Integrated Management of Sustainable Blueberry Farming in Greece

Student: Kyriaki Zafeiriadou
ID: (1102110015)
Supervisor: Dr. Lida Kyrgidou

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Abstract

This research provides a clear picture of all aspects of sustainable blueberry farming in Greece, the way in which they affect each other, and the associated risks. Establishing a small commercial, organic blueberry farm is the main project goal, exploring the implementation of new cultivation methods that provide entrepreneurial skills for starting a new land-based business. The plan also targets the processing and promotion of domestically grown high quality blueberry varieties and attempts to connect business practice with academic and practical research. Finally, the penetration in the Greek market and the determination of distribution channels (EU networking) assist in the potential entry to the domestic German, UK and the rest of Northern Europe markets.

The study’s main conclusion is that, entrepreneurial farming qualities can be improved by the continuous research on cultivation practices that discover new field treatments connected with sustainable agriculture. Additionally, the current study discusses the contribution of research to the improvement of agricultural systems, making the procedures involved, easier to be adopted in the future, and reveal business opportunities even during periods of economic crises.
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Chapter 1: Introduction

Relying on the fact that sustainable ways of doing business, create new opportunities and solutions, considering the new market trends, consumer demands, legislation and activists (The Guardian Professional, 2011), the current study aims to provide evidence that, investing in sustainable agriculture, offers farmers and other businessmen, great opportunity to succeed. In particular, it focuses on the examination of sustainable blueberry farming, which contributes positively to a healthier environment, and leads to the supply of healthier fruits, based on a way of living that is capable of guaranteeing continuity of life for all. Provided that, a structure enabling business sustainability (particularly in the agricultural sector), represents a pathway to overcome the current economic crisis (Gatsios, 2010), the particular research proves to be particularly valuable, in terms of exploring the “green” business future.

In general, making more efficient use of natural resources, saves costs, lowers managerial risks and is doing less harm to the society in the long run. From the entrepreneurial perspective, the success in dealing with change in every aspect of the society, and the conversion of this effort into business practice, has become a basic skill for every farmer (Alsos et al, 2011). As such, the current study places strong emphasis on new business prospects, like the introduction of innovative products/services, and efficient fruit production/processing that improves social and environmental conditions, based on the theoretical framework of sustainable entrepreneurship. Overall, European and American entrepreneurial qualities (attitudes and characteristics) were exploited, so that aspects of advanced farm management systems that encompass business development and strategic farm planning, can be reproduced.

Organic blueberry cultivation is chosen to be researched, because it is extremely promising, and can occur all over Greece (from Crete to Evros), as varieties are adaptable to each climatic condition (Tratsa, 2012). Greek literature and practice, on sustainable blueberry farming, are very limited and exploration of further management practices (update business improvement) is needed. Primary (in-depth interviews), and secondary (articles, journals, books) data were used, that take lead in: a) encouraging risk taking in cultivating new crops to Greece b) eliminating bad reputation coming from the unknown management methods and c) giving a clear picture of the competitive advantage, farmers will gain when choosing alternative crops and modern cultivation methods. Establishing a sustainable blueberry farm requires careful planning and scrupulous research over all the necessary actions that need to be taken correctly and timely. These actions include the determination of the land, determination of the necessary number of plants, organic soil preparation for planting, appropriate planting, organic fertilization, organic management of the
weeds, processing plan, marketing plan and exporting plan. The current study also revises all issues relevant to fruit processing, like: determination of European distribution channels, market penetration, and product promotion and distribution, aiming at giving real business opportunities to farmers/businessmen (who see business deadlocks all around them ever since the Greek crisis has begun). Investigating the topic from the Greek farmers’ perspective, a clear picture of all managerial aspects of blueberry farming is provided, which clarifies the most prominent sustainable cultivation practices. The adoption of these new systems in the future will definitely lead into fewer entrepreneurial mistakes and consequently into reduced risks.

Another objective will also be the marketing and promotion of domestically grown, high quality blueberries and the main question to be answered in this section is whether establishing a small commercial, sustainable, organic blueberry farm is a clever entrepreneurial move regarding the Greek market. Overall, an attempt is made to connect business practice with academic and practical research, in order to answer basic inquiries, derived from Greek farmers who hesitate to grow new crops. Ultimately, primary data contribute substantially towards developing entrepreneurial competences, identifying additional entrepreneurial characteristics and skills associated with innovative agriculture.
Chapter 2: Literature Review

2.1. Introduction to the literature review

The combination of sustainable development and entrepreneurship, considering small/medium agricultural enterprises, is discussed by many authors like Cohen & Winn (2007), who state the opportunities for an emerging model of sustainable entrepreneurship that improves local, social and environmental conditions. Crals and Vereeck (2003) add that sustainable entrepreneurship cannot be achieved only by large organizations, but by SMEs as well, supporting the idea of establishing a small, sustainable blueberry farm in Greece. Finally, Motomura (2010) talks about the application of this entrepreneurial energy, the defeat of barriers that inhibit entrepreneurial action considering the efficient functioning of markets, and the contribution to a more efficient application of environmental and natural resources plus ecologically sustainable development of crop cultivations.

A relevant book, published by Agrotypos, considering this field of research is written by a Greek author (Kassandros Gatsios) and is called, The Blueberry (To Myrtillo). Mr Gatsios is the author of the first books in Greece about the cultivation of, blueberry, sea-buckthorn, pomegranate and truffle with regard to the Greek farming conditions and standards. The author has developed all the blueberry farm management phases, but the application of sustainable methods as regards organic production and environmental awareness are missing. Adversely, the use of old pesticides and fungicides (contain poisonous ingredients) has been suggested, neglecting the assessment practice for ecological risk that should be followed by all farmers who know that, exposure to one or more pesticides may cause harmful ecological effects. Additionally, after the book was published, there have been some considerable efforts by Greek farmers, to cultivate organic blueberries in Greece using environmental friendly techniques which have been reported and evaluated for their results.

There is also much random information derived from meetings and conferences held in a variety of places, which are exploited for the dissertation needs, as such this research will be a systematic contribution to this field. Greek entrepreneurs have just started exploring and experimenting blueberry cultivation within the Greek territory. As a result, this research is based on key literature and references extracted from different American and European studies, like the “Blueberry Journal”, which is produced by the North Carolina State University, and provides all sorts of advises and recommendations (accompanied by pictures for beginners) to blueberry enthusiasts.
2.2. Basic theoretical frameworks

This research is based on the theoretical frameworks of sustainable development and entrepreneurship, as consumers are shopping in a smarter way, eating healthier food, and are more concerned about agricultural practices, that have been followed by farmers, when enjoying an abundance of fresh, locally-grown products. At this point, entrepreneurship takes the lead, because in order for entrepreneurs to achieve sustainability in the long run, they must stop borrowing against the future and implement, environmental friendly, and healthy food production practices, today.

The sources of research ideas are common agricultural issues, arising from past researches, that often generate questions and disagreements, like: a) some researchers state that, organic blueberries have much more nutrients to give when compared to conventional blueberries (Xie, 2008), while others state that this statement has proved to be wrong (Brien, 2012), and b) other researchers prevent farmers from growing blueberries, claiming that this fruit is not that competitive compared to other fruits (Gertsis, 2012), while others, are in favor of blueberry cultivation (Gatsios, 2010). As such, the outcome of expanding, the existing knowledge in blueberry farming, is connecting health efficiency to the environmental and social efficiencies which are not supported much by the Greek farmers.

2.2.1. Sustainable development in agriculture

Sustainable agriculture involves natural food production methods, which, do not harm the environment, respect workers and provide fair wages to farmers (Motomura, 2010). When considering the current farming situation, everyone would agree that agriculture relies on, synthetic fertilizers, chemical pesticides, the use of large amounts of water, and old style practices for raising livestock and crops. Additionally, artificial hormones in milk, antibiotic-resistant bacteria, mad cow disease, and large-scale outbreaks of E.coli bacterial diseases, are associated with this old industrial form of food production, (Grace Program, 2011) due to intensification of agriculture, through massive adoption of high yield cultivation (Mishra and Nayak 2004). In fact, as ecological principles are often ignored or overridden, several agricultural scientists have arrived at a general consensus, stating that modern agriculture can confront environmental crisis. According to Motomura (2009), a growing number of people are worried about the long-term sustainability of existing food production systems; as such, sustainable agriculture has become more a way of life, than a regulation. Modernization of agriculture, benefits the society as a whole, as it is protecting the planet for future generations, and is responding more effectively
to the consumer’s requirements (Altvorst et al, 2011). Lastly, there is definitely need for, a) promotion of a positive shift toward local, small-scale sustainable farming which does not harm the environment, and b) elimination of agricultural structure and policies that, do not synchronize with the necessity of providing the best conditions of life for everyone, in order to avoid a bigger environmental crisis.

2.2.2. Entrepreneurship in agriculture

While most agricultural entrepreneurs are putting considerable effort into confronting the continuing spread of urbanization, and the growing needs of consumers for high-quality food, they are also able to change the way they use agricultural resources (Iowa State University, 2007). Altvorst et al (2011) state also that, nowadays entrepreneurial action, in agriculture, is interpreted as the creation of new managerial solutions and opportunities and responding in order to survive, will no longer be sufficient for the new agricultural entrepreneur. However, in order for that to happen, farmers have to use efficiently environmental and natural resources (development of sustainable crop cultivation methods) and overcome barriers which emerge from the traditional business stereotypes (Alsos et al, 2011). Through the discovery, evaluation, and exploitation of new farm prospects, farmers keep up with the ongoing agricultural changes and eliminate environmental failures. (Altvorst et al, 2011). It is a fact that in recent years, the agricultural, food production and rural development sectors have experienced profound changes around the world. Investing in the aforementioned sectors is an opportunity through which, individuals, companies and society can benefit, creating a balance between planet, people, and profit.

Greek agriculture can gain a competitive advantage for the first time in decades, while most individuals have direct access to information (foreign/domestic researches), new training methods and certification’s issuance. If farmers apply all these aspects of farming development to alternative crop cultivation, they can get the country out of the crisis, with at least 300,000 jobs covered within the next four years within the agricultural sector (Tratsa, 2012). Considering the current entrepreneurial situation in Greece, there are growing economic incentives strengthening the effort that has been put by farmers.
2.2.3. Sustainable entrepreneurship

Sustainable entrepreneurship is a spin-off concept, arising from sustainable development, that can be defined as the continuing commitment from businesses, to behave ethically and contribute to the economic development (Crals and Vereeck, 2004) while reducing environmental impacts (waste generation & resource consumption). In other words, sustainable entrepreneurship is the action of creating opportunities, through the process of transforming material and energy into salable products (Cohen & Winn 2007). Therefore, the energy that is given to entrepreneurs, in order to make things happen in a conscious manner, helps them to conceive local sustainable solutions, while considering also all the requirements for the well-being of future generations.

The concept of environmental awareness, moves farmers toward sustainability and the common good, and covers many business evolutions like, corporate social responsibility, ethical entrepreneurship and ecological care (Motomura, 2010). The combination of ecology and economics is the key to the attainment of sustainability, for the benefit of current and future generations (Wilkins, 2012). In addition, Crals and Vereeck (2004) state that, sustainable entrepreneurship can be applied by a small/medium enterprise, when it devotes time and effort in selecting simple and effective designs, tailored to the company needs and compatible with its style. The authors also add that, small/medium enterprises should mainly look out for the return and the opportunity costs of the selected strategies, rather than the financial costs, and gain business relationships with large companies requiring sustainable partners with a positive reputation that also motivates and attracts employees.

2.3. Alternative crop cultivation and the economic crisis

The economic crisis in Greece, leads more and more people to swap their current business professions, with the farming jobs (primary sector), or turns young unemployed people on the farm land (Gatsios 2010). After all, Greece definitely needs to start producing more intensively, and this opportunity for Greek exports, is provided by the global increase in demand for organic products (Epixirein, 2012). Simultaneously, the immerse of new crops, the so-called "alternative", which promise satisfactory financial returns, are the new agricultural trend all over the world, effacing the cultivation of traditional crops that have reached the end of their production cycle (see appendix 1).
As the Greek newspaper, “To Vima” (2012) has published, 1.5 million people (most of them highly educated) want to leave big cities. In addition, the nationwide survey conducted on behalf of ELGO "Dimitra" (2012) organization, concluded that, young people who wish to settle in the province, will be engaged in the production of more sophisticated and modern alternative crops. In order to create good conditions for young people, the Greek Ministry of Rural Development is supporting them, giving comparative advantage to the young people, who own small fields in the countryside, where along with fruits and vegetables for their own use, can start operating their own businesses. Also, the land allotment to farmers and unemployed youth has already begun, giving top priority to those, who do not own rural land (Koutsabaris, 2012).

2.4 The Blueberry

Blueberries are members of the genus Vaccinium and belong to the Rhododendron family (Ericaceae). Sweet with excellent firmness and shelf life, low in sugar and highest in antioxidant levels of all fruits and vegetables, blueberries are the new miracle fruit (Tufts University, 2010). Blueberries may be added to the list of the most challenging crops to grow, but their distinctive characteristics are also the most rewarding (superfoods). The levels of Vitamins A, C, E, beta-carotene, potassium, magnesium, phosphorus and fiber are completing the nutritious puzzle, which places them in the first step of a healthy diet. A research carried out by the American Tufts University (2010) has ranked blueberries as the No. 1 (among 60 fruits) in antioxidant and anti-aging properties, almost 40% more than red wine.

Blueberries are also rich in anthocyanins (fruit color), consequently they can become a natural food colorant and act as a functional food with therapeutic properties such as prevention of cardiovascular diseases, anticancer, antitumor and antimutagenic, diabetes, treatments for age related diseases and antibacterial activity, (Wang 2009). Also, many studies of American universities and organizations have recognized the beneficial properties of blueberries, due to the phytoestrogen content, considering the eye vision, urinary infections, allergies, "bad" cholesterol (LDL), atherosclerosis and hypertension (Hippophae Pellas, 2011).
Blueberries also contribute significantly to the good functioning of digestion, due to the high fiber content, and they even help the human body to fight prostate, breast and mouth cancer due to the high fiber content, and combat diseases of the elderly such as Parkinson's disease and Alzheimer. A vivid example from the Second World War, regards the British aviation pilots who ate large quantities of blueberries and were able to see better the German planes (Gatsios, 2010).

2.5. Blueberry varieties and pollination

In general blueberry is a highly specialized crop that has exact soil and climatic requirements, which differ from other fruit. There are many different blueberry varieties, that need acidic, and well-drained soil to thrive, like the highbush blueberry, dryland, evergreen, rabbiteye, half-high and low bush. Blueberry varieties are distinguished by the adaptability to climatic conditions and ripening, so farmers have to be confident, and choose varieties with good suitability for adapting to the selected field (Willis Orchard, 2007). Different varieties ripen at different times, or feature large fruit (best for fresh eating and desserts) or small fruit (best for muffins and pancakes).

The most famous blueberry commercial varieties are the following: The **Highbush blueberry** is the type that is most widely cultivated due to the broadest
adaptability, high yields and excellent fruit quality (see appendix 2). The **Northern Highbush** which is the most famous blueberry variety in the world, is growing best in temperate climates where total winter chilling reaches 1,000 hours or maybe even more, and the **Southern highbush**, which is a new hybrid, has lower chilling-hours requirement, and is flowering earlier than Rabbiteye varieties. (Fall Creek farm & nursery Inc, 2011) The **Rabbiteye** is a large bush, with firmer berries (excellent self-life) and thicker skin.

Blueberry variety selection has a strong relation to the plant’s pollination requirements. Most plants including blueberries have both male and female organs on the same flower, but not all are self pollinating. The best pollination practice for blueberries is to have different varieties of blueberries within 30 m, so bees can travel and cross pollinate as blueberries cannot be fertilized by their own pollen (Shutak and Gough, 2011). According to Tom & Theresa Gaffney (2011) who own Highland Blueberry Farm, 2011 was not a good year for Grade A (big) blueberries, because the pollination procedures that were applied were not the best, with the consequence of having low fruit yield. They did have berries for making value-added products, but they had no Frozen berries (Grade A) to sell. Farmers have to learn to appreciate the lean years as they do the bountiful years, and for this reason, they have to start preparing early, take precautions against threats, and run field tests more often.

2.6. Blueberry planting and climate conditions

The climate of Greece is suitable for growing Blueberry plants. Attention must be paid only to the selection of suitable varieties to be grown (Gatsios, 2010). In Northern Greece, varieties that require larger periods of cold winter can be cultivated, while in Southern Greece, the varieties that require less time of winter cold are preferred (Hipophae Pellas, 2011).

Considering the spacing of blueberries, they are typically spaced at, 1,5 to 2,5 m. within a row, and 3,7 to 4,3 m. between the rows (Kuepper and Diver, 2011). An educational partnership of 74 American universities, “Extension” (2011), suggests that, soil quality also needs to be monitored for its functional capacity, in order to
determine the success of management practices or the need of additional management changes.

Furthermore, as blueberries grow best in sunny locations, spring is the best time to plant young blueberry bushes, as it ensures that hot weather will not stress the new plant, and good air circulation will help prevent fungal diseases (Gatsios, 2010). Although blueberries need winter’s chill hours, and they should be planted in areas where there are at least 2 months below 5°C, these limits can be extended by planting cultivar crossings (highbush blueberry and rabbiteye for southern and northern locations). Also, the term “microclimate” can be successfully implemented when there are climate limitations, by selecting a field location with the characteristic of being warmer or cooler than the surrounding area. If the area is protected from the cold Northern winds, it will be warmer than an exposed area, and it will also reduce drying injury (Shutak and Gough, 2011).

2.7. Blueberry organic treatment and weed management

Much information exists on controlling blueberry plant problems, caused by pests or diseases, but farmers must first receive sophisticated diagnosis of problems before their intervention occurs. The online Cornell berry diagnostic tool, developed by researchers at Cornell University, assists students, growers, and extension educators to identify potential causes of plant/crop problems, serving as a production guide for strawberries, blueberries, raspberries and blackberries. Descriptions and photos of numerous diseases and pests related to berries, affecting the: plant, canes, leaves, flowers and fruits are accessible online (Cornell University, 2007). Moreover, all of them have been released, by the university without charge, and no subscription fees. A good suggestion from Karipidis (2012) is that since birds are particularly fond of ripe blueberries, farmers should think of a way to protect them, once the harvesting season gets close. He also recommends that light bird netting over the bushes, is an excellent solution to the problem. Also, Papoutsis (2012) states that the insects (e.g. Zina) coming out in June, can leave the blueberry field very easily if they have somewhere else to go, so planting grape vines close to the blueberry field is a wise move in order to avoid chemical pesticides.

On one hand, on most Greek sites, blueberries are relatively free of diseases and pests; therefore, organic fruit cultivation is not difficult to be achieved. On the other hand, weeds are considered to be the main trouble in organic blueberry farming (Meselidis, Papoutsis 2012). It is crucial for farmers to control aggressive persistent weeds such as johnsongrass, bermudagrass, and quackgrass prior to crop
establishment, with natural recourses (see graph 2) and to avoid sites in which these grasses are growing. Since blueberries do not have extensive root systems, clean cultivation (removing all weeds at all times) of row middles can be put into action, but it is wise to till no deeper than 7 cm (Kuepper et al, 2004).

Graph 2: Blueberry organic treatment

Indiana Blueberries (2010) suggest that, a mulch layer must be spread around the blueberry plant, (10 cm from the main trunk), and the layer should be about 12 cm deep in order to prevent weed growth. Also, the plants grow rapidly when the roots are planted into the bark, but the work load is heavier as irrigation and fertilization practices must be adjusted to suit the pine bark University of Florida (2010).

2.8. Blueberry organic fertilization

Since herbicides cannot be used in organic production, field preparation, at least one year in advance of setting the plants, is strongly recommended by most researchers and people involved in this field like Rugen and Bachman (2007), Meselidis (2012) and many others who agree on this subject.

Blueberries do not require high soil fertility; as such fertilizing once or twice a year, preferably in early spring (before the leaves have grown), with cottonseed meal, blood meal or organic compost, replenishes the soil with nutrients lost in the growth process (NASA, 2010). The application of too much fertilizer can damage fruit, as the only nutrient that is normally expected to be added is nitrogen, which can be found in coffee grounds or grass clippings. It can be even more convenient, when made at home, and the farmer is expected to sprinkle 5 cups of coffee grounds or a 5 litter
bucket of grass clippings within a 90 cm circle around the plant (Bradley et al, 2009). When blueberries are planted in neutral basic soil, can fail due to the lack of ammonium nitrogen (denitrifying organisms that convert nitrates into ammonium), which survives in soil with low PH level (The University of Georgia, 2006).

2.9. Organic Blueberries & the European Organic Market

A collaborative project, between the US Department of Agriculture and Rutgers University (2008), attempted to answer whether organic blueberries are better than conventional. Collecting blueberries from five organic farms and five conventional farms (similar fruits and surroundings, comparable environmental factors) in New Jersey, the berries were tested in sugar, acid, and antioxidant contents. In terms of sugar content, organically grown blueberries contained higher amounts of fructose and glucose, and there was no significant difference in citric acid content. Lastly, organic blueberries contained more malic acid, which contributes strongly to the taste and the quality of fruits, (Kent, 2010).

Table 1: Organic versus Conventional blueberry nutritious contents

<table>
<thead>
<tr>
<th>Cultivation Method</th>
<th>Fructose (mg/g)</th>
<th>Glucose (mg/g)</th>
<th>Citric Acid (mg/g)</th>
<th>Malic Acid (mg/g)</th>
<th>ORAC (mg/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic</td>
<td>97.06</td>
<td>45.53</td>
<td>3.47</td>
<td>0.043</td>
<td>46.14</td>
</tr>
<tr>
<td>Conventional</td>
<td>79.26</td>
<td>29.72</td>
<td>3.14</td>
<td>0.029</td>
<td>30.76</td>
</tr>
</tbody>
</table>

The above average values, suggest that organic blueberries are better for consumers, but we have to keep in mind that the nutritional soil content and many other factors, influence the final nutritional content and quality of blueberries too.

Liz Condo (2010) and her family, who planted blueberries at their organic family farm in New Jersey, supports the idea of farming organically, as it is of the utmost importance. In detail, she stated that their kids are not inhaling any chemicals, and that it is also beneficial for adults and the environment. Another study from Wang et al (2008) has directly compared the total antioxidant capacity of organically grown
versus conventionally grown blueberries, and found that organically grown blueberries turned out to have significantly higher total antioxidant capacity. A supporting view from Papoutsis (2012) is that, even though research into the subject has yielded mixed results, in general organic fruit have much more benefits for individuals, than conventional fruit. After all, consumers are avoiding the pesticide residue left on fruit leading to various health problems, and eat more nutritious fruit. A good suggestion to farmers who are about to grow blueberries is that, if they want to maximize the antioxidant benefits from blueberries, they have to go organic.

As far as the European organic market is concerned, organic fruits are one of the major product categories in the organic segment. Sales of organic products are increasing in most European countries (Germany, Sweden and Denmark), with France, the UK and other countries, catching up quickly. The organic market is less developed in Southern and Eastern Europe, but there is potential for growth, (CBI, 2009). Even though, the market for organic frozen fruit is much smaller than fresh products, the growth prospect appears to be bright. Mc Shane (2012), states that there is an expectation to ship 500 tons more blueberries to Europe, which is a significant increase, as blueberries have been extensively promoted to UK, France, Germany, Denmark and the Netherlands.

2.10. Blueberry consumption and usage

Everyone loves blueberries, and each day, they are becoming more and more popular as consumers get to know the goodness of this little fruit. Blueberries are available at the market as fruits, and also as products containing blueberries. The main industries that use blueberries are the pharmaceutical, food and cosmetic industries.

The products that have been introduced to the Greek market the last few years and contain blueberry as a main ingredient or as secondary are the following:

- **Blueberry Detox - Daily Fiber Formula**

  Purity’s Blueberry Detox Fiber Formula is an advanced phytonutrient formula with 6 full grams of fiber. Unlike plain fiber, which does not contain antioxidants or phytonutrients, Blueberry Detox represents the next generation in fiber supplementation, supporting the liver and kidney function. It also promotes healthy energy, focus and vitality and helps maintain cholesterol levels.
• **Naora Limited Edition 2012, by Nespresso.**

The fruit started being presented in the Greek market, more dynamically by Nespresso. The sweet red fruit, blackcurrant and blueberry offer an incredible long-lasting coffee flavor.

• **Le Petit Marseille Hair Treatment with Carthame and Myrtille**

The French cosmetic industry Le Petit Marseille has introduced the carthame and blueberry complete product range for hair treatment (shampoo, conditioner, hair mask, hair spray/oil, after shampoo), offering new hair treatments. Carthame oil and blueberry is the new recipe “Flashing Color” for colored hair. It enhances the natural protection of hair and prolongs color vibrancy.
• **Korres Myrtille Hydrating Balsam & Korres Myrtille and Citronella Emulsion**

- The Greek cosmetic industry Korres has introduced:
  
a) the myrtille hydrating balsam that is paraben, mineral oil, silicone, propylene and ethanolamine **FREE &**
  
b) the myrtille insect repellent milk, ideal for all outdoor activities and summer nights.

Despite the common usage of blueberries in muffins and other deserts, Brian and Michelle Driscoll decided to process a portion of the berries into wine. This new approach, by Springbank Farm (blueberry farm in Oregon), would allow the family to make a living from blueberries, ending discrimination against non grape wine. Also Papoutsis (2012) suggested that, the leaves of blueberry plant can be collected and processed in order to produce a very beneficial decoction for people suffering from diabetes. However, these actions can be viewed as positive moves towards sustainable markets, introducing the role of entrepreneurial innovations in the environmental arena.
Chapter 3: Methodology

3.1. Research Method

The current qualitative in nature study, has its roots in sustainable farming techniques and is more concerned with exploring how organic blueberry cultivation can be adjusted to the Greek farm context. It is a field much explored, but an adequate response, regarding organic cultivation methods of alternative crops in Greece, is rare.

The interviewer pursued in-depth information from four key people, who belong in different agricultural sectors, soliciting more than one word answers, and steering to control the course of the interview to avoid digressions from the topic. Even though clear, simple, and short questions were spoken understandably, the interviewer was critical up to a point in order to test the reliability and validity of what the interviewee tells. Notes were written down during the interview, and the results provided valuable insights in order to fill the literature gaps, regarding the new market demand for organic products and concerns for environmental responsiveness in Greece. Regardless of the convergence of focus among development research and practice, especially in the field of agriculture, a gap still exists in transferring knowledge regarding the Greek farming conditions. Collaboration between experts is limited, and still relevant knowledge is not reaching blueberry farmers. Many efforts to bridge this gap have been initiated, in order to bring together research and practice towards the achievement of development objectives. As such, the outcome of this project is a combination of theory and practice, sustainable development and entrepreneurship, traditional and organic farming, in order to enhance the efficiency and effectiveness of sustainable blueberry farming in Greece. In addition, the topics and questions were derived mainly from the Greek literature gaps in organic blueberry farming, after the overview of the research purpose was drawn (intended uses for the interview data), and potential issues to look when cultivating crops organically, were considered thoroughly.

3.2. Strengths and weaknesses of the selected methodology

The in-depth examination of alternative crop cultivation phenomena using sustainable techniques will certainly contribute to the agricultural as urbanization is continually spreading and the consumer’s needs are growing. In addition, research methods should give various opportunities to other researchers, who can be motivate to expand the research topic (Patton, 2000), and this has been taken into consideration from the beginning. The current qualitative research focuses on subjective information and provides detail and complete description of the topic. It also seeks to
understand Greek territory requirements for growing blueberries, gathering information (primary data) from knowledgeable people who have already tested organic management trials which have either succeeded or failed. An advantage of working with secondary data is economy, because someone else has already collected the data, the researcher does not have to devote resources and time to this phase of research, so it is available effortlessly, rapidly and inexpensively (Cresswell, 2007).

Apart from the efficient aspects of this qualitative research, the researcher possibly loses the information richness arising from a group of people (exchange views and debate issues), but he is able to obtain more detailed information for each subject. Furthermore, potential biases were considered when designing this qualitative research (e.g. questions not reflecting the personal interest), and the subjects were chosen based on what would most benefit the research topic, not just on what would be convenient. The downside though is that, the current study is being subject to researcher bias, as the data collected, have to go through the researcher’s mind before they are put down to a paper, so the results may come out subjective. However, there are approaches available to the qualitative researcher to protect against these drawbacks and generate a less biased result (Silverman, 2004), which have been explored in order to, make sure that the researcher’s own personal biases and opinions do not get in the way of the research, and give fair consideration to all sides.

3.3. Data collection methods

Primary and secondary data was collected and analyzed to convene the requirements of the research objectives, with secondary data being the only possible source of the desired data, on the subjects which cannot have primary data at all. For example, survey records already collected, can offer information which cannot be obtained from original sources. Secondary data was collected by determining which institutions conduct large and reliable surveys on the topic area in question, and proper analysis has led to the attainment of information that was needed in order to make judgments, and recommend areas of intervention.

Primary data collection involved, gathering an amount of information from a rather small, but purposive sample, conducting semi-structured interviews including open-ended questions extracting experiences and viewpoints of particular topics. The design of interview questions depends upon the semi-structured type of interviews, the purpose of findings, and relevant researches that gave the initial inspiration to study the subject. Open questions are allowing the respondents to give full answers to questions with some supporting explanation (Cresswell, 2007). As Patton (2000) suggests, interview questions have to be constructed such a way that they ensure the
information collection of the same general areas (from each interviewee), and interviewers have to allow a degree of freedom and adaptability when they solicit innovative research suggestions. Thus, subjects were interviewed individually through Skype (proprietary voice-over-Internet Protocol service and software application), in person or even through telephone, in order to collect primary. Telephone interviews facilitate the procedure of gathering information rapidly, and personal interviews succeed in getting the story behind the participant’s experiences, as they are driven by a more personal contact between the interviewer and the respondent (Silverman, 2004).

In this qualitative research, the interviewer had wide-ranging discussions with the interviewees from the educational, commercial, practical and managerial sectors. Primary data has been completely custom-made, so there was no problem of adjustments. A set of predetermined questions, focusing on sustainable blueberry farming, were answered by the selected people, who also commented on real events rather than giving generalizations. Additionally, the interviewees were encouraged to express their views, for the subjects tailored to each sector, at length, and were asked to reveal more about real blueberry farming drawbacks, clarifications and solutions. Secondary data was also collected, in order to give richer answers to arguments raised by researchers the previous years, and give valuable insights, which might have been missed. The main electronic databases that were used are: EBSCO and HEAL-LINK. Books, magazines and other material were obtained from the libraries of the International Hellenic University and American Farm School of Thessaloniki.

3.4. Ethical considerations

The interviewees were contacted on their mobile phones; as people often dislike the intrusion of a call to their home (Cresswell, 2007), and the ones who did not have publicly listed telephone number, were reached at work. The interviews were also useful as follow-up to certain respondents, who agreed on being contacted again and the interviewer, had planned to be patient and tolerant, in case of provocative and unconventional opinions.

When reporting the results, the researcher made sure that the representation was done on what had been observed and what was told, interview responses out of context were not taken into consideration and small parts of observations discussed were put into the appropriate context. Finally, reproducibility of the findings was also considered from the beginning, so that the findings will be applicable to other subjects or settings, assisting in further literature expansion.
Chapter 4: Case study and data analysis

4.1. Blueberry farming in Greece

As more and more Greeks are becoming aware of the blueberry, most people refer to the fruit as “the berry of youth” since its consumption assures more physical energy, greater vitality, wellness, and health improvement. Moreover, Greeks find blueberries to belong to the list with the super fruits that contain far more nutrients than other fruits, necessary for the proper functioning of the human organism in order to keep healthy and have a greater resistance to disease. According to the Greek agricultural farming news (2011), the blueberry is a new crop to Greece and has begun systematically to be cultivated in the last few years. In many parts of the country (Epirus, Macedonia, Central Greece etc.), the first cultivation results are very encouraging, and specifically the first cultivations in Drama (2005) were very successful (Papoutsis, 2012).

The blueberry varieties have to be chosen according to the cold winter hours, needed for them in order to grow. In Northern Greece farmers can cultivate the varieties that require larger amounts of cold winter, while in Southern Greece they can cultivate the varieties that require smaller amounts of winter cold (Gatsios, 2010). Apart from the climatic conditions that need to be taken into account before establishing a blueberry farm in Greece, there are many other factors, among which the most important is the adaptability of the variety to the soil conditions of the region.

According to Karipidis (2012), even though every farmer should have in mind that blueberry farming is a business with many risks and a lot of work involved, it is worth to be done in Greece, under certain circumstances. Farmers have to experiment at least 2 to 3 years before planting. They also need to be careful when choosing the varieties and supplier of plants and always evaluate as many options as possible, due to the fact that many people in Greece are trying to make “a quick profit” just to catch the trend of the blueberry demand for the plants, not caring for the quality (Karipidis and Papoutsis, 2012). Meselidis (2012) adds that farmers should be aware of 3 essential characteristics when buying the plants:

a) The color of the leaves should be green and not yellowish,

b) The plant should be at least 50 cm tall (2-3 year plant), and

c) The plant should have at least 2-3 sprouts.
Also, soil suitability (pH, salinity and organic matter) should be checked, and as blueberries require a lot of water, it must be ensured that, the field must be close to a water source (Papoutsis, 2012). Another very important aspect is that the growers need to be educated by constantly reading articles and academic papers so that they acquire appropriate knowledge and benefit from the latest publicizing (Karipidis, 2012).

4.2. The Blueberry project

A small scale preliminary study has started in 2011, in order to evaluate feasibility, time, and adverse events, of blueberry cultivation at the municipality of Katerini, and to improve upon the study design prior to performance of a full-scale research project. Initially, the pilot experiment considered the selection of blueberry varieties that can be cultivated in the area of Paralia. Among many varieties that were selected, the variety that seems to perform remarkably well is the Rebel southern highbush blueberry variety, which is released by the University of Georgia. Rebel is a very early season southern highbush blueberry, productive in yield, with large fruit and excellent fruit characteristics like stem scar, color, and firmness (The University of Georgia, 2009). The companion varieties that are recommended for cross pollination are Star and Suziblue, and were planted for testing reasons too. Southern Highbush blueberries are becoming more popular for commercial plantings and are an excellent choice for sandy soils near coastal areas like Paralia. Northern Highbush varieties are performing well too, as they have not seemed to be having any problems up to now.

Considering the climatic conditions of Paralia, the climate in this area is truly unique. The surrounding mountains protect the resort and create a cooling sensation especially during the summer, when the temperatures are extremely high. The microclimate of the area created by the two mountain ranges Olympos (southwest), Pieria (northwest) and the adjacent sea (coastline: 60 km) ensures that the plants will have: a) shelter from the wind and absence of frosts (mainly the early spring and late autumn frosts generating problems for plant development and fruit-bearing) and b) necessary relative humidity and temperature fluctuations within the limits. In addition, the sunshine and the fertile, well drained, neutral pH soils guarantee ideal conditions for cultivating the plant to yield quality fruit; moreover the amount of sunshine in Katerini is another factor with a positive impact on development of fruit’s chemical composition (acid/sugar balance).
4.3. Preparing the soil for Blueberry Planting

Blueberries have specific soils requirements and they grow best in sandy soils like Paralia’s soil, and farmers can modify the soil condition that is initially unsuitable and make it suitable for blueberry production (e.g. add acidic peat). According to the University of Georgia (2006); unless a large amount of acidic organic matter is added to the soil, growth is much better in virgin soils than in soils previously farmed. Preparing the soil for highbush blueberries means building up organic matter, adjusting the soil PH and providing good water drainage. An educational partnership of 74 universities in the United States (2011) suggests also that soil quality has also to be monitored, involving the functional capacity of the soil in order to determine the success of management practices or the need for additional management changes.

4.3.1. Increasing organic matter

Adding organic matter such as compost, leaves, straw and other material is the traditional way of treating the field, but a decent start for someone who is willing to grow blueberries, would be to plant a green manure crop (buckwheat) in the early summer before planting blueberries the following spring, (Oregon State University 2008). In the late summer, soil PH should also be measured and adjusted, just before turning under the buckwheat. Winter rye can also be planted in September in order to reduce soil loss from erosion during the winter months and enrich the soil with extra organic matter in early spring (Gertsis, 2012).

4.3.2. The Soil PH & Drainage

The best soil PH acidity is between 4.5 and 5.6 in general, but this can change according to the blueberry varieties selected to be cultivated (Melesidis, 2012). Considering the classic PH acidity, if the soil is higher than 5.6, powdered sulfur should be added (11 kilos for each 93 m², lower acidity by 1 full PH point). For sandy soils, the rate should be around 3 kilos of sulfur for 93 square meters (Kuepper and Diver, 2011). Alternatively, if PH is too low (sour soil) limestone should be added (68 kilos for each 93 m², lower acidity by 1 full PH point) Oregon State University (2008). PH has to be tested right before the field is planted because fertilizers used in past field treatments, may change PH levels (Karipidis 2012).

The soil characteristics considering the geographical zone of Paralia, are the lack of boron toxicity, activated calcium and adequate iron content, which are factors contributing to, high fruit quality (solid flesh) late deterioration of fruit quality after cropping (Agricultural Cooperatives Union of Pieria, 2006). Additionally, the
University of Georgia (2009) suggests that planting on heavy soils that drain slowly and planting in a low-lying area where water accumulates (roots are constantly underwater) should be avoided. Also, growers who plant on well drained, and sandy soils must irrigate frequently, using the double-line drip irrigation (with acid injection to lower the pH of the water) as it is the most appropriate method with less costs (The University of Florida 2010).

4.4. Blueberry Planting & Climate

The climate of Greece is suitable for growing Blueberry plants; as such attention must be paid only to the selection of suitable varieties. Varieties that require larger periods of cold winter, can be cultivated in Northern Greece, while in Southern Greece, the varieties that require less cold in winter, are preferred (Hipophae Pellas, 2009). Growers desiring an early ripening of southern highbush should consider Rebel variety in areas where the estimated chill requirement is between 400 and 450 hours below 7 °C (University of Georgia, 2009). These limits can be extended by planting cultivar crossings between highbush blueberry and rabbiteye for southern locations and low bush blueberry for northern locations (Shutak and Gough, 2011).

The planting distances vary from 1.5 - 2.0 m (on the line planting), and 2.4 - 3.5 m (between rows planting). As blueberries grow best in sunny locations, spring is the best time to plant young blueberry bushes (2-3 years old), ensuring that hot weather will not stress the new plant and good air circulation will help prevent fungal diseases (Meselidis, 2012). Chapman (2006) also suggests that, once the plants are in the ground, it is an excellent idea to prevent them from fruiting for the first couple of years, by pulling the young fruit off. That way, all the energy the plant makes, goes into establishment rather than producing fruits.

4.5. Blueberry Processing

Even though, blueberries are sold mostly directly after harvest, they can be also processed in various ways and used for the production of sweet and garniture or the preparation of yoghurt, juice concentrates, and essential oils, pharmaceutical and cosmetic products. According to Ministry of Agriculture of UK (2011), 70% of blueberries are sold fresh, while the largest proportion (90%) of the processed quantities is sold simply frozen. Given the Greek market circumstances for blueberries; farmers recommend that if blueberries are not meant to be sold directly after picking, it is better to stored frozen for later use (Melesidis, 2012). This is a professional way of dealing with a new crop when its local market is not yet established.
4.5.1. Blueberry Freezing & Drying

Since blueberries are highly perishable, it is necessary for farmers to develop processing plans that increase the fruit storage life, while maintaining all the nutritious characteristics. Freezing is a process that helps fruit in maintaining freshness and natural characteristics (flavor and appearance) that make them a suitable ingredient in a wide variety of food products (jams, bakery product, dairy products and confectionary). A new trend arising from the European freezing industry is the development of sustainable production methods, through which companies aim to reduce the use of pesticides and herbicides in the raw material; as such freezing companies are helping their farmers to implement integrated pest management systems. Moreover, nowadays there is much attention on reducing the amount of energy used in production and on the collection, processing, disposal, and management of waste materials (CBI, 2009).

Graph 3: Ways of freezing blueberries

Frozen blueberries constitute a very promising product for commerce within Greece, as consumers demand in becoming bigger (Melesidis, 2012). The global frozen foods market continues to expand despite the adverse economic conditions since is it has succeeded to overcome the recession due to the increased demand for healthy and convenient products (Farm Press, 2011). The packaging of innovative products and the consumers growing health consciousness are also contributing to the
increased consumption of frozen food. Control atmosphere packaging is playing a vital role, and results in only half as much blemished fruit when compared with storage in regular air, (after 28 days), minimizes fungal development increasing antioxidant activities and total phenol content (Schotsmans et al 2007).

Fresh or frozen blueberries are dehydrated using multiple methods, in order to produce dried fruit intended to be sold. In most cases, dried blueberries are first infused with a sugar solution (give more weight) and then processors reduce the fruit moisture level to around 18% (CBI, 2009).

Graph 4: Blueberry Dehydration Methods

Source: US Highbush Blueberry Council (2011)

Sometimes farmers sell at remarkably low prices during the harvest season because they cannot store or preserve their surplus products (Melesidis, 2012). Adversely, the procedure of selling dried fruits improves the bargaining position of farmers, while creating employment opportunities and a sustainable income. Dried fruit can be sold easily as they are very popular and can be used as backpacking food, camping food, snacks, cereals, and desserts. Lastly, the procedure of processing berries into dehydrated fruits and jams is also selected by farmers, when the quality of blueberries is not exceptional (Meselidis, 2012).
4.6. Blueberry marketing

The increasing consumption of fruit is strongly related to health, convenience, and indulgence; as such consumers are always looking for more nutritious products and wellness (significant word in marketing). Blueberries have increased popularity in European countries, which have contributed to their consumption increase, in recent years. Initially, in order for consumers, who comprise the blueberry market in Greece, to be identified, there has to be extensive production of the fruit in the country (Meselidis, 2012). This way, consumers will have the chance to be acquainted with the new fruit, and include it in their shopping lists. Considering the farms that have just been established, they can introduce the new fruit to local people and export to countries that have high blueberry demand (Papoutsis, 2012). The three direct markets, which are primarily available for Kentucky blueberry growers, and can be implemented by Greek farms, are the following:

1. Pick your own (PYO)
2. On-farm retail, and
3. The farmers’ market.

“Pick your own” marketing approach has many benefits, as local people will get to know the nutritious fruit, and farmers will have the opportunity of selling the fruit at lower prices (good motive for consumers to save money) and capture as much, or more, profit (University of Kentucky, 2004). As labor intensiveness to harvest is the main drawback for planting blueberries according to Gertsis (2012), this way, any blueberry farm will save money and effort by decreasing harvest labor.

A breakthrough in value-added marketing, came with the scientific research, conducted by the USDA Human Nutrition Research Center at Tufts University (2010), indicating the numerous health benefits of blueberry consumption. Blueberries can translate traditional health and quality concerns into exceptional fruit benefits that everyone can obtain, as more farmers are now looking at on-farm, value-added products. While consumption of fruit “out of home” is increasing in many European countries, blueberries can be marketed at stands, at operations, at farms fresh, frozen or dried. Since blueberries have many health benefits, they can be promoted to many customer groups like:

- women and athletes who care about their figure and love cosmetic products,
- older people who look more for quality and nutritious food
- kids who love all kinds of snacks and
- people suffering from various diseases (pharmaceutical product)
Especially now that the family households are getting smaller because people have fewer children, with the number of single-person households still increasing in almost all European countries, consumers needs have changed and ready meals containing frozen fruit are more and more commonly used (CBI, 2009). Meselidis (2012) also adds that, since the last years have shown that consumers look for convenient snacking alternatives, which do not make them choose between nutrition and taste, it is remarkably easy to offer fruit that maintain these characteristics, in order to keep up with this trend and win loyal consumers.

4.7. Potential EU entry & the distribution channels

Blueberries are found from Iceland to Japan and grow abundantly in U.S.A., Canada and in China. Nationwide, cultivated blueberries are considered to be the second most important berry, after the reputable strawberries (Jones, 2009). As blueberry retailing industry, is not well established yet in Greece, farmers are searching for European distribution channels (e.g. cooperatives), through which they can sell easier their fruit. For many farmers, the initial plan is to promote raw blueberries to local markets, but when they take into consideration the higher risk involved (storage and selling), this idea is dropped (Karipidis, 2012).

On one hand, consumption patterns for fruit vary across Europe, with higher consumption per head by the northern European countries, where people consume more frozen fruit since fresh fruits are not available throughout the year. On the other hand, Southern EU consumers traditionally prefer fresh product, since the availability of fresh produce has increased lately. Looking at the market for frozen fruit and vegetables in Europe through CBI’s research findings (2009), frozen fruit and vegetables are largely used by the food processing industry in Germany, Italy and in the United Kingdom. The market of frozen fruit is expected to grow more since production is not sufficient to meet domestic demand and imports are necessary. Germany and France are the largest importers with a large domestic market, while Belgium and the Netherlands are major re-exporters of frozen fruit and vegetables.

Supermarkets and grocery stores are the main outlets of selling all fruit products (fresh, frozen, dried, jams and other fruit products), and specialized agents are the most compelling business partners. Also, restaurants and food services such as hospitals, canteens, and catering companies are powerful channels for fruit distribution too. Most food processing companies are supplied by specialized fruit importers, agents (intermediaries establishing contacts between exporters and importers) or sometimes they get fruits directly from the farms (see appendix 3). In general, trade channels across the European countries do not differ significantly (CBI 2009).
4.8. Expansion Opportunities

Since consumer demand for blueberries is sky high in Europe, the blueberry industry has experienced explosive growth in the export markets. Unquestionably, there is more growth to come as the fruit is becoming more famous due to the introduction of new blueberry US products to the markets (US Highbush Blueberry Council, 2011).

The farmer’s attitude concerning farm expansion incorporates, to cultivate other alternative crops like: Aronia, Goji Berries and Raspberries, and to develop their current farm of blueberries, in terms of size, which will eventually produce more blueberries after many years (Karipidis, 2012). Also, supplying Greek farmers with high quality blueberry plants is another expansion plan that can be developed, after further technical knowledge has been obtained (Meselidis 2012). Most sustainable agriculture and entrepreneurship conferences conclude by stating that: the future of farming expansion in Greece incorporates the improvement of product quality and specification (satisfying market requirements of the food industry) and the concentration on social and environmental impacts (Gertsis, 2012).

Considering the opportunity of providing dried fruit to the European markets, even though consumption has decreased by 14%, in terms of volume, due to the economic crises and price increases, there are opportunities in Italian, UK, Germany and Spanish fruit markets, which are importing dried fruit from China, Chile, Turkey, Argentina and Tunisia as European production satisfies only a small part of the markets needs (Eurostat, 2009). As such, the goods that have complete product specifications, instructions (storage and processing), documentation and information on quality assurance (e.g. HACCP/ISO certifications), can access the European markets, claiming equal treatment for small farms that are striving to contribute to the recovery of the European and local economies. The tables below indicate the opportunities and threats regarding the blueberries’ export procedures, and facilitate the decision making process of sufficiently reducing uncertainty and doubt.
Table 2: Exporting Opportunities

<table>
<thead>
<tr>
<th>EXPORTING OPPORTUNITIES</th>
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<tbody>
<tr>
<td>+ Blueberries are not enough for the EU consumption and, therefore, need to be imported</td>
</tr>
<tr>
<td>+ Food industry uses more diverse, new fruits</td>
</tr>
<tr>
<td>+ Distinct innovative blueberry ingredients like antioxidants, addressing key consumer demands such as health and wellness</td>
</tr>
<tr>
<td>+ More cost-effective value adding (processing and packing) in the country of origin (comparative advantage of lower labor costs)</td>
</tr>
<tr>
<td>+ Expanding market for frozen fruit</td>
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</tbody>
</table>

Table 3: Exporting Threats

<table>
<thead>
<tr>
<th>EXPORTING THREATS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Rising fuel prices increase transport costs</td>
</tr>
<tr>
<td>- Higher market demands in terms of quality and reliability of supply</td>
</tr>
<tr>
<td>- Increasing demand for innovation and proactive propositions to the market (propose concepts, not just products)</td>
</tr>
<tr>
<td>- Certification documents (HACCP, GMP, ISO 9000, BRC and IFS) needed for market access of processed food and Global GAP for access of fresh fruit and vegetables</td>
</tr>
<tr>
<td>- Increasing competition, forcing manufacturers to become more innovative and cost-efficient</td>
</tr>
<tr>
<td>- Rising prices of raw fruits creates the need for the food processing industry to look for more economic substitutes</td>
</tr>
<tr>
<td>- Europe is increasing blueberry production for its market, which is not, as established as in North America</td>
</tr>
</tbody>
</table>
Many small businesses believe that they are too small to compete in the European market, but the government has always been supporting farmers, even during difficult economic times, and give loans or grant programs, helping them to become exporters or expand their current exporting activities (Meselidis, 2012). Moreover, it is all about proper planning and organization, from the farmer’s side, and the ability to realize, which way the pendulum swings, and the commercial attitude generating good profit.

4.9. Implementation barriers

a) The main risk of maintaining successfully a sustainable blueberry farm is the lack of technical knowledge and people/scientists that have relevant experience to identify diseases, health issues, and nutrient requirements, additionally the lack of technical knowledge involves also, a risk regarding the final selling of the product (Karipidis, 2012)

Unavoidably, since the fruit is new to the Greek farming culture, the first years have to be experimental in all phases of the production cycle. The solutions to this problem are found to the electronic facilities emerging from universities (Cornell berry diagnostic tool) and young farmers (blueberry forums). The logical step forward for knowledge sharing between practitioners and researchers would be to request the experts in the field, to join the forums. This way, farmers can cooperate with experts and ask questions regarding professional treatments and field issues.

b) Since blueberry farms are making their first steps in Greece, there is not much support so that Greek products can be promoted abroad, without spending too much money (participation costs in international exhibitions is unbearable for farmers).

Blueberry farmers can always contact the ministry of agriculture, in order to be included in the “Basket of Agricultural Products” that will be used as a growth engine of the local economy, counting the highest quality products of each region (Papoutsis, 2012). Also, the structure of a blueberry database that could sort out electronically all blueberry farmers can include them to the European commercial catalogues.
c) Considering new product development, one of the biggest challenges is how to define the market for new products like blueberry wine or tea, as the research must start from scratch.

First of all, wine or tea production can start with a small number of cases annually, and grow in response to market demand. In the beginning, the farmer can sell the products in the farm, so that local people can have the opportunity to taste them, in grocery stores or even local restaurants. After the product has been approved by local people, expansion can further show the way to bigger markets.

d) Another issue that may arise when the products will be ready to be exported is that, Greek farms will face tough competition from well-established companies located in major blueberry-exporting countries such as Canada, the United States, and Chile. Many of these companies have large quantities and are substantially better capitalized than any small/medium sized farm.

This is a general issue that has to be tackled from the beginning (farm establishment), since the conduct of business must comply with the existing European farm and food industry laws, rules and regulations. Papoutsis (2012) also states that the provision of residue free fruit is a competitive value, as more and more environmental groups are quick to educate and remind consumers that the allowable pesticide residue limits set by the government are deemed too liberal.
Chapter 5: Interpretation of findings

5.1. Data Interpretation

As sustainable entrepreneurship is a very recent phenomenon, both in practice and as a topic of scholarly inquiry, this research offers a theoretical definition for this emerging field considering the agricultural sector and despite the youth of the industry in Greece it involves the avoidance of unnecessary risks to blueberry farming. Finally, innovative sustainable farming initiatives are examined which are logical from a business perspective (herbicide organic alternatives) and affect positively the development of blueberry cultivation practices within Greece.

The research method proved to be very useful for the blueberry project presented in this case, since the interviews with the Greek experts, gave a sound impression of the significance of entrepreneurial skills in blueberry farming. Additionally the open–ended questionnaires provided sufficient opportunity for the respondents to express their thoughts and opinions. The questions that were chosen were also extremely useful to the interviewer, opening the discussion about the managerial skills that farmers need. In the analysis, too, the trends of sustainable entrepreneurship provided a useful framework for understanding why specific managerial implications are essential for farmers in order to provide competitive and innovative products to the foreign and local markets, establishing a sustainable farm. Since the key to the data review process is the ability to judge the quality of the information that has been gathered (Mc Caston, 2005), the researcher has:

a) gathered reliable sources of information (reports and studies) from top agricultural institutions
b) avoided the collection of data published for corporate or marketing purposes
c) consulted university libraries which are good sources of information and
d) established contacts with experts at local university departments (e.g. American Farm School) that are dedicated to research on the topic in question.

Finally cross-analyzing data has helped the researcher to understand not only what is happening in a particular area but also the reason why this is happening.

5.2. Contribution

This research contributes to the literature by examining the managerial practices of blueberry cultivation in creating entrepreneurial opportunities within Greece. It is also closing the knowledge gaps with respect to how new entrepreneurial
opportunities come into existence within the agricultural sector. However, much of this research is focused on incremental innovation, through the improvement of traditional crop management practices that damage the environment and humans, and incorporates findings that bring together two currently disparate fields, that of organizations and the natural environment, and that of entrepreneurship.

Even in times of economic crisis, there are opportunities that allow new crop cultivations to be considered by Greek farmers. For many agricultural entrepreneurs the point at which they realize their ideas is the one at which they must confront the decision, as to whether to take the risk or not. This uncertainty to take decisions is undoubtedly defeated, when pilot projects are established or target customers identified. Farmers need to understand that they need to cooperate with people from many sectors, change the traditional way of cultivating their fields, and spend time in reading researches, (even when time is scarce), this way the decision will hardly ever be taken lightly.

A certain profit from blueberry cultivation may not be guaranteed, but this is the case in most crop cultivations. The following tables illustrate some of the basic finance information, regarding the maintenance of a traditional blueberry farm, identified by Gatsios (2010).

Table 4: Financial information on blueberry cultivation

<table>
<thead>
<tr>
<th>duration of the crop</th>
<th>average fruit yield</th>
<th>the first harvest</th>
<th>cost of harvesting by hand</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 years</td>
<td>1,000 kg/ stremma</td>
<td>3rd year</td>
<td>700-1000 €/ stremma</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>selling price (conventional fruit)</th>
<th>selling price (organic fruit)</th>
<th>installation cost</th>
<th>annual cost of cultivation (plant in full growth)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-5 €/ kg</td>
<td>10 €/kg</td>
<td>900-1000 €</td>
<td>1,500 €/stremma</td>
</tr>
</tbody>
</table>

The above numbers can furthermore be adapted to the financial needs of a small organic blueberry farm (establishment and maintenance cost). The establishment of a sustainable small farm can incorporate other crops, rather than blueberries, like truffle (an expensive type of mushroom), aronia, stevia and many other crops that are sold out almost immediately upon entering the market. Producers who trusted these products claim that, if they had more production, they would have sold it, as the demand is high (Meselidis, 2012).
Chapter 6: Conclusion

6.1. Conclusion and Recommendations

Data collection has revealed that Greece lies far behind Europe and U.S.A., in organic cultivation and production. During the last years of great improvement in organic farming, significant advances regarding field and product treatments have been revealed, but still, farmers adopt only few of them, in every agricultural practice. Growing blueberries is not a demanding procedure and can be successfully implemented in Greece, once the appropriate varieties have been selected, and the appropriate cultivation practices have been followed. For instance, a good cultivation practice is the separation of the field into management zones in which groups of planting holes have different Ph treatment. Moreover, strategic plans should be generated by the government, with the intention of giving incentives to Greek farmers, who will then mimic the production of European and US organic products that are stimulating new product development. However, it is necessary to create the infrastructure (factories), for the development of products that will result from the new crops. Whereas, companies producing and selling processed fruit, should then try to increase customer awareness through promotion campaigns, supporting the facts that a) organic products are healthier, and b) processed fruit are a convenient alternative to fresh.

Since, responding in order to survive from the crisis will no longer be enough for the new agricultural entrepreneur, the commerce of blueberries’ will soon be performing as a good import source of currency, for Greece. Blueberry exports have long been commenced for Europe, and the Greek state has to take this opportunity, of introducing first-rate products, which will help the country to become more efficient and competitive. Many studies have implemented services regarding innovative crop cultivations (blueberry, truffle, stevia, aloe, palm and mango) and demonstrate the feasibility of Greek agricultural development, in times of economic crisis. Also, given the fact that sustainable agriculture is more than philosophy or a strict set of rules (no legal obligation to follow any of the criteria for sustainability), entrepreneurial farming qualities can only be improved by the continuous research on cultivation practices.

The following strategies can be implemented by farmers and other businessmen who are involved in this field, in order to take advantage of the growth opportunities:
1. Enhance field examination practices in order to keep increasing production capacity of biological fruit in to meet the increasing global and local demand for blueberries.

2. Plan on expanding into management knowledge of the processed fruit industries and to leverage that knowledge in the future in order to produce lines of many kinds of blueberry products.

3. Expand the distribution network of the farm in order to increase the Greek presence of blueberry fruits throughout Europe, mainly via electronic sources.

Additionally, the successfullness of this research lies in the discovery of new blueberry field treatments that are connected with sustainable agriculture and entrepreneurship. Entrepreneurial suggestions like: a) buying a few plants every year to test the climate and the varieties, b) experimenting with different soil types and ph treatments and c) finding possible solutions to other issues before planting, came out as expected. The unknown situations, regarding blueberry farming, make farmers indecisive about choosing a new crop to cultivate, but the risks affecting the achievement of project objectives, can be identified if the experimental field processes lasts up to three years before planting.

Finally, further research can bring together academics, managers, policy makers, farmers, marketers, who will build up a forum regarding the exchange of knowledge and experience on economic, financial, organizational and managerial aspects of new crop cultivation practices and funding. This way, the farmers' resistance to change will be eliminated, and simultaneously, (through the in-depth communication between experts and practitioners), the advancement of product quality will facilitate the interpretation of sustainability definition excluding so many food products labeled sustainable, when they are not. The next step would be a dynamic movement to educate consumers on food issues, and to help them build organic food communities in Greece. Finally, all these efforts will also contribute to the improvement of environmental and social performance (ex. waste generation & resource consumption).
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APPENDICES

APPENDIX 1- Graph 5: Modern Crop Cultivations for New Farmers (Newspaper “TO VIMA”, May 2012)

- Blueberry (Myrtille) 1,000kg per stremma, sale price: 4-5 euro/kg
- Blackberry 500-1,000 kg per stremma
- Pomegranate 2,000kg per stremma
- Hippophae 800- 1,200kg per stremma, oil price: 150 €/kg, juice price: 50-55 €/liter
- Snail 1,200 – 7,000 per strem. depending on breeding, sale price: 6 €/kg
- Aronia 1,600/ kg /stremma fresh fruit sale price: 4-6 €/kg, frozen fruit sale price: 5-7 €/kg.
- Truffle 1,000 kg per strem.
- Stevia 200 kg per strem., up to 600 kg
- Plum 2,5-3 ton /stremma
- Aloe 18 ton per stremma planting density 5,000 plants/
APPENDIX 2 – Graph 6: The most famous blueberry varieties
APPENDIX 3

Graph 7: Distribution channels for frozen fruit and vegetables

Source: Preserved fruit and vegetables CBI MARKET SURVEY: THE EU MARKET FOR FROZEN FRUIT AND VEGETABLES (2009)
A. Nikolaos Meselidis – Owner of a Commercial Greenhouse
Telephone interview, September 13, 2012

1. Is organic blueberry cultivation worth trying in Greece regarding the plant diseases?
2. What are the main issues that have to be considered very carefully before planting blueberries?
3. Which varieties do you think are best for suiting the Greek climate in terms of resistance to various plant diseases and weather conditions?
4. Regarding the Blueberry plants:
   A: What characteristics formulate quality plants?
   B: How old are the plants on sale?
5. Are you satisfied from the commerce of frozen and dried blueberries?
   A. what are the key aspects that a farmer has to be aware of when exporting blueberries?
   B. Which are the promising blueberry processing methods?

B. Petros Karipidis - Owner of Blueberry farm, and Eco-blueberry facebook group-forum.
Skype interview, September 5, 2012.

1. What testing methods did you follow before deciding the compatible Blueberry varieties to the soil type and climate conditions?
2. What are the best Blueberry cultivation practices matching the Greek territory requirements?
3. What are the yield expectations concerning your Blueberry farm operation?
4. What are the production risks anticipated / experienced throughout the operation cycle?
5. Are you going to follow any processing methods or are you going to promote raw blueberries at the markets (which markets)?
6. What are your plans for future expansion?
7. What would you suggest to a Greek farmer planning to grow blueberries?

Telephone interview Tuesday 24 September, 2012

1. Have you reported any farmer who has started cultivating blueberries and quit (why?)
2. Do you consider hand picking as a major constraint for cultivating blueberries? If not, which is the major constraint and why?
3. What do blueberry farmers have to do, in order to promote their products to foreign markets, without spending too much money?
4. Which are the promising blueberry processing methods?
5. What are the main threats of blueberry export to EU?
6. What are the key findings from various seminars that you have attended regarding Blueberry farming in general?
7. What does it take for the Greek farmers, cultivating blueberries, to be competitive in Europe?

D. **Athanasios Gertsis** - Professor, M.Sc., Ph.D., Perrotis College -American Farm School, Research field: Environmental Sciences & Conservation)

Personal Interview September 12, 2012.

1. What are the key findings from various seminars that you have attended regarding Blueberry farming in general?
2. What are the benefits of choosing blueberry plants for cultivation in Greece?
3. What are the main barriers (if there are any) in sustaining a viable blueberry farm in Greece?
4. Which U.S universities implement valid researches in Blueberry farming?
5. Looking to the future what are the main aspects that one should focus, in sustaining a successful Blueberry farming operation.