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## Perceived Quality framework in Mediterranean Clusters: Analyzing the Functioning, the Conditions, the Strategies and the Performances of Fruit and Vegetables Short Food Supply Chain

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**Abstract:**

This article presents a theoretical model developed for the analysis of supply chain systems of fruit and vegetables in the Mediterranean Clusters, according to MED-LINKS project, 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 Short Food Supply Chain system (SFSCs). 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 the supply chain systems' external and multidimensional drivers, strategical choices and competitiveness.

Our theoretical model allowed the identification of four fruit and vegetable production clusters in the Mediterranean partner countries according to the SFSCs, that allowed us to do the exploration of an inventory of cluster-relevant reference indicators at the level of the four countries.

This empirical study was analyzed to measure and assess the degree of importance of relevant indicators related to external and multidimensional factors (economic, environmental, rules, behavioral attitude), strategic choices and supply chain performance of clusters in the Mediterranean area. The survey carried out by questionnaire among the experts interviewed also made it possible to raise, for certain clusters, other proposals for variables likely to impact the performance of the said clusters.

**Keywords:** Short food supply chain ; Perceived quality ; Value chains ; Quality Labels.

## **Introduction:**

The objective of this article is to develop a theoretical model for the analysis of supply chain systems of fruit and vegetables in the Mediterranean Clusters, 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 the literature revue, our theoretical model will identify an inventory of selected reference indicators that will subsequently be needed to assess, in the survey, the specific variables to assess the supply chain systems' external and multidimensional drivers, strategic choices and competitiveness.

The objective of the empirical study is to measure and assess the degree of importance of indicators related to external factors (economic, environmental, rules, behavioral attitude), strategic choices and performance of short food supply chain in Mediterranean Clusters.

### **1. Literature revue**

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.

#### **1.1.Types of fruit and vegetables supply chain systems**

This article is a result of the MED-LINKS project, which 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.

Table 1. Types of fruit and vegetables supply chain systems (FV SCS)

Supply chain systems	Actors	Institutional arrangements	Geographical area
<b>Short Food Supply Chain</b>	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
<b>Green Public Procurement</b>	Regional producers, Municipalities, Regional governments, Certification bodies	Tendering, horizontal coordination	Regional/National
<b>Export Oriented Supply Chain</b>	Coordinated small-scale producers, International logistics, Export agents, Certification bodies	Label based contracts, horizontal & vertical coordination,	International

Source: MED-LINKS Project, report on Supply Chain Systems definition and Cluster Identification

### 1.1.1. 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.

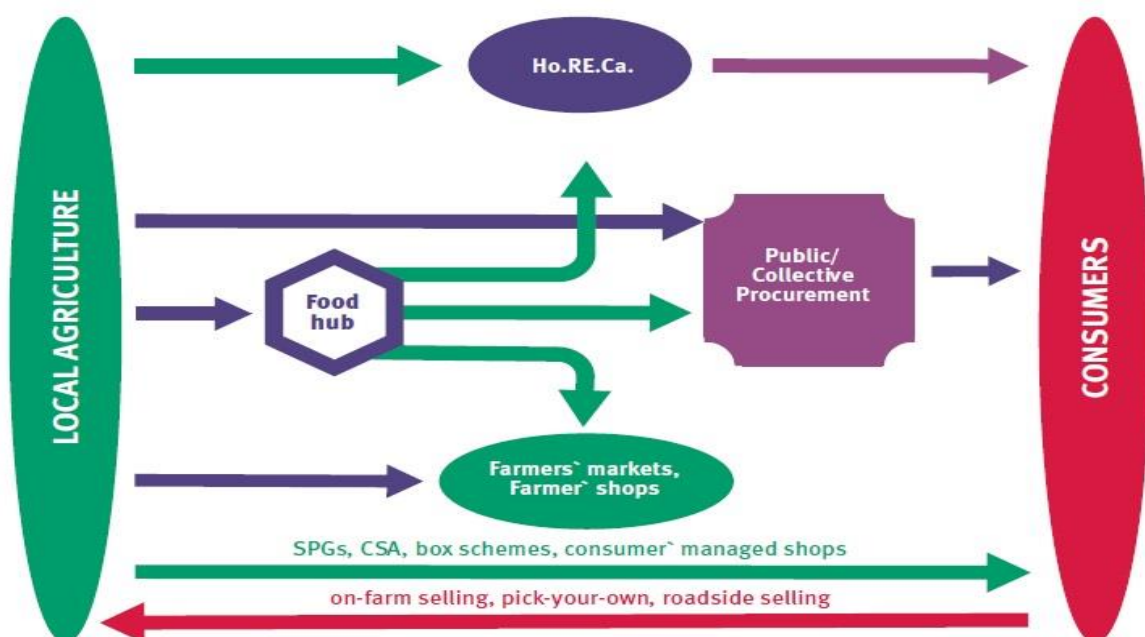
The key categories of stakeholders in SFSC are farmers and consumers. Moreover, the EU definition of short food supply chains is complemented by Article 11 of European Commission Delegated Regulation (EU) No 807/2014 supplementing the Rural Development Regulation, which specifies that “*Support for the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



*Source: MED-LINKS Project, report on Supply Chain Systems definition and Cluster Identification*

### 1.1.2. 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](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.

### **1.1.3. 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 labor 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.

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

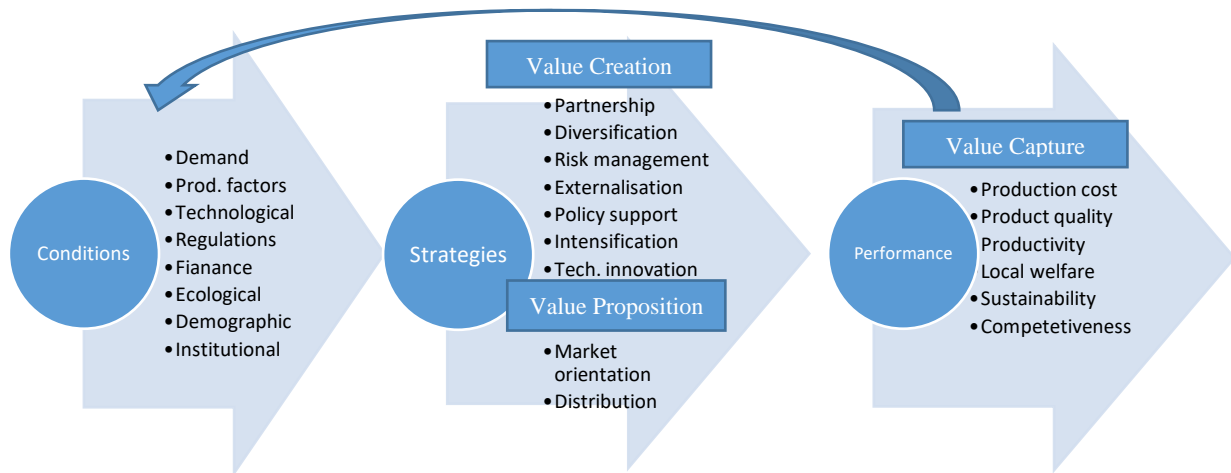
A description of the FV SCS's characters and the analysis of the socioeconomic and biophysical environment that influences actors' strategies, provide a base to reflect on the strategies adopted by supply chains and the consequent performance that will be then developed. The conditions in which supply 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. 2) 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.

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 organizational 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 characterize 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 offers 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 analyze 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



Source: MED-LINKS Project, report on Supply Chain Systems definition and Cluster Identification

### 1.3.Rationale for choosing SFSC

In order to study the main characteristics of Fruit and Vegetables Supply Chain in Mediterranean countries, we choose Sort Food Supply Chains because of its mains benefits:

- Enhanced negotiating positions for cultivators
- Increased feed-back between farmers and consumers
- Less transportation costs
- Improve quality
- Risk control

However, SFSC makes a greater social and economic cohesion at local level, and we are going to study all indictors that lead to a system in which both farmer and consumer are satisfied.

## 2. Methodology

The Short Food Supply Chain main actors are: Local producers, Limited intermediaries, Organized consumers' networks and Producer associations. The principal characteristic of this type of FV Supply Chain Systems is direct selling to consumers (e.g. farmers' markets) and to intermediaries (e.g. local shops). So, we organized an empirical study by questioning these actors to identify indicators that describe their supply chain systems. The three main components to be studied here are: conditions, strategies and performance.

Figure 3. Potential template/example of an indicator matrix

Conditions	Strategies	Performance
Demand	Institutional arrangements	Prices & costs
Infrastructures		
Information technology	Certifications	Products' quality
Regulation & policy		
Socio-demographic	Technological improvement	Digitalization
Socio-institutional		
Finance & risk		Finance and risk sharing

Source: MED-LINKS Project, report on Supply Chain Systems definition and Cluster Identification

The theoretical model was developed in order to identify the multiple external drivers of supply chains systems as conditions that characterize the structure and the strategical behavior of the related fruit and vegetables clusters and that, in turn, trigger the consequent performance in terms of competitiveness. The theoretical framework (fig. 2) is built on the approach of sectors developed in the industrial organization and management literature that categorizes the building blocks of main conditions, strategies, and performance that shape the functioning dynamics of short food 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.

Four fruit and vegetable production clusters in the Mediterranean partner countries are defined and delineated at the geographical and economic level: Italy, Greece, Egypt and Morocco. 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 (fig. 2).

Table 2. Number of experts interviewed

	Public technical advisory services	Academia/ Research	Producers' organisation/ Associations	Private sector	Total per country
<b>Egypt</b>	3	2	2	-	7
<b>Greece</b>	-	1	-	1	2
<b>Italy</b>	1		2	-	3
<b>Morocco</b>	2	-	1	-	3
<b>Total per sector</b>	6	3	7	2	15

Source: Partners' team leaders of the Med-Links project (adapted to the subject)

Each indicator was evaluated according to its importance from 1 (Very important) to 5 (Not important).

A questionnaire was provided to each cluster by representing the methodological guidelines that partners were recommended to follow for key informants and expert interviews, according to the list of general indicator provided in the figure 3.

The results were analyzed by using the SPSS STATISTICS V.25, in order to do some descriptive statics by group, and then discussed in a Mediterranean context, in order to summarized most significant indicators in a SFSCs' local clusters.

### 3. Analysis and discussion of results

The indicators were evaluated according to their importance by using the scale below:

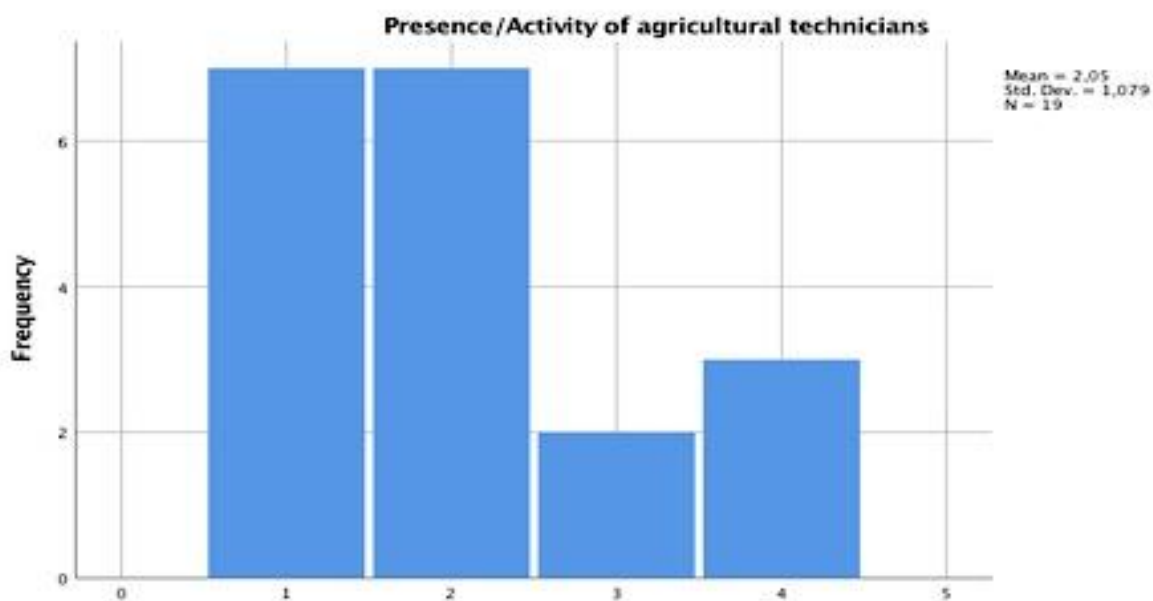
- 1 = Very important
- 2 = Important
- 3 = Moderately important
- 4 = Slightly important
- 5 = Not important

The results were analyzed by using the building blocks of main conditions, strategies, and performance, as mentioned in theoretical framework.

#### 3.1. Analysis of results

##### 3.1.1. Conditions

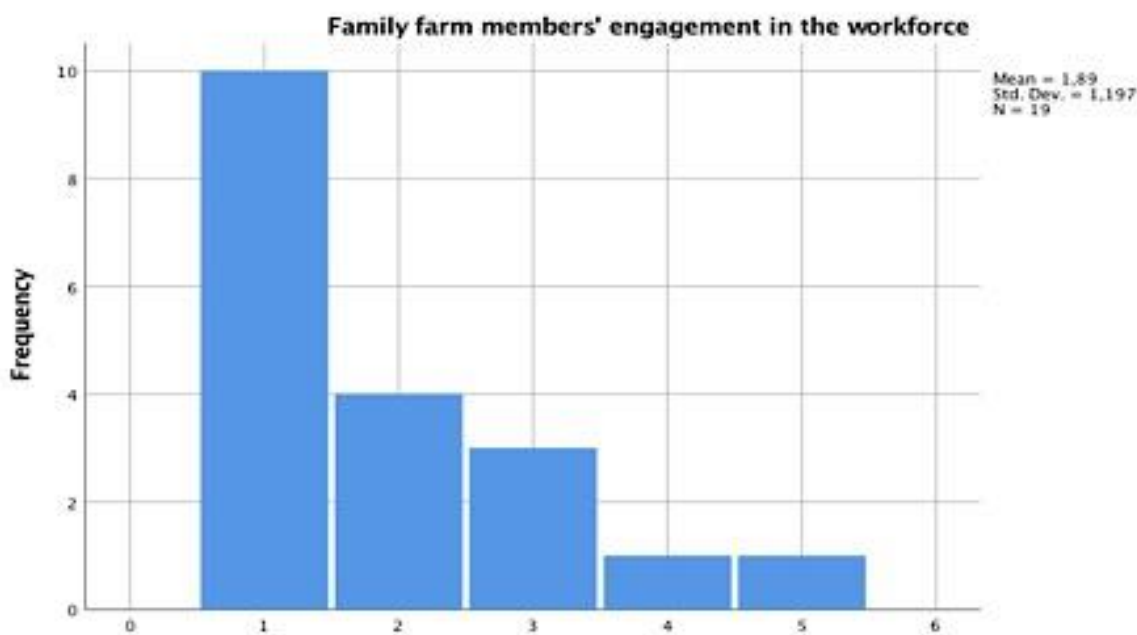
Figure 4. Presence of an agricultural technicians



Source: MED-LINKS Project

More than 70% of experts of our study confirmed that the presence of agricultural technicians is important to improve the quality of yield in Fruit and Vegetables farms. These actors help scientists to conduct novel experiments by setting, including laboratories, processing plants, farms and ranches, greenhouses, and offices. 70% of respondents said that keeping transport cost down is essential in agricultural growth. Saving this type of costs low helps farmers make their prices suitable to consumers, more accessible, and let them make more profit too.

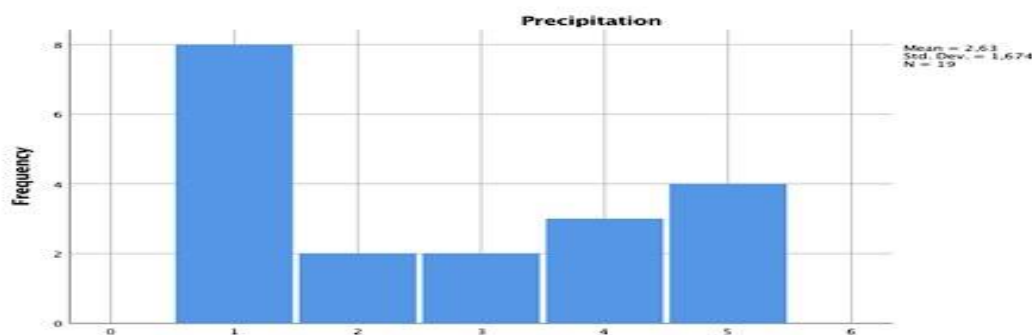
Figure 5. Family farm members' engagement in the workforce



Source: MED-LINKS Project

The majority of respondents mentioned that family farm members' engagement in the workforce is very important, because it provide both on-farm and off-farm employment opportunities, and help rural economies grow. A younger generation of farmers is needed to provide a continuous agricultural income, and it was specified by over than 50% of respondents. We can figure out that lack of young farmers in farming should be handled with much care to avoid crisis in agriculture.

Figure 6. Precipitation

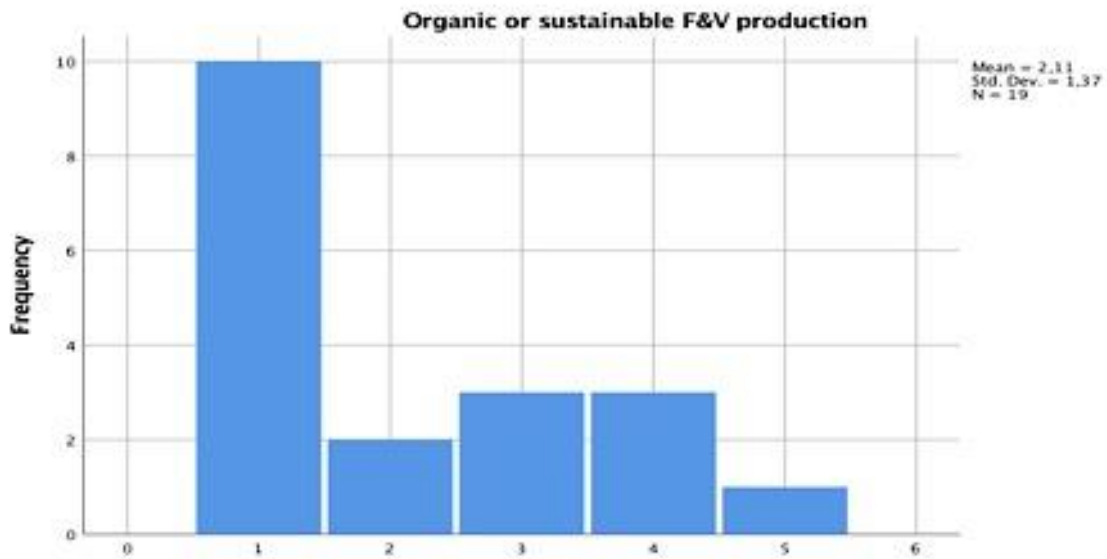


Source: MED-LINKS Project

We can see clearly in this graph that good balance of rain is essential in agriculture, it's the most significant agricultural weather parameter, and it's the most difficult factor to precisely measure. More than 70% of respondents confirm that climate change had an economic impact in agriculture. Warmer temperatures, sea level rise and intense weather destruct farm properties and critical infrastructure, influence productivity, and disturb negatively agriculture.

### 3.1.2. Strategies

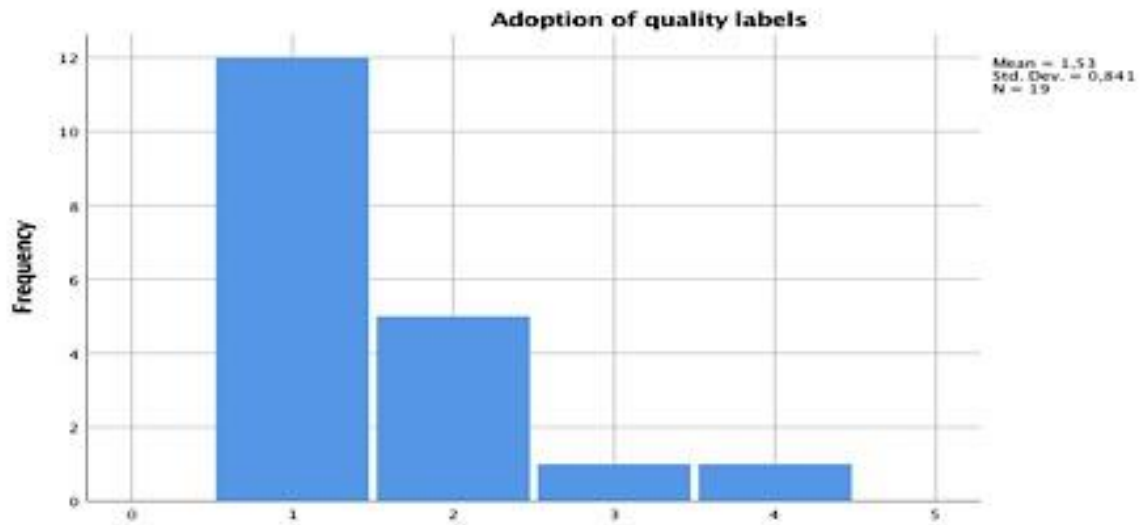
Figure 7. Organic or sustainable F&V production



Source: MED-LINKS Project

We can see in this graph that more than 60% of respondents choose organic or sustainable fruit and vegetables production. Organic farms produce usually of healthier size, taste and quality. Underground water under organic farming is generally free of toxic chemicals, and conserve soil fertility, manage water resources, develop and implement bio-diverse strategies to control pests, and assure constant market relationships. 84% of respondents use pooling Logistics in their supply chains, which is a collaborative solution that provide more value by grouping together logistic and transportation processes, and then maximizing the profit by a best use of space availabilities. More than 80% of farmers use lot codes, that could be a number, number and letter combined together, icons, symbols, or other designation that helps to identify the lot much easily. That helps producers authenticate the accuracy and quality in the production of their Agri-Products.

Figure 8. Adoption of quality labels

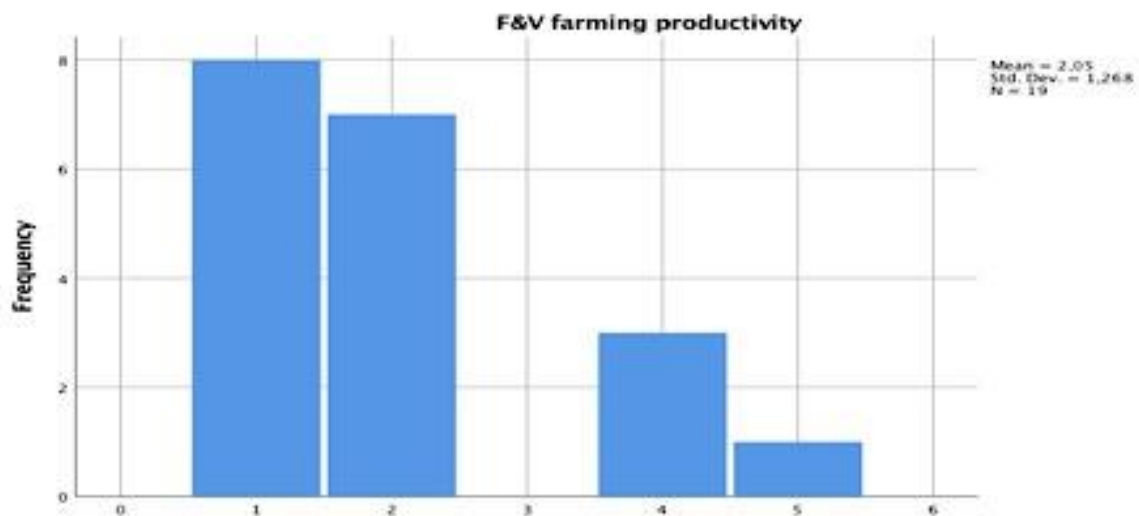


Source: MED-LINKS Project

90% of farmers said that quality labels are very important to facilitate market integration. Using information Labeling can influence positively the market, and generate a strong brand image by highlighting on a product's packaging a featured word or image to boost sales.

### 3.1.3. Performance

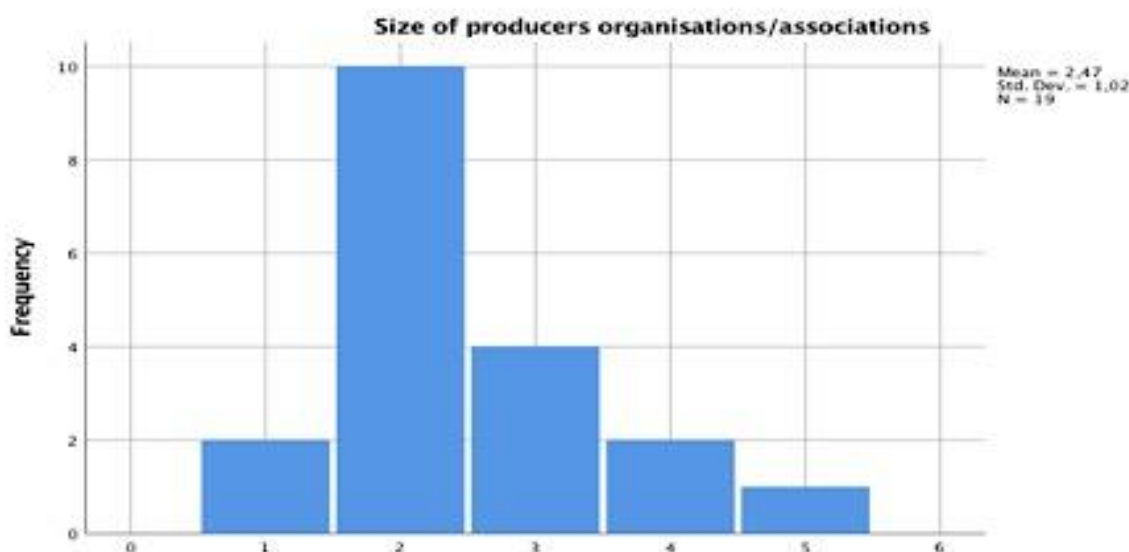
Figure 9. F&V farming productivity



Source: MED-LINKS Project

The first indicator of performant farmer is its productivity, which can measure the quantity of output produced with a number of inputs. Its improvements reflect farmers' production efficiency and technological progress thanks to agricultural technicians and farmer's experience.

Figure 10. Size of producers organisations



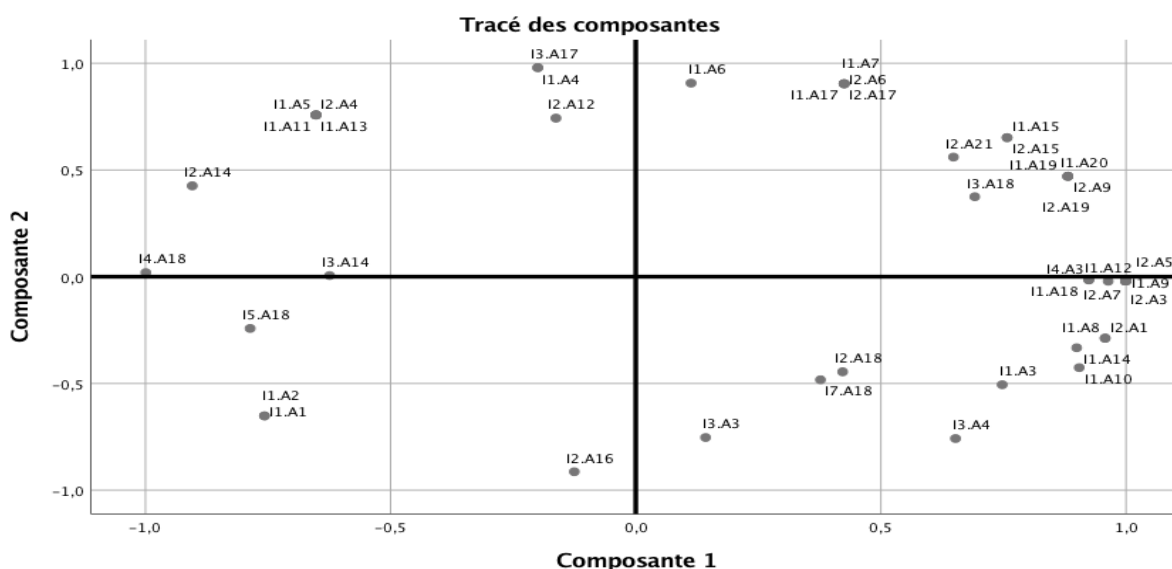
Source: MED-LINKS Project

Here, we can see that 60% of respondents think that size of producer's organizations/associations is a meaning of performance. Size of producers can be a limit for such negotiations with their stakeholders.

### 3.2. Discussion of results

After collecting the responses from the experts who participated in this study, we conducted a comparative analysis between the different countries that we can discuss in tree blocks: Conditions, Strategies and Performance. It can be summarized by the Factorial Correspondence Analysis below (Fig. 11).

Figure 11. Factorial Correspondence Analysis between our latent variables



Source: MED-LINKS Project



### 3.2.1. Conditions

Regarding the short food supply chain, in terms of *conditions* that influence the cluster activity, state subsidies for fruit and vegetable production are important in Greece, Egypt and Morocco, while they are not very important in Italy. In this sense, support and commitment were proposed by the Moroccan respondents as very important indicators, as were the Italians who added the control of certification bodies and the level of community involvement as very important indicators. On the other hand, the Egyptians proposed other indicators that were considered very important, namely: food safety regulations (chemical pesticides), import of improved seed varieties, regulation of contract farming, and food waste policy.

With respect to demand conditions, Greece, Morocco, and Egypt consider fruit and vegetable sales at farmers' markets and domestic consumption per capita as important to very important indicators. In Italy, these two indicators remain moderately to not very important. Rather, the socio-economic conditions of potential customers and the attention to the quality of food and services of citizens are considered the most important indicators, as is the valuation of products in Morocco, and the attitude of consumption in Egypt.

In relation to technological availability, the use of irrigation in fruit and vegetable production, the presence/activity of agricultural technicians, transport costs, logistical pooling, and the marketing of fruit and vegetables through internet platforms are important to very important indicators in all 4 countries. The difference is that irrigation is only moderately important in Greece, and it is not important in Morocco where the indicator of transport costs was only moderately important. Respondents in Egypt added cold chain and traceability systems as very important indicators.

In terms of *factors of production*, the involvement of family farm members in the labor force, the cost of non-family labor, and the cost of renting land are all important to very important indicators in Italy, Egypt, and Morocco, except in Greece where they are moderately to not very important. In this context, other important indicators were added by the Italian experts such as the valuation of social and environmental aspects and energy saving. For the Egyptians, the quality of the pesticides and fertilizers used and the price of the pesticides used and quality were added as very important indicators.

With regard to the *financial and risk conditions* that influence the activity of the cluster, the subsidies as income of the producer, the insurance coverage of the farms are indicators considered by all the countries as moderately or even not very important, except Morocco where the insurance coverage of the farms is considered as a very important indicator. The Italian

experts, in this sense, added the ability to drain public funds and the focus on new productions as important indicators.

Regarding the socio-demographic, ecological and socio-institutional conditions, all the indicators (Age of the farmers, Level of education of the workers in the production of VF, Precipitations, Economic cost of the damages caused by the climate change, Size/activity of the organizations/associations of producers) are very important in the Italian context, together with other indicators that have been added by the experts, namely: Producers' link with the territory and past generations, socio - economic levels of the consumer community, Biodiversity in production, landscape beauty and agro-ecological tourism as a driver of development and the capacity for institutional dialogue.

In the Egyptian context, all the indicators in the study are important to very important, except the Size/activity of the producer organizations/associations which is not important as an indicator. The experts added gender - female labor, feminization of agriculture (ownership and management), excessive use of pesticides and fertilizers, drought, partnerships with traders to access agricultural credit and contract farming as important to very important indicators.

### **3.2.2. Strategies**

With respect to short food supply chain strategies, specifically diversification strategies, the following indicators: Diversification of income sources (agro-tourism, catering, etc.) and Organic or sustainable production of fruits and vegetables, are important to very important according to the Italian, Moroccan and Egyptian experts, on the other hand the same indicators remain unimportant in Greece. For the other indicators (Processing of fruits and vegetables, Minimum processing of fresh fruits and vegetables), they remain important to very important in Morocco and Greece, while the Italians and Egyptians consider them moderately important. In this sense, the Italian experts have added another indicator that is the level of diversification of fruit and vegetable production to which great importance is given.

In relation to risk management, improving access to water through water management remains an important to very important indicator in all contexts, except in Greece where it is moderately important. Within this framework, actions to mitigate extreme weather events, and measures to mitigate negative socio-economic events were added as very important indicators by the Italians, and the diversity of market channels to minimize price volatility was cited by the Egyptians as an important indicator.

Regarding the outsourcing strategies adopted by the cluster within the supply chain system, off-farm labor and fruits and vegetables transferred by third-party logisticians/distributors are important to very important indicators in Morocco and Egypt, while they are moderately

important in Greece and Italy, except for the second indicator which remains important among Italians.

With regard to policy support strategies, the adoption of technical advice by farms and producers receiving public subsidies remain important to very important indicators in the Moroccan context. The results from the other countries show several discrepancies, as the first indicator is important in Italy, but moderately important in Egypt and Greece. The second indicator is moderately important in Italy, not important in Egypt, and very important in Greece. The Italian experts added two other indicators to which they attach importance, namely: the support of the consumer community and other ethical elements to be promoted in production and sale.

With respect to the intensification and up-market strategies adopted by the cluster within the supply chain system, the dynamics of farm size and the size of producer organizations/associations are very important indicators in Morocco. The first indicator is moderately important in Italy, Egypt and Greece. On the other hand, the second indicator is important in Italy, not important in Egypt, and moderately important in Greece. The Italian experts added "A rich product offer" as a very important indicator.

For the technological innovation strategies adopted by the cluster within the supply chain system, the following indicators: Adoption of internet-based platforms for marketing of fruits and vegetables, greenhouse production and implementation of irrigated crops, are all moderately in Egypt and for Greece, except for Italy where the first indicator is important, and the Moroccan experts who consider it very important by giving the same level of importance to the 3rd indicator. The Italians added energy autonomy as a very important indicator.

As far as partnership strategies are concerned, the participation of farmers in fruit and vegetable producer organizations/associations, and the marketing of fruit and vegetables through the pooling of logistics, are two very important indicators in the Moroccan and Italian context. In Greece, only the second indicator is very important, and both indicators remain moderately important in Egypt.

For distribution strategies, the two indicators (Marketing of fruit and vegetables through direct sales and Marketing of fruit and vegetables through a single intermediary) are all important to moderately important in four countries surveyed. The same is true for market orientation strategies with its indicators (Participation in initiatives to reduce food supply distance, Adoption of traceability systems, Adoption of quality labels) being important to very important for all countries.

### 3.2.3. Performance

With regard to performance indicators, we note:

At the economic level: all indicators included in the survey (Fruit and vegetable quality, Farmers' income, Fruit and vegetable agricultural production costs, Fruit and vegetable agricultural productivity, Farmers' access to financial resources, Fruit and vegetable market expansion, Agricultural risk mitigation plans) are all important to very important in all 4 countries, except in Italy where farmers' income is moderately important, as is fruit and vegetable market expansion in Egypt.

At the social level: the findings on economic performance remain valid at the social level, as all indicators (employment in the supply chain, income of rural households, consumer-producer relations, self-esteem in family farms, stability of employment of small farmers, promotion of local/regional identity) are important to very important in all countries participating in the survey, except in Greece where self-esteem in family farms is moderately important

At the environmental level: all the indicators (food miles, environmental footprint, quantity/volume of organic fruits and vegetables, area devoted to organic farming) of the study are very important to important for all the countries with some discrepancies, in the sense that the quantity/volume of organic fruits and vegetables is a moderately important indicator in Italy, the area devoted to organic farming remains unimportant to not important in Greece, as well as the environmental footprint that is moderately important in Morocco.

At the level of governance: the size of producer organizations/associations and the equality of decision making among members of producer organizations/associations are important to very important indicators in Morocco, moderately important in Egypt and Greece, but for the Italian experts the first indicator is moderately important compared to the second which is important to very important. In this sense, the latter experts added the presence of a coordinated regulation and image and the control bodies as very important indicators.

## **Conclusion:**

Four fruit and vegetable production clusters in the Mediterranean partner countries was defined and delineated at the geographical and economic level. Thus, the theoretical model has allowed the identification and realization of an inventory of relevant reference indicators.

These indicators were evaluated in the empirical study with the exploration of variables specific to external and multidimensional drivers, strategic choices and competitiveness of short food supply chain systems.

Regarding the SFSCs, we note that all indicators are important to implement a performant supply chain for fruit and vegetables. But the important of each indicator change from a region to another one.

We can conclude that both financial and risk conditions influence the activity of clusters; the subsidies as income of the producer, the insurance coverage of the farms are indicators considered by all the countries as moderately or even not very important, except Morocco where the insurance coverage of the farms is considered as a very important indicator. In relation to risk management, improving access to water through water management remains an important to very important indicator in all contexts, except in Greece where it is moderately important.

For the technological innovation strategies adopted by the cluster within the supply chain system, the following indicators: Adoption of internet-based platforms for marketing of fruits and vegetables, greenhouse production and implementation of irrigated crops, are all important because of climate changes and its impact on the profitability of agricultural activity.

We can also note that some new indicators were defined by few clusters as in Egypt: food safety regulations (chemical pesticides), import of improved seed varieties, regulation of contract farming, and food waste policy). In the Italian context, some other indicators that have been added by the experts, namely: Producers' link with the territory and past generations, socio-economic levels of the consumer community, Biodiversity in production, landscape beauty and agro-ecological tourism as a driver of development and the capacity for institutional dialogue. However, another research paper can be planned by including these new indicators, added by the experts, to assess their impact on all the other clusters in the Mediterranean region.

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