Master’s Thesis
Msc in Sustainable Development

Sustainable organic agri-food supply chain

The case study of organic citrus fruits and vegetables of the prefectures of Preveza and Arta, Greece.

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Abstract

There is a growing interest of the sustainability of agri-foods but there is not so much evidence of scientific researches which confirm the sustainability of organic agri-foods supply chain. Organic agriculture is perceived to be more sustainable than conventional one. Examining the industry at two stages of the supply chain, farmers and merchants, the paper aims to assess the sustainability of organic agri-foods supply chains, from farm to merchants and comparing the sustainability of organic agri-food supply chain to conventional one.

Following a review of relevant literature, a case study was used for the organic and conventional citrus fruits and vegetables supply chain of the prefectures of Arta and Preveza. Semi-structured interviews were carried out with 14 farmers and 5 merchants to explore perceptions of the sustainability of organic agri-foods supply chain. The research additionally attempts to examine the actors’ views and activities in terms of organic and conventional agri-foods, in relation to the sustainability.

Results led to insights regarding the sustainability of farming and logistics of the agri-foods supply chain. The general conclusion was that the two actors of the organic agri-foods supply chain use more sustainable methods and applications than those of the conventional agri-foods supply chain, but there are also basic requirements in order to expand more the Greek organic food industry.
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LIST OF ABBREVIATIONS

HACCP: Hazard analysis and critical control points
GLOBAL G.A.P: Global Good Agricultural Practice
ISO: International Organization for Standardization
1. INTRODUCTION

1.1 General concept

There has been given a lot of attention to organic agri-foods since the last decade and the demand for these products has been increased a lot. Organic product is a very crucial part for every society as it offers the possibility to preserve or increase the productivity level which enhances the soil fertility and the protection of the environment. Organic agriculture demands the use of sustainable and environmentally friendly practices with respect to natural resources. The purchase price of organic products is significantly higher as consumers prefer to pay more in order to get a high food quality, animal welfare and environmental integrity. So it’s obvious that organic agriculture can meet some sustainable criteria by default.

Sustainable development is one of the greatest global challenges which society is facing in the 21st century. In order to tackle sustainability related problems, several global, European, and national targets for 2050 have been set. The concept of sustainable development supports that the implementation of high and stable levels of economic development and employment may go in a parallel direction with social growth that takes care the needs for everyone, efficient environmental protection and reasonable use of natural resources (DETR, 1998a). The shift of supply chain activities towards sustainability targets calls for designing new strategies and continuously identifying and tackling the challenges that can delay the implementation of such strategies.

In recent years, the concept of the supply chain is a field of increasing interest, both for the scientific community and for the economy in a global level. All the stages of a supply chain, customers, retailers, wholesalers, distributors, manufactures, suppliers have a common objective, directly or not to meet the customer’s demand. In Europe, the food industry is the leader in industrial sector, concerning profits, value added, employment and business participation. The production and distribution of perishable agricultural products, in the appropriate quantity and quality has always been a critical issue for the society. However, there is an increasing discuss at a global level regarding the adverse effects of human actions on the environment and society. An organic supply chain which meets sustainability principles is something new for agri-food industry, and it is anticipated that will offer many benefits for the society and for the companies which are involved in the supply chain.
1.2 Problem definition

Sustainability of the food supply system has been the major issues of many research efforts and political debates. Many researches, until now, have focused either on improving the economic and financial performance of supply chains without including the other two dimensions of sustainability, environment and society (Beamon, 1999).

The problem has two sides: on one hand, with the development of organic agri-food supply chain, agricultural industry affects more natural environment and social welfare; on the other hand, environmental and social complications also bring more obstacles and restrictions to the agricultural sector. All the companies which participate in the supply chain are affected. Consequently, with the purpose of achieving the objective of sustainable performance, it is necessary for all companies which participate in the chain to work closely together under some basic principles. Sustainable organic food systems can be seen as economically, socially and environmentally more viable than standard systems and it could also offer an extra competitive advantage to the organic product.

Greece is a country with large scale of agriculture yet still not very mature. However the agricultural industry has not paid enough attention to sustainable development. But the improvement of sustainability cannot be achieved by a manufacturer or a farmer independently. In Greece, most of the farmers and the other intermediaries of the organic supply chain do not introduce green supply chain management and they have not paid enough attention to environmental or social factors. The fast development of organic agriculture makes the conflict between environmental and economic benefits more and more serious. Even organic farming is considered to meet some environmental and social challenges, through the production of healthy food free from pesticides and toxic substances, still upstream and downstream partners of the organic agri-foods supply chain are needed to achieve the goal of sustainability. This means that there are some sustainable drivers which they should be considered in every stage of the organic supply chain.

1.3 Objective

The purpose of this thesis is to examine the actors’ directions towards a sustainable supply chain in the organic agriculture by taking as a case study the organic citrus fruits in the prefectures of Preveza and Arta. Our objective is to assess whether the participants of the organic supply chain integrate the sustainability principles in their activities. The research focuses on the two poles of organic agri-food supply chains: one of primary production and the other of merchandising part: Organic farmers who are responsible the crops produced and merchants who
deal with the procuring, packing and marketing of organic citrus fruits. The research additionally attempts to examine the actors’ views and activities in terms of organic and conventional, in relation to the sustainability.

The organic citrus fruits supply chain has been selected as a case study to focus the research because in Greece, the cultivation of organic citrus fruits represents approximately the 10% (2045 hectares) of the total organic cultivated area of the country (ICAP 2011). While the study focuses on organic citrus fruits, it is anticipated that the outcomes will provide important insights of relevance to organic agri-foods and food supply chains, in general.

This study aims to answer a number of key questions:

1. Could the actions and applications of the two actors of organic supply chain, farmers and merchants, confirm the sustainability of organic agri-foods?
2. Are there any differences in the implementation of sustainability principles between the two actors of organic and conventional food supply chains (farmers and merchants)?
3. What actions could be taken by farmers and merchants to improve the sustainability of the organic citrus fruits supply chain in future?

1.4 Methodological approach

This chapter explains two methodological approaches selected to analyze our case which is the literature review and semi structured qualitative interviews.

Information which gathered through the literature review was used for the parts of introduction and presentation of the existing theory. The literature review covers issues of the supply chain and sustainability in general, then it provides an analysis of organic agri-foods supply chain and finally it explains how organic agriculture industry contributes to sustainable development.

Qualitative research is research method that is based on the "quality" of the object (Punch, K. 2005) in order to find out the explanation of problems. There is qualitative research almost every day in every workplace and learning the environment. It can be characterized as professional conversations. Furthermore, according to Kvale “an interview is an intrer view, an interchange of views between two people about a theme of mutual interest” (Kvale 1996, p.124). Interviews refer to face to face discussions with a participant about certain issues. Furthermore, qualitative interviews stand as one option for gaining more profound data for grounded interpretations of actors’ social reality (Kvale, 1996).
2. LITERATURE REVIEW

2.1 Supply chain management

In recent years, the concept of the supply chain is a field of increasing interest, both for the scientific community and for the economy in a global level. In this growing interest there is a wide range of definitions and approaches, from too many writers and different perspectives. Quinn (1997, p.47) defines the supply chain as "all of those activities associated with moving goods from the raw-materials stage through to the end user. This includes sourcing and procurement, production scheduling, order processing, inventory management, transportation, warehousing, and customer service. Importantly, it also embodies the information systems so necessary to monitor all of those activities."

According the Council of Supply Chain Management Professionals’ (CSCMP) definition for supply chain management is: “supply chain management a new and very promising part of the science with a huge effect in business performance. It includes the planning and the management of all activities, including sourcing and procurement, conversion and all logistics management activities. Supply chain management also includes different coordination and collaboration with channel partners like suppliers, intermediaries, third party service providers and retailers or consumers. It links the supply and demand within companies”.

2.2 Stages of the supply chain

All the actors of a supply chain such as, customers, retailers, wholesalers, distributors, manufactures, suppliers have a common objective, directly or not to meet the customer’s demand. The structure of the supply chain affects significantly the total cost of the product, and therefore the final selling price. More than one transaction processes are conducted within each echelon of the supply chain which involves the purchase or sale of a product, for example, the transaction between a wholesaler and a retailer. The reduction of the transaction cost could be achieved if the structure of the supply chain will not be affected, provided a prior consultation and communication among its members (Williamson, 2008).

The purpose of supply chain is to coordinate business processes of each company in order to ensure to the maximum extent an efficient flow of products and information along the chain with the lowest possible cost and as quickly as possible through balancing the supply market and demand. Many scientists claimed that the supply chain value is the difference between the value of the final product to the customers and the effort of the supply chain actors to satisfy customer’s demands.
There are some decisions that should be taken at every stage of the supply chain. Such decisions could be about the locations of the facilities, the kind of products that should be produced, where they should be stored, what kind of transportation mode should be used and details about the information systems. All these decisions must maintain the main objectives of the supply chain. It could also be considered as efforts for an efficient coordination among producers, suppliers, transporters, etc. of a value chain to maintain that the right products are produced and delivered in the right quantity and quality, at the right time at the right place with the ultimate goal of reducing the total cost, while delivering high levels of service to final customers (Simchi-Levi et al., 2000).

Figure 1 provides a general structure of food supply chains. However, it is not necessary for all components shown in figure 1 to be available in every food supply chain. The Supply Chain Management includes the design of a wide range of business functions:

**Raw material suppliers:** This stage includes the suppliers of raw materials (fertilizers, seeds, pesticides, etc) and of course the land which is the most essential part of the chain.

**Producers:** The next echelon of the supply chain is the producers who use their resources and knowledge to produce the right product which they will sell in the domestic or global market.

**The intermediate stage:** From the farmer to the consumer, a wide range of logistic activities are involved such as transportation, warehousing, inventory control, distribution. Many of these activities could be repeated. Also, apart from the flow of products, a reverse flow of information can take place in the supply chain which can be of equal importance.
**Consumer:** The final echelon of the supply chain is the consumer. It represents the person who is interested to buy the product, from the right place, at the right time and at the right price. The consumer is the actor who led the demand and so the previous echelons of the supply chain should be able to predict it as best as possible.

In conclusion, the supply chain which is a value chain, which starts from raw material suppliers and ends up to the final customer. Aiming on maximizing the value for the customer and taking advantage of flexibility, quick response, time and effectiveness of a properly regulated supply chain, a company acquires a competitive advantage and consumers are better satisfied (Kotler, 2000).

### 2.2 Agri-food supply chain management

The most important characteristics of agri-food supply chain are the cooperation between farmers, manufactures, retailers in order to deliver consumers high quality agri-foods. An effectively implemented supply chain can reduce the risks concerning the food safety, provide high levels of services and cost savings. Through the agri-food supply chain, all the actors are better organized and they cooperate in order to supply the customer what the market demands in the right quality and quantity and provide economies of scale. Moreover, through the supply chain all the actors are informed about the customer’s needs in order to be better satisfied (Tsitsamis, Iakovou, Vlahos, 2005).

#### 2.2.1 Stages of agri-food supply chain

**1. STANDARDIZATION**

Standardization of an agricultural product is the division of the overall quantity of the product into different categories of quality and then the price specification for each category.

This separation of the agri-foods in qualities is also called grades and it is achieved under some certain quality standards and specifications. The qualitative characteristics which these criteria are based on could be the size, the content, the color, the shape or the flavor of the product.

Some certain and common standards for the different quality types of each variety of an agri-food, were established in order to falcate the distribution of agri-foods. An example could be the States of European Union. They established some common rules of standardization for fruits, vegetables, olive oil and some other agri-foods (Kitsopanidis and Kamenidis, 1995).
2. MANUFACTURING AND PROCESSING

Manufacturing and processing of a primary agricultural product is its transformation into other forms which meet better customer’s needs. In some products the transformation is necessary and it results in the creation of entirely new products such as the manufacturing process of olive oil. Some other agri-foods are preferred by consumers in their primary form.

The manufacturing and processing procedures have been the results technological progress and the most important benefits of this stage of the supply chain can be: a) the production of new processed agri-foods which satisfy better the consumer needs, b) the period which the agri-food products can be available to consumers is extended, c) the weight and the mass of the primary agri-foods are reduced. By this way, the cost of storage, distribution (transportation, loading, uploading) and other activities is reduced, d) the geographical area in which agricultural product can be available, is expanded, e) the incomes of the farmers are increased due to the increase high sales of the agri-foods, f) new additional permanent or seasonal jobs are created, g) the export of the primary agricultural products are increased (Kitsopanidis and Kamenidis, 1995).

3. PACKAGING

The basic purpose of packaging is to protect the agri-food products against risks of damage which can be caused by some entomological and mycological diseases or improper temperature and humidity. Another major objective is to achieve an effective product distribution at the lowest possible cost for the final consumer. Furthermore, packaging of agri-foods aims to contribute, increase and promote the sales of the agri-foods. The package of the agri-foods should make the product more attractive and convenient to consumers. Finally, packaging provides information about the product such as marks for special treatment, storage conditions, ingredients, date of production (Kontaratos, 2004).

4. AGRI-FOOD LABELING

Agri-food labeling is a process that follows packaging and it is essential for the proper promotion of the product. The label contains all the information about the origin and quality characteristics of the agri-food. Food labeling is the primary communication channel between producers and consumers as it contains a range of information such as the name of the food, list of ingredients, storage condition, manufacturer’s names and usage information (Stuart 2010).

5. STORAGE

The storage of an agri-food product includes its preservation into special areas, under specific conditions in order to be distributed to the market. Storage includes some processes which
require good coordination and management. The storage has become the main echelon in the supply chain of agri-foods. The storage should only add cost to the products or processes but it should create also values. Therefore, an effective storage process could be the key factor for a successful supply chain and high quality of services for the consumers.

The need for storage of agricultural products is derived due to the seasonal production in combination with normal consumption. So, the main reason for agri-foods storage is to harmonize supply and demand. Storage also contributes to the followings:

a) Increase of the available amount of agri-foods,
b) Prevent the price reduction of the product,
c) Prevent damage of the product,
d) Normal and continuous supply of buyers with agri-foods,
e) Increase the income of the producers,
f) Satisfy better the consumers.

In order to protect agricultural products from various risks that they incur during storage process, warehouses should have some special infrastructure. It is very important to mention that during the storage the agricultural products should not suffer from any adverse qualitative alteration. The storage methods depend on the type of agricultural product. Some of the storage methods are a) vented warehouses, b) chilling – maintenance warehouses, and c) ditches (Malindretos, 2009).

7. TRANSPORTATION

The term of transportation includes the transportation of the product from the suppliers to the production factory and then to warehouses. Most of the agricultural products are produced in places far from where they are stored, packed, processed and consumed. Agri-foods are transported from areas where there is a surplus of these products and therefore, their selling prices are lower in the areas where the demand and the utility of the same products are higher.

The transportation of agricultural products, especially the perishable agri-foods, because of their special characteristics, they face some problems which can cause an increase in the delivery time and transportation costs. There are four different means of transport, the road transport (tracks or vans), the maritime transport, air transport and the rail transport.

Dominant mean of agri-foods transportation in Greece is the trucks. The agri-foods are transported by trucks to the central markets of urban areas or large warehouses. However the choice of transportation mode is associated with the cost speed, safety, damage and packaging
requirements. In order to reduce the overall transportation cost and possible delays combination of more than one mean could be required within a supply chain of agri-foods (Malindretos, 2009).

8. DISTRIBUTION, DISPOSAL AND SALES

The distribution of the agri-foods can be conducted by various agencies such as producers wholesalers, supermarkets, etc. The more complicated an agri-food supply chain can be, the greater risk for the quality, greater possibilities for the cost increase and lower value for the consumer. According to the Ministry of agricultural development and foods in Greece the distribution of the agricultural products is taking place in:

- central vegetable markets
- local markets from farmers themselves
- fruit and vegetable stores and supermarkets

9. THE INFORMATION FLOW OF AGRIFOODS

There are two categories of information flow in a supply chain (a) information about the demand of the product and (b) information on traceability of the products.

According to Farnes and Hughes (Fearnes A. and Hughes D. 1999) the flow of information about the product demand is driven by the dominant position of retailers in the supply chain and their demand to meet consumer needs.

Information about the market and product demand is one of the most important functions of the supply chain because keeping appropriate and detailed information on market conditions of a product, an essential decision making can be achieved which will result in an efficient distribution and it will ensure a good price for the product (Zografos and Tsanos 2005).

Any decision which is taken involves risks which they cannot be eliminated but they can be reduced by an appropriate information flow. The key role of information is to lead the market agents, consumers and producers in decisions which promote their maximum economic benefit and their welfare. So farmers will produce these products which are in high demand in national and international markets and so they can achieve better prices. Respectively, consumers will buy high quality agri-foods at reasonable prices, thank to the information flow of the market.

The European Commission requirement for traceability of agri-foods (Regulation EC No 178(2002)), “laying down the general principles and requirements of food law, establishing the European food safety Authority and laying down procedures in matters of food safety”, creates the need for further information in the supply chain of perishable goods. According to Manikas (Manikas 2010), “traceability links the production materials with their origin, the treatment
processes, distribution and delivery to the final customer”. Traceability could not guarantee the safety and the quality of the product but it can cancel the distribution of an inappropriate product.

2.3 Organic agri-food supply chain

2.3.1 Organic agriculture

There has been given a lot of attention to organic agri-foods since the last decade and the demand for these products has been increased a lot. The organic product is a very crucial part for every society as it offers the possibility to preserve or increase the productivity level which enhances the soil fertility and the protection of the environment.

The international market of organic agri-foods has gained a lot of attention as their sales have been increased annually by 10% to 30% in most countries, with fresh fruits and vegetables take the lead. The largest areas around the world of organic agri-food production are Australia (12.14 million), Europe (8.18 million) and Latin America (8.07 million) (Wliller and Yuseffi 2007).

The boom of the organic agri-foods the last few years is very remarkable. The supply of organic agri-foods has transformed the mass agriculture production into an industry that produces organic products with strictly defined quality standards and high technology processes. Organic agriculture demands the use of sustainable and environmentally friendly practices with respect to natural resources. The purchase price of organic products is significantly higher as consumers prefer to pay more for higher food quality, animal welfare and environmental integrity.

The most common organic agri-products which customers in Greece purchase are: tomatoes(50,8%), vegetables(10%), olives and olive oil(8,5%), oranges, potatoes, wine, fruit juices, pasta(3,8%) other fruits(25%)(ICAP 2011). The organic products are available only at specific market spots :( 50%), at supermarkets (45%), and at local organic market (5%).

Greece compared to other countries, has a low rate of organic cultivated areas. This percentage in 1998 was only 0,4% of the total cultivated areas, in 2002 touched 0,9%, in 2004 amounted to 1,6% while in 2009 increased to 8,8% (ICAP 2011). This rates increase was a result of the growth which has been made in recent years. The table above presents this upward trend of the organic cultivated areas for the period 2000-2009.
Despite the fact that the Greek organic agri-food industry has been developed recently, currently the general image that results is a small industry regarding the number and the size of the firms. More specifically the industry consists of small family firms (production, manufacturing and import companies). Most of these units have the legal form of the personal business and their annual revenues are at low levels. Also, most of these companies are interested on the exports of the organic agri-foods.

2.3.2 Roles and responsibilities of the players

In the supply chain of organic agri-foods, there are many actors each of them play an important role in order to supply consumers with the right organic products, at the right time, quality and quantity while meeting some certain certifications and criteria (the demand needs).

- **Farmers**: They are responsible for the harvesting of the corps based on some specific procedures in order to be certified and be characterized as organic.
- **Farmer organizations**: In many countries farmers are organized into groups. a specific type of organic agri-food is produced by these groups, at the specific quantity which is requested by the buyer.
- **Buyers:** There are different kinds of buyers in an organic agri-food supply chain such as individuals, international trading companies, supermarkets, wholesalers, retailers. Buyers could receive the organic agri-foods either directly from farmers or from intermediaries (wholesalers, farmer federations). Buyers can also be responsible for transportation, storing, processing and marketing of organic agri-foods.

- **Transportation, logistics and Infrastructure:** The main objective of every supply chain and especially in the agri-food sector is the preservation of the quality from the producer to the final consumer. Especially organic agri-foods need to be under certain conditions during the procedures of harvesting, collection, transportation storage and packing in order to be certified by the authority bodies. A new measure of ensuring the quality preservation of organic products is the traceability at all stages of the supply chain.

- **Support organizations:** These organizations support and facilitate farmers in order to get certified as organic and participate in the supply chain. These organizations can be governmental or nongovernmental. They are also responsible for motivating the farmers to follow organic agriculture and formatting the farmer’s federations.

Organic agri-foods require some additional conditions in order to be certified as organic. One major prerequisite is that the procedures of collecting, storing, shipping and packaging should be conducted separately from conventional agri-foods to establish that the ingredients of organic agri-foods will not affect their healthy attributes. Storage and transportation are parts of the organic supply chain which are very crucial especially from products which are exported in bulk as they are more exposed than products which are packed. Due to the moisture and the storage pests, the logistics costs of the organic agri-foods are remarkably higher than the conventional’s. The shipping costs are also considerably higher because of the high risk of contamination.

Safety and the quality of organic agri-foods are two prerequisites for both domestic and foreign markets. Three of the main problems of organic agri-food supply chain are: the physical perishability, the long distance and the time between the farmer and the consumer. Food safety and quality management are two elements that every supply chain should be based on. Besides, the organic certification other established international quality framework certifications are HACCP, GLOBAL GAP and ISO 9000 which ensure the required quality.

### 2.3.3 The Greek supply chain of organic agrifoods

In Greece, the effort of design a small market and a supply chain of organic agri-foods has started at the first half of 90s. The first specialized retailing stores of organic products started in
Athens and Thessaloniki in 1993. Today the number of these stores amounts to 300-500 which are located in urban areas. These stores have only standardized organic products, which are required by the inspection and certification agency of organic products. Since 1998 the distribution of organic products has been conducted by the supermarkets too. The first major supermarket which started to sell fresh and standardized organic products, (From Greece or imported) was AB Vasilopoulos. Later other supermarkets which included organic products in their catalogues were “Carrefour”, “Marinopoulos”, “Masoutis”, “Sklavenitis” and “Metro”. Today most of supermarkets sell organic products but only a small portion of their total sales represents the sales of these products (ICAP 2011).

2.3.4 Distribution of organic agri-foods in Greece

The distribution of organic products to consumers is carried out by various methods. The typical distribution channels of organic agri products are:

1. Farms

The farm is the place where the process of fresh agri-food production starts. Greek agricultural sector is characterized by small size and low productivity (Lamprianidis, 2004). Furthermore farms are small and scattered and the majority of the farmers are elderly with low educational level. European policies for the development of rural areas through their support programs (LEADER, WFP and others.) have activated local communities over the last two decades in particular forms of entrepreneurship (www.info3kps.gr).

Visitable farm is a trend that has become a habit for many years in countries in developed markets of organic products, such as Germany and France. In these farms visitors have the opportunity to see the production process and to be informed about relative issues. In Greece, however, this trend is not very popular. It is estimated that more than 50 organic farms can be visited in Greece and visitors can buy the products. This could be a good way to improve the agro tourism in Greece which is a form of alternative tourism by taking advantage the farms and the environmental benefits an area and it aims to strengthen the economy of the local population.

2. Federations

The Federation is a voluntary association of individuals whose purpose is to promote the economic situation of its members. By creating federations, cooperation among producers is achieved and their bargaining power against the merchants is increased (Fragkaki- Ioannou, 1989). In Greece there are many women federations, founded by European Legislation and programs,
such as LEADER, which support female entrepreneurship in rural areas of Greece. Female entrepreneurship is enhanced as a factor of equal opportunities in the labor market, aims to increase family income and retaining the rural population (Kamperis, 2008). The problems are not absent from these collaborations. Due to lack of communication and business experience, the skepticism from retail stores to promote these products on the market, the limited participation of women is the main problems. The support from local agencies is essential to enhance the cooperatives in order to remain viable (Anthopoulou 2008). A place with a specific nature can bring out a product and a product can highlight a place, because of its reputation. Quality, tradition, reliability, healthy diet, prosperity, production of safe food is basic principles which constitute the philosophy of a federation (Keranis and Theodosiou 2010).

3. Open air, street markets of organic products

The open air, street market is a weekly outdoor exhibition of agricultural products which takes place in urban areas. There is a direct sale of fruit and vegetables from the producer to the consumer. It has been established in Greece as an institution of folklore. From the operation of open air market can be advanced both agricultural producers, and consumers due to the absence of intermediaries. The operation of open air, street market enhances local producers and small federations of organic products. Simultaneously it connects agricultural production and economy to urban centers. The available range of fresh organic agri-foods contributes to the improvement of consumers’ eating habits and the adoption healthier consumer habits (To Vima, 2010).

Although organic agri-foods can be considered as an alternative solution to the insecurity that consumers have for conventional products, the operation mode of the local market, the absence of control, the lack of certification evidence about these products, raises questions whether these products which are sold so expensive are ultimately organic. According to a report of the newspaper “the Investor's World, 2010”, the reduction in turnover of organic agri-products at outdoor local market reaches 40% because of the credibility crisis of consumers.

4. Markets of Organic Farming

The Markets of Organic Farming have been established globally for decades knowing spectacular success. In Greece, the direct disposal of organic agri-foods is not officially established, with the exception of a very small percentage of farmers which participate in conventional farmers market. In Greece there are only the 38 organic farmers markets (ICAP 2011). In the Markets of Organic Farmers only organic farmers participate and the products they provide are exclusively certified as organic. It is the ideal model of a farmer market as beyond its
general benefits, food can be free of pesticides and synthetic substances, the production methods are environmentally friendly and the production process from seed to the organic farmer are controlled and certified. It is proved that organic farmers markets have helped towards the improvement of public health, environmental protection and ecological consciousness (Keranis & Theodosiou, 2010). Organic farmers markets have been successfully operating for 15 years in Greece in order to secure high quality agri-food distribution directly to the consumer. Through direct disposal of products these markets manage, on one hand, to break the cartels in food industry and help to ensure that prices are fair and reasonable for both producers and consumers, without intermediaries’ hats, while on the other hand they support the development of Greek organic agriculture and the economy as well.

5. Supermarkets

Supermarkets have created "corners" of alternative products to distinguish them from the conventional products. Organic fresh products take a specific space on the shelves of the supermarkets. Supermarkets are the main channel of marketing and distribution of organic products, which covered 50% of total sales in 2008 according to a study published in ICAP (2011).

6. Stores of organic products

The consumers’ turn towards quality and organic products has come up due to their insecurity about mass production products. So the trend of searching organic food creates favorable conditions for small businesses, manufactories and food retail stores. Study of Agricultural University of Thessaloniki (AUTH) has shown that the citizens of Thessaloniki prefer traditional and organic products compared to conventional and junk and fast food.

7. Ecommerce of food

Internet has given companies the opportunity to be developed online. In the food sector online sales are at low levels. Small and medium-sized businesses choose this way of selling their products. Despite the fact that there is no third parties involvement between the retailer and the consumer, there are obstacles to the spread of direct selling food online. According to an article of the newspaper “To Vima”, consumers are trying to create an online traditional grocery. "Small and local farmers from all corners of Greece decide to stand up against the industrialized food production chains: the Internet" (To Vima, 2010). The limited free time of people living in urban areas, the familiarization with the internet, the quality of the food, the support for small and
medium-sized Greek firms against international companies are some of the motivations of consumers to trust online stores

2.4 Sustainable supply chain of organic agri-foods

2.4.1 The concept of sustainability

It is very noticeable that the last few years, politicians, economists, policy makers or scientists have used the words of sustainable development on a regular basis. Many governments around the world have set as a target to improve sustainability. There are many definitions for the sustainable development.

According to the Report for the World Commission of Environment and Development (WCED) of the United Nations, “sustainable development is the development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations, 1987, p.54).

The definition of sustainability includes three main dimensions as shown in the Figure 2 above:

- The economic dimension is connected with the efficient use of resources, industrial growth and the contribution of the economy to society.
- The environmental dimension relates to the proper management of natural resources in order not to be related for future generations.
- Finally, the social dimension refers to human development issues such as fairness, wellbeing human rights and justice.

![Figure 2. The three dimensions of sustainability (source: Wikipedia.org)](image)

Between the three dimensions of the sustainable development there is interdependency. For instance, through increasing the economic growth of a certain social group, for example...
farmers will contribute to the preservation of the social and environmental improvement. It can be achieved the improvement of agricultural social groups and the enhancement of the ecosystem. A strong and powerful society can result from a healthy economy. For example, if the government takes measures without any differences between urban and rural communities, correspondingly through the enhancement of the environmental dimension like the proper use of farms it can be achieved the economic. The viability of the agricultural sector is another very important objective that the term of sustainability is that the actions of a society in the present should not affect future societies negatively.

2.4.2 Sustainable supply chain management

According to the perspective of Carter and Rogers (2008), sustainable supply chain management is defined as “the strategic, transparent integration and achievement of organizations social, environmental and economic goals in the systemic coordination of key inter organizational business process for improving the long-term economic performance of the individual company and its supply chain”. The perspective of Seuring and Müller (2008) is stated by referring to sustainable supply chain management as “the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development i.e. economic, environmental and social, into accounts which are derived from customer and stakeholder requirements.” Carter and Rogers (2008) admit that any company which implements sustainable supply chain strategies can achieve higher economic efficiency than companies which initiates only one or two of the three pillars of sustainable development (Carter and Rogers, 2008).

Rao and Holt (2005) mention that “greening in different stages of supply chain will lead to an integrated sustainable supply chain, which ultimately leads to competitiveness and economic performances”. Nevertheless, actuality the combination between economic, social and environmental performance is very difficult to be accomplished. Zaklad et.al (2003) mentioned that “sustainable supply chain must balance the business process improvement, enabling technology and social system transformation whereas sometimes firms put less attention to one of the three components”.

2.4.3 Sustainable Agricultural Supply Chain (SASC)

Sustainability in agricultural industry can be achieved by reaching three objectives: (a) economy – enhancing development and profitability of the agricultural industry, (b) earth – the environmental challenge of promoting eco- friendly strategies; and (c) human – the social
challenge to advance the social welfare and growth. Accomplishing these three objectives, sustainable agriculture will be improved, both the demands of markets and state will be fulfilled, the development of the sustainable supply chain agriculture will lead to an equal distribution of wealth (Veerman, 2004; Peeters, 2010; Brigstoke, 2004).

Sustainable agriculture through the sustainable agricultural supply chain has demonstrated that it could supply healthier and safer products and facilitate to protect the environment as well as biodiversity compare to conventional agricultural applications, (Soulsby and Fuller, 2004; Johansson, Paul and Finlay, 2004) and it could reduce the waste of water for example, by using of efficient irrigation systems.

Pretty et. al (2008) supported that many agricultural supply chains have already accepted and adopted sustainability indicators and measures for social and environmental performance. Similar to Pretty et. al (2008), Jöhr (2004) reported that Nestlé, Danone Group and Unilever have adopted with success “the Sustainable Agriculture Initiative (SAI) towards sustainable agricultural supply chain by increasing environmental awareness, share knowledge, tracing and monitoring throughout entire supply chain and encourage sustainable”.

2.4.4 How organic agriculture industry contributes to sustainable development

Organic industry can contribute significantly social, economical and ecological sustainable development. This is a result of the application of organic principles, which means efficient management of local resources (e.g. local seed varieties, manure, etc) and therefore cost effectiveness. Furthermore, the organic agri-foods market both at local and international level has remarkable growth possibilities and offers opportunities for farmers to increase their income and improve their living conditions.

According to Research Institute of Organic Agriculture (FiBL) Sustainability dimensions of organic agriculture:

1. Organic agriculture is sustainable and diverse.
2. Organic farmers contribute to resource preservation.
3. Organic farmers produce more with few, increase the quality of products and achieve higher profits.
4. Organic products open new market and create added value.
5. Organic agriculture raises cooperation and creates new partnerships.

Organic agriculture is a category of the agricultural industry which tries to minimize the adverse environmental impacts through the elimination of the use of pesticides, insecticides and manufacturing fertilizers. Although there is not a widespread operational definition of sustainable
development, however, the context of this term has been included in the official policy of ECI. As mentioned before the term of sustainable development has three dimensions and it represents a development not only in the economic terms but also with environmental and social dimension. There have been many studies about the contribution of organic agriculture to sustainable development (Stobbeelaar et al., 2000, Clemetsen and Van Laar 2000, Van Mansvelt et al., 1998). Furthermore, there are studies which indicates that in some cases organic agriculture can be more economically efficient than conventional agriculture (OECD, 1999a). There is also a social contribution of organic agriculture as it demands more labor inputs (Mikkola, 2011). Organic agriculture could also contribute to the preservation of local tradition products and local traditional production procedures, it provides to consumers healthy and high quality products and it points out the region where these products come from (Marsden, 1999). For this reason organic agriculture is considered as a solution to the environmental, economic and social malfunctions of the agricultural production model.

4. Qualitative analysis

This chapter deals with the methods used to describe the aim and objectives of research. It also describes the data analysis approaches used to answer the research questions-objectives. The questionnaires which were used in interviews are included in the appendix.

4.1 Overview of the methodology

In this thesis, we research the problem by combining the reality with the theories. In-depth interviews with representatives of the organic citrus fruits farmers and merchants were carried out to explore issues associated with the sustainability of the supply chain, identified in the existing literature. The findings from the in-depth interviews coupled with the literature review were used to study the organic citrus fruits supply chain in terms of economic, environmental and social issues. Moreover, it was necessary to visit respondents at their working places because most of them had limited available time for the interview.

Interviews were mostly used in the social sciences and only recently they were practiced as a research method (Fontana and Frey 2000). Furthermore, through interviews we can achieve a more integrated description of the relations between humans. In contrast to quantitative researches, interviews can provide more space and opportunities for the interviewees to express their opinions and their ideas on a certain subject (Bryman and Bell, 2007 p.474). There are different ways of carrying out an interview and they depend on the kind of data the researcher
wants to collect (Kvale, 1996). Face to face interviews are important for every researcher who demands a deep understanding of insight on an issue (Gillham, 2000, page 11, Richie and Lewis 2003 p.138).

By using semi-structured interviews as a research method the researcher has the opportunity to collect qualitative data and the respondent has time and space to express its opinion on a particular subject. It’s not only a quick and easy way to gather information but also is efficient and practical. People can have the opportunity to talk about complex issues in detail. This study is basically interested in the actors’ point of view and considerations of their professional fields as ‘inside’ information (Alvesson, 2003) about their possibly contribution towards sustainability.

This research is based on interviews with the representatives of two stages of organic and conventional supply chain. It explored issues related to the sustainability of the supply chain which were identified in the existing literature. The quantitative survey aimed to assess the sustainability performance of organic and conventional citrus fruits and vegetables supply chain according to selected economic, environmental and social (sustainability) indicators. A dyadic approach was followed for the research and two stages of the supply chain were selected to investigate. Semi-structured interviews were conducted with representatives of two participants of the supply chain for two reasons due to lack of time. In-depth interviews were chosen instead as a method to gather our data because it was thought that the participants would feel more comfortable to talk about some private issues. Moreover, it was necessary to visit respondents at their working places because most had limited time available for the interview. Questions for farmers and merchants (Appendix 1) were structured based on the three bottom lines of sustainability, environment, economy and society. The questions of the semi structured interviews aimed to explore:

- Main characteristics of citrus fruits and vegetables industry,
- Records kept about activities (selling prices, costs, etc)
- Methods and applications in their businesses and how they contribute to sustainable development based on the three pillars of sustainability.
- Other issues of particular concern at this moment or in the future.

Before the interview, the participants had a short verbal description of the research, and the topics which we would discuss with them. Initially, interviewees were asked if they agreed that the interview would be recorded and all of them accepted. The interviewer made a brief introduction about the aim of the research and the expected outcomes of the interview. The
respondents, in general, followed the order of the questions list, and the interviewer engaged in discussions of related topics when appropriate. The interviews lasted on average around an hour.

4.2 Case study

This chapter will provide a description of the case, Arta’s and Preveza’s organic industry. The prefectures of Arta and Preveza have been chosen for our case study because of their suitable geographical conditions and microclimate for agricultural production (the climate in the prefectures is very favorable for the agricultural production). The agriculture always played a very important role for the economy of these two prefectures.

The cultivation of vegetables and citrus fruits are very crucial for the agricultural development of these areas as there are many plains and with a generally mild climate. This type of cultivation can generate high incomes in relatively small areas. Therefore compared with other cultivations, vegetables and citrus fruits are less affected by the problem of the fragmented agricultural areas.

Preveza has particularly favorable climate conditions for growing off season vegetables in greenhouses. For this reason Preveza has become the third center of the off-season vegetable production in Greece after Crete and Peloponnesus. This is due to the mild climate that prevails in the coastal regions of Western Greece in combination with the particular influence of microclimate of Ambracian Gulf region. In the prefecture of Preveza there are 1800 hectares of greenhouses, 90% of which cultivate tomatoes.

The prefecture of Arta is a place with a long history in cultivation of citrus fruits. According to statistics of the agricultural economy management, in 2010, the cultivated areas of citrus fruits were accounted for 55.000 acres and the total production reached 190.000 tones. The main varieties of oranges that are cultivated in this region are: Navelina, W. Navel and Salustiana while the two varieties of mandarins are: Reticulata and Nova.

Organic farming grew rapidly in Europe since the 1990s (Millers et al 2008/9). By the end of 2010, Europe’s organic cultivated areas accounted for the 3.7% of the total national area in the area of organic farming in Greece. In Greece there are 3.098 hectares of organic farming areas in transition and full organic stage (ICAP 2011).

4.3 Sample of the research

The sample of the study was the participants of the organic and conventional supply chain farmer merchant. 19 interviews were carried out to serve as a basis for the analysis. The collection of data proved to be difficult as much time and effort was spent. 1200km by car and 10days were needed to gather all the data. The interviews took place in various places such as in cafes, taverns,
warehouses, farms, houses, on the road, by telephone. Some of the interviewed farmers and merchant companies were chosen from a database of the ministry of agriculture and others by the database of some certifying bodies. The marketing manager of the organic citrus fruits packer was very helpful and he introduced us to 5 organic citrus fruits farmers who he cooperates with. Furthermore, some of the conventional farmers were also introduced by other farmers and merchants. The exact number of the farmers and merchants which participated in the research is presented below:

- 4 conventional citrus fruits farmers
- 3 conventional vegetables farmers
- 4 conventional citrus fruits and vegetable merchants
- 2 organic vegetables farmers who implement vertical integration processes
- 5 organic citrus fruits farmers
- 1 organic citrus fruits merchant

Convenient sampling method was used for the target population of the interviews. This method was chosen due to the lack of time available. In general, it would be ideal to interview the entire population, but in most cases, the population is just too large and widespread that it is impossible to interview everyone. This is the reason why most researchers prefer to use different sampling techniques like convenience sampling which is the most common of all sampling techniques. This sampling technique is used by many researchers because it is fast, low-cost, simple and the subjects are readily available (Langer G. 2010).

Three of the conventional merchant companies which participated in research were located in Preveza and the other in Arta. All the conventional and organic vegetable and citrus fruits farmers are located in Preveza while the rest of the participants are from Arta. In the end of the thesis there is a map which indicates the exact location of every participant.

Two of these conventional farmers have large citrus fruits enterprises, with an annual production of 150 tons each and they sell their crop to merchants that supply major retailers in north Greece. The production manager of an organic citrus fruits packer companies was also interviewed. The data selected from this merchant gave a holistic picture of the business performance in terms of the selected sustainability. This company is among the leaders in their industry with current exporting activities to European countries abroad such as Germany, Austria, the Netherlands and England, as well as in its marketing to the largest supermarket chains in Greece. There are several marketing channels by which organic citrus fruits and vegetables of the
examined prefectures arrive in consumers' hands, the most dominant of which is farmer-merchant/packer major retailer.

4.4 Analytical framework of qualitative analysis

The qualitative analysis was carried out to examine the sustainability of activities and applications of the organic and conventional citrus fruits and vegetables farmers and merchants according to the three pillars of sustainable development. It used a questionnaire because it aimed to extract the perceptions of the participants at two stages of the supply chain. The questionnaire assessed the sustainability performance of the actors of the supply chain using a dyadic approach. It investigated areas which could not be easily quantified, like product quality, relationships between the actors and examine economic, environmental and social criteria in the organic and conventional farmers' and merchants' choices.

The desired outcomes of the questionnaire, the number of questions that should be included and the concern not to exhaust the good will of the respondents were factors considered in the selection of criteria for the qualitative survey. The questionnaire for the qualitative research was consisted of several common questions, which varied slightly according to each stage of the supply chain.

Three sustainability directions were used to assess the degree of sustainability of the supply chain of organic and conventional agrifoods: economic, environmental and social.

**Economic:** Economic indicators were selected to capture the financial relations between the participants in the supply chain, the most important inputs-outputs of citrus fruits and vegetables enterprise/business financial operation such as production cost, maintenance cost, selling prices, subsides.

**Environmental:** Environmental indicators captured the most important aspects of natural resources management and environmental pollution of organic citrus fruits and vegetables supply chain, such as Energy Consumption (limited resources of some energy sources), water Consumption (irrigation systems), wastes (packaging material), emissions to environment (emissions come mainly from the fertilizer and pesticide application, and fuel use, while at merchant and retailer stage the transportation).

**Social:** Social indicators dealt with the most important and easily quantified social aspects of the citrus fruits and vegetables supply chain supply chain, such as the labor force (skilled or unskilled, permanent or temporary) used at each stage of the supply chain, relationships between the participants.
4.5 Results of semi structured interviews

4.5.1 Conventional farmers’ interviews

The table below shows some information about the conventional farmers who participated in the research regarding the cultivated crop, the prefecture which belong and the productivity.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Prefecture</th>
<th>Name of the farmer/ company</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional citrus fruits</td>
<td>Preveza</td>
<td>Conventional Farmer A</td>
<td>1100 trees (48t)</td>
</tr>
<tr>
<td>Conventional citrus fruits</td>
<td>Preveza</td>
<td>Conventional Farmer B</td>
<td>360 trees (2.5t)</td>
</tr>
<tr>
<td>Conventional citrus fruits</td>
<td>Arta</td>
<td>Conventional Farmer C</td>
<td>600 trees (25t)</td>
</tr>
<tr>
<td>Conventional citrus fruits</td>
<td>Preveza</td>
<td>Conventional Farmer D</td>
<td>1,500 trees (58t)</td>
</tr>
<tr>
<td>Conventional vegetable</td>
<td>Preveza</td>
<td>Conventional Farmer E</td>
<td>20t tomatoes and 350,000 pcs cucumbers</td>
</tr>
<tr>
<td>Conventional vegetable</td>
<td>Preveza</td>
<td>Conventional Farmer F</td>
<td>40t tomatoes and 270,000 pcs cucumbers</td>
</tr>
<tr>
<td>Conventional vegetable</td>
<td>Preveza</td>
<td>Conventional Farmer G</td>
<td>25t tomatoes and 340,000 pcs cucumbers</td>
</tr>
</tbody>
</table>

Table 2 Information about conventional farmers’ interviews

Economy

Farmer A mentioned “we are facing huge financial problems with the cooperatives since the last two years. We are not paid on time and in some cases we are not paid at all. The agricultural cooperatives have lost their initial form”. The creation of agricultural cooperatives started many decades ago with very good perspectives to limit the merchants’ power, to retain prices at normal levels, to eliminate intermediaries, help small producers and to enter into new markets. Farmer B said that “cooperatives gained great power as they had to control enormous production capacities and large amounts of money. Unfortunately cooperatives do not succeed to fulfill their objectives because in order to manage such big numbers, high educated managers were needed. Cooperatives until now are directed by a group of farmers-members”. In the research, two out of seven farmers also support that the cooperatives were politically motivated to follow some
specific directions and serve some interests. Farmer C claimed “another problem of cooperatives is that they have not created a list of permanent clients so to have a large portion of the production pre-sold. Managers of the cooperatives didn’t make any effort to search for new clients neither in Greece nor in foreign countries. So they have lost their negotiating power as they were trying desperately to find clients”.

Farmer D stated “the economic crisis has affected a lot the agricultural sector. Nowadays, the market demands not so improved quality but low prices and consequently reduced production cost, something which is not feasible”. The financial problem by which farmers are suffering creates an echelon of many other problems. Three farmers suggested that they can’t even afford to buy pesticides and fertilizers, as the agriculturist have stopped credits. Furthermore they have reached a point of not being able to make any profit and they can only pay their costs. Farmer D mentioned “10 years ago we could sustain financial losses at some years because there were 3-4 years where profits were very high. Nowadays, we need to have stable, though or positive financial outcome each year to carry on”. Only one out of the seven farmers gets a small subsidy which covers only 15% of his costs. For these reasons many farmers were forced to search for new merchants and new markets. Some of them have started a new cooperation with some individual merchants and others chose to sell their products in open street markets in Ioannina. Farmer B is thinking to abandon the citrus fruits cultivation as he is very disappointed of the current situation and he cannot manage to manage to bear the huge costs and the regulatory burden which is becoming heavier over time.

Environment

Farmers also take into consideration farm natural constraints like type of soil and irrigation availability. Access to irrigation is very important to produce high quality agricultural products. Only two out of five farmers follow a program of integrated management which includes the prevention and control of pests and diseases by using all of the available bioorganic, chemical, agricultural and other methods in order to reach a profitable and efficient production, without disturbing the balance of nature and protects the environment. The production process is controlled and supervised by a certification body. Farmer C also said “it is not worth to produce such a quality improved product which cannot be sold even 0.10€ higher than the other conventional products”. The type and quantity of pesticides that farmers can use is defined by the ministry of agriculture, which are usually adequate to protect their crop from diseases. Only in a municipality of the prefecture of Preveza a new irrigation system has been implemented by which
a central valve supplies farms with water from a river. None of the farmers use any type of automation in their private irrigation systems.

Society

Some of the farmers perceived that in order to stay in businesses educational requirements are now much more indispensable to understand and deal with the new market challenges, for this reason they attend relative seminars, they search in the web for more information and they get advices from experts. While there are some farmers which are not willing to abandon their traditional methods of cultivation and they deny any educational effort.

Farmer A stated “we have decreased the total number of people employed in farm. We and our families work in farms and sometimes we employ immigrants for the heavy work, because they are cheap and they do not complain about anything”. All farmers also agreed that the agricultural development could contribute to promotion of local community only if state takes efficient measures to this direction. Farmer B also mentioned “We think that agricultural cooperatives must be re-organized; they should conduct continuous market researches for which products are on demand and then inform us about the results. State also should give us the right motivations and directions through subsidies and new regulations in order to achieve the agricultural development.”

4.5.2 Conventional merchants' interviews

The table below presents some information about the conventional merchants, such as the marketable crops, the prefecture of their business and the amounts of agri-foods traded.
<table>
<thead>
<tr>
<th>Marketable crop</th>
<th>Prefecture</th>
<th>Name of the farmer/company</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional vegetable and citrus fruits</td>
<td>Preveza</td>
<td>Conventional farmer A</td>
<td>200t citrus fruits</td>
</tr>
<tr>
<td>Conventional vegetables</td>
<td>Preveza</td>
<td>Conventional farmer B</td>
<td>1.000t tomatoes 1.000.000pcs cucumbers</td>
</tr>
<tr>
<td>Conventional citrus fruits</td>
<td>Preveza</td>
<td>Conventional farmer C</td>
<td>3.000t tomatoes 2.500.000pcs cucumbers</td>
</tr>
<tr>
<td>Conventional vegetables</td>
<td>Preveza</td>
<td>Conventional farmer D</td>
<td>800.000t tomatoes 500.000pcs cucumbers</td>
</tr>
<tr>
<td>Conventional vegetables</td>
<td>Preveza</td>
<td>Conventional farmer E</td>
<td>400.000t tomatoes 1.000.000pcs cucumbers</td>
</tr>
</tbody>
</table>

Table 3 Information about conventional merchants’ interviews

**Economy**

Most of the agricultural merchants in the prefectures of Preveza and Arta, supply with conventional citrus fruits and vegetables mainly the markets of northern Greece, Balkan countries and local market. Merchant B also mentioned, “Nowadays the agricultural supply chain is market driven, while 10-15 years ago it was mainly production driven. We have also to face great business uncertainty because we don’t have some stable customers in order to have some the production capacity presold and since the last delivery we do not know if we supply the same retailer or not”. They also said, “Every day we give a big fight to find customers”. Only two merchants were subsidized from E.U. for the construction of the warehouses and buildings. All merchants sell the agri-foods on farmers’ behalf to the retailers or wholesalers withholding 12-13% of the total sales for covering fixed costs, transportation costs and the wages of the members.

In the research, 3 out of 4 merchants who were interviewed are members of agricultural cooperatives. The agricultural cooperatives, especially in the prefecture of Preveza, have a long history but in the last two years they are facing a very difficult situation since the debts of the cooperatives are plenty and there is limited room for maneuver. The manager of the cooperative D mentioned, “Like so many businesses and so cooperatives are victims of the large financial crisis. Some bad business decisions of previous administrations and the absence of any support from the state have led the cooperatives day after day in decline”. One of the most famous cooperative in
Preveza essentially stands on the brink of complete dissolution being unable to meet the minimum obligations due to high debts to the Greek state of non-payment of taxes.

**Environment**

Environmental issues were supposed to be of very little importance. Merchant C claimed, “We require from farmers to comply with specified environmental standards without affecting the quality of the product. Retailers set high environmental standards because of consumers' pressures”. Furthermore, merchant D is one the few companies in the prefecture of Preveza whose buildings and warehouses are certified to ISO14001 and HACCP standards and it’s a prerequisite from a big supermarket chain which he cooperates with. Merchants B and C undertakes the transportation from farms to warehouses by trucks.

**Society**

The number of employees has been dramatically decreased with the most significant example of merchant A who employed 35 workers in 2002, while nowadays there are only 3. Also none of the merchants employed any women or immigrants. All merchants agreed that there are great possibilities for local development through agriculture. Especially, merchant A said “both the areas of Arta and Preveza have a long history in the agriculture industry for the dynamic crops and high quality agri-foods. The weather conditions and the quality of the soil give a competitive advantage to the cultivation of these agri-foods”. Merchant E added “There is extended knowhow and expertise but there have been a series of incidents which perturb the local community. First of all, the economic crisis reduced the consumption which caused many problems in the agriculture industry. In addition, local authorities followed wrong strategies by entering many efficient agricultural areas in the city plan. Finally the political separations of cooperatives divided the agriculture industry of the area, paying more attention in serving political purposes than searching for new markets”. Also, all merchants agreed that in order to alter the current situation a reorganization of the agriculture system is needed.

**4.5.3 Organic farmers’ interviews**

The following table shows information about the organic farmers regarding the cultivated crop, the prefecture in which they belong and the annual average amount of their production.
<table>
<thead>
<tr>
<th>Crop</th>
<th>Prefecture</th>
<th>Name of the farmer</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic vegetable</td>
<td>Preveza</td>
<td>Organic farmer A</td>
<td>28t tomatoes, 140,000 cucumbers, 13t eggplants, 5t lettuces</td>
</tr>
<tr>
<td>Organic vegetable</td>
<td>Preveza</td>
<td>Organic farmer B</td>
<td>11t tomatoes, 60,000pcs cucumbers</td>
</tr>
<tr>
<td>Organic citrus fruits</td>
<td>Arta</td>
<td>Organic farmer C</td>
<td>1050 trees 150t</td>
</tr>
<tr>
<td>Organic citrus fruits</td>
<td>Arta</td>
<td>Organic farmer D</td>
<td>680 trees (40t)</td>
</tr>
<tr>
<td>Organic citrus fruits</td>
<td>Arta</td>
<td>Organic farmer E</td>
<td>789 trees (45t)</td>
</tr>
<tr>
<td>Organic citrus fruits</td>
<td>Arta</td>
<td>Organic farmer F</td>
<td>950 trees (52t)</td>
</tr>
<tr>
<td>Organic citrus fruits</td>
<td>Arta</td>
<td>Organic farmer G</td>
<td>800 trees (48t)</td>
</tr>
</tbody>
</table>

**Table 4 Information about organic farmers’ interviews**

**Economy**

Organic vegetable farmers supply groceries of organic products with organic vegetables directly from the farm without the intervention of any intermediaries. Organic farmer A said, “in order to promote your products you should consider marketing as a form of art”. Both of them don’t face any serious problems with the customers. They can understand that economic crisis has affected everyone, as farmers who are engaged in organic agriculture are sensitized with production of a high quality product, so in their transactions with the retailers they should be honest and clear. They have not started the organic production to make money but to contribute to the improvement of social welfare. All the organic citrus fruits farmers supply the only organic merchant in the prefectures of Preveza and Arta and they maintain excellent working relationships. The head manager of the company cooperates with farmers; he gives advices regarding crop protection methods, he informs them about the demand fluctuations, the agri-foods’ prices.

The producer price of organic agri-foods generally is much higher than conventional’s. Until two years ago, the price of organic agri-foods was 30-70% more than conventional. Another issue regarding the prices of organic agri-foods is that the price of conventional is determined by the relation between supply and demand. While the price of organic agri-foods is stable and it is based on the production cost and the profit margin of producer. All the organic farmers agree that
the production cost for organic agri-foods is very high as the organic pesticides that are used in the production process are very expensive. Also the cultivation of organic agri-foods demands many hours of personal work, a huge effort and every monitoring of the progress. None of the producers take any subsidy from E.U. or state. Some organic citrus fruits producers were subsidized by E.U. for the production process 10 years ago but now they don’t get any help from anywhere.

*Environment*

Organic agriculture involves using techniques to achieve good crop yields without harming the natural environment or the people who live and work in it. The methods and materials that organic farmers use to keep and build good soil structure and fertility and to control pests, diseases and weeds differ very much from the methods which are used in conventional agriculture. Organic farmers recycle and compost crop wastes and animal manures, they use the right soil cultivation at the right time and natural pesticides, and they also induce predators that eat pests. Two out of six organic farmers collect, store and process in warehouses animal manure and then they turn this material into food for plant growth. Other farmers use compost made of leaves, fruit skins and animal manures which improves the structure of the soil and improve soil and crop quality which is a cheap, easy way to make a very effective material. Organic farmer A to control pests and diseases uses some natural techniques such as companion planting with other crops that pests will avoid, such as onion or garlic or by using crop rotations to help break pest cycles and prevent a carryover of pests to the next season. All organic farmers are certified by inspection agencies which operate organic standards that meet the European Union’s minimum requirements. Organic vegetable farmers are using their own vehicles to deliver their agri-foods to customers; while organic the transportation of organic citrus fruits is undertaken by the merchant by trucks. Most of organic farmers are trying to use water which is available locally, avoiding using water faster than it is replaced naturally. They use of rain water basins, careful irrigation and they add organic matter to the soil to improve its ability to hold water.

*Society*

All organic farmers consider that organic farming demands always high labor intensity and it is a tool for keeping people in the countryside and especially young people, taking into account the increasing levels of unemployment. Organic citrus fruits farmers also mentioned that the workers, that they will employee in the farm, are chosen very carefully. The workers that are employed must be the best on the labor market and for this reason should be trustworthy and capable. Especially in the collection process, workers should be very careful not to harm the product. Organic farmer A, is also responsible for environmental education in all high schools in
the prefecture of Preveza and he has made many efforts to motivate farmers to get involved with organic agriculture. Many farmers were interested but when they were informed about the long personal working hours, they found it difficult to try it. As he said, in Greece there is an attitude to make money without working a lot. He feels very disappointed because in a few years he will retire from the education field and he hasn’t managed to contribute to the development of organic agriculture in the prefecture of Preveza. Most of organic farmers interviewed agree that they are open to give any advice to everyone who wants to get involved with organic agriculture and they don’t act competitive as they want create a team of organic farmers who produce high quality product in order to enter in the markets with a good brand name.

Organic farmers from the prefecture of Preveza noticed that there were many possibilities for organic agriculture development and this current situation will have been avoided. For many years, farmers cultivated some specific conventional varieties not so qualitative which were not in great demand. The varieties of the crops, the pesticides, the fertilizers and the money which you can afford for production process play an important role in agriculture. Organic farmer A mentioned: “if you don’t pay for the crop, you won’t get your money back”. Furthermore they said also that the economy of the prefecture of Preveza is based on two industries: agriculture and tourism. If it could be achieved a combination of these two industries Preveza will be one of the most rich prefectures in Greece. Until now neither state nor the farmers are acting towards this direction.

Organic citrus fruits farmers from the prefecture of Arta also agree that there are many possibilities for bringing out the local community through agricultural development. Organic agriculture demands hard work and every day monitoring. The attitude of conventional farmers should change, as they were used to work only once a week. Furthermore, state contributes to this situation by offering delusive subsides to products which are not exportable or in demand, just to serve some political purposes. Many researchers have proved that the prefecture of Arta is enough burdened from the continuous use of pesticides due to intensive conventional agriculture.
4.5.4 Organic merchant’s interview

The table below presents some information about the organic merchants, such as the marketable crops, the prefecture of their business and the amounts of agri-foods traded.

<table>
<thead>
<tr>
<th>Marketable crop</th>
<th>Prefecture</th>
<th>Name of the company</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic citrus fruits merchant</td>
<td>Preveza</td>
<td>Organic merchant A</td>
<td>3.000t citrus fruits</td>
</tr>
</tbody>
</table>

Table 5 Information about organic merchant’s interview

Economy

Organic merchant A has been engaged in the marketing and distribution of organic products since 2001. Having an extensive and broaden experience in the organic agricultural sector, he aspires to become the driving force behind the export of organic products. This is proved by the exporting activities to advanced countries such as Germany, Austria, the Netherlands and England, as well as in its marketing to the largest supermarket chains in Greece. The total construction cost of the invested building new, privately-owned facilities on 2.5 hectares of land, was very high and 50% of which was subsidized by E.U. The philosophy of the company is to create not only a professional relationship but also a personal approach with the suppliers and clients in order to achieve long term cooperation. The organic merchant also said: “The marketable quantity is not standard; it is determined by the demand. We are mostly interested for the foreign markets as in Greece the consumption of organic products is decreased due to the economic crisis”. He continued: “the selling price also is not stable, it is different for every customer and it depends on the variety, the quality, the packing material and the transportation cost. The selling price is 20-70% higher than the price of conventional agri-foods”.

Environment

The company undertakes the organizing and management of the logistics. Organic merchant added, “We select the logistics company based on two important criteria, such as service quality and price. Then we check if these companies are certified to ISO14001”. The transportation techniques are organized by the logistics company and most of the times combined transportation modes are used for the exports. He said “we don’t participate actively in the logistics process but we monitor the whole process until our products arrive to the customer. We always make our best to serve customers’ needs”. The company undertakes the transportation from farms to the warehouse. “Depending on the production capacity of every farmer we use the suitable truck in order to avoid the frequent transportation” merchant completed.
The company has created modern and eco-friendly building facilities with high technology packing and labeling equipments. Moreover there are special storage chamber with controlled atmosphere where the existence of ozone allows the extension of life postharvest life. The company is certified by one of the most well-known inspection agencies in Greece. Moreover the company is certified to ISO 22000, an international management system for food security which has replaced the Greek standard ELOT 1416. The representative of the company said “with the ISO 22000 we can secure the high agri-food quality standards for consumer’s health”. Also they implement integrated management systems AGRO2-1 and AGRO 2-2. He continued saying “our objective is to secure the quality of products always with respect to the environment. Also the company is certified to HACCP and Globalgap for rational implementation of the agricultural practices in the international market. Organic merchant mentioned “Globalgap certification gives us the necessary requirements to enter in foreign markets. Especially the supply of German market with organic products is possible under the demands of European Regulation 834/2004 and under the certification standards of Naturaland”. They also have a traceability system which gives them the opportunity reach in every farm of the producer with accuracy. The materials which are used for the packing procedure is plastic and paper. The choice of the material which it will be used depends on customer needs and it includes the relative cost. Moreover they use photovoltaic panels as a source of alternative energy.

Society

The company employs 50 seasonal workers and 30 of them are women. Organic merchant is trying to keep very good cooperative relations with farmers. “I have created my own team of producers who are certifies to Globalgap, I give them advice and we perform continuous checks at all stages of the production. I’m trying to create a friendly and cooperative relationship between farmers and not act competitively. I inform farmers about new cultivation plant protection methods and I’m doing my best to pay them in time. I admit that farmers are the most important actors in the supply chain of every agri-product. The organic production is very difficult and demanding process and for this reason I’m trying to satisfy all the farmers that I cooperate with”. He was the one who motivated farmers to get involved with organic agriculture.

The head manager of company believes that there are many possibilities for development in the prefectures of Arta and Preveza but there are some things that must be changed. He stated, “The economy of these prefectures is based on the agriculture industry. We shouldn’t forget it. The microclimate of these areas is suitable for organic agriculture which offers a competitive
advantage. There are two major that must be altered: The lazy attitude of Greek farmers, always with the support of state”.

4.6 Discussion

Several key findings emerged from this study. The research effort led to insights regarding the suitability for supply chain of organic agri-foods. The results of the semi structured interviews are separated as in the previous chapters based on the three dimensions of sustainability.

Economy

Conflicts between farmers and merchant in the supply chain of conventional citrus fruits and vegetables are fiercer and more frequent than in the past because of the reduced profitability in the supply chain and the way this is allocated to each stage, even though, the supply chain is more integrated and partners work closer together. Moreover, the buying power of many participants in the supply chain is reduced, which may have impact on the well-being of the market and national economy in general. On the other hand, the findings from the literature review and the in-depth interviews showed organic citrus fruits and vegetables industry is not a field for competitive battle, but it is a field where all actors cooperate with each other in harmony.

In the next two tables there is a comparison between organic and conventional agriculture based on some financial evidence. The first row in both tables includes three elements: the producer price regarding the productive year 2013, the production cost which includes: protection plant cost, fertilizing cost, fuel cost, labor cost and finally the producer profit which comes out from the deduction of the two previous elements.

<table>
<thead>
<tr>
<th></th>
<th>Citrus fruits</th>
<th>Vegetables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oranges</td>
<td>Mandarins</td>
</tr>
<tr>
<td><strong>Producer price</strong></td>
<td>0.08€/kg</td>
<td>0.25€/kg</td>
</tr>
<tr>
<td><strong>Production cost</strong></td>
<td>0.03€/kg</td>
<td>0.10€/kg</td>
</tr>
<tr>
<td><strong>= producer profit</strong></td>
<td>0.05€/kg</td>
<td>0.15€/kg</td>
</tr>
</tbody>
</table>

Table 6 Financial elements of conventional citrus fruits and vegetable agriculture (2012)
Concerning the economic results, the focus is on a comparison of the average organic and conventional farm. When the specific subsidy for organic farm is not taken into account, the average organic orange cultivation makes a profit of 0.24€/kg, which is 80% more than the profit of the average conventional farm (0.05€/kg). From the financial comparison we can result that organic citrus fruits and vegetables farming is more profitable than conventional. The organic farmers are more sensitized in the production of a high quality, environmental friendly and healthy agri-product. For this reason they spend so much money for the production costs.

Regarding the sustainability in the next stage of supply chain, the results are clear. The agricultural cooperatives of conventional agri-foods in the case study are suffering from many financial difficulties due to economic crisis and organizational problems. For this reason they reach to a point of not being able to fulfill some of the basic financial obligations. No serious effort has been made to search both in domestic and foreign markets. And of course the victims of this scene are the farmers. In-depth interviews revealed that merchants in organic industry are more interested to maintain not only cooperative but also personal relations with farmers. Furthermore organic merchants have broadened their sales in foreign markets with exporting activities in many European countries.

**Environment**

Few farmers have made some steps towards sustainability by adopting the Integrated Crop Management program (ICP) but as they mentioned it is worth financially. It is well known organic agriculture is a sustainable way of farming without chemical inputs during cultivation. A very obvious example is one of the organic farmers who collects, processes, produces organic manure and then he use it as fertilizer in the farm. There is no executive irrigation system used by conventional farmers in order to control and save water consumption. While some of the organic
farmers use some methods to store and use water more efficiently. In transportation, there is no progress neither from conventional nor organic farmers, to reduce the environmental impact.

Only few movements have been made from conventional cooperatives towards environmental sustainability. Some basic actions have been made to ensure product safety and quality and to protect the environment. While the organic merchant uses three different certifications for product quality and environment plus the certification of the inspection agency for the packing process of the organic agri-foods. In addition organic company environmental active through implementing applications for energy saving. So it can be said that the processes practiced by the organic merchant is greener than conventional merchants’. The merchants of organic vegetable and citrus fruits supply chain improve their overall performance by adopting supply chain management elements, food assurance schemes and 'greener' technologies for transportation, carrying out environmental audits and taking advantage of information technology innovations

**Society**

Considering training of farm managers, organic farmers are trying more to get informed through the web or seminars than conventional farmers who are not willing as much to get involved to something new. Organic farmers tend to be more open to new methods and practices regarding the organic agriculture of citrus fruits and vegetables. They are willing to inform any new farmer who wants to get involved with organic agriculture, as mentioned before they don’t act competitively. Organic farmers appear more sensitive to the environmental impact of conventional agriculture, whereas the attitude of conventional farmers is influenced more by economic factors.

Detailed information about costs showed that organic supply chain generates more employment than conventional as a consequence of the high labor intensity and the increased labor cost. More employment opportunities are offered not only by organic farmers but also by the organic company, as more expertise and capable workers are required. They are willing to keep young people to countryside and get involved with the organic agriculture industry, taking into account the high unemployment rates. They are so optimistic for the local development and they show that the route to get out of economic crisis is through the intensive agriculture and efficient marketing. They are more realized of the current situation and how to get out of it. While conventional farmers and merchants are stuck to their problems and they don’t seem to make any real effort to get out of this situation. They are waiting from the state to show them the way.
Overall, taking into account the dyadic analysis of the supply chain, the results of the interviews and the literature review we can conclude that the organic agri-foods supply chain follows stricter the sustainability principles than the conventional agri-foods supply chain.

5. Conclusion
The aim of this thesis was to develop an approach to assess the sustainability of organic agri-food supply chain combining the findings of the relevant literature and interviews with two of the key representatives of the supply chain, farmers and merchants. This paper has performed an empirical analysis comparing organic and conventional supply chain practices and has draw some financial, environmental and social conclusions from the information available from our sample of individual farmers and merchants.

Research question 1 was answered by literature review and semi structured interviews with key representatives from two stages of the supply chain. The concepts of sustainable development, supply chain management, organic supply chain and sustainable development were used in this process. The findings of the thesis revealed that sustainability issues are of considerable interest for all the participants of the supply chain of organic citrus fruits and vegetables. The findings from the semi structured interviews showed that organic agri-food enterprises or businesses are no longer the units in the competitive battle, but it is supply chains of organic agri-foods which compete each other. Organic supply chain gets more integrated, state and European Union sets higher standards so that high quality and healthy food agri-products arrive to consumers and businesses which are engaged in this supply chain minimize any potential negative impacts on the environment and society. The qualitative survey concluded that the actors of the organic supply chain recognize that their business performance is significantly with respect to some basic sustainability criteria. Farmers’ and merchants’ main concern is to remain in business and while maintaining on some important environmental and social issues.

Research question 2 was answered by a qualitative survey in order to compare the perceptions of the participants in the organic and conventional agri-food supply chain regarding the three pillars of sustainable development. These were elicited by three groups of questions based on the three pillars of sustainable development (economy, society and environment). It seems that food product, safety and quality, employee health and safety issues, environmental risk and natural resources management have been among the most important for the organic food supply chain. On the other hand the supply chain of conventional agri-foods is facing many problems in Greece. The concept of sustainability was not very clear to all the members of the conventional agri-foods supply chain. A lack of knowledge can be clearly noticed concerning the
basic principles of sustainability. Only the actors who were closer to the earth are somehow more interested about environmental issues. Conventional farmers did not perceive that reducing environmental risk could bring significant financial benefits to their business. Merchants and especially agricultural cooperatives are suffering from huge financial problems due to economic crisis and lack of efficient management. An essential requirement, though, is that agricultural policy makers will address the weaknesses that have emerged from the investigation of conventional producer and merchant attitudes towards economic and environmental issues, that is to improve the economic performance on the one hand and the environmental protection on the other. Both organic and conventional participants in the questionnaires believe that agriculture in these areas have many advantages to offer in local community.

Research question 3 was also covered by the semi-structured interviews with representatives of two stages of the organic agri-foods supply chain. They agree that subsidies for organic farming can contribute to economic development, as it (and for integrated management as well) could be treated as a measure that would reward farm managers for achieving environmental improvements. Such a decision would depend on the goals set at an agricultural and environmental policy level. The recommendations emerging from the research are as follows: It is recommended that the Ministry of Agricultural should bring together a panel of experts and representatives from all stages of the organic agri-foods supply chain to discuss the problems and the ways to overcome some issues raised about the organic citrus fruits and vegetables supply chain, such as how to increase the number of organic farmers or the size of organic farmlands, to motivate young people to get involved with organic industry. The study also revealed the serious problem of lack of merchants for the organic agri-foods. There is only one merchant in two agricultural prefectures who is involved with the packing and marketing of organic agricultural products. So, the state should promote and encourage the establishment of organic agricultural cooperatives with integrated processes ((production, processing, packaging, marketing, exports, etc). Another issue that needs to be solved is the low level of domestic organic agri-foods consumption. The participants in the supply chain or governmental agencies should also better inform consumers about the implications on the sustainability of organic agri-food supply chain of their requirements for continuous supply all year round and the quality criteria to be met.
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Appendices

Appendix 1

QUESTIONNAIRES OF THE SEMI-STRUCTURED INTERVIEWS
Interview form with the citrus fruits and vegetables farmers

Name of farmer: ………………………………………
Type of cultivation: ……………………………………… Organic □ Conventional□
Prefecture: Arta □ Preveza □

1. Describe in short your business activities:
   • Production
   • Packing
   • Labeling
   • Transportation
2. Cultivated hectares: …………
   Number of trees: ……………
   Productivity amount: ………
3. Where do you supply your products?
   • Organic products retail shop
   • Wholesalers- merchants
   • Supermarkets
4. Do you face any difficulties regarding your transactions with the merchants?
   • Financial difficulties
   • Understanding difficulties
   • Other difficulties
5. How you deliver your products to the merchant?
6. What plant protection methods do you use?
7. What fertilizing methods do you use?
8. What irrigation systems do you use?

9. Do you use any kind of automation in the irrigation systems?

10. Number of employees: …….
    • Are there any women in the working force?
    • Are there any workers of different nationality? Are there differences in the payments with the Greek workers?

11. Which is the producer price for each of your products regarding the season 2012-2013?

12. Which is the product cost for each type of cultivation?
    • Labor cost
    • Plant protection cost
    • Transportation cost
    • Certification cost

13. Do you get informed somehow for new cultivation methods or for the fluctuation of supply and demand?

14. Do you receive any subsidy from the state or European Union?

15. According to your opinion, are there any prospects to bring out local community through the agricultural development?

**Appendix 2**

**QUESTIONNAIRES OF THE SEMI-STRUCTURED INTERVIEWS**

*Interview form with the citrus fruits and vegetables merchants*

Name of company: ………………………………………

Name of the interviewee: ………………………………..

Type of trading cultivation: ……………………………… Organic □ Conventional□

Prefecture: Arta □ Preveza □

1. Describe in short your business activities:
    • Production
    • Packing
    • Labeling
    • Transportation

2. Where do you supply your products?

3. Amount of trading products for each type of products……….
4. How do you determine the amount of agri-products that you will ask from farmers?

5. Number of employees: …….
   • Are there any women in the working force?
   • Are there any workers of different nationality? Are there differences in the payments with the Greek workers?

6. Which is the average selling price for each of your products regarding the season 2012-2013?

7. Do you use alternative energy sources in building facilities or in warehouses?

8. Do you apply an Environmental Management System, such as ISO 14001?

9. What kind of packaging materials do you use?
   • Plastic
   • Paper

10. What kind of transportation mode do you use?
    • For domestic transportation
    • For foreign transportation

11. Do you use any transportation techniques?
    • Designing optimal routes
    • Systems monitoring and tracking
    • Intermodal techniques
    • Cargo consolidation techniques

12. Do you receive any subsidy from the state or European Union? Is it enough to cover some of your costs?

13. According to your opinion, are there any prospects to bring out local community through the agricultural development?