environment. Moreover, coherently with the prescription of the Green Deal, the use of phytosanitary inputs has been sensibly reduced, so contributing to mitigate the impact on the environment and on climate change. On the other side, the larger adoption of greenhouse production does not benefit the environment and may represent an issue to be considered in future strategies of mitigation of environmental impact.

7.5. Cluster Morocco

7.5.1 Apple SFSC (Morocco)

Definition and description of cluster of firms

In the case of Morocco, the chosen cluster in our study has a special status "Economic Interest Group" hereafter called "EIG". The so-called EIG is located at Ait Illhoussan, Zaïda, Province of Midelt (Drâa-Tafilalet Region). It's performed in the production and commercialization of apple products.

The cluster named "EIG" regroups about 71 actors how are grouped in 3 cooperatives including farmers, packagers (5 actors), distributors and retailers. Hence, in order to better promote their products, an application for accreditation to start processing has been submitted to the ADA[4] and accreditation is pending. In addition, the founder of EIG is armed with a great deal of experience in the production and marketing field. This experience is the heritage of his father (46 years of experience).

In terms of characteristics, farmers and other producers, distributors, retailers are mainly small and medium in size and they totalized an area of about 400 to 500 hectares with an average of 7 ha by actor. In addition, the EIG produces the Apple product only and provides supplies to its customers as retailers, supermarkets, wholesalers (processing, transport and logistics). The area of production is scattered on the province of Midelt especially at the Zaida area and its surroundings. According to the GIE's president, the processing unit, which will be accredited in the near future, will be installed in Zaida near the national road N° 13. This geographical situation will facilitate to the processing unit to source its customers at the local, regional, national and international level as the most destination markets.

Activity of the cluster of firms within the related supply chain system

As outlined in the first part, the cluster named "EIG" produces a single product only: Apple. In addition, the EIG supplies its customers by using transport and logistics means which they are at its disposal until it has the authorization to use the appropriate means of transport. The farmers involved in the EIG are mainly producers performing in SFSC, but in these last years and after the completion of national market, actors tend to be EOSC by targeting several external markets as Africa, Gulf and a tendency to European market. and the main forms of coordination were defined by the EIG basing on the exchange and sharing of information among farmers. This structure confers to the EIG a central role in coordinating all activities in the so-called cluster. The production activities are performed at the local level: province of Midelt (Ait Illoussan, Boumia, Zaida, etc.).

Geographical location	Types and number of actors of the cluster	Actors of the Supply Chain System (EOSC, SFSC, GPP)	Products and services provided	Locations of production, processing, distribution, retail, consumption	Main forms of coordination between actors
- Region: Draà-Tafilalet - Province : Midelt - Territory: Ait - Main municipalities: Zaida, Boumia - etc.	- Farmers: mainly farmers are producers - etc.	- Farmers: SFSC - Processors: ongoing agreement - Distributors: … - Retailers: … - etc.	- Apple only - Transport and logistics - …	- Production: Ait Illoussan, Boumia, Zaida - Processing: … - Distribution: local, regional and national level - Retail: local, regional and national level - etc.	- Cooperatives: 3 large cooperatives - Producers' organisations: GIE - etc.

Conditions influencing the activity of the cluster within the supply chain system

As regard to the external conditions as external drivers, the competent authorities established a panel of regulation. Apart from the agricultural sector is exempted from taxation, the most regulation pointed is the compliance with the Moroccan norms, especially the Food law n° 28-07 established by

[4] ADA means Agricultural Development Agency

The PRIMA programme is an Art. 185 initiative supported and founded under Horizon 2020, the European Union's Framework Programme for Research and Innovation

"Office Nationale de Sécurité Sanitaire des produits Alimentaires" (ONSSA) related to SPS and LMRs and other practices of production and processing. This norm is obligatory in nature. In addition, the labelling system for the product is in progress. With regard to public policies to support small and medium farmers, the Green Morocco Plan (GMP), in particular Pillar 2 which provide a large support to improve the competitiveness of the sector through the program – contract with actors by receiving direct State subsidies in the context of GMP and Rural Development Fund (FDR). In response to these promising policies and markets demand, actors involved in the so-called cluster are equipped with high technology practices such as meccanization of size operations, and developed e-commerce platforms with a strong trend to SMART.

Regarding the production factors' availability, actors confirm the availability of labour market but with a lack of workforce technical skills. The access to land and inputs is not a challenge and does not a constraint, while they incur high energy and input costs. Despite this, their relationships with their suppliers are judged stable. Furthermore, the EIG has a risk management system and the insurance systems. In addition, the EIG has access to credit without any problem which is justified by the availability of new financial tools. Consequently, business risk and intermediation, Cash-flow, speculation of food commodities and capital control of food chain actors are well controlled by the EIG.

Concerning the socio-demographic conditions, the EIG (unit) and orchards are placed away from population centres. The producers' aging and generational renewal in firms are provided when necessary. This strategy will ensure to the EIG a new lifestyles and values with responsible with high educational level.

At the ecological level, climate change impact negatively production systems with alternation of extreme weather events with long period of drought and hailstone. However, the area is characterized by the abundance of biodiversity (in terms of fauna and flora) by the availability of new vegetal varieties and animal species.

On the socio-institutional level, the availability of social capital is marked with an efficiency of administration and authorities especially with the establishment of food law n° 28-07 which the compliance with is obligatory and the law n° 13-83 on fraud controls. Nevertheless, corruption and informal economic/legal practices are very difficult to control. Ending, traditional/cultural land-use practices are marked by a strong tendency towards the modernisation.

Strategies adopted by the cluster within the supply chain system

Talking now about the strategies adopted by the cluster "EIG", two forms of coordination are identified: horizontal and vertical coordination partnerships. These forms of coordination come as a response to GMP policy, which promotes and supports the aggregation of producers in cooperatives and EIG. The aggregation in cooperatives and EIG represents a new mode of organization as business-based networking, the club systems is being introduced. Regarding externalisation, some of activities and services, production phases, workforce marketing and export may be outsourced by the EIG when it is necessary. On the other hand, risk management strategies are not yet applied such risk-sharing contracts, risk-shifting and insurance contract. At the distribution level, the EIG perform mainly on the SFSC with a tendency to EOSC. At this level, the EIG has a local-based networks outlined above with direct sales to its customers. Hence, the so-called cluster being to introduce innovative logistics that will allow it competitiveness rather than its competitors'.

Concerning market orientation, the investigation points out that the EIG makes the customer care at the core of its interests by providing certified products (compliance with local norms, SPS, MLRs), reducing price/cost ratio and maintaining its performances superior through brand/status reputation etc. At the multi-functionality level, the EIG is vertically-integrated (as claimed by its president and mentioned above), the on-farm processing is ongoing while the agro-tourism, catering and recreational activities are not yet provided but a great intention toward natural landscape is provided in its agenda.

Diversification strategies are also under consideration by providing new apple products with high value added (HVA) and best quality brands, seeking new markets/market channels (export). For increasing their product's value basing on organic and environmentally friendly methods, the EIG will introduce also a labelling system through PDOs, IG or Agricultural label certifications (labelling system is also ongoing). In terms of policy support, and to improve the sector, the EIG seek out any opportunity provided for support as like the support provided in the FDR program, GMP and the contract-program (public authorities) or support provided by NGOs.

At the intensification and Upscaling level, the EIG tend to be EOSC through the internationalisation of its sales. To reach this objective, a depth restructuration of EIG become necessary by increasing more its size with new potential members. In this vein, several cooperatives and independent actors seek to become members of the EIG. Finally, and regarding to technological innovation, the EIG uses digital marketing tools. It has already an e-commerce platform (as pointed above), and a digital traceability tool. According to the EIG presidents', an important innovation on information technology for production is already prepared though a project on the weather and crop management warning systems but the president claims that there is a lack of necessary means for its implementation.

Performance obtained by the cluster within the supply chain system

The performance of EIG is placed on its capacity to be more competitive than other competitors. In this vein, the EIG tries to increase it productivity by increasing the production area, accepting other cooperatives and independent producers to be memberships of the EIG. The performance can be improved by reducing the cost of energy and input. In this context, a tendency towards renewable energy uses is planned. On the other hand, one of the most important ways of the EIG for upgrading its performance is the improvement of their quality products, services and varieties. The financial resources are available but remain no sufficient to access to diverse markets/market segments orientation (export).

The performance related to social aspects are multiples. We can cite for example the contribution to local community welfare, employment creation especially women's labour and creation of optimal working conditions. The implication of gender approaches in the employment creation can contribute to socio-economic inequalities reduction.

Concerning performance related to environmental aspects, we can claim that there is a positive impact on water, soil and climate by using sustainable management.

At the end, and relating to governance aspect performances, the EIG registers a positive impact of governance on equality and transparency among supply chain actors' by providing a value sharing strategy among all EIG's actors

8. Comparative analysis of Mediterranean local clusters and supply chain systems

Conditions

8.1.1 Regulations and policies

Regulations described in the Mediterranean clusters have either mandatory or voluntary nature. They are set either by formal authorities or by private actors of the supply chain.

In the case of European countries, the Common Agricultural Policy sets the regulations at the production level. The financial supporting aspect of CAP has been highlighted beside the restraining conditions that limit the modernization of small-scale farms as reaching the CAP requirements are declared difficult for small-scale farmers. In fact, it is observed that this social and political setting of CAP aiming to reduce the environmental footprint of agricultural practices discourages small-scale farmers to further modernize their farm. In the two north African countries of the clusters (Egypt and Morocco), however, the state provides subsidies through rural development plans beside setting obligatory norms to be followed. Interventions in setting prices has also been observed in some cases. It has been observed that public entities function as exporting agents in the supply chain by purchasing the commodities from producers at established prices. On the other hand, in cases of SFSC and GPP, producers' organisations/associations function as intermediaries between farmers and the (public or private) market and in such way facilitate the price formation. In cases where farmers confer responsibilities to the producer organisations/associations, some regulatory conditions are set by this organisation to homogenise the process of supplying the market. In the case of GPP, the criteria set by the EU and the national authority for public market defines the characteristics of products which can be supplied to collective public restaurants. In general, the regulatory conditions for EOSC seems to be more demanding compared to those of GPP and SFSC. Strict obligations concerning environmental and social conditions in which production is realized are set by national authorities and large retailers at the destination market. The producers targeting the international markets need to respect the mandatory regulations of food safety beside, in many cases, providing a traceability procedure to insure the respect of right environmental and social practices.

8.1.2 Demand

The growing demand for fresh, local and quality fruit and vegetables has been declared as a driver of the development of short channels of F&V commercialisations. It is pointed out that the raised awareness on health issues has influenced the recourse to fresh and local products. Fruit and vegetables occupy a considerable share of the farmers' market. The bonding that is created between the consumers and the producers has been identified as a guarantee to their continuity in the coming future. The demand for quality products has also forced the collective restaurants to procure half of their food from local and organic fruit and vegetables.

In the farmers' market, the prices of fruit and vegetables are decided by the producers based on the actual demand. Contrary to the price flexibility of SFSC markets, the international fruit and vegetable supply chain is characterised by low demand elasticity due to international competition. High levels of

international supply have set the prices at a competitive level. In this environment the producers' organisations/associations have limited bargaining power.

8.1.3 Technological availability and access

Traditional techniques of production (i.e. local varieties, natural fertilizers, etc.) dominate the SFSC market. They are associated to practices favouring the conservation of biodiversity and the environment. There are low adoption of precision farming tools and digital solutions in this production environment. However, old machineries are regularly replaced by new ones. The mostly highlighted technological innovation at the production level is the generalized recourse to greenhouse production among vegetable producers. Adoption of greenhouse production is seen as a factor facilitating the adoption of traceability system beside mitigating weather conditions and climate change. In some cases, producers apply modern irrigational systems (i.e. drip irrigation). To apply technological improvements, low access to specialised technicians has been pointed as a restricting factor. Although old varieties of agricultural products are valorised in the SFSC, nevertheless, the attributes of new varieties are more demanded in EOSC. Post-harvest logistics, such as grading, packaging and storage are more important in long supply chains. In case of adhesion to cooperatives and/or producers' organisations/associations, the farmers are provided with technical assistance and support for mandatory certifications.

Concerning the transport of goods from farm to market, mutual agreements are observed in SFSC. By pooling logistics in transport, storage and location of sale the producers seek cost reduction in marketing their products. The development of internet-based platforms for direct sales are also remarkable. The adherence of producers to such virtual hubs or actual producer' organisations/associations is commonly seen in cases of GPP and EOSC.

8.1.4 Production factors

The scarcity of skilled labour has been pointed out several times in different clusters, especially for the period of harvesting. In the case of SFSC, the production labour is composed mainly by family members. However, apparently, small-scale farms who search workers outside the family have difficulty to find seasonal workers and struggle economically for their remuneration. Ageing of farmers and lack of intergenerational renewal put in danger the sustainability of small-scale agricultural production. The labour sought and employed in the case of EOSC are mainly low skilled. The size of farms engaged in EOSC are relatively large and women and immigrants employed from the district where the farm is located compose a high share of workers in EOSC.

Fluctuation of prices of production factors, especially that of inputs are outlined as a threat to economic viability of small-scale farms. Water scarcity and high cost of implementing irrigation systems are also mentioned as limiting factors of production. In addition, soil quality is considered low in certain regions and good quality seeds for some vegetables are hard to acquire.

8.1.5 Finance and risk

Farmers can receive subsidies and financial aids from the state in different forms with the objective of stabilizing their income. Forms of organisations, such as associating in farmers' unions, stabilise also the marketing activities of producers and guarantee their incomes. In all three supply chain systems (SFSC, EOSC and GPP), producer organisations/associations (in different forms) play a role of securing

the continuity of the commercialising channels. Insurance schemes are also present in clusters. However, mainly large farms benefit from insurance plans.

8.1.6 Socio-demographic

High concentration of activities related to the production and logistics of vegetables are observed in districts specialized in export. Therefore, the whole community is concerned, directly or indirectly, with the supply chain. On the other hand, fragmentations of farms and diversity of production methods hinders the expansion of specialized farming such as organic production. There are farms that cannot pass to organic farming because they are surrounded by conventional farms.

The workforce of the supply chains has relatively low education levels. This factor, beside the age of farmers, limits the transformation of farms to what regards technological innovations. Weak processing know-how is mentioned as a limiting factor to create high value products. In the case of SFSC and GPP, a decline in the number of farmers is observed in clusters. That may be due to lack of intergenerational renewal within farms.

8.1.7 Ecological

Climate change has been pointed out for almost all cases. The high cost of recourse to irrigational systems and its maintenance imposes an economic burden on the shoulders of producers. In addition, extreme climatic events such as hailstone are counted as a factor damaging the production. Nevertheless, in the EOSC, the Mediterranean climatic conditions are counted favourable for early harvest or suitable for certain vegetable productions.

8.1.8 Socio-institutional

The producer organisations/associations play a significant role in all the three F&V supply chain systems. Producer organisations/associations facilitate the market access and represent their members at the political sphere. In addition, their bargaining power and lobbying in the market and at the political level assures a fair price for producers and regulatory conditions. For example, the Covid-19 pandemic had limited farmers' markets, however, the producer organisations/associations reinforced their effort to adapt to the 2020 Covid-19 lock-down situation in order to guarantee the continuity of the market. Administration system supporting these supply chains is deemed to be efficient. Laws which concern the commercialization of F&V are updated regularly. No criminality or illegal activities is reported.

Strategies

8.1.9 Partnership

Aggregating in producer organisations/associations is a common strategy in all the three supply chain systems. However, in SFSC and GPP the collaboration is mainly horizontal while in EOSC vertical collaborations are widespread beside the horizontal networks. For a successful export, producers integrate into available forms of cooperation and then these associations seek relationships with international distributors. Private-public partnership in upstream and downstream of the supply chain is also seen in some clusters where the state subsidizes the inputs or takes a role in the export of final products. Foreign investors have been sought among the retailers at the destination market to participate in the processing and packaging of export oriented products.

8.1.10 Distribution

The SFSC are marked with either direct sales or with only one intermediary. In many cases, the single intermediary is an association/organisation that shares the same values and ambitions as the producers. The aggregation of producers in organisations/associations allows them to adopt collective marketing strategies concerning the distribution and pooling logistics. Even in the absence of formal organisations/associations, collaboration at the farmers' market can be seen.

In the case of EOSC, the role of producer organisations/associations is more remarkable. They take care of the logistics along the search for new markets. For GPP, the producer' organisations/associations facilitate the participation in procurement calls by aggregating the products and communicating the origin of the products.

8.1.11 Market orientation

Valorising the environmental functions of farming activity is the most notable strategy among all three supply chains. Certifying the production by employing quality labels is the most common strategy in this regard. In addition to that, in cases of SFSC and GPP the proximity of production is also emphasized. To prove the freshness of fruit and vegetables, local production is valorised through traceability mechanisms.

8.1.12 Diversification

A comparison between the small-scale farmers who commercialize through SFSC and those farmers who produce for export reveals a difference in the level of specialization. Farmers pertaining to SFSC have a larger range of activities beside selling at the local market. Strategies such as organising open farms, agro-tourism and catering are possible for small-scale farms, although they are rarely practiced in the clusters. Whereas, the producers pertaining to EOSC are specialized in certain productions and focus their effort and investment for more specialisation. Increasing organic and environmentally friendly methods of production is counted as a diversification strategy employed by all the three supply chains. In this regard, the multi-functionality of farming practices through preservation of biodiversity, natural landscape and local culture are promoted. In the case of GPP, respecting the organic farming criterion would give higher chances to reach the public market. An issue brought up in this context is the post-harvest treatment of products. Storage, processing and packaging are issues which gains importance when talking about adding value to fruit and vegetables. Increasing added value are sought by marketing fourth range products (the fruit and vegetables ready for consumption).

8.1.13 Risk management

The fact of aggregating into organisations/associations is a widespread risk management strategy. In the case of SFSC, even in the absence of the organisations/associations, holding farmers' market and the effort for its maintenance is a principal strategy observed in the clusters. For instance, at the time of Covid crisis, the network of farmers guaranteed the continuity of farmers' market. In this context, emerging collaborative logistics with the goal of cost reduction and stabilising sales can be observed.

In the case of EOSC, long term relations between the producers' organisations/associations and the trading companies stabilizes the trade by creating trust between the actors of the supply chain. Long term contracts can be counted as a strategy for all the three supply chains, allowing the actors to plan for production and processing.

At the production level, beside the insurance schemes, eliminating production risks caused by water scarcity, such as rain water harvesting and applying agricultural relocation is mentioned.

8.1.14 Externalisation

Most of the producers seek occasional workforce outside of their own fixed labour, especially at the harvesting season. These seasonal employments are more common in specialized production that characterises the EOSC. In the EOSC, third party logistics prevail. Distributors in this case, take care of the promotion of the products.

All the three supply chains depend on external advising systems that are provided by private or public institutes. That is also more relevant for the case of exporting supply chains that receive particular propositions from their customers. These propositions sometimes are transferred by technical advisors provided by international retailers. In some cases, they also take part in investing in the processing lines.

8.1.15 Policy support

Actors of the three supply chains seek opportunities that are offered through the state supported programs. The EU farmers receive funds from the Common Agricultural Policy and for non-EU farmers there are national development plans financing innovative initiatives. Technical supports are provided by national organisations for different steps of production and post-harvest. Connection with academic and research institutes are proposed as a strategy. The certification of new varieties and seeds are considered as initiatives that can be supported by states.

International trade is regulated by state entities of the clusters in different forms and levels. In some cases, the state interferes in the regulation of trade, preventing the import of harmful pesticides, but in some other cases the state entities get engaged into the trade of the F&V as an export-import agent.

8.1.16 Intensification and upscaling

Increasing the size of the firm is a progressive strategy that is opted especially in the case of EOSC which demand high levels of competitiveness. The organisations/associations tend to increase their size by receiving more adherents. This allows the organisations/associations active in the clusters to apply common management strategies for their adherents, enjoying the economies of scale.

8.1.17 Technological innovation

At the production level, several technological innovations are pointed out by clusters to be of high importance, developing greenhouse production, promoting agroforestry, cultivation of new varieties, improving seed quality and improving irrigation efficiency. At the commercializing phase, the development of virtual (internet-based) platforms and applications are mentioned.

Performance

8.1.18 Economic performance

The economic performance perceived by the experts of the clusters may be classified in two groups of positive and negative outcomes. The great part of clusters in SFSC have observed a quality improvement of F&V. That is also the case for productivity improvement and covering larger areas of

land under cultivation. Some producers' organisations/associations have aggregated with other entities that creates better financial stability and guarantees the activity of the supply chain. These elements would result in higher revenues for farmers. However, in what concerns the production costs, some have experienced a reduction and others a considerable increase.

The negative performance that are perceived concern the low access to financial resources that slowdowns the process of modernization and further investments to expand markets beyond the regional and national borders. In addition, few cases of risk mitigation plans are identified in the SFSC clusters.

The main point raised concerning the economic performance of the EOSC clusters is the overall income generated by the export of F&Vs. The other points may be considered as sub-elements of the economic performance impacting the total income of export. These elements consist of higher levels of productivity, management of post-harvest losses, harvesting cost management (manual or mechanised), and efficiency of distribution channels. In addition, trading higher added value products either due to further processing or selection of better varieties influences the total income.

In the case of GPP cluster, beside the factors mentioned above concerning production income and more efficient channels of distribution, corresponding better to the public market demand with more coherent production was raised as a performance of this kind of commercialisation.

8.1.19 Social performance

The social impacts pointed out for the three supply chains have qualitative and quantitative aspects. The social outcomes counted for the existence and improvement of SFSC highlight the local culture preservation through consumer-producers' connection. These outcomes are believed to create self-esteem among the members of family farms and promote local/regional identity.

As the EOSC requires high number of seasonal workers, job creation was raised as the main social impact of these clusters. The category of workers who are influenced during the harvesting season are mainly women and immigrants (for the case of European countries). The clusters are normally concentrated in districts specialized in the production of F&V. The concentration of the cluster engages (directly or indirectly) a high population of the district into the supply chain. The working conditions and a fair remuneration of workers counts as social indicators in these clusters.

Concerning the social impacts of GPP, a considerable population benefit from the public collective public restaurants. In addition, the conventions made between the producer organisation/association with the municipality to provide charity organisations with fresh and local F&V may be considered as a social impact in this cluster.

8.1.20 Environmental performance

As the F&V offered in the SFSC are supplied from farms in the proximity of the market, the environmental benefits associated to transport are emphasized in these clusters. In addition, the effects of organic farming or other environmentally friendly productions on the global environment (soil, water and air) are counted beside lower environmental footprint induced by shorter distances of supplying local products.

In the case of EOSCs, lower quantities of chemical products employed in the production has been pointed out beside the more efficient use of water. The importance of waste management in highly concentrated areas of production has been emphasised.

For what concerns the GPP, beside the above mentioned issues, the food waste reduction is raised as an issue relative to better management of upstream and also downstream of the procurement of collective restaurants.

8.1.21 Governance performance

A high level of social capital among the producers who participate in the farmers' market is observed. To what concerns the producer organisations/associations, there is a transparent management and equal governance system applied. However, in the case of EOSC the decision making in the producer organisation/association seems to be less democratic but the negotiation power of these entities are more remarkable. The cluster active in GPP has created connections with the municipality and seeks further agreements to supply higher volumes of F&V to collective restaurants and charity organisations. All the three producer organisations/associations seek also more adherents and to connect with other producer organisations/associations to increase their supplying capacity and negotiation power.

9. Indicators for Mediterranean local clusters within supply chain systems

Building on the definition of Med-Links Supply Chain Systems for fruit and vegetables in the Mediterranean - obtained through stakeholders and experts' elicitation on key issues and opportunities of local supply chain systems - it was possible to identify a large set of cross-cutting indicators that allow to characterise the functioning of the supply chain systems considered. Therefore, key informants for each Med-Links F&V cluster were interviewed on relevant insights and functioning schemes of the specific supply chain systems in order to build the inventory of general indicators that articulates from the main building blocks of conditions, strategies and performance of fruit and vegetable cluster dynamics. Through this theoretical and methodological approach, it will be possible to identify the multiple external drivers of supply chains systems as conditions that characterise the structure and the strategical behaviour of the related fruit and vegetables clusters and that, in turn, trigger the consequent performance in terms of competitiveness. The general indicators identified in this task for each cluster and supply chain systems of Med-Links will contribute to guide and inform task 1.2 to assess specific variables.

10. Deliverable contributions to SDGs

This deliverable makes substantial contributions to several Sustainable Development Goals (SDGs) by analyzing and defining supply chain systems and identifying clusters within the Mediterranean region. The findings provide a structured approach to addressing economic, social, and environmental challenges specific to agri-food supply chains. Below are the detailed contributions:

1. **SDG 1 - End poverty in all its forms everywhere**: Deliverable 1.1 highlights systemic challenges faced by small and medium enterprises (SMEs) and farmers in fragmented supply chains, particularly in rural areas. By mapping these systems and identifying clusters, it provides a foundation for improving their competitiveness and resilience. This enhanced competitiveness empowers local farmers and SMEs with the tools to generate more stable incomes and participate more equitably in value chains, helping to alleviate poverty across Mediterranean rural areas.
2. **SDG 2 - End hunger, achieve food security, and promote sustainable agriculture**: The deliverable promotes sustainable agricultural practices by identifying inefficiencies and gaps in supply chain systems and recommending targeted improvements. For instance, the integration of short food supply chains (SFSCs) encourages local production and consumption, reducing reliance on long-distance trade while increasing access to fresh, nutritious fruits and vegetables. The report also addresses the importance of voluntary sustainability standards (VSS), which guide stakeholders in adopting environmentally sound and resource-efficient practices, ultimately contributing to food security and sustainability.
3. **SDG 8 - Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all:** Through its detailed assessment of supply chain systems and cluster identification, the deliverable supports local economic growth by enhancing the operational efficiency and market reach of small-scale producers. The focus on export-oriented supply chains (EOSC) introduces new economic opportunities for producers, especially in underserved rural areas. Additionally, by linking these systems to certifications and standards, it creates incentives for decent work practices and enhances the overall productivity of the Mediterranean agri-food sector.
4. **SDG 12 - Ensure sustainable consumption and production patterns:** Deliverable 1.1 emphasizes the role of sustainability certifications and the alignment of supply chain systems with responsible production patterns. For instance, the report promotes the use of SFSCs to minimize environmental impacts such as transportation emissions and food waste. By identifying and enhancing these sustainable supply chain models, it fosters environmentally and socially responsible production practices that align with consumer demand for high-quality and sustainable products.
5. **SDG 13 - Take urgent action to combat climate change and its impacts:** By integrating recommendations for sustainability certifications that address carbon emissions and resource efficiency, the deliverable encourages climate-smart agricultural practices. For example, reduced pesticide use and better water management practices are highlighted as essential components of sustainable supply chains. These measures directly contribute to reducing the carbon footprint and environmental impact of Mediterranean agri-food systems.

6. **SDG 17 - Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development:** The deliverable facilitates collaboration among diverse stakeholders, including farmers, SMEs, policymakers, and consumers, across five Mediterranean countries. It establishes a shared framework for understanding and improving supply chain systems, fostering transnational partnerships that strengthen regional integration and cooperation. These partnerships are vital for creating harmonized approaches to certifications, sustainability, and supply chain optimization.

	Short Food Supply Chain (SFSC)	Export Oriented Supply Chain (EOSC)	Green Public Procurement (GPP)
Conditions			
Regulation and policy	State subsidies for F&V production	Existence of mandatory or voluntary regulations set by either public authorities, producer organisations or retailers that facilitate or limit F&V export	Quality requirements for FV set by state for public canteens
			Farm-market distance as local product criterion for F&V
Demand	Sales of F&V in farmers' market	Price elasticity of demand for FV	Demand for high quality F&V in public procurement
	Domestic per capita consumption	Difference of price between local and export destination market	
Technological availability	Use of irrigation in FV production	F&V production in greenhouses	F&V commercialization through internet-based platforms
	Presence/Activity of agricultural technicians	Presence/Activity of agricultural technicians	Presence/Activity of agricultural technicians
	Transport costs	F&V production from new varieties	Transport costs
	Logistic pooling	Foreign investments in the logistics of supply chain	Logistic pooling
	F&V commercialisation through internet-based platforms		
Production factors	Family farm members' engagement in the workforce	Farm size	Family farm members' engagement in the workforce
	Non-family labour cost	Cost of manual harvesting	Non-family labour cost
	Cost of land rentals		Cost of land rentals
Finance & risk	Subsidies as producer income	Subsidies as producer income	Subsidies as producer income
	Insurance coverage of farms	Insurance coverage of farms	Insurance coverage of farms
	Age of farmers	Age of farmers	Age of farmers

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Socio-demographic	Workers' education level in the FV production	Workers' education level in the FV production	Workers' education level in the FV production
		Local employment in the export supply chain	
Ecological	Precipitation	Precipitation	Precipitation
	Economic cost of damages from climate change	Economic cost of damages from climate change	Economic cost of damages from climate change
		Harvest anticipation compared to international market	
Socio-Institutional	Size/activity of producer organisations/associations	Size/activity of producer organisations/associations	Size/activity of producer organisations/associations
	Short Food Supply Chain (SFSC)	**Export Oriented Supply Chain (EOSC)**	**Green Public Procurement (GPP)**
Strategies	***VALUE CREATION***		
Diversification	Income source diversification (agro-tourism, catering, etc.)	Diversification of F&V types and varieties produces	Organic or sustainable F&V production
	Organic or sustainable F&V production		F&V processing
	F&V processing		
	Minimally processing of fresh F&V		
Risk management	Water access improvement through water management	Commercialization of F&V through long term contracts	Commercialization of F&V through long term contracts
Externalisation	Workforce from outside farm	Workforce from outside farm	Workforce from outside farm
	F&V shifted by third party logistics/distributors	F&V shifted by third party logistics/distributors	F&V shifted by third party logistics/distributors
		Technical advisory	
Policy support	Adoption of technical advisory by farms	Adoption of technical advisory by farms	Adoption of technical advisory by farms
	Producers benefiting from state subsidies	Trade undertaken by state entities	Producers benefiting from state subsidies

		Producers benefiting from state subsidies	
Intensification and upscaling	Farm size dynamics	Size of producers' organisation/association	Size of producers' organisation/association
	Size of producers' organisations/associations		
Technological innovation	Adoption of internet-based platforms for F&V commercialisation	Adoption of internet-based platforms for F&V commercialisation	Adoption of internet-based platforms for F&V commercialisation
	Production under greenhouse	Production under greenhouse	Production under greenhouse
	Implementation of irrigated cultivations	Implementation of irrigated cultivations	Implementation of irrigated cultivations
	VALUE PROPOSITION		
Partnership	F&V Farmer participation in producer organizations/associations	Commercializing of F&V through producer organizations/associations	F&V Farmer participation in producer organizations/associations
	Commercialization of F&V through pooling logistics	Supply chain intermediation activity	Commercialization of F&V through pooling logistics
Distribution	Commercialization of F&V through direct sale	Participation of intermediaries in the distribution channel	Producer organisations' supply of F&V to public canteens
	Commercialization of F&V through one intermediary	Exporting destinations	Supply of F&V to public canteens directly by farmers
Market orientation	Participation to initiatives for reducing food supply distance	Adoption of quality labels	Participation to initiatives for reducing food supply distance
	Adoption of traceability systems		Adoption of traceability systems
	Adoption of quality labels		Adoption of quality labels

	Short Food Supply Chain (SFSC)	**Export Oriented Supply Chain (EOSC)**	**Green Public Procurement (GPP)**
Performance			
	VALUE CAPTURE		
Economic	Quality of F&V	Total income generated by export of F&V	Income generated by supplying public collective restaurants
	Income of farmers	Production cost	Organic F&V supplied to public market
	F&V farming production costs	Harvesting method (manual or mechanised)	Local and fresh F&V supplied to public market

	F&V farming productivity	Productivity	Coherence of local production with the demand of public market
	Farm access to financial resources	Export of F&V high added value products	F&V farming production costs
	Expansion of F&V market	Post-harvest losses	F&V farming productivity
	Farming risk mitigation plans	Efficiency of distribution channels	F&V area under cultivation (cluster)
Social	Employment in the supply chain	Job creation	Food charities supplied by the cluster
	Rural household income	Population benefiting/affected from the supply chain	Population benefiting from public canteens
	Consumer-producer relationships	Working conditions of the supply chain workers	Job creation
	Self-esteem among family farms	Fair remuneration of supply chain workers	
	Employment stability of small-scale farmers	Employment of women	
	Promotion of local/regional identity	Employment of immigrants	
Environmental	Food miles	Sustainable agricultural practices certification schemes	Waste management
	Environmental footprint	Waste management	Reduction of food waste in the supply chain
	Quantity/volume of organic F&V	Efficiency of water use	
	Area under organic farming	Pesticides and fertilizers used	
Governance	Size of producer organisations/associations	Size of producers organisations/associations	Conventions and contracts between small-scale farmers and the municipality
	Decision-making equality among the members of producers organisations/associations	Running of farm business by immigrants and women	Size of producers organisations/associations
		Bargaining power of producer organisations/associations	Decision-making equality among the members of producers organisations/associations
		Decision-making equality among the members of producers organisations/associations	

References

Agence Bio (2020), La consommation bio en hausse en 2019 stimule la production et la structuration des filières françaises, les chiffres 2019 du secteur bio, https://www.agencebio.org/wp-content/uploads/2020/07/DP-AGENCE-BIO-CHIFFRES-2019_def.pdf

Barnard F., Akridge F., Dooley F., Foltz J. (2016), *Agribusiness management*, London, Rouletdge

Chambre d'agriculture Occitanie (2017), Installation Transmission en bref, https://occitanie.chambre-agriculture.fr/fileadmin/user_upload/National/FAL_commun/publications/Occitanie/Sinstaller_transmettre/Publi_ObsIT_2017_Vdef.pdf

EU (2014), Article 4, Threshold amounts, Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC, ELI: http://data.europa.eu/eli/dir/2014/24/oj

European Commission. Joint Research Centre (2019), EU GPP Criteria for Food Procurement, Catering Services and Vending Machines. LU: Publications Office.

European Parliament (2016); Short food supply chains and local food systems in the EU. https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/586650/EPRS_BRI(2016)586650_EN.pdf

Ferrandino, R. (2016) ; Les écolabels : sont-ils des instruments pouvant être utilisés par un pouvoir

adjudicateur dans le cadre de la passation d'un marché public?. Faculté de droit et de criminologie, Université catholique de Louvain, Prom. : Wauters, Kris. http://hdl.handle.net/2078.1/thesis:7830

Fonte M. (2008); Knowledge, Food and Place. A Way of Producing, a Way of Knowing, *Sociologia Ruralis* 48(3): 200-222, Doi: 10.1111/j.1467-9523.2008.00462.x

Gow, H.R., Oliver, L.D., Gow, N.G. (2002); Co-operating to compete in high velocity global markets: the strategic role of flexible supply chain architectures. Journal on Chain and Network Science 2(1): 19-32. https://doi.org/10.3920/JCNS2002.x015

Grando S., Bartolini F., Bonjean I., Brunori G., Mathijs E., Prosperi P. and D. Vergamini, (2020), Small Farms' behavior: conditions, strategies and performances, Innovation for sustainability Research in Rural Sociology and Development, Emerald Publishing Limited, Volume 25, 125–169, doi; :10.1108/S1057-192220200000025008

Herault Tribune (2021), Signature d'une convention pour impliquer l'agriculture local dans l'aide alimentaire des Restos du Cœur, https://www.herault-tribune.com/articles/montpellier-signature-dune-convention-pour-impliquer-lagriculture-locale-dans-laide-alimentaire-des-restos-du-coeur/ (consulted 19 November 2021)

INSEE (2019), Demographics of inter-community authorities (french EPCI): growth is concentrated in and around metropolitan areas, https://www.insee.fr/en/statistiques/4137139 (accessed on 29/11/2021)

Maertens, M., Minten, B., Swinnen, J. (2012), Modern Food Supply Chains and Development: Evidence from Horticulture Export Sectors in Sub-Sahara Africa. Development Policy Review, 30(4).

Meemken, EM., Barrett, C.B., Michelson, H.C. *et al.* Sustainability standards in global agrifood supply chains. *Nat Food* **2,** 758–765 (2021). https://doi.org/10.1038/s43016-021-00360-3

Mercadis (2019), Guide d'Accueil, http://www.mercadis.net/wp-content/uploads/2019/07/MIN_Guide2019_V2_148x210_EP1_WEB.pdf

Montpellier (2021), Le marché d'Intérêt National a présenté sa feuille de route 2021-2026, https://www.montpellier.fr/evenement/25611/3624-le-marche-d-interet-national-a-presente-sa-feuille-de-route-2021-2026.htm

Montpellier3M (2017), un pôle de transformation pour le MIN, https://www.montpellier3m.fr/actualite/un-p%C3%B4le-de-transformation-pour-le-min

Morris, M., Schindehutte, M., & Allen, J. (2005), The entrepreneur's business model: toward a unified perspective. *Journal of business research, 58*(6), 726-735.Optigede (2021), Restauration collective, https://www.optigede.ademe.fr/alimentation-durable-restauration-collective-outils-pratiques (accessed 29/11/2021)

Porter, M. E. (1981), The contributions of industrial organization to strategic management. Academy of Management Review, 6(4), 609–620.

Rastoin, J. L., & Ghersi, G. (2010), Le système alimentaire mondial: concepts et méthodes, analyses et dynamiques. Paris: Editions Quae.

Reardon, T., Codron, J-M., Busch, L., Bingen, J., and Harris, C. (2001), Global change in agrifood grades and standards: agribusiness strategic responses in developing countries. International Food and Agribusiness Management Review, 2(3-4), 421-435.

Richardson, J. (2008), The business model: an integrative framework for strategy execution. *Strategic Change, 17,* 133-144.

Stephan J. (2021), Témoignage Cuisine centrale de Montpellier et son projet "Ma Cantine autrement" , entretien faite par Jennifer Stephan , https://ma-cantine.beta.gouv.fr/blog/4 (accessed 26/11/2021)

Storper M. (1997); *Regional World*, New York, Guilford

Torre A., Traversac J.B. (eds) (2011); *Territorial Governance. Local Development, Rural Areas and Agrofood Systems*, Springer Verlag, Heidelberg & N. York

UNIDO (2020), *Short food supply chains for promoting local food on local markets*, United Nations Industrial Development Organization

USDA (2020), Citrus Annual : Egypt Maintains its Position as the World Leading Orange Exporter,

https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Citrus%20Annual_Cairo_Egypt_12-15-2020 (accessed 16/12/2021)

Van der Ploeg J.D., Masden T. (2008); *Unfolding webs*, van Gorcum, Assen

Vecchio Y., De Rosa M., Adinolfi F., Bartoli L., Masi M.(2020); Adoption of precision farming tools: A context-related analysis, *Land use policy* 94: 104481 https://doi.org/10.1016/j.landusepol.2020.104481

Annex 1: Questionnaire for semi-structured interviews to key supply chain systems' partners and experts

Methodology and guidelines for the questionnaire to key informants and experts (for the report "Supply chain system and cluster description and functioning dynamics")

The objective of this questionnaire is to contribute in Task 1.1 to the definition and characterisation of clusters and the related supply chain system/s in which clusters are active. These findings will be provided by partners in the attached report "*Supply chain system and cluster description and functioning dynamics*". The report will provide information and data on Supply chain system and cluster, their structure and functioning, and then the conditions, strategies, and performance that characterise their activity.

For each cluster, partners will interview at least 2-3 key informants/experts. It is possible (and recommended) to interview even more experts.

The questionnaire provided here represents the methodological guidelines that partners are recommended to follow **for key informants and expert interviews**, according to the theoretical framework proposed for task 1.1 and to its objectives.

QUESTIONNAIRE - TASK 1.1

1) Could you please describe **the main structural and functioning characteristics of the cluster of firms** that you will analyse and the activity of this cluster **within one or more supply chain systems** (EOSC, SFSC, GPP)?

Memorandum/guidelines for the interviewer:

Please include:

- ***WHERE***:
  Geographical location and context *in which the cluster is active.*
- ***WHO, HOW MANY:***
  Composition *of the cluster (e.g. farmers, processors, distributors, retailers, etc.)*
  Characterisation of farmers and other producers, distributors, retailers*: average size of farms; If possible,* ***quantify*** *each actors'* ***category*** *in the cluster*
- ***WHAT:***
  What are the agri-food ***products or/and services*** *provided by the cluster?*
  Please clearly distinguish if the supply chain system studied will be specific to a ***single product*** *(for example "cherries") or an* ***aggregate of products*** *(for example "fruits" and "vegetables", in that case please list the fruits and vegetables that compose this aggregates).*
- ***WHERE*** *are these products* ***produced, processed, distributed, sold, consumed (destination markets)****?*
- ***HOW MUCH****: If possible* ***quantify the flows of products*** *produced, traded, distributed*

2) What are the **main/most important conditions that influence the activity of the cluster within the supply chain system** studied?

Memorandum/guidelines for the interviewer:

*Please consider firstly **external conditions as external drivers**.*

*- Consider conditions of **Regulation and Policy** such as **Prohibitions, Permissions, Incentives, Obligations** (e.g. Taxation of farms and firms; Subsidies and payments as direct support or rural development policies; Quality/hygiene/safety standards; International/national trade rules; Environmental/Landscape regulations and policies; Labour policies and regulations, etc.).*

*- Consider conditions of **Demand** (e.g. Food demand patterns; Price volatility; Agricultural and food market concentration, etc.).*

*- Consider conditions linked to **Technology availability** (e.g. Traditional production practices; High-Tech production practices; Digital and info-tech infrastructure and services for exchanges, transport and logistics; Extension services; GMOs and biotech, etc.).*

*- Consider conditions of **Production Factors'** availability (e.g. Labour market and skilled workforce; Access to land; Access to inputs; Costs for energy and inputs; Relations with suppliers, etc.).*

*- Consider conditions linked to **Finance and Risk** (e.g. Risk management; Insurance systems; Access to credit; Business risk; New financial tools; Business intermediation; Cash flow dynamics; Speculation on food commodities; Capital control on food chain actors, etc.).*

*- Consider **Socio-demographic** conditions (e.g. Urbanisation, Producers' ageing and generational renewal in firms; New lifestyles and values; Education level, etc.).*

*- Consider **Ecological** conditions (e.g. Impact of climate change; Loss of biodiversity; Extreme weather events; Soil and water use and depletion; New vegetal varieties and animal species available; etc.).*

*- Consider **Socio-institutional** conditions (e.g. Social capital; Administration and authorities' efficiency; Controls on frauds; Criminality; Corruption; Informal economic/legal practices; Traditional/cultural land-use practices; etc.).*

3) What are the **main/most important strategies** that are **adopted by the cluster within the supply chain system** studied?

Memorandum/guidelines for the interviewer:

*Please consider firstly **strategies as interactional and relationship dynamics** among actors/stakeholders.*

*- Consider strategies of **Partnerships** (e.g. Forms of coordination, Cooperatives, Club systems, Business-based networking, Contracting; Horizontal coordination, Vertical coordination; etc.).*

*- Consider strategies of **Externalisation** (e.g. of production services, of production phases, of workforce, of marketing and export; etc.).*

*- Consider strategies of **Risk Management** (e.g. Risk-sharing contracts; Risk-shifting contracts; Insurance contracts; etc.).*

*- Consider strategies of **Distribution** (e.g. Short supply chains; Local-based networks; Innovative logistics; Direct sales; etc.).*

*- Consider strategies of **Market orientation** (e.g. Marketing management; Customer care; Certifications; Price/Cost reduction; Brand/Status; Convenience/Usability; Design; etc.).*

*- Consider strategies of **Multi-functionality** (e.g. Vertical integration; On-farm processing; Agro-tourism; Recreational activities, Catering; Natural landscape care, etc.)*

*- Consider strategies of **Diversification** (e.g. New products; New market channels; Quality brands; Organic and environmentally friendly methods; PDOs and local branding; etc.)*

*- Consider strategies linked to **Policy support** (e.g. Subsidies seeking; Policy income support; Rural development funds; Agro-environmental schemes; Advocacy; Lobbying; etc.).*

*- Consider strategies of **Intensification and Upscaling** (e.g. Supply and sales' internationalisation; Size increase and merging; etc.).*

*- Consider strategies of **Technological Innovation** (e.g. Digital marketing tools; Digital traceability tools; Information technology for production; etc.).*

4) What are the **main/most important performance obtained by the cluster within the supply chain system** studied?

Memorandum/guidelines for the interviewer:

*Please consider firstly **performance as competitiveness.***

*- Consider performance linked to **Competitiveness** (e.g. Productivity increase; Cost reduction; Quality improvement; Products and services' variety; Financial resources availability; Access to diverse markets; Effective protection from risks; etc.).*

*- Consider performance linked to **Social aspects** (e.g. Contribution to local community welfare; Employment creation; Working conditions; Socio-economic inequalities; etc.).*

*- Consider performance linked to **Environmental aspects** (e.g. Environmental impacts of production and supply practices on water, soil, climate, etc.; Ecosystem services provided; etc.).*

*- Consider performance linked to **Governance aspects** (e.g. positive and negative impact of governance on equality and transparency among actors of the supply chain; etc.).*