SECTORAL STUDY

Olive oil & table olives

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«Recharging Greek Youth to Revitalize the Agriculture and Food Sector of the Greek Economy»

Final Report

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Olive oil & table olives

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Executive Summary

Since the middle of 1990s, Greece had appeared as one of the fastest growing economies in the EU. The Greek GDP had a significant growth (outperformed the EU average). In 2002, Greece adopted the euro and in 2010 financial crisis erupted. Despite the economy of Greece had improved in recent decades due to the industrial development and tourism, presently the country faces a severe debt crisis and has many challenges to tackle, such as the low rate of development and the large unemployment (26.7% in 2014). The most important economic industries in Greece are tourism and merchant shipping. Greece economy has saw negative growth rates since 2008. The financial assistance by the EU and the IMF has no impressive results so far and the austerity packages have been met with anger by the public, leading to riots, social unrest and strikes. Despite the many austerity measures, the government deficit does not reduce accordingly, leading to largest recession.

Even if Greece is clearly a predominantly agricultural country (according to OECD criteria), the Greek agricultural sector remains timeless as one of the most important economic sectors and the agricultural activity has always been the "locomotive" of the rural Greek economy. The agricultural sector in Greece remains a very important sector of economic activity and employment for Greece. The primary sector employs a high percentage of total labour force in Greece, amounting to some 1,212,720 people (2010). Agriculture contributes roughly 4% of GDP. Exports of agricultural products account for one third of total exports in Greece. Main categories of exported products are fruits, vegetables and <u>olive oil</u> while main imports include meat and dairy products. Organic farming has grown dramatically over the last years constituting an important priority in the sustainable development of the sector in Greece. Overall, the food and drinks industry is a vital component of the economy, since it has become a dynamic, competitive and export-oriented sector

The climate in the south Mediterranean region is well suited for the cultivation of olives, which cover a greater share of agricultural southern regions of the three main producer countries (Spain, Italy and Greece) which enjoy the highest productivity (about 30-40 per cent higher than each country's average). Greece has the largest share, with 14 per cent of agricultural land covered by olive groves, followed by Cyprus, Italy and Spain at about 10 per cent (compared with less than
1 per cent for other European

The increasing popularity of the healthy Mediterranean diet, and especially olive oil, has more than doubled demand for olive oil in other countries (apart from the 3 main producers) during the past 20 years. Between 2008 and 2014, Greece is the third largest

producer of olive oil in the world (10 per cent of total volume production), following Spain (44 per cent) and Italy (15 per cent). Indeed, Greek olive oil is of superior quality, since 80 per cent of production is extra virgin olive oil (compared with 65 per cent in Italy and 30 per cent in Spain). Despite the comparative advantages of Greek olive oil only 25 per cent of Greek production reaches the stage of labeling/branding, compared with 50 per cent in Spain and 80 per cent in Italy, with the remainder sold in bulk form, including 70 per cent of exports (mainly to Italy for re-export). Greece's market shares in the world market of branded olive oil decreased from 6 per cent during the 1990s to 4 per cent during the past 5 years. Greek producers have failed to benefit from the global growth in olive oil demand, mainly due to structural problems such as the high cost of production Greece (about €1/kg of olives, compared with €0.6/kg in Spain) due to small size of the farm and the higher milling cost (€0.19/kg of olive oil for Greek mills, compared with €0.16/kg of olive oil for Spanish mills). As far as the standardization of quality control which is vital for the promotion of premium olive oil, the fragmented nature of Greek olive oil cooperatives does not facilitate it. Also, the small size of bottling and labeling companies does not allow for the successful promotion of branded products.

During the past 20 years, Spain has invested in the modernization of its olive oil mills, with the aid of European subsidies. Notably, two-phase mills cover about 87 per cent of the sector in Spain, compared with less than 2 per cent in Greece and Italy. Greek olive oil mills mostly use three-phase technology (80 per cent), while Italy uses both three-phase (47per cent) and traditional mills (37 per cent). In Greece and Spain, olive oil mills are, to a large extent, owned by cooperatives controlled by farm owners. These old fashion cooperatives was acting as an organized enterprise with a clear business strategy. In order to change the Greek model towards the promotion of high quality branded olive oil, the restructuring of the sector should be one of the main priorities, inter alia, <u>to comprise more vertically integrated production, both</u> <u>upstream in the olive production stage, as well as downstream in the production of</u> <u>branded products</u>. Moreover, Greek firms need larger economies of scale, irrespective of the degree of vertical integration.

Despite the expected further increase in olive oil demand (mainly in other countries, i.e. apart from the main producers), the gradual decrease in CAP subsidies for Greek olive oil is expected to make small producers, with low productivity, unprofitable. <u>As a result, Greek olive oil production is expected to decline to 280,000 tons in 2020</u> <u>compared with an annual average of 310,000 tons during the past 5 years</u>. However, the second Pillar of CAP and the Rural Development Program for the period 20142020 it gives more motivations in youth entrepreneurship

The main export destinations for the Greek olive oil are Italy, Germany, U.S.A., United Kingdom and Canada. As far as the table olive exports is concerned the main export destinations were Italy, Germany, U.S.A., Australia and Canada. In fact, Italy mainly dominates the traditional markets (covering more than 60 per cent of the markets in the US, Germany and Canada), while Spain has penetrated the new markets (covering around 70 per cent of the markets in Japan, Russia, China and Australia).

The **Balassa index** (RCA2)- which was employed in order to derive the competitiveness of Greek virgin olive oil and table olives (in the main export destinations) shows that Greek virgin olive oil and table olives fulfil all the requirements to obtain powerful brand name internationally. This will be achieved through the simultaneous application of a proper powerful well organized marketing strategy. In particular, a shift from bulk to branded olive oil and a more efficient marketing strategy could increase the value of Greek exports. In view of the fact that Greece has one of the highest levels of per capita consumption of olive oil, it is clear that the domestic market could be used as the base for the Greek companies to grow. A potential shift in domestic consumption from bulk to branded olive oil, meaning an additional volume of about 110,000 tons (all the Greek families apart from producers' will consume branded olive-oil) would enter the manufacturing stage, would increase the average annual turnover of Greek branding companies thus gradually closing the gap with their Italian competitors. Another effect from that shift of domestic consumption to branded olive oil would be the increase of government revenues through the Value Added Tax, as those extra tons would pass through official distribution channels.. In the same time a more vertically integrated production structure would increase the efficiency of the sector, strengthen its marketing strategy, and consequently prove favorable for a successful branding of Greek olive oil. This marketing strategy should combine other upcoming sectors such as agro tourism, e-commerce and organic farming in order to be successful.

As far as the table olives sector is concerned, also there is still significant untapped potential, as 75 per cent of the Greek exports is in bulk form. As the average bulk price of table olives is much lower than branded olives, the extra receipts in case all our exports were branded products could help the Greek economy and traders. Finally, turning to destination markets, we note the extremely low penetration of Greek exports in the Russian market (6 per cent in 2013 versus 25 in other major markets). Note that Russia is the strongest growing market for table olives and is also a traditional market for Greek products (e.g. Greek olive oil exhibits its highest penetration in Russia).

According to the sectoral analysis which has been done, the project finally includes two ten-year business plans for the potential investors. Both business plans are referred to small-medium operation, which will standardize and commerce extra virgin olive oil and

table olives. The extra virgin olive oil standardization firm will be based at the industrial area of Kalamata. The company's portfolio consists of two products that belong to the category "extra virgin olive oil" and will adopt the highest international standards of quality. The raw material supply (Koroneiki variety) and will come from Messinia's olive mills. According to financial analysis the total investment is estimated at 270,000.00 € with a 4-year payback period and Net Present Value (NPV) and an Internal Rate of Return (IRR) in 10-year period approximately around 1.5 million € and 65.6% respectively. In the same line, the table olive standardization firm will standardize table olives and olive paste and it will be based at the industrial area of Amfissa. The supply of raw material (Conservolea – Amfissa variety) and will come from Fokida. According to financial analysis the total investment is estimated at 320,000.00 € with a 4-year payback period and Net Present Value (NPV) and an Internal Rate of Return (IRR) in 10-year period approximately

around   1.9   million   €   and   59.6%   respectively.

GREEK ECONOMY

Since the middle of 1990s, Greece appeared as one of the fastest growing economies in the EU. The Greek GDP presented a significant growth outperforming the EU average. In 2002, Greece adopted the euro and in 2010 financial crisis erupted. The back ground of Greek debt crisis is dubious.

Many academics supported that Greek government was responsible for the debt because they provided false statistical data in order to improve the sovereign debt. This viewpoint was based on the fact that in 2001 the Greek government had a controversial deal with a multinational investment banking firm, which used numerous doubtful currency swaps, in order Greece to fulfill the Maastricht criteria. Therefore, in 2002 the entrance of Greece in the Eurozone became reality. On the other hand, a large number of economists supported that the Greek entrance was just the cause for Greek debt crisis eruption. The main reason was that the country suffered from high levels of political and economic corruption, in conjunction with low competitiveness (compared with its European Member States).

The Greek deficit was increased rapidly, as a consequence of a combination of reasons, such as low government budgets, low competitiveness of the Greek economy, continuous increase of labor costs, higher inflation than other EU-members, etc. All these reasons contributed to the uncompetitiveness of Greek exports.

Nowadays, in the era of financial crisis, many manufacturers are pretended low labor costs in order to reduce the number of workers in these sectors. As a result, in 2010, the unemployment was estimated at 12.6%, in 2013 jumped to 27.6% and in 2014 was reduced to 26.8%. Thus, Greece ranked first, in unemployment, among the countries of the EU-28, with the general government gross debt in high levels (175.5%) (Table 1).

Table 1: General data of Greece (2014).

Population (1st January)	11,062,508 inhabitants
Area	131,621 km^2
Currency	EUR-Euro
Nominal GDP at current prices	180.2 billion Euros
GDP per capita current prices	16,343 Euros
GDP per capita at purchasing power	19,688 PPS
Harmonized index of consumer prices	-1.0 annual % change
Unemployment rate	26.7% of labor force
Exports (goods and services)	57.2 billion Euro
Imports (goods and services)	60.3 billion Euro
Exports of agricultural products	4.9 billion Euro
Imports of agricultural products	6.1 billion Euro

Current account balance	-2.8% of GDP
General government balance	-1.6% of GDP
General government gross debt	175.5% of GDP

Source: European Commission, Eurostat, COMEXT, Directorate General for Economic and Financial Affairs The vast majority of the Greek population has been concentrated on predominantly urban regions (Table 2). In recent years, the Greek agricultural economy has given the primacy to the tertiary sector of services and this was the reason of urbanization.

According to OECD's criteria, Greece is a predominantly agricultural country because 97.1% of its area is classified as rural. Thus, the Greek agricultural sector remains timeless as one of the most important economic sectors and the agricultural activity has always been the "driving force" of the rural Greek economy.

Year 2013 (2011*)	Territory (Km²)	Population (1000 inhabitants)	Gross Value Added (million Euro)
Predominantly Rural Regions (PR)	108,216.0	1,875.0	62,998.0
Intermediate Regions (IR)	15,914.0	1,154.6	15,972.6
Predominantly Urban regions (PU)	7,491.0	5,032.9	104,166.5
Total	131,621.00	11,062.50	183,137.10

Table 2: The importance of Greek rural areas (2013).

Source: European Commission, Directorate General for Agriculture and Rural Development, CAP context indicator

Agricultural sector

In 2010, Greece was one of the EU Member States with the largest number of holdings (723,010 holdings) and the utilized agricultural area in the country (UAA) was estimated at 3,477,930 ha (approximately - 2.9% compared with 2000) (Table 3). Two important facts are that, between 2000 and 2010, 94,050 farms ceased their activity (-12%) and 218,530 persons stopped working on farms (-15.3%).

Table 3: Greek farm structure and key indicators (2000, 2010).

Greece	2000	2010	Change %
Number of holdings	817,060	723,010	-11.5
Total Utilized Agricultural Area (ha)	3,583,190	3,477,930	-2.9
Number of persons working on farms (Reg lar labor force)	1,431,250	1,212,720	-15.3
Average area per holding (ha)	4.4	4.8	9.7
Utilized Agricultural Area per inhabitant (h a/person)	0.33	0.31	-6.4

Source: Eurostat and FSS 2000 and 2010

The cultivated land is spread across a large number of farms resulting in the appearance of many small size farms. In 2010, 92.7% of total farms had size less than 10 ha. The highest proportion of agricultural land size ranged between 0 to 2 ha (51.6%), followed by 2 to 5 ha farms (25.4%) and finally 5 to 10 ha farms (12.1%).

Farms with size exceeding 100 ha covered the lowest proportion of UAA (0.2%) (Table 4).

For each activity on a farm, a standard gross margin (SGM) is estimated, based on the area and a regional coefficient. The sum of all margins, for all activities of a given farm, is its economic size, expressed in €. In 2010, the main economic size categories of farms were only four. Farms with economic size less than 2000€ (32.6%), less than 4000€ (19.5%), less than 8000€ (18.7%), and less than 15000€ (13.2%). The sum of these four categories was 84% of total Greek farms (Table 4).

As far as employment is concerned, the agricultural sector absorbs greater proportion of the workforce than the other economic sectors. In 2010, 1.2 million people worked in Greek farms (Table 5). It is noticeable that, in 2010, 33.3% of farmers were older than 64 years old and only 6.9% were under 35 years old. Therefore, it is logical that a large amount of elderly people have low educational level and this become a further important inhibitor of competitiveness improvement in the agricultural sector (Table 4). This happens because elderly people are not well informed of new technologies, cannot follow new trends and most importantly they have only work experience derived by artisanal practices and lack of know-how.

Between 2000 and 2010, the decrease of regular labour force had been estimated at 15%. In addition, if the annual work unit (AWU) is taken into account, the decrease appeared sharper (-27%), falling from 512 to 372 (Table 5). It is noticeable that family labor force decreased and the non-family labor force increased both in person's labour force and annual work unit.

Table 4: Farm Structure of utilized agricultural area (2003, 2010).

Holdings			2003 Total	%	2010 Total	%
By UAA (Utilized Agricultural Area)	< 2 ha		397,530	48.2	373,350	51.6
	2 - 5 ha		229,850	6.5	183,820	25.4
	5 - 10 ha		109,670		87,770	12.1
	10 - 20 ha		53,510		45,580	6.3
	20 - 30 ha		15,950	1.9	14,670	2.0
	30 - 50 ha		11,460	1.4	10,850	1.5
	50 - 100 ha		4,980	0.6	5,480	0.8
	>100 ha		1,520	0.2	1,540	0.2

	0			5,320	0.7
	< 2,000 €			235,680	32.6
	< 4,000 €			140,840	19.5
	< 8,000 €			134,970	18.7
	< 15,000 €			95,590	13.2
	< 25.000 €			53,340	7.4
	< 50,000 €			39,280	5.4
	< 100,000 €			13,500	1.9
	< 250,000 €			3,760	0.5
	< 300,000 €			540	0.1
	≥ 500,000 €			240	0.0
By Economic Size					
	< 35 years	60,210	7.3	50,180	6.9
	35 - 45 years	128,350		112,710	15.6
	45 - 54 years	167,090		163,060	22.6
By age of holder	55 - 64 years	180,730		156,230	21.6
	> 64 years	288,080		240,890	33.3
Total		824,470	100.0	723,060	100

Source: Eurostat, Farm Structure Survey 2003 and Agricultural Census 2010. Updated: October 2013

Table 5: Greek agricultural labor force (2000, 2010).

	Persons			Annual Work Unit		
	2000	2010	Change %	2000	2010	Change %
Direct Labor Force				587,480	429,520	-26.89
Regular Labor Force	1,431,250	1,212,720	-15.3	512,860	372,750	-27.32
Family Labor Force	1,420,790	1,186,510	-16.5	504,210	354,440	-29.7
Non family labor force, employed on a regular b	asis,					
incl. group holders	10,470	26,210	150.3	8,650	18,320	111.79
Labor force, employed on a non-regular basis				74,620	56,760	-23.93
Labor force, not directly employed by the holdin	g			6,070	4,450	

The agricultural sector is the major feeder of many products and services, particularly for the food and beverage industry which is steadily spurring manufacturing. Nevertheless, the contribution of agricultural products in the country's trade balance shows stability and dynamism even in downturn periods of the Greek economy. In Greece, farms are specialized in specific types of crops. In 2010, specialist olive farms made up the largest share (38%) of farms (Figure 1). General field cropping farms accounted for the second largest proportion (10.1%), whereas farms specialized in cereals, oilseed and protein crops, as well as those with various permanent crops and specialist fruit and citrus fruit farms accounted for similar proportions (8.4 -
8.6%).

Figure 1: Number of Greek holdings by main type of farming (2010) (%).
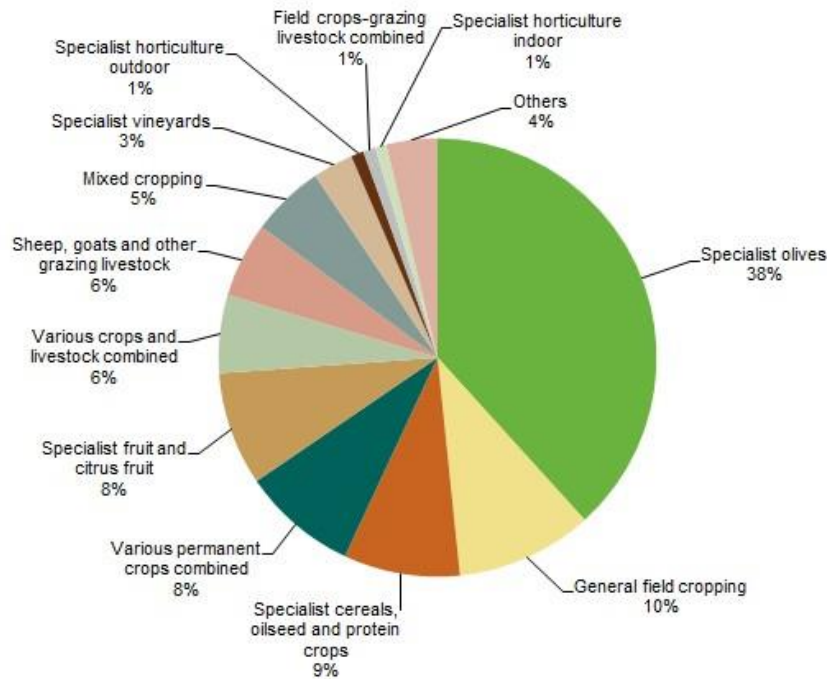
Source: Eurostat

Specialist olive farms and general field cropping farms also represented the largest proportions of standard output, although, as far as this indicator is concerned, the latter type was the most dominant. It was accounted for 19% of total Greek standard output, while specialist olive holdings represented 15% in 2010 (Figure 2).

Figure 2: Standard output by main types of Greek farming (2010) (%).
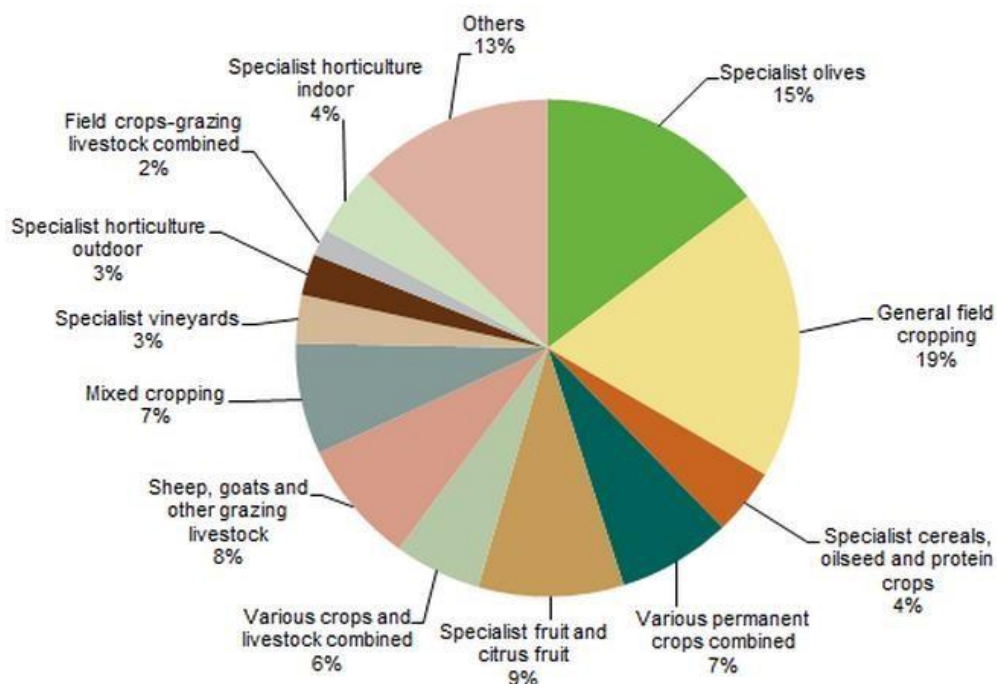
Source: Eurostat

It should be noted at this point that 69% of the Greek olive production comes from the southern regions of Greece (Table 6).

	Contribution to olive production	Yield (ton/ha)
Crete	30%	3.9
Peloponnese	39%	3.5
South Greece	69%	3.7

Table 6: High olive yield Greek regions.

Source: Eurostat

Food and beverage industry

Another fundamental sector of the Greek economy is the Food and beverage industry.

According to Eurostat's recent data this sector comprises almost 1/5 of all Greek processing companies and is the largest employer in the country, as 1/4 of the total workforce in the secondary production is employed in this sector. The year 2009 was the first year of the Greek economy recession and the industry was hit hard in terms of employment. However, this reduction affected predominantly the smaller companies (less than 10 employees), which constitute the overwhelming majority in both the Food (95%) and beverage (90%) industry.

Compared to the EU-27 average, in 2010, the Greek food sector was the largest contributor to the processing sector, in terms of number of enterprises, turnovers,

production value, gross added value and number of employees. The food sector was first in the European Union in all the above categories apart from the number of enterprises in which metal products ranked first. The largest share of the Greek food industry in processing reflects the domestic dynamics, which derives from its connection to tourism, hotels and restaurants.

Table 7: Classification / comparison of the top 5 processing sectors in Greece and the EU-27.

Number of firms			
Greece (83,565 processing firms)		EU-27 (2,040,000 processing firms)	
Processing	100%	Processing	100%
Food	18.90%	Metal products	17.90%
Metal products	15.10%	Food	12.30%
Clothing	13.00%	Wood products	8.40%
Furniture	8.70%	Repair of machinery and equipment	7.60%
Wood products	7.70%	Clothing	6.30%
Operation Circle			
Greece (54,884 million € processing)		EU-27 (5,800,000 million € processing)	
Processing	100%	Processing	100%
Coke and refined products	21.80%	Food	13.50%
Food	20.20%	Manufacture of motor vehicles	10.80%
Metal products	7.60%	Manufacture of machinery and equipment	8.80%
Basic metals	7.50%	Chemical products	7.20%
Products from non-metallic minerals	5.90%	Metallic products	6.90%
Production Value			
Greece (50,150 million € processing)		EU-27 (5,200,000 million € processing)	
Processing	100%	Processing	100%
Food	20.40%	Food	13.80%
Coke and refined products	18.70%	Manufacture of motor vehicles	10.00%
Metal products	8.20%	Manufacture of machinery and equipment	8.90%
Basic metals	7.70%	Metallic products	7.40%
Products from non-metallic minerals	6.40%	Chemical products	7.20%
Gross value added			
Greece (16,901 million € processing)		EU-27 (1,400,000 million € processing)	
Processing	100%	Processing	100%
Food	19.70%	Food	11.30%
Metal products	9.40%	Manufacture of machinery and equipment	10.70%
Products from non-metallic minerals	8.40%	Metallic products	9.80%
Coke and refined products	7.60%	Manufacture of motor vehicles	7.10%
Drinks	6.30%	Chemical products	6.60%
Number of employees			
Greece (400,943 employees processing firms)		EU-27 (31,000,000 employees in processing firms)	
Processing	100%	Processing	100%

Food	20.30%	Food	13.50%
Metal products	11.90%	Metal products	11.70%
Clothing	7.40%	Manufacture of machinery and equipment	9.40%
Products from non-metallic minerals	6.70%	Manufacture of motor vehicles	7.20%
Furniture	5.20%	Manufacture of plastics and plastic materials	5.30%

Source: Eurostat, SBS. 2010

INTERNATIONAL OLIVE CULTIVATION

In 2013, the global olive cultivation covered an area of 10,309,275 hectares (FAO, 2013) of which approximately 98% is located in the Mediterranean basin. European countries, where olive trees are grown, are Spain, Italy, Greece, Portugal, France, Croatia, Cyprus, Slovenia and Malta. In 2013, 99.5% of olive production, in the EU28, was concentrated in the first four States (Spain, Italy, Greece and Portugal).

Specifically, according to Eurostat, in 2012, the EU-27's olive tree groves covered an area approximately equal to 4,670,682.27 hectares, of which, 2,478,443.97 (53%) were in Spain, 1,193,701.05 (24%) in Italy and 705,960.99 (15%) in Greece.

The European Union's production leads the world market (over 2 million tons of olive oil), but there are also some other major producers, such as Tunisia, Turkey, Syria and Morocco. The rest global production of olive oil is negligible. The fact that the European Union is self-sufficient, does not preclude the trade and the marketing of olive oil. The countries of Southern Europe import olive oil and table olives from third countries (mostly in bulk). The aim of these imports is to re-export packaged and value-added products into new markets.

Greece and Italy have similar landscape structures (mountainous and semimountainous terrains). This landscape structures as well as the low levels of humidity are the main factors leading to the superior quality of Greek and Italian olive oil – characterized by low acidity and quality taste.

The Greek cultivated land is spread across a huge number of farms resulting in the appearance of many small size farms. It is observed that the same happens in Greek olive plantations, which are chopped in smaller farms (< 5 ha and 5-20 ha), than competitor's olive plantations (Figure 3).

Figure 3: Structure of olive plantations.
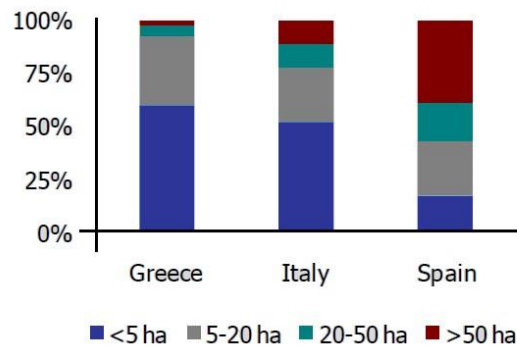
The advantage of Spanish landscape provides the opportunity to farmers to use machines, in order to facilitate their activities in olive tree cultivation. As a result, Spain manages to retain low production costs, that when combined with the higher percentage of Spanish large holdings (> 50 ha), results in higher labor productivity (Figure 4). It is essential to note that Spanish harvesting methods do not affect negatively the olive cultivation, instead, they contribute to less damage in olive fruits due to (i) the implementation of proper harvesting techniques and (ii) rapid transportation of olive fruits to olive mills (minimum loss of olive quality).

Figure 4: Labor force productivity (tons of olives per Annual Working Unit).
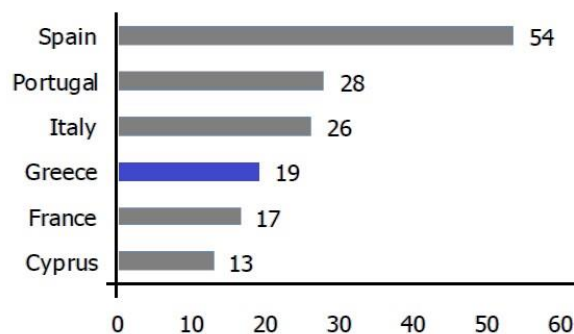
In 2012, the Greek wage payment was estimated approximately at 4€/hour. The corresponding competitor's wage payments were estimated approximately at 7€/hour (Figure 5). This noticeable difference was owed to the fact that in Greek farms, the seasonal workers are not EU-citizens, so they receive lower wages. In Spain and Italy, only 5% of seasonal workers were not EU-citizens. Thus, in Italy and Spain, the wages are higher and make up a higher percentage of production cost (e.g., in Spain 60% of product cost concerns wage payments). So, the low Greek labor force productivity was counterpoised, to a large extent, by the low wage payment.

Figure 5: Olive's real wage per hour (deflated values 2012 prices).
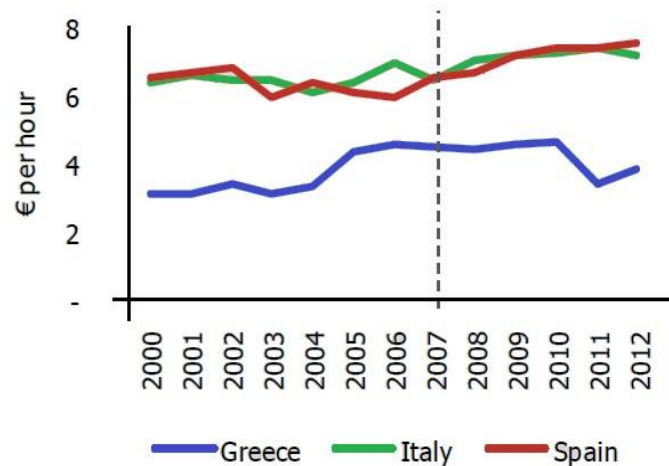
In spite of the high percentage of wage payment in production cost, the total Spanish olive production cost is the lowest. In 2012, it was estimated at 0.6€/ Kg of olives. It is essential to clarify that production cost includes, except for labor force wages, specific costs (seeds, fertilizers, etc.), overhead (energy, machines etc.) and other costs. Greece and Italy had similar higher production costs (approximately 1€/ Kg of olives) (Figure 6). At this point it is essential to note that these prices concern an average at national level. Furthermore, the production cost includes the implied compensation of family labor (considered as equivalent to the average sectoral wage for paid labor). In Greece, family labor covers approximately 90% of working hours (almost the whole wage cost). The corresponding competitors' percentages are 80% in Italy and 70% in Spain. Consequently, the real cost paid by the farm owners (without unpaid labor) is similar in Greece (0.33€/kg) and Spain (0.34€/kg), but it is higher in Italy €0.56/kg (Figure 6).

Figure 6: Olive's production cost (2007-2012).
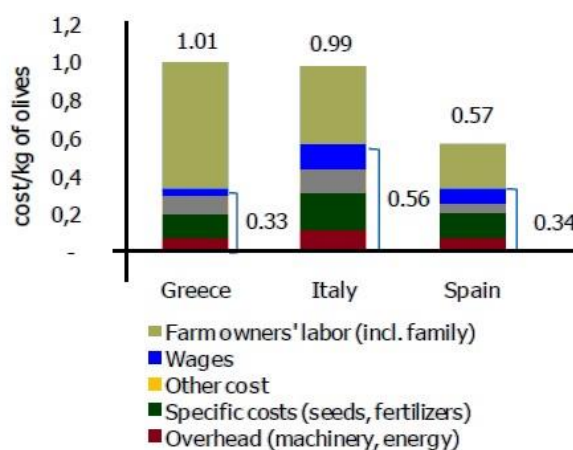
Between 2007 and 2012, the real Greek and Spanish production costs have followed a descending tendency (-10% and -15%, respectively). In Greece, the reduction was owed to lower real wages/hour (-15%) and, to a lesser extent, to higher labor productivity. Spain recorded the highest growth in labor productivity, almost 65% (with relatively

steady wages/ hour). On the other hand, in Italy, the real production costs were increased, nearby 10%, due to higher wages/hour (up to 18%), as well as a larger increase in other costs (mainly seeds and fertilizers).

For the same period, Italian olive farms offered higher real income to farmers (0.94€/kg of olives) than Greek (0.82€/ kg) and Spanish olive farms (0.58€/kg) (Table 8). A disaggregation of that income indicates that Italy has the highest selling price, excluding subsidies (€0.64 per kg compared with €0.48 in Greece and €0.42 in Spain) and Greece has the highest subsidy (€0.33 per kg compared with €0.3 in Italy and €0.16 in Spain). Bearing in mind the countries' production costs, the profitability of Greek olive farms was easily estimated at 0.49€/kg, while in Italian farms it was

0.38€/kg and in Spain remained in lower levels, 0.24€/kg (including subsidies, but not including the compensation of unpaid family labor).

	Greece (€/kg)	Spain (€/kg)	Italy (€/kg)
Total revenues	0.82	0.58	0.94
excl. subsidy	0.48	0.42	0.64
Subside	0.34	0.16	0.3
Cost	0.33	0.34	0.56
Cost incl. family compensation	1.01	0.57	0.99
Net income	0.49	0.24	0.38
Net income compensation	-0.19	0.01	-0.05

Table 8: Olive's net income.

Source: Farm Accountancy Data Network, Eurostat (2010), National Bank of Greece estimates

It is essential to point out that one of the most important parts, of total income, is subsidies. In 2012, this percentage was estimated at 40% for Greece, and 30% for Italy and Spain. Without a doubt, in Greece, the profitability (excluding subsidies and family payments) declined to 0.15€/kg, compared with 0.08€/kg in Spain and Italy. A significant point is that in the near future the total level of C.A.P. subsidies will be reduced. As the olive cultivation has been among the high-subsidized sectors, the new C.A.P. policy will have a large negative effect on the sector. In 2020, in Greece and Italy, subsidies will record a large reduction (approximately 30%) compared with

2007-2012 (Figure 7). This reduction will decrease the profitability at 0.39€/kg and 0.30€/kg for Greece and Italy, respectively. On the contrary, in Spain, olive oil subsidies

will remain relatively steady, and as a result the profitability will remain at the same levels (0.24€/kg of olives) because of relatively lower total C.A.P. subsidies/ha during the period 2007-2013.

Figure 7: Contribution of subsidies in olive farming (2007-2012).
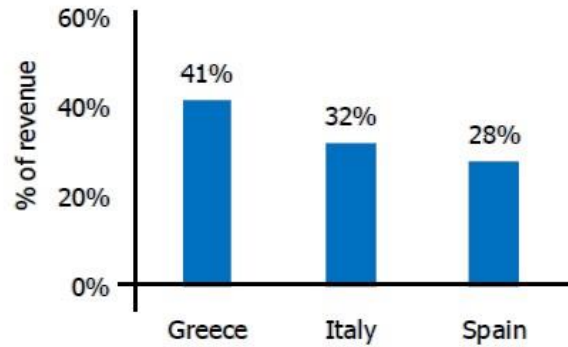
Source: Farm Accountancy Data Network, Eurostat (2010), National Bank of Greece estimates

In conclusion, if the factor of the family labor compensation is included as equal as the average sectoral labor cost, the Greek profitability would end up with noteworthy losses (-0.19€/kg) despite the existence of extensive subsidies. In contrast, Italy and Spain would be in a more stable situation (loss of -0.05€/ kg in Italy and marginal profit of 0.01€/ kg in Spain, which benefits from its more mechanized approach). (Figure 8)

Figure 8 Olives real production cost (including unpaid family labor) deflated values (2012 prices).
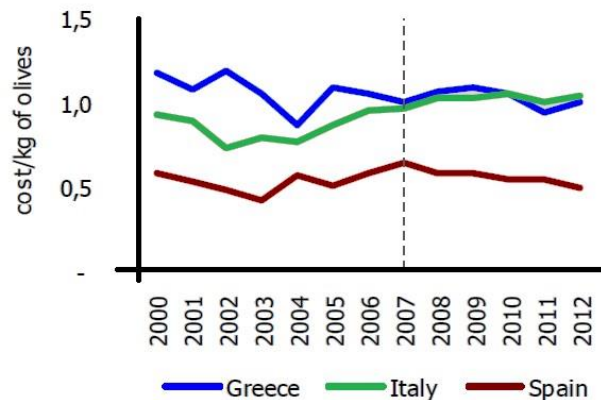
Source: Farm Accountancy Data Network, Eurostat (2010), National Bank of Greece estimates

In the text below, the production of the olive sector (including virgin olive oil and table olives) will be analyzed on global level.

International olive oil production

Between 2001 and 2014, the average share of olive oil production in the Greek agriculture was estimated at 9% of total production value.

Figure 9: The average share of olive oil production in Greek agriculture (20012014).
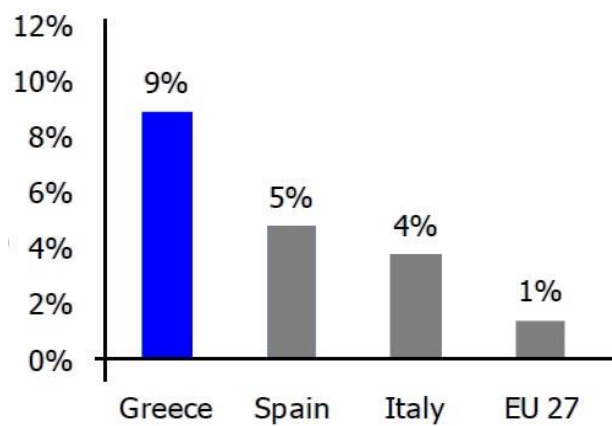
During the last 25 years, global olive oil production has increased from 1.5 million tons (1990), to 2.8 million tons (2014) (Figure 10). As mentioned above, the world olive oil production is concentrated in the Mediterranean basin, where the climate favors the cultivation of olive trees.

Figure 10: World production of olive oil (million tons).
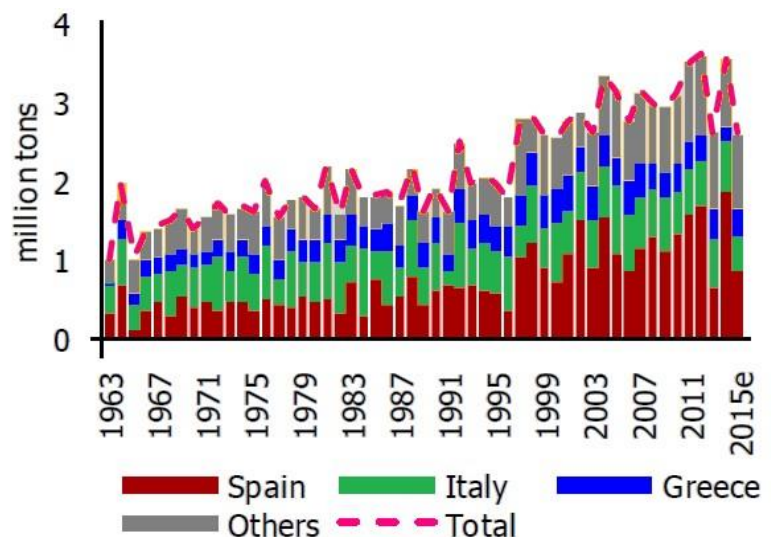
For the six-year period 2008-2014, Spain is the undisputed leader in the olive sector (44% of global production) (Table 9). Specifically, Spain managed to double its olive oil production from 0.6 million tons (1990) to 1.2 million tons (2014) (accounting for half the increase in world production during the same period), through the introduction of new techniques in cultivation of olive trees (Figure 9). The following table contains the detailed amounts of annual olive oil production per country.

Table 9: Olive oil production per year and country (in 1000 tons).

COUNTRY /YEAR	2008/09 1030.0	2009/10	2010/11	2011/2012	2012/2013 618.2	2013/14	AVERAGE
SPAIN		1401.5	1391.9	1615.0		1775.8	1305.4
ITALY	540.0	430.0	440.0	399.2	415.5	461.2	447.7
GREECE	305.0	320.0	301.0	294.6	357.9	131.9	285.1
TURKEY	130.0	147.0	160.0	191.0	195.0	190.0	168.8
SYRIA	130.0	150.0	180.0	198.0	175.0	165.0	166.3
TUNISIA	160.0	150.0	120.0	182.0	220.0	70.0	150.3
MAROCCO	85.0	140.0	130.0	120.0	100.0	120.0	115.8
PORTUGAL	53.4	62.5	62.9	76.2	59.2	91.6	67.6
ALGERIA	61.5	26.5	67.0	39.5	66.0	44.0	50.8
ARGENTINA	23.0	17.0	20.0	32.0	17.0	30.0	23.2
JORDAN	18.5	17.0	27.0	19.5	21.5	30.0	22.3
LEBANON	12.0	9.0	32.0	14.0	14.0	20.5	16.9
PALESTINE	20.0	5.5	25.0	15.5	15.5	15.5	16.2
AUSTRALIA	15.0	18.0	18.0	15.5	9.5	18.0	15.7
LIBYA	15.0	15.0	15.0	15.0	15.0	15.0	15.0
OTHER PRODUCT.	15.0	15.0	15.0	15.0	15.0	14.5	14.9
CHILE	8.5	12.0	16.0	21.5	15.0	15.0	14.7
ISRAEL	9.0	3.5	12.5	13.0	18.0	15.0	11.8
ALBANIA	6.0	5.0	8.0	7.0	12.0	10.5	8.1
EGYPT	5.0	3.0	4.0	9.0	16.5	7.0	7.4
FRANCE	7.0	5.7	6.1	3.2	5.1	4.9	5.3
CYPRUS	2.8	4.2	6.5	6.5	5.6	5.6	5.2
IRAN	4.5	4.0	4.0	7.0	3.5	5.0	4.7
CROATIA	6.0	5.0	5.0	4.0	4.0	0.0	4.0
U.S.A.	3.0	3.0	4.0	4.0	4.0	5.0	3.8
SAUDI ARABIA	3.0	3.0	3.0	3.0	3.0	3.0	3.0
SLOVENIA	0.5	0.7	0.7	0.5	0.2	0.6	0.5
MONTENEGRO	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Source: International Olive Council

Figure 11: The average olive oil production (2008/2009 – 2013/2014).

Source: International Olive Council

In contrast, during the past five years, Italy and Greece reduced their levels of output production compared with the previous decade. This decrease was estimated at 17% for Greece and 37% for Italy. As a result, they both lost market share in global production (from 23% to 14% in Italy and from 14% to 11% in Greece) (National Bank Of Greece, 2015). During the period 1990-2014, other producers such as Turkey, Tunisia, Morocco and Syria almost doubled their production, increasing their market share in global production by 25% to 35% (National Bank Of Greece, 2015).

International table olive production

During the past two decades, the world production of table olives has been increased from 1 million tons (1991) to 2.6 million tons (2014).

Figure 12: Global production of table olive.
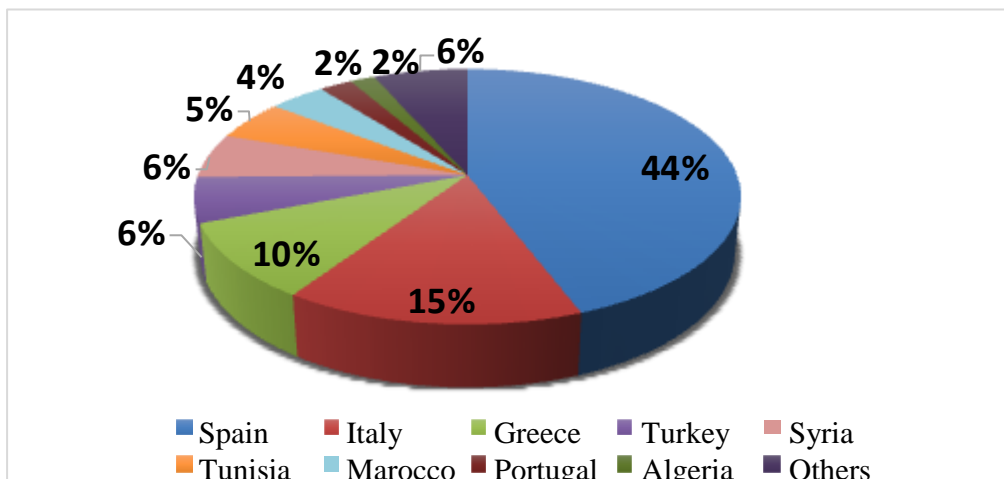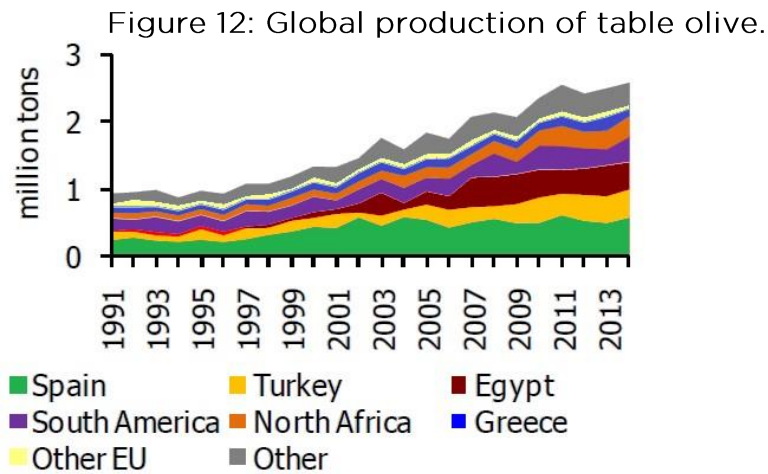
Source: International Olive Council and NBG estimates

Spain and Turkey are traditional leaders of this market, followed by North Africa (mainly Egypt and secondly Algeria, Morocco and Tunisia) and South America (Argentina and Peru) that led the production boom (National Bank Of Greece, 2015).

In accordance with the International Olive Council, for the period 2008/20092013/2014, the annual average world production was estimated around 3,162,900 tons (Table 10). The production of table olives varies per year, depending on the quantitative and qualitative data of each country. For the same period, Greece was the sixth largest producer of table olives globally and the second largest producer in Europe. The first place was occupied by Spain (17%) (Figure 13).

Table 10: Table olive production per year and country (1000 tons).

COUNTRY /YEAR	2008/09	2009/10	2010/11	2012/2013	2013/14	AVERAGE
	485.7	492.6		491.0		
SPAIN			608.6		573.5	528.8

EGYPT	440.0	409.0	350.0	384.5	453.0	400.0	406.1
TURKEY	300.0	390.0	330.0	400.0	410.0	430.0	376.7
ALGERIA	98.0	136.0	192.5	145.5	175.0	208.0	159.2
SYRIA	120.0	135.0	147.0	172.0	134.0	125.0	138.8
GREECE	105.0	107.0	135.0	130.0	197.0	100.0	129.0
ARGENTINA	95.0	220.0	90.0	150.0	60.0	140.0	125.8
MAROCCO	100.0	90.0	110.0	100.0	100.0	100.0	100.0
U.S.A.	47.5	24.0	154.0	26.0	78.0	82.5	68.7
PERU	9.0	75.0	72.5	81.0	57.5	110.0	67.5
ITALY	68.5	58.6	69.7	75.7	76.0	42.0	65.1
IRAN	30.5	47.5	47.0	35.0	48.0	67.5	45.9
JORDAN	27.0	34.0	54.0	26.0	28.0	36.0	34.2
CHILE	20.0	25.0	26.0	34.0	34.0	34.0	28.8
ALBANIA	20.0	18.0	28.0	27.0	41.0	30.0	27.3
TUNISIA	18.0	22.0	20.0	24.0	25.0	22.0	21.8
PORTUGAL	13.0	12.3	10.3	9.0	12.5	17.5	12.4
PALESTINE	9.0	2.5	11.0	9.0	9.0	9.0	8.3
MEXICO	8.0	10.0	8.0	8.0	8.0	8.0	8.3
SAUDI ARABIA	4.5	4.5	4.5	4.5	4.5	4.5	4.5
AUSTRALIA	3	3.5	3.5	3.5	3.5	3.5	3.4

Source: International Olive Council

Figure 13: Average rate of main producer countries of table olives (2008/2009 – 2013/2014).
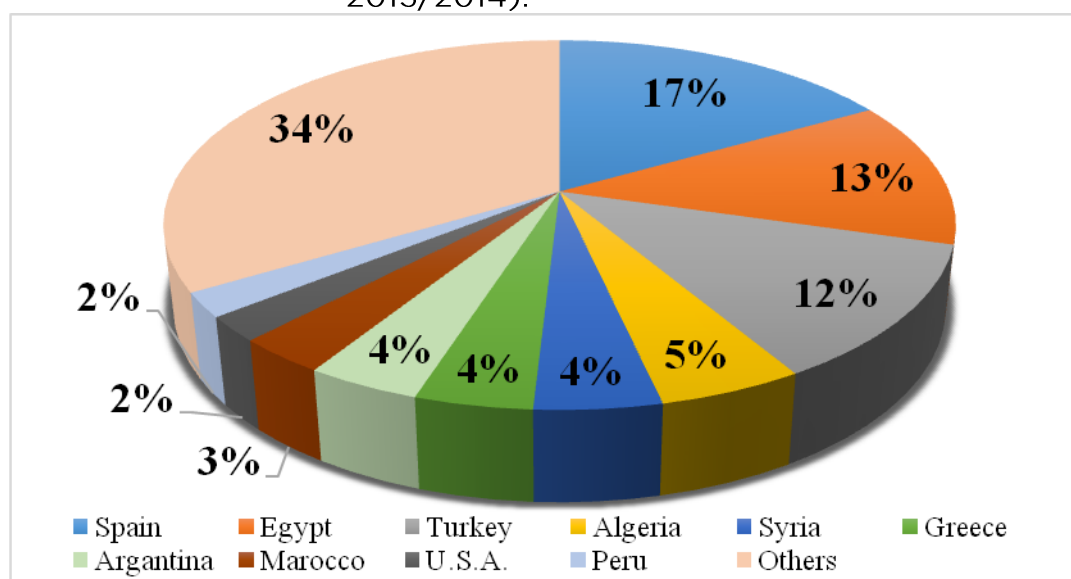
Source: International Olive Council

PRIMARY OLIVE SECTOR

Climatic and soil conditions

The olive tree is considered a xerophytic species, able to grow well under various pedoclimatic conditions. Its cultivation is feasible throughout the entire temperate and subtropical zone, i.e. between 30° and 45°. Under tropical conditions olive tree grows only vegetative without producing fruits, unless it is cultivated either: (i) at adequate elevation in order to fulfil its needs of low temperatures (vernalization) and (ii) if the cultivars have low chilling requirements (Ayerza and Coates, 2004). Olive is traditionally grown in areas characterized by Mediterranean type climate (a short rainy winter period and long dry summer), to which it is ideally adapted. The areas where olive is usually cultivated exhibit a mean annual temperature between 15–20 °C, with a minimum of 4 °C and a maximum of 40 °C. The minimum temperature should not drop below –7 °C, otherwise severe damage occurs to the trees (Therios, 2009). Furthermore, high altitude areas are not appropriate for olive culture, due to the danger of frost incidence and to the shorter vegetative period. In Mediterranean countries, olive trees are not planted at altitudes greater than 600-800 m.

Olive trees are less sensitive to wind damage than other trees. Nevertheless, wind-affected areas should not be used for olive culture, as trees may be damaged by hot and dry air currents, especially during the period of flowering and fruit set. Furthermore, hot winds during the summer instigate fruit drop. High relative humidity is responsible for disease problems, while hail damages olive trees and fruits and increases the incidence of *Bacterium savastanoi* infection, in susceptible olive cultivars. Finally, heavy rains during spring deplete pollen from the flowers and result to low fruit set (Therios, 2009).

Concerning soils, olive trees can grow in nutrient poor, but well drained, as well as in calcareous and gravelly soils. However, the deep, sandy-loam soils adequately supplied with mineral nutrients (especially N, P and K) and water are the best for annual bearing (Sibbett and Ferguson, 2005). Clay soils that have high moisture content and immobilize K and P, as well as soils with a hardpan close to the soil surface are not suitable for olives. Olive trees grow and produce in soils with both medium acid and medium alkaline pH (pH values greater than 8.5 reduce growth significantly) and in soils that the sodium chloride (NaCl) content is less than 1 g/L(Therios, 2009). Olives also withstand relatively high boron soil content.

Plantation systems

Planting distances depend among others on soil fertility, cultivar, cultural practices and planting system. Five major types of olive plantation systems are identified: traditional, semi-intensive, intensive, super high density system and organic (Metzidakis and Koubouris, 2006; Roussos, 2015) based on agro-ecological, technological and socio-economic criteria.

Traditional cultivation: This is characterized by low-density plantations approximately 100 trees per hectare (10-12 m x 10-12m) of old trees (> 50 years), which are grown as rainfed trees planted on moderately steep slopes. This system has low inputs, no mechanization and results in low yields not exceeding 1000–2000 kg/ha. In areas with very low rainfall (below 200 mm annually) trees are still planted at such densities (Tunis).

Semi-intensive: The density in this system is variable, fluctuating between 100 and 150 trees/ha. These orchards have productive trees and yielding (for example 2800–4000 kg/ha in Crete).

Modern cultivation of olive – intensive systems – high density system: trees are planted at a density of approximately 200-300 trees per hectare (6-7 m x 6-7 m), yielding up to 5000 kg/ha and the system may be mechanized.

Super high density system (SHD): trees are planted at a density of approximately 1500-1800 trees per hectare (1.35-2.5 m x 3.5-4.7 m) (irrigation is necessary and tis system works only with olive oil cultivars). The main objective of this system is to reduce the cost of harvest, which in the traditional olive cultivation participate at around 40-60% to the total cost of olive culture.

Organic: This system is labor-intensive but it produces high-quality olive oil. Organic olive orchards in Greece represent ~ 1% of total area planted.

Cultivation practices (techniques)

Olive irrigation

Olives are considered drought tolerant, the extend depending on genotype, soil properties and climatic data of the region. Their small leaves are thick, leathery with a waxy cuticle on the upper surface and on the lower surface are covered with trichomes which protect them and reduce water loss (transpiration), while they are characterized by heliotropic movement (Pontikis, 2000). This permits olive cultivation in very dry areas. However, olives, like other tree crops, have certain developmental periods that are especially sensitive to low soil moisture. The bloom period is very sensitive to dry soil conditions particularly under warm and dry weather (Pontikis, 2000; Therios, 2009). So, in order to sustain good productivity

with high yields of superior quality the application of water is necessary. Furthermore, irrigation is essential in the circumstances where a. the rainfall is inadequate; b. the precipitation distribution is not appropriate in the critical periods during spring and summer; c. in lighttextured soils, with a low water-retaining capacity.

Irrigation is necessary in both table and olive oil varieties. However, irrigation is more important in table olives, in order to achieve high quality large fruits, in dense and high-density plantings (Therios, 2009). Table olives should be irrigated during the third stage (cell expansion) of fruit growth to increase their size. In contrast, over-irrigation increases shoot growth, produces waterspouts and increases the sensitivity of vegetative growth to winter frosts. The methods applied for olive orchard irrigation include flood, furrow, sprinkler, surface, sub-surface and drip irrigation, where sprinkler and drip irrigation being the main irrigation systems used during the last decades.

The effect of irrigation on the quality of table olives and olive oil

Irrigation induces greater shoot growth and therefore total leaf surface area and increased photosynthesis and transpiration. Furthermore, irrigation increases fruit weight, volume and pulp:pit ratio, but have no effect on fruit shape or on ripening. The larger fruit size is primarily the result of both a larger number of cells and the positive effect of water availability on cell division rather than cell expansion. With irrigation, pulp water content increases and firmness decreases slightly.

The quantity of the water applied to olive trees exerts a profound influence on olive oil quality (D'Andria et al., 2002; Herenguer et al., 2006). Therefore, olive oils, produced from non-irrigated orchards based completely on annual precipitation, were found to have higher levels of oleic and linoleic acids (Castro et al., 2006), higher polyphenol contents (Motilva et al., 2002), bitter index and oxidative stability. So, producers who wish to optimize oil production, which is a function of both yield and percentage oil content, need to take into account the benefits of moderate irrigation.

Furthermore, moderate water stress results in an olive oil of better quality, due to greater polyphenol content, greater oxidative stability and better flavor. On the other hand, irrigation increases productivity but has a negative effect on oil quality. The more water applied the more likely it is that the oil will have lower polyphenol content and stability, since the water content of the fruit can influence the amount of polyphenols remaining in the oil after processing. Minimally to moderately irrigated trees produce oils that are fruitier, with a balanced ratio of bitterness and pungency, while increased irrigation degree may affect oil flavor. If producers want to increase the intensity of bitterness and pungency they should

limit water application. An irrigation system supplying 40%-70% of ETc gives good oil extractability and maintains excellent oil chemical parameters (Roussos, 2015).

Olive fertilization

Olive trees are among the least fertilized trees. They are hardy plants that will tolerate poor growing conditions – especially low fertility – better than almost any other fruit tree (Sibbett and Ferguson, 2005). They tend to fruit better under conditions of average vigor and nutrition. This unfavorable treatment of olives concerning the application of organic or inorganic fertilizers derives from the opinion that they do not require adequate fertilization, because of their extensive root system. However, olive trees respond positively to applications of potassium, magnesium, nitrogen and boron mineral elements.

Nitrogen is most essential for both vegetative growth and flowering- fruit set production. It may affect in an indirect manner the alternate bearing phenomenon of olive tree (Sibbett and Ferguson, 2005). The trees respond readily to nitrogen application when they are grown in low fertility soils and when soil moisture is not a restrictive factor (Therios, 2009). Depending on soil fertility and moisture, an average application of 500-1500 g of nitrogen per tree is usually recommended for a bearing tree (1 kg N= approx. 5 kg ammonium sulfate, 3 kg ammonium nitrate, 4 kg calcium nitrate or 2 kg urea). The time of nitrogen application should be related to the availability of water, either rainfall or applied through the irrigation system. Most of the fertilizers containing nitrogen should be spread on the soil and within a few hours rainfall or irrigation should follow, so that there would be minor or zero losses due to evaporation of nitrogen in the form of ammonia (especially on calcareous soils). The season of nitrogen application is strongly related to the flower induction and fruit set of olive (Sibbett and Ferguson, 2005).

Phosphorus deficiencies are not so common in olive culture. Phosphorus is usually applied every two to three years. The application of phosphorus in the soil should be followed by incorporation; so that the mineral element could gradually reach the root zone (phosphorus is highly immobile in the soil) (Therios, 2009). Phosphorus application is considered necessary in acid soils or soils characterized by high amounts of calcium carbonate.

Potassium is one of the main nutrients in olive culture. High amounts of potassium are removed from the soil with fruit harvest and pruning, particularly in high yield seasons. Regular potassium fertilization is necessary to maximize both yield and quality (Sibbett and Ferguson, 2005). Potassium is usually applied during the winter (after incorporation) in order to gradually reach the rooting zone by rainfall (Therios, 2009). In areas where the availability of water does not pose a problem, potassium application can be done during the

end of winter. Olive fruit is highly demanding during growth, which means that an additional amount of potassium should be applied in the years of heavy yield during the period of fruit growing, thus during mid-summer. This application is better to be done using a foliar fertilizer, in order for potassium to be readily absorbed and translocated to the needing parts (sinks) of the tree.

Boron is also another major element for olive culture. Boron application as foliar fertilizer usually gives better results when applied during the pre-flowering stages (Therios, 2009). Thus the trees are sufficiently supplied with boron, which plays a major role in pollen growth and thus fruit set. Most growers combine during that period a foliar fertilizer of boron along with urea and sometimes sea-weed extracts in order to achieve the highest fruit yields.

Magnesium is also another major element for olive tree growing. It is a major constituent of the chlorophyll molecule. This means that it plays a significant role in photosynthesis (Therios, 2009). Magnesium application is usually done only after detection of deficiency. Nevertheless, most of the fertilizers contain a significant amount of magnesium, so that it is applied in sufficient quantities along with the other major elements.

In any case the best way to evaluate the nutrition status of the olive tree and of any plant in general is to proceed to soil analysis along with plant tissue analysis (usually leaves). These analyses will give significant data on the status of both soil and plant, regarding the fertilization program to be applied.

Olive pruning

Pruning is the major cultural practice in an orchard. The term pruning includes the techniques known as *cutting*, *heading*, *incision*, *inclination*, *twisting* and *girdling* (Therios, 2009). In olive trees pruning has two main objectives, to improve vegetative and reproductive growth (Roussos, 2015). Successful pruning involves the knowledge and experience of olive tree physiology, as with pruning the grower adjusts the tree to the specific climatic and soil condition of the area and increases the orchard's productivity.

The main aims of pruning are summarized below (Roussos, 2015):

- To give the best shape to the olive tree under the certain soil-climate conditions in order to achieve a balance between structure and productivity, and optimum light penetration.
- To achieve a rapid development of a strong tree skeleton to support fruit load and be able to transmit the vibrations from mechanical harvesters.
- To adjust the shape of the tree canopy for the dense and super-high-density planting systems.

- To balance vegetation with fruit yield and improve the quality of olive fruit and oil.
- To minimize the nonbearing period.
- To achieve early onset of production and prolong the productivity of the orchard.
- To delay senescence by renewing the canopy in old, non-productive trees to stimulate productivity.
- To create new canopy after the olive tree has been damaged by frost, fire, pests or disease.

The pruning type depends on the age of the olive tree, the crop load, the use of olives as table or olive oil fruits, the soil and environmental conditions. Although these factors differ from area to area and from cultivar to cultivar, certain general rules are applicable to pruning (Therios, 2009; Roussos, 2015):

- Olive tree is necessary to be pruned every year. In some cases pruning is conducted every 2 years, as pruning cost may be a limiting factor.
- Plant age is a determining factor of the type of pruning (light, medium, severe).
- The pruning method should be simple and fast.
- The light penetration and air circulation into the canopy must be checked and then the need for more severe pruning must be assessed.
- Pruning should be contacted from the top of the tree and proceeds towards the base.
- Large shoots are cut first, followed by those of smaller diameter.
- In mature plants pruning is light; pruning intensity increases with age of plant.
- The cut should be executed close to the point of attachment of the lateral branch.
  There are three main pruning types:

a. pruning during the early stages of tree growing

b. pruning for fruiting

c. rejuvenation pruning

Olive Cultivars

Small size olive cultivars

'Koroneiki'
Other names of this cultivar are 'Kritikia', 'Ladolia', 'Psilolia', 'Nanaki', 'Vatsiki' or 'Staphylolia'.

'Koroneiki' is the most common variety for oil production and it is widespread in the main oliveproducing districts of Greece, especially in Crete, Peloponnese and Cyclades (covers 50-60% of the acreage in Greece) (Kostelenos, 2011). The leaves are thick, with a small leaf blade. The fruit is very small (0.6-1.5 g), with cylindroconical shape and ending in a teat. The fruit matures from November to the end of February and the ratio of flesh:pit is 1.63–4.06:1. Koroneiki fruits may be small, but have high quality oil yield. The medium yield per tree is 50–60 kg. The olive oil content ranges from 15 to 30%, but most usually it is between 20% and 25%. This cultivar is resistant to water stress and wind but its tolerance to cold is low. Finally, 'Koroneiki' and clones of it, are among the most common and suitable cultivars for super-high density growing systems around the world (e.g. Australia, Italy, Spain).

'Koutsourelia'

Other names of this cultivar are 'Patrini', 'Ladolia', 'Kurelia' or 'Xylolia'. 'Koutsourelia' is considered as a good but water demanding cultivar for olive oil production and it is widespread in the areas of Korinthia, Ahaia and Aitoloakarnania (Kostelenos, 2011). The tree height at maturity is around 5–7 m. The leaves are small and the leaf blade is broader at the middle and the top. The fruit is small, weighs around 0.8 to 2.0 g, has cylindroconical shape with a characteristic mastoid protuberance and the ratio of flesh:pit is 3.58–5.00:1. The fruit matures from November to January. 'Koutsourelia' has medium quality oil yield and the oil content of the fruit is 20–25%.

'Mastoidis'

Other names of this cultivar are 'Athinolia', 'Tsunati', 'Asprolia' or 'Matsolia'. It is cultivated in Crete and Peloponnese and it is considered a very good cultivar for excellent olive oil production (Kostelenos, 2011). The leaves are 6–7 cm in length and 1.1 cm wide; their colour is light green to green. The fruit is medium, weighs approximately 2.0–3.0 g, has cylindroconical shape with a large characteristic mastoid protuberance and the flesh:pit ratio is 6.0:1. The fruit matures from the end of November to February. Its oil content is 20–30% and has medium quality oil yield. This cultivar is medium drought resistant, tolerates low temperatures and can be grown at altitudes up to 1000 m.

Medium size fruit olive cultivars

'Megaritiki'

Other names for this cultivar are 'Ladolia', 'Perachoritiki' and 'Vovoditiki'. This is a Greek cultivar cultivated in the area of Megara, Attiki, Central and North Euboea and part of Peloponnese. The last few years there is also an increase in the cultivation of this variety in

the areas of North Greece (Kostelenos, 2011). It is a dual-purpose cultivar for the production of both good quality olive oil and green or black table olives. The leaves are oblong and the shoots are hanging. The fruit is of medium size, weighs 3.0-5.5 g and has cylindroconical shape with a large characteristic mastoid protuberance. The fruits are presented in the shoots singly or in pairs and have characteristic grey spots on their epidermis during ripening. The ratio of flesh:pit in the fruit is 8.6–10.1:1. 'Megaritiki' has high quality yield and the oil content ranges from 12–25%. Furthermore, this cultivar presents medium tolerance to cold and salinity and requires pollination since it is partially non-self-fruiting with a tendency towards alternate bearing.

'Kothreiki'

Other names of this cultivar are 'Manaki', 'Manakolia', 'Glykomanako' or 'Korinthiaki'. It is cultivated in central Greece and Peloponnese. It is a dual-purpose cultivar for the production of both excellent quality olive oil and table olives (Kostelenos, 2011). The leaves are broad and the fruit has spherical shape without a teat. The mean fruit weight is 4.3 g (ranges from 3.0 to 5.5 g), the pit is cylindroconical and the ratio of flesh:pit is 4.70:1. The fruit matures from the middle of October to the beginning of December. Its oil content ranges from 18–25%. This cultivar is very sensitive to salinity, tolerates low temperatures and can be grown at altitude less than 800 m.

'Throumbolia'

Other names of this cultivar are 'Throumba', 'Xondrolia', 'Ascouda' or 'Xamada'. It is cultivated in the islands of Kyklades, Mitilini, Xio, Samo, Crete, Euboea and in some areas of Attika. This is a dualpurpose cultivar for the production of both good quality olive oil and the excellent quality of table olives known as 'Throubes' (Kostelenos, 2011). The leaves are dark green and the shoots are hanging. Its fruit is cylindroconical in shape, ending in a teat and weighs 2.1-4.0 g. The fruit matures from October to December. This cultivar has medium yield and its oil content ranges from 20–28%.

'Throumbolia' is sensitive to low temperatures and to water deficit.

Large size fruit olive cultivars

'Kalamon'

Other names of this cultivar are 'Kalamatiani', 'Aetonichi', 'Tsigeli', 'Karakolia' or 'Nyxati'. It is the most popular Greek table olive cultivar and has recently begun to be cultivated in other countries, as well. It is originated in the region of Kalamata in South-East Peloponnese and it has proved its adaptability as an excellent cultivar in both warm and cold areas worldwide. In Greece, 'Kalamon' is cultivated in Lakonia, Messinia, Aitoloakarnania, Phthiotida and in

some areas of Argolida (Kynouria) (Kostelenos, 2011). It is an excellent black table olive cultivar producing a high-quality product as far as color, texture and taste are concerned. It can be used for both black table olives and oil production.

The tree obtains a height of 7–10 m and its leaves are dark green, distinctively large, slightly twisted from end to end and their length:width ratio is 4.11:1.

The fruit is lengthy and pointed, with a distinctly bent point at its tip and is presented in the shoots singly or in pairs. The fruit has a mean weight of 3.0–8.0 g and the flesh:pit ratio is 6.72:1. It matures in November-December. When the fruit fully matures it turns black and it has a mean oil content of 17%.

It is resistant to cold and salinity.

'Konservolia'

Other names of this cultivar are 'Voliotiki', 'Piliou' or 'Amphissis'. This variety is cultivated in various regions of Greece such as Central Greece, Agrinio, Arta, Amphissa, Agia and Pilio (Kostelenos, 2011). This variety is mostly used for olive pickling of excellent quality. The mean tree height is 6–8 m. The fruit has spherical shape; its weight ranges from 4.0-10.0 g and matures in November. The flesh:pit ratio is 8.28:1 and its oil content is 14-18%. It can be cultivated at altitudes of up to 600 m as it tolerates medium to low temperatures.

'Chondrolia Chalkidikis'

Other names of this cultivar are 'Karidolia Chalkidikis' or 'Karidolia'. This variety is cultivated mostly in the region of Chalkidiki (northern Greece) and in the coastal areas of Serres, Kabala, Magnissia and Xanthi (Kostelenos, 2011). Its fruit has a very large size, cylindroconical shape with a large characteristic mastoid protuberance. The fruit can exceed 10 g in weight and matures at the end of October to the end of November. This cultivar is mainly used either for pickling of green olives or for stuffed green olives (with almond or chili). The remaining - inappropriate for processing - product is used for oil production, as the oil content ranges from 17 to 22%. This variety is sensitive to frost and non-self-fruiting.

'Gaidourolia'

Other names of this cultivar are 'Damaskinati', 'Koromilolia', 'Adrokarpi' or 'Palamara'. This variety is cultivated mostly in the region of Arkadias and Argolidas. The cultivar is mainly used for the pickling of green table olives (Kostelenos, 2011). The tree has a height of 5–6 m, the leaves have light green colour and the shoots are hanging. The surface of the fruit has many lenticels, whitish to light green in colour. The fruit has an elongated shape and its weight ranges from 7.0–20.0 g. The ratio of flesh : pit is 9.7:1 and its oil content is 17-19% and has excellent quality. When the fruit load is average, the fruit size is very large – up to 30 g.

It is considered the largest Greek table olive. The fruit matures from the end of October to the end of November.

SECONDARY SECTOR OF OLIVE OIL PRODUCTION

Olive oil Mills

After harvest, olives are transported with minimal delay to olive oil mills, in order to extract the olive oil. Olive transportation and storage should be considered as critical phases for controlling both mechanical damage and temperature. Improper handling during these phases can result in undesirable enzymatic reactions and the growth of yeasts and molds. The best way to transport the olives is in open-mesh plastic crates that allow air to circulate and prevent the harmful heating caused by the respiration of the fruit (Kiritsakis, 1998). To ensure high quality olive oil, olives must be delivered immediately to the extraction plant after harvest for processing.

The pipeline of the recently used extraction plants comprises the following main operations:

Defoliation-Washing: The olives are poured into a hopper and, using a conveyor belt, transported to the defoliator to remove leaves and other debris left with the olives (stones, stems, twigs, etc.). Then, olives are washed with water to remove dust, dirt, pesticides, etc prior to crushing. To improve efficiency, the washing vat is equipped with a shaker that removes any impurities through screens as well as with an air injection system to create turbulence in the mass.

Crushing: The next step is crushing the olives into a paste. The purpose of crushing is to disrupt the cells of the mesocarp to facilitate the release of the olive oil droplets. This step can be done with stone mills, metal tooth grinders, or various kinds of hammer mills.

Malaxation: The obtained paste is subsequently fed into a mixer where it is continuously and gently stirred to allow small oil droplets to combine into bigger ones. The paste can be heated or water added during this process to increase the yield, although this generally results in lowering the quality of the obtained olive oil. The most common mixer is a

horizontal trough with spiral mixing blades. Longer mixing times increase oil yield but allow a longer oxidation period that decreases shelf life.

Extraction: After malaxation, the paste is forwarded into the press in order to separate the olive oil from the rest of the olive components. In modern olive mills, this is achieved by centrifugation where every single component of the olive paste (oil, water and olive residues) is separated.

Separation: This is the final stage of the extraction procedure. The oil is put into the separators for final cleaning, where any remaining water and pulp particles are removed.

At the end of this stage, the olive oil maintains the maximum of its flavor and its scent as well as its organoleptic quality. Finally, the olive oil is stored in stainless steel containers, before being packaged for consumption.

Most olive oil mills are independent installations that operate seasonally, depending on harvest time in each area. However, there are some small olive oil mills, which are located in olive farms and processing is done with traditional systems. The features and efficiency of this stage is based on two significant factors. The first is the implementation of technology and the other is the organization and ownership status.

There are three kinds of olive oil mills: the traditional olive presses, the three-phase centrifugal mills and the two-phase centrifugal mills (which are the most innovative). In **traditional mills**, the olive paste is subjected to pressure in order to separate olive oil and the vegetation water from the solid material. However, this process is discontinuous and it has been replaced initially by the continuous centrifuge using a three phase system and later by a two phase system. Pressing is based on the principle that when a combined solid/liquid mass, like olive paste, is subjected to pressure, the volume of mass decreases because the liquid phase—the oily must—is forced out with the help of the drainage effect of the mats and the stone fragments and is separated from the solid phase (Boskou, 2006) (Figure 14). This method therefore guarantees a top quality olive oil because of the short beating time and the low temperatures throughout the entire operation. Restraints on the practical suitability of pressing are, above all, the cost of the labor it requires, the fact that it is not a continuous operation, and that filter materials have to be used in optimum conditions. Pressure is the oldest method of extraction that is still in use, though not widespread (Boskou, 2006).
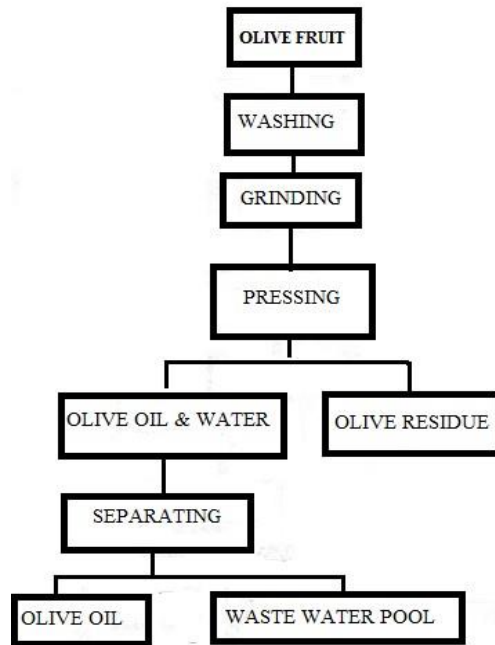
Figure 14: Flow chart of traditional olive oil mill.

Three-phase Centrifugation. For many years, olive pastes undergoing centrifugal extraction had to be quite fluid to facilitate separation of the fractions with different specific weights; this was done by adding lukewarm water, equivalent to approximately 40-60% of the weight of the olive fruits. The water-thinned paste is centrifuged in the decanter. Three phases are obtained: an oily must, vegetable water mixed with the added water (OMWW), and olive pomace (stones and pulp residue). Disadvantages of this process include increased amounts of wastewater that is produced due to increased water utilization (1.25 to 1.75 times more water than press extraction), loss of valuable components (e.g. natural antioxidants) in the water phase, and problems of disposal of the Oil Mill Waste Water. To reduce this problem the water phase can be recycled as soon as it comes out of the decanter. However, the practice negatively affects the quality of the produced oil and it is hardly used anymore (Boskou, 2006) (Figure 15).

Two-phase Centrifugation. The failure to develop a suitable end-of-pipe wastewater treatment technology gave the opportunity to technology manufacturers to develop the two-phase process, which uses no water, delivers olive oil as the liquid phase, and a very wet olive pomace (humidity 60%) as the solid phase using a more effective centrifugation technology. This technology has attracted special interest where water supply is restricted and/or aqueous effluent must be reduced. When fresh olives are used, the paste is produced without addition of water, whereas, when dried olives are used, a small amount of water is added. The performance of the two-phase decanters was evaluated in comparison to the

traditional three-phase extraction process and was found to produce olive oil in similar yields to the three-phase process, but of superior quality in terms of polyphenols and o-diphenols content and keeping ability. In addition, the two-phase process does not produce wastewater during olive oil extraction. The two-phase decanting reduces the water requirements. The produced olive oil is green and has a higher aliphatic alcohols, waxes, and triterpene alcohol content (Boskou, 2006) (Figure 15).

Figure 15: Flow charts of centrifugal olive oil extraction (two-phase mill & three-phase mill).
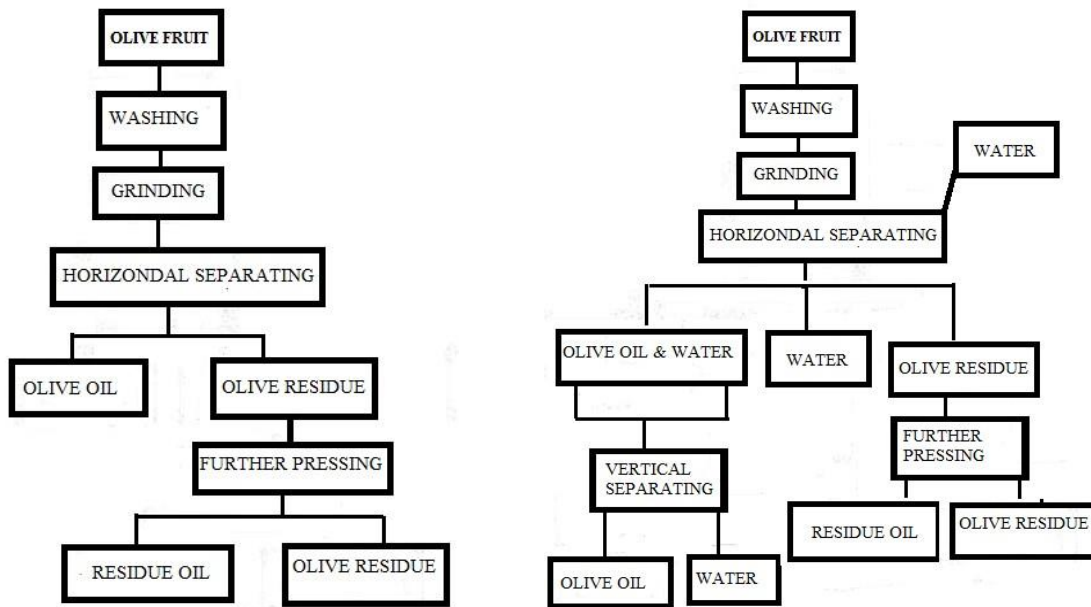
Indicatively, the average processing cost of a two-phase system is about 0.16€/kg of extracted olive oil, while for a three phase system it is about 0.19 €/kg of extracted olive oil. (Figure 16).

Figure 16: Average processing cost by type of olive oil mill.
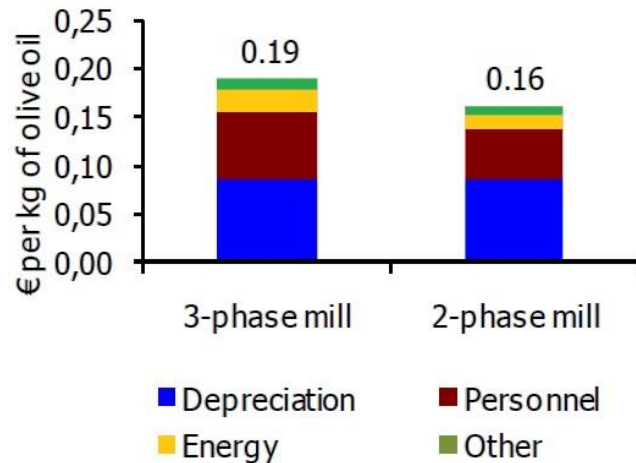
During the past two decades, Spain has exploited the European subsidies, in order to invest in the upgrading of its olive oil mills. Spanish two-phase mills cover about 87% of the Spanish olive oil sector, compared with less than 2% in Greece and Italy. The most common olive extraction system in Greece is the three phase centrifugation system (80%), while Italy uses both three-phase (47%) and traditional pressing mills (37%) (Figure 17). It is essential to promote the two-phase system, because it offers an ideal combination of higher productivity with improved environmental protection.
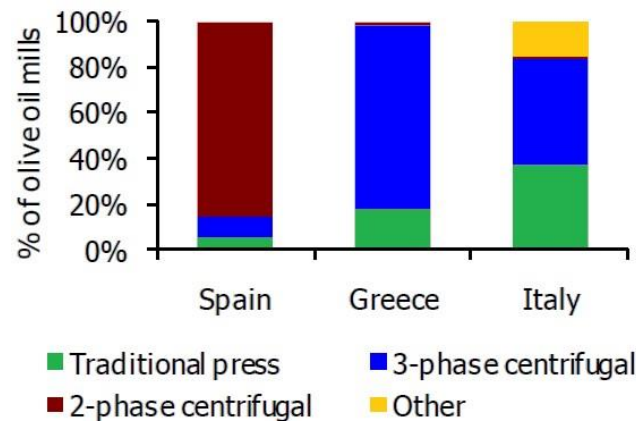
Figure 17: Olive oil mills technology per country.

The Greek and Spanish olive oil mills are, to a large extent, owned by cooperatives which are controlled by farm owners (50% and 70% of olive oil production, respectively). This organizational structure gives the opportunity to small farm owners to benefit from economies of scale. Thus, the farm owners' bargain power increases against large manufacturing companies and retailers. In contrast, Italian cooperatives cover only 10% of

total Italian olive oil production. Italy follows this strategy because cooperatives often face various problems concerning olive oil quality and traceability. Italian olive oil producers need to ensure the promotion of high quality – branded olive oil. The issue of traceability is less important in Spain and Greece, because these two countries trade mainly olive oil in bulk (both for exports and domestic consumption).

Despite their organization in cooperatives, Greek olive oil mills remain relatively small, with an average annual capacity of 170 tons of olive oil, compared with 120 and 150 tons in Italy and Spain, respectively. More importantly, their operation is often limited to the distribution of production subsidies to the farm owners and other administrational activities, instead of acting as an organized enterprise with a clear business strategy (National Bank Of Greece, 2015). If Greece wants to promote high quality branded olive oil, it is essential to restructure the secondary sector, comprising more vertically integrated production, both upstream in the olive production stage, as well as downstream in the production of branded products. In addition, Greek firms need larger economies of scale, irrespective of the degree of vertical integration.

In Greece, the average annual output per mill is very low and varies from 140 to 200 tons per year (National Bank Of Greece, 2015). Cooperative mills are generally larger in production volume and better organized, while olive oil mills from Crete have approximately double average volume of production compared with mills from the Peloponnese.

In 2009, according to the Greek Statistical Authority (EL.STAT.), olive oil mills were amounted to 2,369 units of which 37% operated in the Peloponnese (864 units) and 23.3% operated in Crete (554 units) (Table 11). In the same year, 42.3% of mills were individual enterprises, 33.4% general or limited partnership, 20.4% cooperative units, 1.2% limited liability company and just 2.7% Publicly traded company (SA).

Table   11:

Region	Olive Oil mills (units)	%
Peloponnese	864	36.5%
Western Greece	261	11.0%
Crete	553	23.3%
Central Greece	411	17.3%
Northern Greece and Aegean Islands	280	11.8%
Total	2,369	100.0%

Distribution of olive oil mills by region.

Source: EL.STAT.

Olive Oil Standardization

The extracted olive oil is available in bulk for consumption and trade (promoted to wholesalers for resale in Greece or abroad), but it can be also channeled to enterprises for further processing / standardization (Figure 18).

After extraction, olive oil is transferred in storage containers which are made of different materials (stainless steel is the most common) and capacities. The presence of oxygen should be avoided in the headspace of the containers, or even better the headspace should be filled with nitrogen gas to exclude air. The appropriate storage temperature is about 14-15 °C. According to Regulation 852/2004/CE (Official Journal of the European Union, 2004), all the operations must follow the hygienic-health rules.

Figure 18: Flow chart of olive oil standardization process.
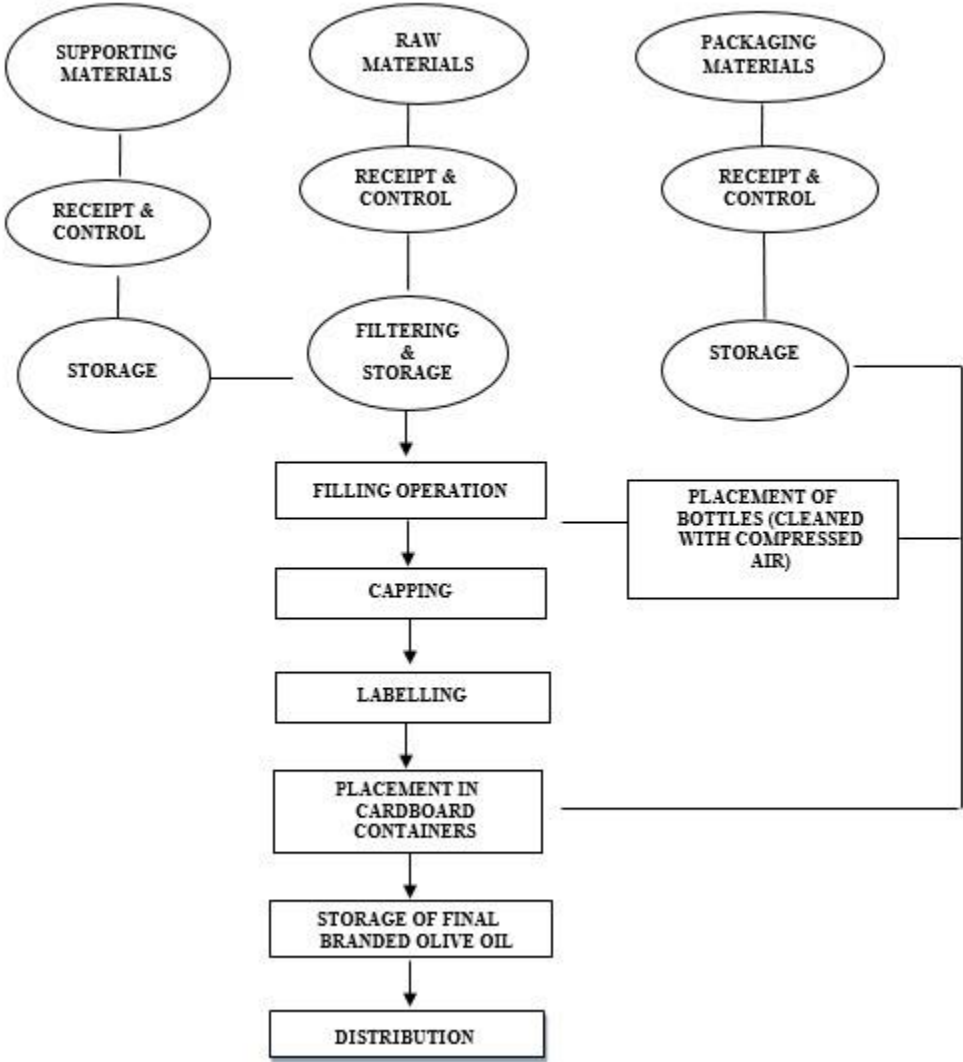
During the process of capping, metal caps are used with a plastic soft liner that permits a perfect airtight acting as dripper. Also, a thermally retractable capsule can be present on cap to seal the packaging and improve the product from the esthetical point of view.

Olive oil labeling has two principal functions, namely safety for the consumer and aesthetic quality. It has to comply with legal requirements and present several technical information (some of these optional, other obligatory). Packaging elements have gained a significant role to communicate not only the product's characteristics but also its history, creating emotions (biological olive oils, for example, of which label can evocate proper quality of biological agriculture).

The legislation of the EU defines that standardized olive oil must be marketed in certain volumes depending on the packaging material to ensure the product's hygiene. In particular, for retail sales, the maximum permissible volume of packaging is defined equal to 5 Lt. Nowadays, olive oil packages are equipped with a safety cap which is used extensively to prevent fraud and ensure quality. Table 12 presents the volume of olive oil packages placed in the market which comply with the current legislation.

Packaging Description	Material	Olive Oil Quantity
		0.25 Lt
		0.50 Lt
Square-Shaped Bottle	Glass	0.75 Lt
		1.00 Lt
		0.25 Lt
Round Shaped Bottle	Glass	0.50 Lt
		0.75 Lt
		0.25 Lt
Square-Shaped Bottle	PET	0.50 Lt

		0.75 Lt
		1.00 Lt
Can	Tinplate	5.00 Lt

Table 12: Forms of olive oil packaging in compliance with current legislation.

The distribution of olive oil in bulk is performed in:
• Metal containers of 216 L capacity
• Tankers of 25 to 30 tons capacity
• Flexi tank containers
The olive oil production sector consists of a large number of enterprises, whose size, activity and production volume vary considerably. In this sector there are several cooperatives and unions of agricultural cooperatives, which have as their principal activity to collect their members' products and proceed with processing, standardization and marketing.

In Greece, the olive oil standardization firms are represented by professional bodies, such as SEVITEL and ESVITE, which participate in activities related to the olive oil industry.
In 2011, according to EL.STAT., there were 260 certified standardization firms. From 2011 and onwards a great increase has been recorded. As a result, in September 2015, the number of certified standardization firms came up to 486 units (Table 13). However, this number is possibly larger, because it is not uncommon for a small firm to operate without certification (this number is unspecified) (Ministry of Rural development and Food, 2015).

Table 13: Distribution of olive oil standardization firms by region.

Region	Standardization Firms	%
Peloponnese	143	29.4%
Crete	115	23.7%
Attica	43	8.8%
Western Greece	32	6.6%
Central Greece	31	6.4%
Central Macedonia	26	5.4%
Ionian Islands	22	4.5%
North Aegean	20	4.1%
East Macedonia and Thrace	20	4.1%
Thessaly	15	3.1%
Southern Aegean	12	2.5%
Epirus	07	1.4%
Total	486	100.0%

Source: Ministry of Rural development and Food

The following table includes the main olive oil and pomace oil processing and standardization enterprises in Greece and their sales per year.

Table 14: Sales of the main olive oil standardization firms € (2009-2013).

BRANDNAME	2009	2010	2011	2012	2013
SOYA HELLAS[1]	292,117,097	245,745,297	288,631,613	263,699,195	304,918,306
MINERVA SA[2]	77,472,528	81,023,171	85,037,947	77,714,179	75,797,950
KORE SA[3]	-	-	-	63,726,895	59,337,104
AGROVIM SA	22,225,230	24,402,509	26,223,724	26,407,010	32,679,916
NUTRIA SA	35,328,583	24,966,962	36,330,344	42,408,706	32,072,567
PANAIGIALEIOS UNION COOPERATIVES SA[4]	N.A.	N.A.	N.A.	21,563,743	24,525,423
HELLENIC FINE OILS SA	23,914,288	17,098,782	18,864,504	17,563,193	19,388,397
AGROTIKI SA	13,166,743	18,224,269	23,745,883	23,213,056	18,679,474
VIOSITIA SA	8,045,944	12,780,036	13,593,336	16,038,848	18,410,610
GAIA FOODS SA	10,025,359	11,088,802	11,341,936	10,533,985	12,266,606
FAKLARIS BROS SA	14,952,788	9,792,170	11,899,662	9,724,854	11,389,013
OLYMPIA – XENIA	7,808,987	8,965,107	8,603,397	7,669,123	10,068,168
KRETA FOOD LTD	N.A.	N.A.	13,293,783	8,707,691	9,000,000*
ELANTHI SA[5]	-	-	-	8,351,453	7,699,097
BLÄUEL, FRIEDRICH, & CO, LTD,[6]	3,935,038	4,118,546	5,443,609	5,676,232	6,638,866
FOUFA, BROS SA	5,024,902	5,405,904	4,903,276	4,800,253	6,578,474
TERRA CRETA SA	3,186,268	4,492,599	4,491,839	4,815,990	5,655,326
ANATOLI "AVEA" SA	4,701,770	3,965,780	4,823,055	4,692,035	5,159,213
BOTZAKIS SA[7]	5,276,948	4,793,352	4,976,647	4,211,837	4,696,849
GREEK LAND FOODS LTD[8]	528,111	N.A.	4,304,895	3,389,541	4,181,850
PANTELOPOULOS "PANPROD" SA	1,799,874	2,529,508	2,404,474	1,716,680	3,120,878
PETROY "ELAEA" SA[9]	-	-	N.A.	3,126,932	3,110,977
KRITEL SA	1,988,470	2,018,126	1,864,810	1,958,088	2,897,911
CHAVADELOS SA	3,266,108	2,940,062	2,815,380	3,173,054	2,638,333
KOLYMPARI, MICHELAKIS SA	1,720,359	1,669,744	1,838,020	1,936,227	2,432,124
KARPEA SA	1,559,770	1,616,748	1,070,984	1,502,036	2,425,232
DIMARAKIS	2,962,697	2,856,704	2,920,185	2,832,194	2,328,917
BOULOULIS, LTD	1,504,896	2,258,257	N.A.	N.A.	2,000,000*
ALEA SA	833,133	1,068,036	1,872,140	2,110,548	1,947,633
DRAGONAS SA	1,431,305	1,636,757	1,877,052	1,406,862	1,844,506
BRANDNAME	2009	2010	2011	2012	2013
VASILAKIS SA	901,626	782,566	787,367	581,529	1,611,097
ELEOURGIA OF CRETE S,A	1,300,217	1,666,170	1,688,323	1,415,192	1,600,000*
VAGIAS SA	1,866,655	2,184,431	1,190,248	1,031,216	1,592,057
EVRIPIDIS SA	1,276,809	1,089,026	1,493,105	1,313,010	1,557,465
ANOSKELI AGRICULTURAL COMPANY SA[10]	1,221,080	1,236,777	1,379,081	959,010	1,446,708
LYRAKI, FAMILY, SA	1,422,607	1,638,916	1,480,962	1,528,479	1,392,544
KASELL SA[11]	N.A.	N.A.	888,236	1,226,378	1,340,916
TSOUDEROS LTD	N.A.	407,457	651,740	611,093	1,174,929
LATZIMAS SA	7,596,530	8,297,189	6,650,522	8,302,156	N.A.

TRIFILIA SA KANELLOPOULOU, EFSTATHIOU, SONS SA	2,875,135	2,392,966		1,885,586	1,824,350	N.A.
ELAIS - UNILEVER HELLAS SA (12)		- 72,414,936	512,195,147 51,000,000*		-	-
KORE SA					-	-
ELANTHI FOOD SA (14)	135,751,718	130,011,664	-	-	-
TOTAL	752,041,568	717,579,326	1,164,462,812	663,462,853	705,605,436

N,A,: Not Available *by declaration

Notes:
(1) all administrative uses begin at 1/7 and end at 30/6 of the next year
(2) all administrative uses begin at 1/6 and end at 31/5 of the next year
(3) in 2012 it absorbed the earliest Kore SA
(4) operating as SA by 2012
(5) the company operates since 2012, after absorbing olive oil industry products of Elanthi SA Food
(6) all administrative uses begin at 1/7 and end at 30/6 of the next year
(7) all administrative uses begin at 1/7 and end at 30/6 of the next year
(8) the use of 2009 covers the period 1/7/08-30/6/09 and from 2011 all the uses cover calendar year (9) founded in 2011
(10) all administrative uses begin at 1/7 and end at 30/6 of the next year
(11) operating as SA since 2013
(12) in 2011, it dealt with olive oil processing and packaging
(13) in 2012 it was absorbed by the later Kore SA
(14) in 2011 the olive oil processing activity and standardization was made by Unilever Hellas SA
Source: ICAP Group SA 2014

Table Olives Processing/Standardization

Raw olives are bitter and require processing in order to become suitable for consumption. Processing should be conducted under good sanitary practices in order to maintain all ingredients and comply with all necessary chemical and microbiological standards. Processing affects the concentration of the major compounds, depending on the type of olive. For high quality table olives the following requirements are important: good quality water, excellent quality of raw olives and excellent quality of the chemicals and additives used. The flavor and taste of processed olives depends on the variety, fermentation conditions, and packing solutions such as vinegar, olive oil and flavorings.

 The main equipment includes washing machines, sorters, graders, tanks (food grade fiberglass), pumps and packing equipment. At every processing stage, sanitation is very important in safeguarding consumer's health. When all statutory food and safety standards are ensured, table olives derived from good quality raw material and harvested at the appropriate stage of ripening can give a tasty and safe product provided that they have been subjected to proper fermentation. Various table olive processing methods are used, depending on cultivar, ripeness, cultural condition and processing technology (Figures 19).

Figure 19: Flow diagram of elaboration processes of table olives.
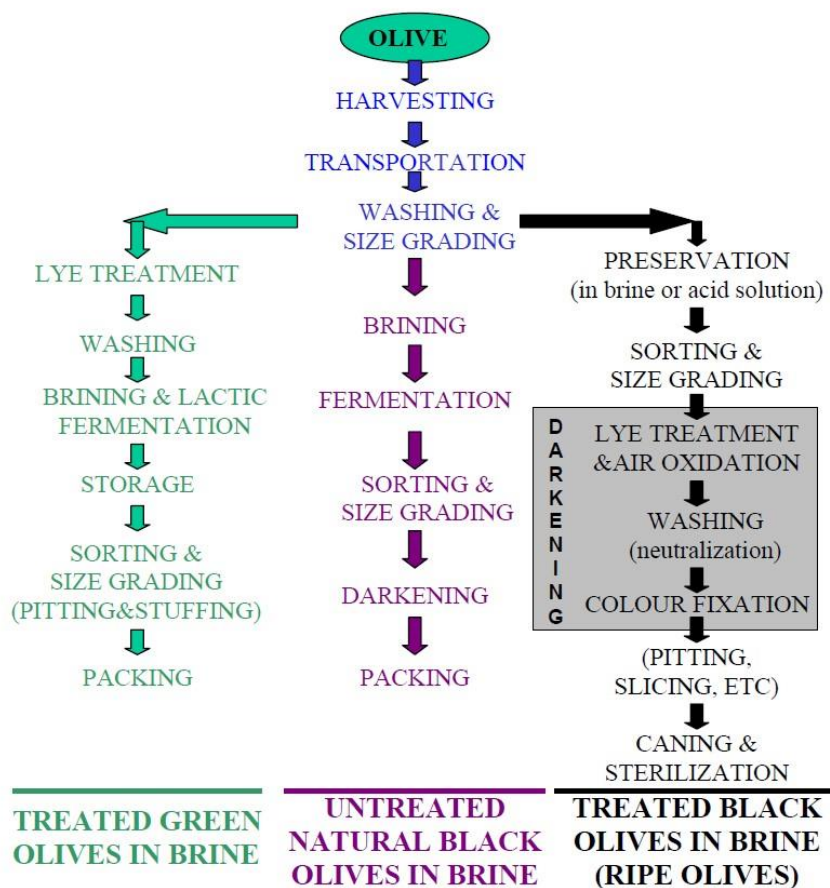
Source:TDC OLIVE booklet "Processing technology in olive oil and table olive"

Similarly to the olive oil sector, the table olive sector consists of many standardization firms, whose size, activity and production volume vary. The product can follow two different directions in terms of marketing. The first is to be available in the market in bulk for direct consumption. The second is to be promoted to traders (wholesalers) for resale in Greece or abroad, or channeled to enterprises for further processing / standardization.

In this sector there are several cooperatives and unions of agricultural cooperatives, which have as their principal activity to collect their members' raw table olives and proceed with processing / standardization and marketing. The exact number of certified table olive standardization firms is not fully recorded. However, PEMETE (Hellenic Association of Table Olive Processors, Packers and

Exporters) has 60 members (corresponding to 75% of total Greek table olive standardization firms) (www.pemete.gr). The following table includes the main Greek enterprises of table olive processing and standardization.

Table 15: Sales of the main table olive standardization firms € (2009-2013).

BRANDNAME	2009	2010	2011	2012	2013
INTERCOMM FOODS SA	42,494,218	45,817,932	57,614,959	62,503,449	72,277,096
ELVAK SA [1]	31,931,856	31,059,026	32,495,058	27,790,741	-
DEAS SA [2]	19,659,465	23,930,685	29,885,646	35,077,364	35,963,448
KONSTANTOPOULOS "OLYMP" SA [3]	24,173,014	26,466,571	27,803,866	30,103,436	32,674,981
ALMI SA	16,261,407	20,619,743	24,569,226	27,544,671	29,280,125
BRETAS LTD	11,843,762	12,605,274	13,349,777	13,930,627	17,236,350
SIOYRAS [4]	11,082,700	13,800,634	17,390,268	17,556,438	17,157,339
ARI SA	9,596,913	9,826,369	11,053,793	14,476,594	17,013,205
IOANNIDIS	14,922,039	15,954,132	15,950,888	17,591,152	16,644,859
PELOPAC	6,019,233	9,452,211	9,599,174	10,718,424	11,497,646
AMALTHIA SA [5]	8,690,644	8,631,566	10,335,819	10,960,429	11,356,569
TSATSOYLI , BROS, "ROYAL"	9,109,669	10,142,480	10,567,775	10,499,622	10,558,858
OLYMPIA-XENIA	7,808,987	8,965,107	8,603,397	7,669,123	10,068,168
OLIVELLAS SA	5,633,883	4,946,155	7,373,013	8,479,448	8,850,139
KORDATOS, IOANNIS [6]	9,654,777	9,034,863	8,642,946	7,193,977	7,843,839
STROFYLIA LTD	6,639,404	9,892,236	9,143,144*	8,845,363	7,202,568
IDEAL MAVRIDIS-CHIMOS S,A	5,422,345	5,791,447	5,583,361	6,274,074	6,753,157
KALOGIROU, BROS, SA	3,320,907	4,330,991	4,864,342	5,890,432	6,571,373
KENTRIS SA	4,394,710	4,854,657	4,941,151	4,071,963	5,699,149
FARMHOUSE	5,028,179	5,135,273	5,642,425	7,722,303	5,549,465
TRIPSAS SA [7]	5,900,772	4,854,746	5,271,568	5,910,029	5,182,595
ANAGNWSTAKOY, SONS SA	3,860,509	4,191,483	4,702,488	5,169,651	4,642,330
GEORGOUDIS SA [8]	3,491,266	3,518,624	4,511,066	4,920,499	4,595,923
SATIVA SA	2,825,043	2,771,938	3,454,188	4,080,743	4,544,043
PARASKEVOPOULOS "ILIS" SA	2,600,114	2,508,940	3,617,923	4,656,877	3,875,817
DANCO SA	5,576,923	3,772,447	4,043,489	4,094,041	3,477,461
LADAS DIMITRIOS SA	1,445,806	2,554,411	2,522,417	3,151,669	3,350,200
BRETAS FAMILY SA	871,609	1,023,060	4,721,828	7,117,866	2,853,901
RILA HELLAS LTD	1,797,820	2,026,300	2,410,254	2,255,890	2,326,003
ESTELL SA	14,858,172	14,083,974	10,427,279	1,037,000*	2,005,526*
INTEROLIVA SA	2,164,008	2,436,357	2,322,365	2,050,488	1,991,540
PARPARAS SA	1,214,657	1,475,007	1,825,689	1,864,804	1,973,379
ELEONES CHALKIDIKIS SA	116,569	843,655	1,242,451	1,644,468	1,856,379
PETROPOULOS, SON SA	1,161,761	1,456,867	1,689,041	2,105,330	1,798,113
PAPANIKITA BROS "ORMYLIA" SA [10]	-	515,304	1,650,303	1,353,209	1,732,763
MARGARITIS, KONSTANTINOS LTD [11]	2,018,604	1,504,174	2,443,842	1,860,076	1,665,666
ILIDA SA	1,510,250	1,384,707	1,791,049	1,923,504	1,625,558
ROI SA	3,133,834	3,230,514	3,289,225	2,520,278	1,585,908
OLYMPION SA	9,483,320	10,000,606	8,136,298	5,748,752	1,344,026
TROFIKO SA	3,058,835	3,761,571	4,577,294	4,586,881	N.A.
ΣΥΝΟΛΟ	320,777,984	349,172,037	390,060,085	402,951,685	382,625,465

N.A.: Not Available   *by declaration

Notes:
(1): the last use covers the period 1/01/13-30/06/14 with operation cycle €51,000,000 (by declaration)
(2): all administrative uses begin at 1/7 and end at 30/6 of the next year
(3): all administrative uses begin at 1/7 and end at 30/6 of the next year
(4):all administrative uses begin at 1/7 and end at 30/6 of the next year
(5): all administrative uses begin at 1/7 and end at 30/6 of the next year
(6) :all administrative uses begin at 1/7 and end at 30/6 of the next year
(7): all administrative uses begin at 1/7 and end at 30/6 of the next year

(8): all administrative uses begin at 1/7 and end at 30/6 of the next year
(9): in 2009 published supply income €2,935
(10): the first administrative use covers the period time 14/02/08-31/12/09 *Source: ICAP Group SA 2014*

Porter Analysis

Threat of new entrants

The sector of olive oil and table olives does not have substantial obstacles (institutional and/or legal) so the entrance of new enterprises is fairly easy and accessible.

Furthermore, the capital requirements are medium, and as a result an individual olive farmer can obtain the essential mechanical equipment to set up a small industrial unit. At this point, the investor's convenience to access the raw material (olive fruits) should also be added. In Greece the volume of olive production exceeds the population needs, so the demand is overlapped and there is also a surplus, facilitating any potential investor to find the necessary raw material.

Moreover, in both sectors, there are no economies of scale and experience curves as "Know-how" of production. It is noticeable that especially in the case of branded olive oil, the market is controlled, to a large extent, by a few large companies, which have developed significant economies of scale and have well-established brand names (but these cases are rather limited).

Another element that weakens the barriers of a new entrance is the minimum product differentiation.

Nowadays, there are no "unique" products, with the exception of Protected Destination of Origin (PDO) and Protected Geographical Indication (PGI). As a result the brand name cannot be a differentiating factor for products and does not affect consumers' consciousness. Furthermore, packaging is similar in most companies, while the majority of table olives and olive oils are marketed in bulk or in large containers which cannot be regarded as a diversity indicator.

The most important obstacle, encountered by the industry, is the access to distribution channels. New companies should focus on product advertising and promotion in order to cope with the established companies and their reputation, so the sales' cost increase is inevitable. In this case, it is required to allocate significant amount of money in advertising, sales and dealers, resulting in limited profit margins and often bring into risk not only profitability but also the viability of the company itself. Something similar could happen with companies targeting foreign markets, facing risk of profit compression due to the amount of money spent on entering into distribution channels, significantly increasing the cost of sales.

In any case, the fact that domestic demand and exports are mainly covered by bulk olive oil and table olives is the biggest obstacle for processing/standardization companies. Ultimately the threat of entry by new competitors is considered particularly high.

Threat of Substitutes

The substitutes of olive oil are other seed oils (such as sunflower oil, corn oil, etc.). It has been observed that a significant increase in the olive oil price turns consumers to buy substitute products. However, in Greece, olive oil consumption per capita remains at high levels. According to a recent survey on budget expenditure of Greek households, in 2012 the average monthly household expenditure for oils and fats was 19.82 € and 18.33 € for the years 2012 and 2013, respectively. Furthermore, the average monthly household consumption of olive oil was 3,729 ml and 3,477 ml for the same period.

According to another important survey of the European Environment Agency, in 2010, olive oil is still the main nutritional component of the Greek dietary model, without significant risk of substitution from other vegetable oils, even in the case of further financial crisis deterioration. However, the household income is a key element for olive oil quantity demand and quality (in bulk or standardized).

Taking into account that the financial crisis does not seem to substitute olive oil consumption by other oils and fats, it is essential to observe the evolution of Greek olive oil substitutes (production and imports). The prevailed erroneous view that the consumption of olive oil substitutes increased over the last years created another false view that the imports of olive oil substitutes were also increased (Figure 20) (Figure 21).

Figure 20: Evolution of Greek olive oil substitutes production (tons) (2000-2012).
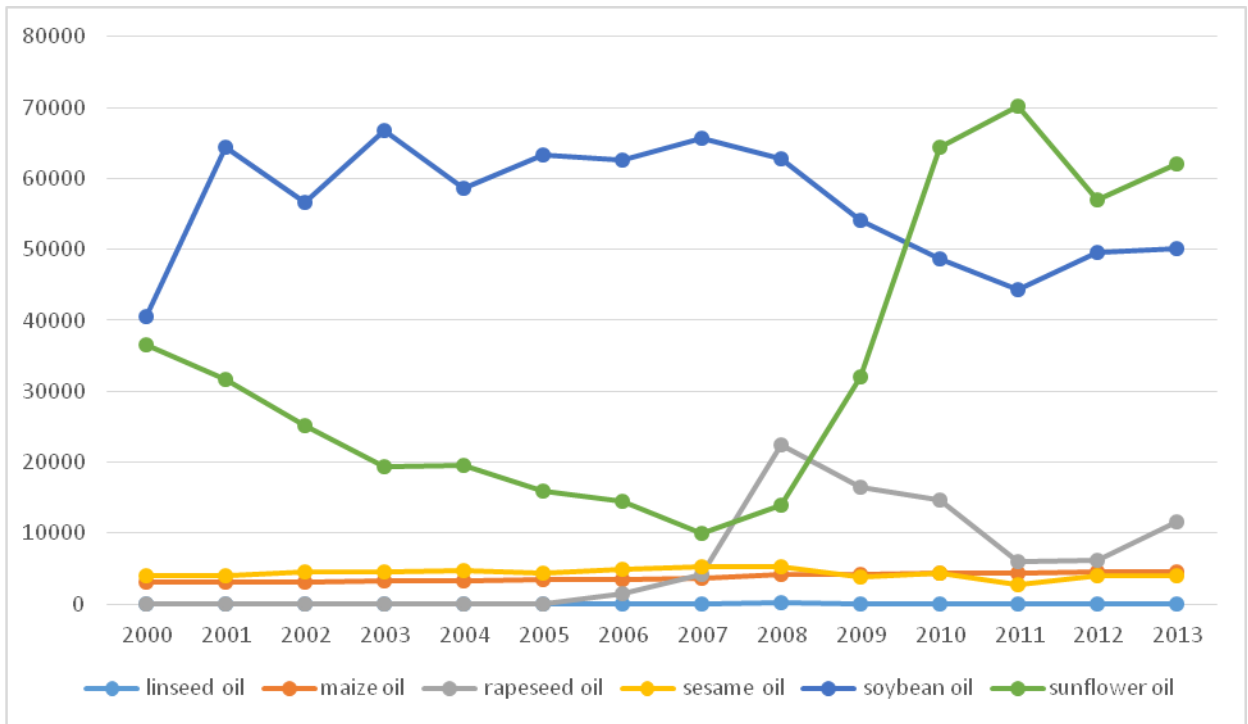
Figure 21: Evolution of Greek olive oil substitutes imports (tons) (2000-2012).
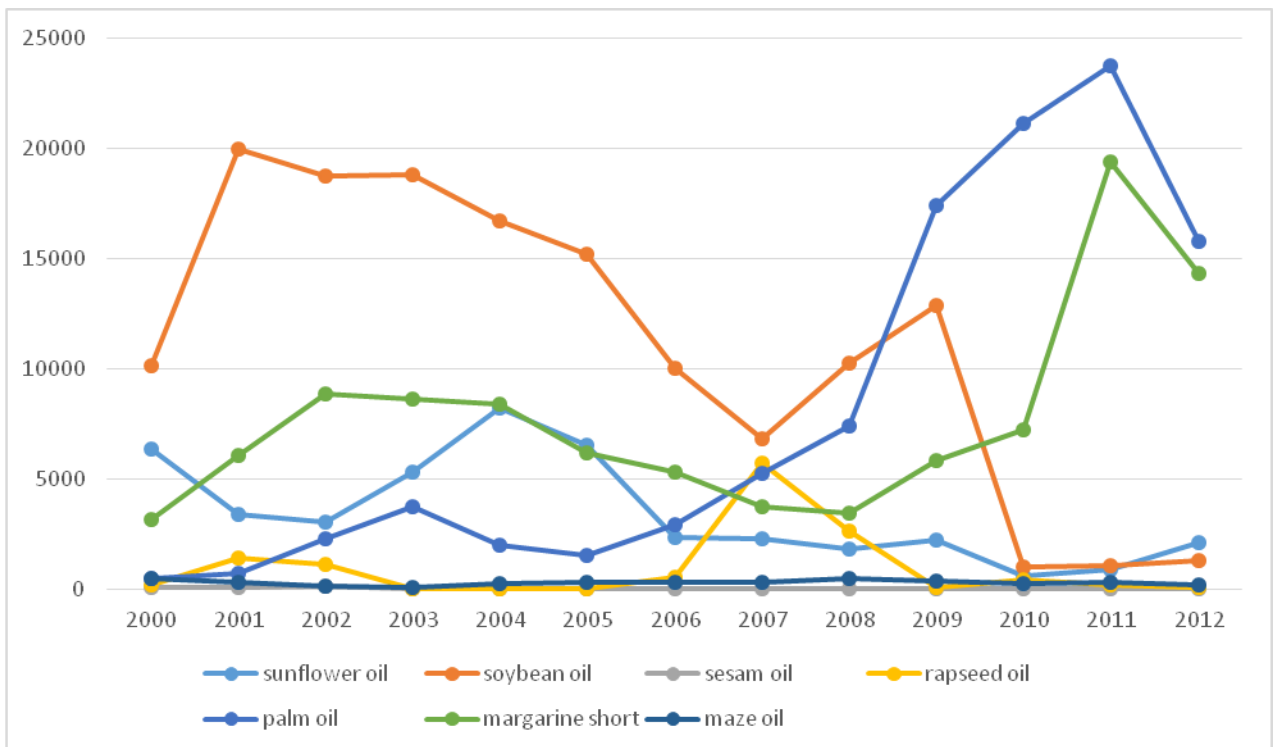
The table olive sector is one of the few sectors that does not have direct competition with substitute products such as pickles. This substitute does not have a strong presence in the

Greek market and thus does not absorb table olive market shares. Furthermore, this substitute does not exist neither in Faostat nor in Eurostat databases, and hence no import records are available.

Bargaining Power of Suppliers

Processing/standardization companies obtain the raw material from the domestic market including olive producers and/or agricultural cooperative associations. The sector of olive oil production is fragmented as there are outnumbered olive farmers and agricultural cooperatives.

The combination of the large number of suppliers, low transportation costs (from one supplier to another) and the lack of product differentiation significantly contribute to the company's negotiating power. Moreover, the negotiating power of large standardization companies (both at national and international level) is strong against olive farmers due to the large quantities of olive oil production. The only case where suppliers have an advantage is the inability of sector companies to implicate vertical integration (backward) due to substantial costs. It is no coincidence that there is a small number of firms in Greece which have their own farms and rely exclusively on their raw material in order to produce the final product.

At this point, it should be noted that many olive farmers sell their olive oil directly to consumers in bulk form.

The bottling equipment manufacturers and secondary packaging suppliers do not hold much bargaining power. Concerning equipment manufacturers, the suppliers, who are mainly established abroad, are generally providing the same products. The number of equipment suppliers is not in short supply, so it is fairly easy for a company to switch suppliers, taking away much of their bargaining power.

Overall, the bargaining power of raw material suppliers, bottling equipment manufacturers and secondary packaging suppliers is small to minimum.

Bargaining Power of Buyers

The buyers of these branded products are primarily supermarkets, food shops and fast-food shops. Supermarkets have bargaining power over their suppliers due to the large volume of sales. They often impose the merchandizing, or else decision of the products place on the shelf, unless the supplier satisfies them on a financial level, although this could negatively affect the company's profit margin. At the same time, it is observed that consumers of urban centers prefer buying olives and olive oil, and for this reason, many retail outlets try to employ vertical integration (backward) through private labels, in order to increase their profitability.

Moreover the knowledge of large profit margins earned by the table olive and olive oil processing industry with simultaneous knowledge of the buyers' costs, requires discounts that reduce the profits of companies in the sector. The only case where the bargaining power of buyers is reduced substantially is in the foreign markets, where the Greek olive products are considered unique and of high quality.

The buyers' bargaining power is quite high especially for supermarkets compared with other distribution channels. Moreover, as already mentioned, a large volume of the products concerns distribution in bulk, which adversely affects the negotiating power of the industry with supermarkets, particularly fast food shops. *Internal or External Rivalry*

The concentration rate in standard olive oil market is quite high, increasing the competition among companies which try to maintain their market shares in any way (e.g., with better promotion and advertising, discounts, etc).

The intensity of competition contributes to the increase of the market share of private label products, which is based on the price difference compared to branded products, resulting in the development of chain discount stores.

The most critical problem for the industry today is that the standardization of olive oil faces strong and unfair competition from producers handling olive oil in bulk, despite the relative EU legislation in force (Regulation (EC) No 1019/2002).

Generally, the competition is even more accentuated because of the deep and prolonged economic recession, which has led to a decline in demand or substitution by other cheaper products (e.g., vegetable oils).

Basically most companies operating in both sectors have net export orientation, so the domestic market is not a priority. However, the increasing number of businesses and farmers who sell products "in bulk" form results in higher competition. Also, the relatively small consumption expenditure of the average

Greek family for table olives, results in a "price war" among standardization firms in order to increase their market share, while decreasing profitability and increasing competition.

As mentioned above, the absence of products' differentiation gives the opportunity to consumers to move easily to another brand resulting in increase of competition.

 It is worth noting that legislation on table olives does not prohibit the sale to retail outlets in bulk, increasing current competition.

 Ultimately, in Greece, competition is particularly increased and thus most companies are looking for new export destinations to enhance their profitability.

Stakeholder analysis

Stakeholders	Stakeholder Interests	Assessment of Impact
Supply		
Investors	High: They want to invest their capital in new and profitable enterprises	High: They require short payback period and great dividends
Olive Farmers	High: They want to standardize their products in Greece in order to achieve higher prices	Low: There are many independent farmers and they have no bargaining power
Equipment Suppliers	High: They want new entries in order to sell their imported equipment	Low: They import the equipment from other countries and they have not much bargaining power on the processors companies
Packaging Suppliers	High: They want new entries in order to sell the packages they import	Low: They import the packages from other countries and they have not much bargaining power on the processors companies
Material Suppliers	High: They want new entries in order to sell the materials they import	Low: They import materials from other countries and they have not much bargaining power on the processors companies
Banking	Low: The financial crisis has a negative impact on the sector of investments	High: They have much bargaining power, the companies depend on their loans in order to get developed
Wholesalers	High: They want to collaborate with new enterprises in order to buy either cheaper or qualitative products	High: The price and the collection period are determinant for the processors company. Impose the merchandizing
Retailers	High: They want to collaborate with new enterprises in order to buy either cheaper or qualitative products	Medium: They are usually outnumbered small food shops with low bargain power
Consultants	High: They want new enterprises in order to offer their services	Medium: If the company follows a false advice-strategy it will not be profitable
Demand		
Consumers	High: They search for new entrances and wider diversification in price and quality	High: The level of satisfaction linked with the loyalty and the profits of the company
Hotel and restaurants.RE.CA	High: They search for new entrances and bigger diversification in price and quality	High: Vital for profitability, acting as an intermediate so that consumers can taste our products, they use bulk products and cheaper substitutes
Regulation		
Agricultural Authorities	Medium: The authorities are interested in new enterprises in order to check their actions	High: The company depends on European subsidies, proper utilization of resources Bureaucracy
Food Safety Authorities	Medium: The authorities are interested in new enterprises in order to check their actions	High: The company should apply the legislation on food safety to avoid penalties Bureaucracy
Environmental Authorities	Medium: The authorities are interested in new enterprises in order to check their actions	High: The company should apply the legislation on environmental protection to avoid penalties. Bureaucracy
Ministry of Labor	Medium: The authorities are interested in new enterprises in order to reduce the unemployment	High: The company should apply the legislation on working conditions and job security for employees

CHEMICAL COMPOSITION

Table olives

The chemical composition of olive flesh is complex consisting of water, oil, minerals, carbohydrates, vitamins, proteins, pigments and fibre. Olive flesh has a low sugar content (2-6% w/w), high oil content (10-30% w/w) (Table 16) and contains a bitter phenolic glycoside known as oleuropein. During processing, the levels of oleuropein in the flesh are significantly reduced either by hydrolysis or lye treatment resulting in fruit debittering.

Table 16: Approximate composition of raw olive flesh (%, w/w), based on composite data from different varieties and at different maturation states (mg/Kg).

Component	Levels
Moisture (%)	60.0-68.0
Oil (%)	12.0-28.0
Saturated fatty acids (%)	12.0-20.0
Polyunsaturated fatty acids (%)	5.0-18.0
Monounsaturated fatty acids (%)	60.0-80.0
Carbohydrate	
Total (%)	8.0-12.0
Soluble sugars (%)	0.5-5.5
Protein (%)	0.7-2.0
Minerals	
Phosphorus (%)	0.02-0.025
Potassium (%)	0.5-3.4
Sodium (%)	0.01-0.20
Calcium (%)	0.02-0.20
Magnesium (%)	0.01 - 0.06
Sulfur (%)	0.01- 0.13
Boron mg/kg	4.0 - 22.0
Copper mg/kg	0.3-5.8
Iron mg/kg	3.0 -95.0
Manganese mg/kg	0.91-5.5
Zinc mg/kg	1.5-33.0
Ash (minerals) (%)	0.4-1.1

Two of the most important features of the olive fruit are moisture and oil content. Thus, changes in the levels of these parameters will have an impact in the overall fruit weight. Fruit's moisture is broadly inseparable with the availability of water to the olive tree. Consequently, table olives from irrigated orchards are larger in size compared to olives from dryland cultivations. It is estimated that the moisture content of the raw olive fruit ranges between 60% and 70% (w/w). Olive weight is a very important factor because consumers have a tendency to prefer larger olives. However, the lower the water content of olive flesh the higher its nutritive and energy value. During processing olives lose moisture and other water soluble components, so their net weight is often lower (up to 10%) compared to raw olives.

The oil fraction of raw olives consists of triacylglycerols (98%), combinations of fatty acids, glycerol, some diglycerides (1.1%) and free fatty acids (0.3%). Other oil soluble compounds are sterols, triterpene acids and tocopherols. The main fatty acids in the oil fraction of raw olives at the stage of maturity are: oleic acid (70-80%), linolenic acid (<1.5%), linoleic (5-10%), palmitic acid (10-15%), stearic acid (2-3%). In cool regions, olives contain higher level of oleic acid in the oil fraction compared to olives from hot regions.

The oil contained in table olives has the same nutritional and health benefits with the extra virgin olive oil which is reported below in more detail. The only major difference is that the olive seed contributes to the fatty acid profile of the extracted oil. During processing, only water-soluble compounds can diffuse through the flesh and skin (during soaking and fermentation operations) whereas the oil content remains unaffected. Despite this assertion, some researchers observed a loss of oil content in olives during lye treatment and reported that sometimes lye treated olives have a soapy taste.

Another important chemical group is carbohydrates. It was estimated that in raw olives the percentage of carbohydrates ranges between 8-12% (w/w). Specifically, the olive flesh contains both soluble sugars and sugar polymers including cellulose, hemicellulose or pectins and lignin (concentrated in the pit). Both hemicellulose and cellulose contribute to the structural characteristics of olive flesh. So, during ripening and processing, changes or reductions of polysaccharides can influence the organoleptic profile of processed olives. Cellulose (3-6%, w/w) covers a significant amount of olive fibre. It is noticeable that raw olives tend to have more fibre than processed olives.

Soluble sugars in olive flesh are glycose, fructose, sucrose and mannitol. Glycose and fructose are utilized in metabolic processing and mannitol is a translocated sugar (operates in the olive the tree). In raw olive flesh soluble sugars range from 0.5% to over 5% (w/w).

This concentration depends on the variety and growing conditions and decrease gradually from the beginning of oil synthesis. An important point is that moisture changes have an impact on soluble sugar concentration. Soluble sugars in the olive flesh are essential to support fermentation during processing. Olives, which undergo prolonged soaking and multiple washing steps, lose an amount of intrinsic sugars. So, during processing, it is essential to add further soluble sugars in order to reinforce the fermentation process.

Reducing sugars in raw olives provide the main energy source for fermentative microorganisms during processing. With dried olives, some of the soluble sugars in addition to the oil content contribute to the energy and organoleptic qualities of the processed olives. Other nutritionally important substances in the flesh are proteins, minerals and vitamins.

Phenolic compounds constitute approximately 2-3% (w/w) of olive flesh with oleuropein being the most abundant polyphenol. During olive fruit growth, oleuropein accumulates and is slowly converted to elenolic acid glucoside and demethyloleuropein as the fruit ripens. The aim of table olive processing is to reduce the levels of oleuropein in the flesh and hence improve the sensory characteristics of the final product.

Low levels of soluble and insoluble proteins are contained in olive flesh at concentrations approximately 1.5% (w/w). In raw olives there are amino acids including arginine, aspartic acid, alanine, glutamic acid, glycine, histidine, methionine, phenylalanine, tyrosine, leucine, isoleucine, threonine, valine, proline and serine (Table 17).

Table 17: Typical composition of green, ripe (darkened) and natural olives in essential aminoacids (mg/100g).

	Concentration range		
	Green	Ripe (darkened)	Natural Black
Valine	99.0 - 138.0	104.0 – 125.0	114.0 – 176.0
Isoleucine	77.0 - 107.0	103.0 – 124.0	48.0 – 74.0
Leucine	131.0 – 183.0	127.0 – 152.0	57.0 – 88.0
Threonine	41.0 – 57.0	---	55.0 – 84.0
Methionine	35.0 – 49.0	27.0 – 33.0	13.0 – 20.0
Phenylalanine	73.0 – 103.0	87.0 – 105.0	61.0 – 94.0
Lysine	11.0 - 16.0	---	7.0-10.0
Tryptophane	14.0 – 20.0	18.0 – 21.0	14.0 – 22.0

Source: (Romero, et al., 2004)

Raw olive flesh also contains pigments (e.g., chlorophylls and anthocyanins), minerals (e.g., phosphorus, potassium, calcium, boron, magnesium, etc.) (Table 18), vitamins (vitamin C, B1, B2, B6, A precursor, E group) and organic acids.

Table 18: Typical composition of green, ripe (darkened) and natural olives in minerals (mg/100g).

	Green	Ripe (darkened)	Natural Black
Phosphorus	7.0 – 21.0	5.3 - 15.0	2.5
Potassium	34.0 – 109.0	5.0 - 12.0	29.3
Calcium	35.0 – 86.0	55.0 – 70.0	27.9
Magnesium	6.0-40.0	18.0 – 40.0	8.4
Sodium	1300.0 – 1800.0	590.0 – 810.0	1374.0
Sulphur	14.0 – 30.0	6.0 - 18.0	6.0
Iron	0.6 - 1.2	3.0 – 11.0	0.3
Manganese	0.06 - 0.12	0.10-0.12	0.02
Zine	0.25 - 0.40	0.30-0.5	0.25
Copper	0.40 - 0.80	0.30-0.4	0.06

Source: (Romero, et al., 2004)

The quality of this product is linked to the combined effect of various factors, such as the suitability of raw materials, processing technologies, nutritional composition and, in no small measure, the sensory properties.

Olive oil

The feature that makes olive oil different from other vegetable oils, is the low content in saturated fatty acids and high content in monounsaturated fatty acids. Olive oil contains mainly triacylglycerols (99%) and secondarily free fatty acids, mono- and diacylglycerols, and an array of lipids such as hydrocarbons, sterols, aliphatic alcohols, tocopherols, and pigments. A plethora of phenolic and volatile compounds are also present and their occurrence contributes to the olive oil's unique character.

Olive oil's fatty acids, which exist in olive oil, are palmitic (C16:0), palmitoleic (C16:1), stearic (C18:0), oleic (C18:1), linoleic (C18:2), and linolenic (C18:3). Moreover, myristic (C14:0), heptadecanoic and eicosanoic acids are also found in trace amounts. The most important fatty acid is oleic (18:1, omega-9 fatty acid) (Kiritsakis, 1993) (Boskou, 2006).

The composition of fatty acids in olive oil may differ and depends on the zone of production, the latitude, the climate, the variety, and the stage of maturity of the olive fruit. Greek, Italian, and Spanish olive oils are low in linoleic and palmitic acids and have a high percentage of oleic acid. On the other hand, Tunisian olive oil is high in linoleic and palmitic acids and lower in oleic acid. Based on the analysis of samples from various countries, olive oils are classified in two types, one with low linoleicpalmitic and high oleic acid content, and the other with high linoleic-palmitic and low oleic acid content. Fatty acid composition depends on the maturity stage. Ninni (1999) reported that oleic acid is formed first in the fruit and there is a strong antagonistic relationship between oleic and palmitic, palmitoleic and linoleic acids. It

is essential to mention that a maximum level for linolenic acid should be set up, because it can be used as a marker of adulteration.

Approximately three decades ago, it was proved that the chemical composition of Greek olive oil excels, by far, from other countries' olive oil. This excellence is due to the fact that the Greek olive oil is very rich in oleic acid, linoleic (18:2, omega-6) acid and it contains α-linolenic (18:3 omega-3) and arachidonic (20:4, omega-6) acid (Paul, et al., 1988).

Another important chemical class is called hydrocarbons. This category includes squalene which is a precursor in sterol biosynthesis. Its presence is regarded as partially responsible for the beneficial health effects of olive oil and its chemo preventive action against certain cancers (Rao, et al., 1998) (Smith, et al., 1998). It is the main constituent of the unsaponifiable matter and covers more than 90% of the hydrocarbon fraction. Its concentration ranges from 200 to 7500 mg/ kg olive oil and it is influenced by the olive cultivar and oil extraction technology.   Apart from, the hydrocarbon fraction of virgin olive oil is composed of diterpene and triterpene hydrocarbons, isoprenoidal polyolefins, and nparaffins (Lanzón, et al., 1994).

Tocopherols (a, b, c and d with antioxidant activity) and carotenoids (xanthophylls, carotenes and lycopene) are also contained in olive oil in small concentrations (Kiritsakis, 1993). A-tocopherol exists in olive oil in free form and in an extensive range of concentration. The factors affecting its concentration are cultivation techniques (different origin of olive oil was proved to have a positive impact), technology and the maturity stage of olive fruit (ripe fruits have reduced concentration). Furthermore, reduced levels are also caused by refining or hydrogenation techniques.

Chlorophylls and carotenoids are included in the category of pigments. The color of the virgin olive oil ranges between green and yellow shades, because of the presence of chlorophylls and carotenoids. There are many factors affecting the color of olive oil including the olive cultivar, maturation index, production zone, extraction system, and storage conditions.

Olive oil, also, contains aliphatic and aromatic alcohols. These alcohols are found in free and esterified form. The alcohol categories, which are the most significant, are fatty alcohols and diterpene alcohols. The main fatty alcohols present in olive oil are docosanol, tetracosanol, hexacosanol, and octacosanol (Tiscornia et al., 1982; Boskou et al., 1983; Frega et al., 1992). Esters of fatty alcohols with fatty acids (waxes) are important minor olive oil constituents because they can be used as a criterion to differentiate various olive oil types (EC Regulation 2568, 1991). The category of diterpene alcohols are phytol and geranylgeraniol, which are two acyclic diterpenoids present in the aliphatic alcohol fraction of olive oil in the free and

esterified form (Camera and Angerosa, 1978; Paganuzzi and Leoni, 1979; Mariani et al., 1992; Cert et al., 1999; Reiter and Lorbeer, 2001). Their concentration is used in the estimation of the alcoholic index (a useful parameter for detecting solvent extracted olive oil in virgin olive oil).

The significant lipids, which are sterols, are inextricably linked with the quality of olive oil and extensively used for the examination of its authenticity. In olive oil, there are four categories of sterols: common sterols (4-desmethylsterols) (in free and esterified form), 4α-methylsterols, triterpene alcohols

(4, 4-dimethylsterols), and triterpene dialcohols. The factors, which affect sterol's composition and total sterol content, are cultivar, crop year, degree of fruit ripeness, storage time of fruits prior to olive oil extraction, processing and geographic factors. Olive storage and harvesting practices were found to be responsible for remarkable changes in the sterol's levels. In virgin olive oil, the sterol content ranges primarily between 1000 mg/kg (the lower limit set by the European Union Commission) (EC Regulation 2568, 1991) and 2000 mg/kg (Morchio et al., 1987; Aparicio and Luna, 2002).

Other olive fruit components are hydroxypentacyclic triterpene acids, which are biologically active compounds and exist at trace amounts in olive oil. Oleanolic (3β-hydroxyolean-12-en-28-oic acid) and maslinic acid (2α, 3β-dihydroxyolean-12-en-28-oic acid), which are the main triterpene acids, are found on the olive husk and a small quantity may be extracted during processing. In extra virgin olive oil, total triterpene acid content, which is obtained from fruits of different olive cultivars, is found to range between 40 and 185 mg/kg.

Approximately, two hundred and eighty compounds have been identified in the volatile fraction of virgin olive oil. They are hydrocarbons (more than 80 compounds), alcohols (45 compounds), aldehydes (44 compounds), ketones (26 compounds), acids (13 compounds), esters (55 compounds), ethers (5 compounds), furan derivatives (5 compounds), thiophene derivatives (5 compounds), pyranones (1 compound), thiols (1 compound), and pyrazines (1 compound) (Table 19). From this large number of compounds, only 67 were found to be present at levels higher than their odor threshold contributing to the aroma of virgin olive oil. These volatiles are responsible for the green and fruity perception of the unique virgin olive oil aroma.

Table 19: Odorants contributing to the aroma of olive oil.

Aldehydes	Esters	Alcohols
Ethanal	Ethyl acetate	Butan-2-ol
Propanal	Ethyl propanoate	2-Methylbutan-1-ol
2-Methylbutanal	Ethyl butanoate	3-Methylbutan-1-ol
3-Methylbutanal	Ethyl octanoate	(Z)-3-Hexen-1-ol
Pentanal	Ethyl cinnamate	Heptan-2-ol
Hexanal	Ethyl 2-methylpropanoate	1-Octen-3-ol
(E)-2-Hexenal	Ethyl 2-methylbutanoate	Nonan-1-ol
(Z)-3-Hexenal	Ethyl 3-methylbutanoate	2-Phenylethanol
Heptanal	Ethyl cyclohexylcarboxylate	
(E)-2-Heptenal	Butyl acetate	**Ketones**
Octanal	3-Methylbutyl acetate	1-Penten-3-one
(E)-2-Octenal	(Z)-3-Hexenyl acetate	Octan-2-one
Nonanal	2-Methylpropyl butanoate	1-Octen-3-one
(E)-2-Nonenal		2-Methyl-2-hepten-2-one
(Z)-2-Nonenal	**Acids**	(Z)-1,5-Octadien-3-one
(Z)-3-Nonenal	Acetic acid	(E)-β-Damascenone
(E,E)-2,4-Nonadienal	Propanoic acid	(Z)-β-Damascenone
(E,Z)-2,6-Nonadienal	Butanoic acid	
(E)-2-Decenal	Pentanoic acid	**Others**
(Z)-2-Decenal	2-Methylbutanoic acid	Guaiacol
(E,E)-2,4-Decadienal	3-Methylbutanoic acid	4-Ethylguaiacol
(E,Z)- 2,4-Decadienal	Hexanoic acid	1-Octen-3-hydroperoxide
trans-4,5-Epoxy-(E)-2-decenal	Heptanoic acid	4-Methoxy-2-methyl-2-butanethiol
Phenylacetaldehyde		2-Isobutyl-3-methoxypyrazin
Vanillin		n-Octane

Source: (Boskou, 2006)

In crude olive oil, some classes of minor constituents exist. One of these classes is phospholipids. It was proved that the main phospholipids are phosphatidylcholine, phospatidylethanolamine, phosphatitylinositol, and phosphatidylserine (Alter and Gutfinger, 1982) and their concentration is significant because of their antioxidant activity. The other category is proteins detected also in trace amounts.

In conclusion, olive oil is an absolutely unique combination of monounsaturated, polyunsaturated, saturated fatty acids and antioxidants. Thus, it ranks at the top of most nutritious vegetable oils.

Olive oil quality categories

According to EU Regulation 865/04 "on the Common Organization of Olive Oil and Table Olives Market", the quality categories of olive oil and pomace olive oil, which may be moved and sold within the European Community, are:

I. *Virgin Olive Oil,* produced by mechanical or physical processes and relatively low temperatures that cause no deterioration in the olive oil. This product is exposed to

no other processes than those of fruit cleaning, centrifugation and filtration. Virgin olive oil is divided into the following categories:

- *Extra Virgin Olive Oil*, whose acidity does not exceed 0.8 g per 100 g (0. 8%). This is a virgin olive oil containing free fatty acids (expressed as oleic acid) ≤0.8 g/100 g. The other characteristics are those of virgin olive oil.

- *Virgin Olive Oil*, the acidity of which does not exceed 2.0%. The free fatty acid content
(expressed as oleic acid) is ≤ 2 g/100 g. The other characteristics are those as in the other virgin olive oil categories.

- *Lampante Olive Oil*, whose acidity is higher than 2.0

II. *Refined Olive Oil*, obtained by refining virgin olive oils, the acidity of which does not exceed
0.3%.

III. *Olive Oil-composed* of refined olive oil and virgin olive oil, obtained by blending refined olive oil and virgin olive oil (except lampante olive oil), with acidity not exceeding 1.0%.

IV. *Crude Olive-pomace Oil*, obtained from olive pomace, after being treated with solvents or with physical means or, in other words, the oil corresponding to lampante oil (except for some special characteristics).

V. *Refined Olive-pomace Oil*, obtained from refining crude olive-pomace oil, the acidity of which does not exceed 0.3%.

VI. *Olive-pomace Oil*, obtained by blending refined olive-pomace oil and virgin olive oils, except lampante olive oil, the acidity of which does not exceed 1.0%.

The categories of edible olive oil are the extra virgin olive oil, the virgin olive oil and the olive oil composed of refined olive oil and virgin olive oil & pomace olive oil, which consistence must be appeared on the labels of branded olive oil.

Olive oil is covered by the EU schemes to promote and protect names of quality agricultural products. Thus, another important classification of olive oil is the following:

- *Protected designation of origin (PDO)*.P.D.O covers olive oil which is produced, processed and prepared in a given geographical area using recognized knowhow.

- *Protected geographical indication (P.G.I.)*. P.G.I. covers olive oil closely linked to the geographical area. At least one of the stages of production, processing or preparation takes place in the area.

- *Olive Oil Product Of Organic Farming* Olive oil produced from certified-organic olive plantations can be labelled as such, on the basis that it conforms with national organic labeling rules, or with the EU's Regulation (EC) No 834/2007 on organic production and labelling of organic products.

LEGISLATIVE FRAMEWORK

Common Agricultural Policy

Since 1960, the Common Agricultural Policy (C.A.P.) offers financial support to the European agricultural sector. In 2007, the E.U. budget for C.A.P. was estimated at 50% of the total E.U. budget, whereas in 2013 it was reduced to 42% and in 2020 it is expected to be maintained at about 35%. However, during the period 2014-2020, the European financial support allocated to the agricultural sector covers up the largest part of the E.U. budget (55,500,000,000 €/year).

Specifically, the new program period (2014-2020) is divided into two main funding pillars. *Pillar I* mainly concerns direct payments to farm owners (as income support) and, to a lesser extent, market intervention measures (e.g. export repayments, private storage aid, etc.), which are mostly offered as a safety net tool, when markets are unpredictably destabilized (e.g. adverse weather conditions). *Pillar II* offers financial support for long term rural development, assisting farm owners modernize their farms and become more competitive, while protecting the environment.

In addition, the new C.A.P. program promotes measures in order to support mostly greener, more sustainable agriculture (through "cross-compliance", and the introduction of the "Green Direct Payment") and more efficient agricultural activity through stricter regulations for the determination of active farm owners eligible for support, administrational improvements and more flexibility for member states concerning the allocation of CAP funding between the two pillars and the allocation of direct payments to promote their individual agricultural strategy.

The new CAP aims at the gradual convergence in the allocation of direct payments per hectare among member states (external convergence) in order to reduce several disparities

brought about by: i) historic allotment systems; and ii) the accession of new member states in the EU. Specifically, the aim is to close ⅓ of the gap between the current level of subsidy in each member state and 90% of the EU average by 2020 (Figure 22). Greece is a country member with a high direct subsidy per cultivated land

(384 €/ha in 2013, when the EU average was estimated at 293 €/ha). In 2019, the Greek share in the EU CAP budget is expected to decrease to 3.5%, when in 2007 it was estimated at 5.6% (these percentages correspond to approximately 2,000,000,000 €/year for the period 2014-2020, compared with

2,500,000,000 €/year during 2007-2013).

Figure 22: Subsidy per Hectare.
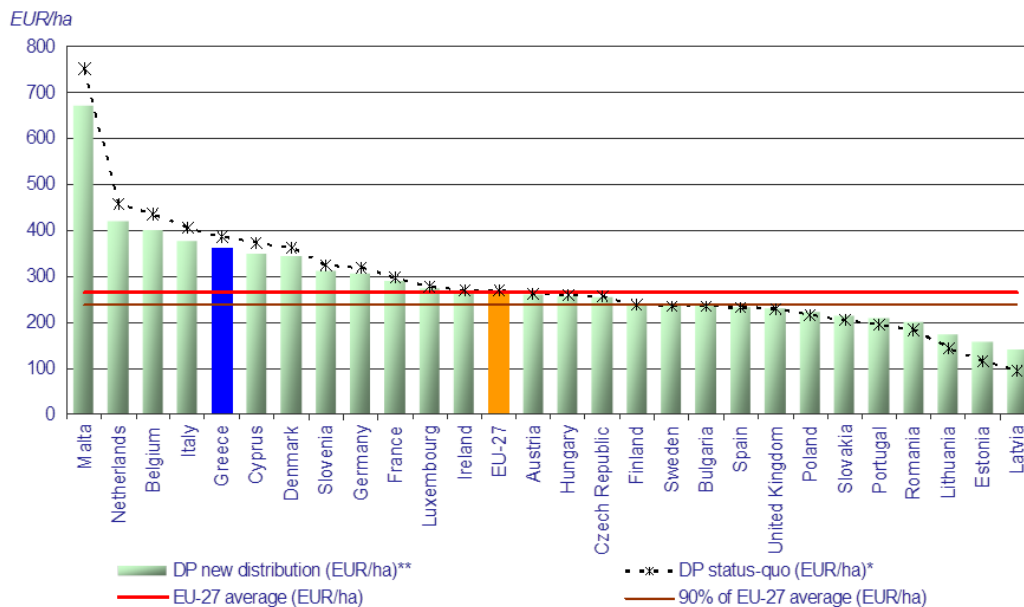
Source: European Commission

   Implementation of CAP reforms in Greece

The new CAP (2014-2020) will offer more than 19,500,000,000 € (total allocation of direct payments and rural development, in current prices) in the Greek agricultural sector and rural areas. Against the background of the main principles of the new CAP, Greece has allocated its available funds to the two Pillars (77 % in Pillar I and 23% in Pillar II) by setting guidelines regarding the allocation of Pillar I funds:

All types of farm owners are eligible for 85 % of annual payments, based on the following allocation scheme:

 a. arable land (absorbing 47% of funds - €420/ha)

 b. permanent crops (absorbing 28% - €500/ha)

 c. pastures (absorbing 25%- €250/ha)

The percentage of 85% includes two categories, namely: i) Basic Payment (55% of annual payments), and ii) Green Direct Payment (30% of annual payments), which is accompanied by environmental criteria.

- Farm owners of specific products (e.g. legumes, forage, sugar beet, hard wheat, bovine animals, goats, rice, industrial tomato, seeds, oranges for juice and asparagus) will also receive extra subsidies. These coupled payments will absorb 8% of direct payments.

- Farm owners in areas with natural constraints (e.g. mountainous areas) will absorb 5% of direct payments (transferred to Pillar II).

- Young farm owners (less than 40 years old) will absorb the remaining 2% of direct payments (as an incentive to join the sector and modernize the production process).

At this point, it is important to note that, during 2015-2019, in an effort to moderate the convergence process, there is a provision for a maximum drop of 30% for each farm owner / hectare Figure 23: Greek CAP and Pillar I Decomposition, respectively.

Arable Areas
Pastures
Permanent Plantations

Basic Payments Greening
New & Young Farmers Coupled Payments
Transer to Pillar II
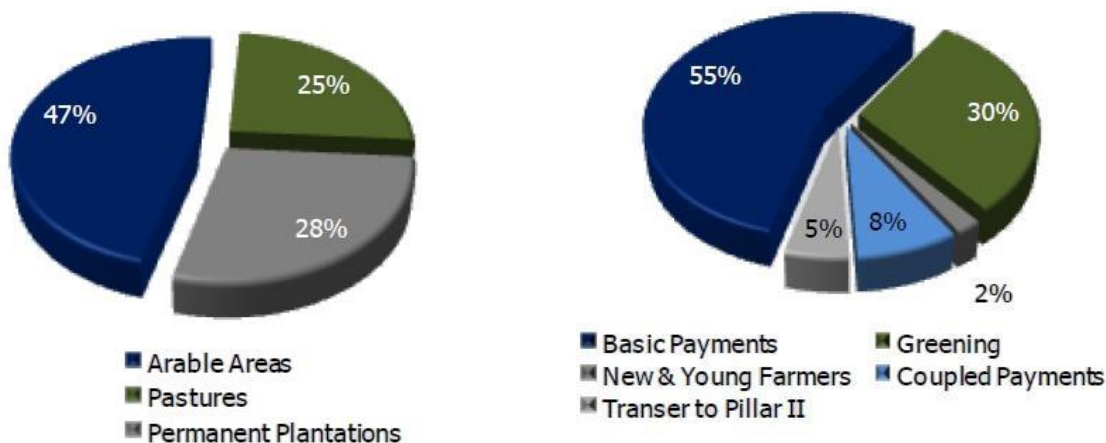
Source: OPEKEPE

 More equitable and greener direct payments

The new direct payments will be distributed in a more equitable way between member-countries, regions and especially farmers. The Greek direct payments are estimated at 15,400,000,000 €. The active farmers will be benefit from offering income-support

schemes. In addition, young farmers will be strongly supported to set up their business by offering a new 25% assistance supplement, during the first 5 years. CAP will give the opportunity to Greek farmers to receive simple, proven measures to promote sustainability and combat climate change. Moreover, 30% of direct payments will be connected to three environmentally-friendly farming practices: crop diversification, maintaining permanent grassland and conserving 5% of areas of ecological interest or measures considered to have at least equivalent environmental benefit.

Market measures to strengthen position of farmers in the food supply chain

In the new CAP program, Greece is willing to improve the food supply chain balance, dedicating new instruments to farmers in order to facilitate them to get well organized and market their products in a better way. As a result, both professional and interprofessional organizations will be strengthened.

Supporting key priorities for Greece's rural development

For the period 2014-2020, in Greece, a large amount will be spent in accordance with well-defined priorities set out in the so-called "Rural Development Program" (RDP). The new CAP program will focus on the following main objectives:

- Improving competitiveness of the agricultural sector
- Preserving ecosystems and an efficient use of natural resources, while fighting against climate change " Offer employment opportunities in rural areas.
- Promote innovation across all activities in the RDP

Implications for the olive sector

Olive oil is in an aid scheme. Until 1 November 2005, the aid amounted to 132.25 €/100 kg of subsidized olive oil. In 2005/06, the aid scheme was put into force coming from the reform of the Common Market Organization (CMO) in tobacco, cotton and olive oil. The full or partial decoupling of premiums from the production of these products is anticipated and the creation of a single payment system per farm. In Greece, according to JMD (Joint Ministerial Decision) 292464 / 27.7.2005, the percentage decoupling of premiums from the olive oil production amounted to 100%.

Until 2008/09, apart from the total aid scheme decoupling of the olive oil production, also provided a quality reduction of 4%, both in the olive oil and table olive sector, in order to improve the quality of products and protect the environment. According to JMD 256494 / 4.1.2006, the area deducted from the olive sector, was granted to beneficiaries as an annually area aid in certain types of farming and in particular certified crops.

In 2010, the percentage of deduction was abolished and replaced from other specific aid measures in order to promote specific types of farming, improve quality and enhance marketing. According to JMD 262345/ 22.3.2010, an additional annual aid was granted to farmers, who cultivate and produce PDO and PGI olive products, and were certified for integrated management or organic farming. The total annual budget support amounted to 10,000,000 € and the indicative value of the additional aid (for the olive oil and table olive sectors) was estimated at 300 €/ha. Additional actions to implement support measures pursuant to Article 68 of Regulation (EC) 73/2009 and Regulation 1120/2009 were regulated by JMD 263343 / 4.6.2010.

The new CAP program has many changes for the olive sector. Greek olive producers will benefit from the fact that they will be allowed to receive the full amount of the Green Direct Payment without the obligation to meet environmental requirements. However, their subsidies will suffer through:

- the reduction of the total CAP budget for Greece (about 17 % lower in 2019 compared with 2013), and the reduction of the share of the budget received (approximately 18% in 2019 21% in 2006)

- Combining the above-mentioned effects, olive farm owners will receive about 390,000,000

  €/year, during 2015-2020 compared with 455,000,000 € in 2014. Therefore, the annual subsidy for olive farm owners will be around 530 €/ha in 2019 (versus 640 €/ha in 2014), leading to a subsidy of about 1.35 €/kg of olive oil in 2019 (versus 1.55 €/kg in 2014).

The size of the reduction will not be uniform across all farm owners. Due to the objective to eliminate the inequalities between farm owners, well-paid olive farmers of southern Greece will suffer a greater reduction to their subsidies which, however, have a ceiling of 30% during 2015-2019).
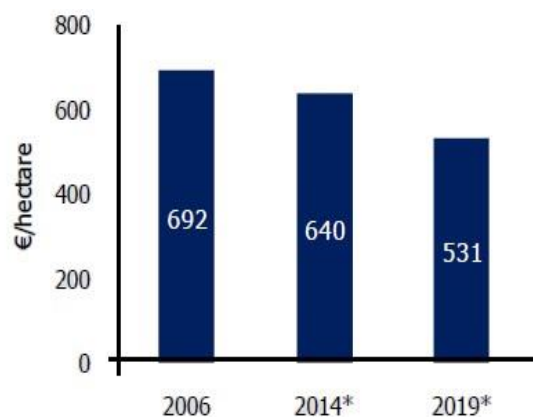
Figure 24: Olive Oil Subsidies National Weighted Average.

Table 20: Olive oil subsidies (€/ha).

Region	2006	2014*
Crete	1,554	1,065
Ionia Islands	971	776
Region	2006	2014*
Attiki	298	756
Western Greece	467	558
Peloponnese	515	548
Northen Aegean	310	440
Sterea Ellada	289	400
Eastern Macedonia & Thraki	560	387
Central Macedonia	657	378
Epirus	236	336
Thessaly	262	317
Southern Aegean	354	276
Western Macedonia	225	132
Weighted National Average	692	640

Common Market Organization's Legislation for olive oil and table olives

Commission Regulation (EC) No. 2568/91 of 11 July 1991 concerns the characteristics of olive oil and olive-residue oil and the relevant methods of analysis Annex I to this Regulation, which defines the olive oil characteristics to be fulfilled. The characteristics are determined by following the methods of analysis set out in article 2. For the purpose of assessing organoleptic characteristics, the Member States should set up panels of trained and selected tasters in accordance with the rules laid down by the method set out in Annex XII. The Community provisions concerning the presence of undesirable substances, other than those referred to in Annex XI, shall apply.

Commission Regulation (EU) No. 1019/2002 adopts olive oil marketing standards at the retail level. The olive oil sales, which intend to the final consumer, must be packaged in containers of maximum capacity five liters.

Commission Regulation (EC) No. 826/2008 of 20 August 2008 lays down common rules for granting of private storage aid for certain agricultural products and complementary measures for the establishment of procedures and supporting documents for the grant Community aid scheme for private olive oil storage under the Reg. (EC) 1234/2007 and Reg. (EC) 826/2008.

Commission Regulation (EC) No. 182/2009 of 6 March 2009 amending Regulation (EC) No 1019/2002 on marketing standards for olive oil. It is compulsory the indication of the origin country for both virgin and extra virgin olive oil. In particular, this Regulation concerns the following cases. If olive oil comes from a single country, then this country should be required indicating on the product's label. If olive oil is a mixture of olive oils from different EU countries, then you must indicate either "blend of community olive oils" or "EU product". If olive oil is a mixture of olive oils from different "third countries", it should be indicated as a "mixture of olive oil outside the EU" or a reference to origin outside the EU. If olive oil is a blend of Community olive oils with "third countries", it should be indicated as a "blend of non-Community olive oils" or a reference to the European Community origin or not. In case of PDO or PGI olive oil, the corresponding patented name of the region must be inscribed.

Commission Implementing Regulation (EU) No. 29/2012 of 13 January 2012 lays down marketing standards for olive oil at the retail level. The olive oil sales to the final consumer must be realized in packages of maximum capacity of 5 liters. It incorporates all the past revisions. This Regulation amends article 12(2) of Regulation (EC) No. 357/2012 which sets out marketing standards for olive oil and repeals those laid down under Regulation (EC) No. 1019/2012. By virtue of this Regulation, products which have been manufactured and labelled in the European Union or imported into the European Union and put into free

circulation in accordance with Regulation (EC) No. 1019/2002 before 1 January 2013 may be marketed until all stocks are used up.

Commission Implementing Regulation (EU) No. 65/2013 of 24 January 2013 amending Annex III to Regulation (EC) No 826/2008 laying down common rules for the granting of private storage aid for certain agricultural products.

Commission Implementing Regulation (EU) No. 299/2013 of 26 March 2013 amending Regulation (EEC) No 2568/91 on the characteristics of olive oil and olive-residue oil and on the relevant methods of analysis This Regulation lays down some amendments to Regulation (EEC) No. 2568/91 on the characteristics of olive oil and olive-residue oil and on the relevant methods of analysis. Firstly it amends the definition of olive oil marketed, which in the new provision means total quantity of olive oil and olive pomace oil of a relevant Member State that is consumed in that Member State or exported from that Member State. Further the Regulation inserts a new provision which stipulates that natural or legal persons and groups of persons who hold olive oil and olive pomace oil from the extraction at the mill up to the bottling stage included, for whatever professional or commercial purposes, shall be required to keep entry and withdrawal registers for each category of such oils.

Commission Implementing Regulation (EU) No. 1305/2013 for rural development support by the European Agricultural Fund of Rural Development (EAFRD) and the repealing of Regulation (EC) No. 1698/2005.

Commission Implementing Regulation (EU) No. 1306/201 concerns financing, management and monitoring of the common agricultural policy and the repealing of Regulations *(EEC) No. 352/78, (EC) No. 165/94, (EC) No. 2799/98 (EC) No. 814/2000, (EC) No. 1290/2005 and (EC) No. 485/2008.*

Commission Implementing Regulation (EU) No. 1307/2013 lays down rules for direct payments to farmers under common agricultural policy aid schemes and the repealing of Council Regulation (EC) No. 637/2008 and Council Regulation (EC) No. 73/2009.

Commission Implementing Regulation No. 1308/2013 of the European Parliament and of the Council of 17 December 2013 establishing a common organization of the markets in agricultural products and repealing Council Regulations (EEC) No 922/72, (EEC) No 234/79, (EC) No 1037/2001 and (EC) No 1234/2007. This Regulation establishes a common organization of the markets for agricultural products, namely all the products listed in Annex I to the Treaties with the exception of the fishery and aquaculture products as defined in European Union legislative acts on the common organization of the markets in fishery and aquaculture products. Agricultural products covered by these provisions include cereals, rice, sugar, seed, olive oils and table olives, fruits and vegetables, wine, tobacco, milk and

milk products, meat, apiculture products and silkworms. Reference is made to the general Common Agricultural Policy provisions. Communication on the publication of the volume of olive oil production as referred to in Article 169(4) of Regulation (EU) No 1308/2013 of the European Parliament and of the Council.

Commission Implementing Regulation (EU) 1310/2013 lays down certain transitional provisions for rural development support by the European Agricultural Fund for Rural Development (EAFRD) and amending Regulation (EU) No. 1305/2013 of the European Parliament and of the Council, as far as the resources and their distribution for the year 2014 are concerned and amending Regulation (EC) No. 73/2009 and Regulations (EU) No. 1307/2013, (EU) No. 1306/2013 and (EU) No. 1308/2013 of the European Parliament and of the Council as regards their application in 2014.

Commission Implementing Regulation (EU) No 1333/2013 of 13 December 2013 amending Regulations (EC) No 1709/2003, (EC) No 1345/2005, (EC) No 972/2006, (EC) No 341/2007, (EC) No

1454/2007, (EC) No 826/2008, (EC) No 1296/2008, (EC) No 1130/2009, (EU) No 1272/2009 and (EU) No 479/2010 as regards the notification obligations within the common organization of agricultural markets.

Commission Implementing Regulation (EU) No 1335/2013 of 13 December 2013 amending Implementing Regulation (EU) No 29/2012 on marketing standards for olive oil, in particular as regards labelling. It stipulates that information on the special preservation conditions for oils subject to article 1(1), namely that they must be stored away from light and heat, shall appear on their containers or on labels attached to them. In addition, each Member State shall verify the accuracy of the labelling, in particular the conformity of the trade name of the product with the contents of the container, on the basis of risk analysis as referred to in article 2a of Regulation (EEC) No. 2568/91.

Commission Implementing Regulation (EU) No 1348/2013 of 16 December 2013 amending Regulation (EEC) No 2568/91 on the characteristics of olive oil and olive-residue oil and on the relevant methods of analysis. The present Regulation updates Regulation (EEC) No. 2568/91 as regards the methods of analysis to be followed to determine characteristics of oils. It is stipulated that verification by national authorities or their representatives of the organoleptic characteristics of virgin oils shall be effected by tasting panels approved by the Member States. Annex VI, on determination of erythrodiol and uvaol, is hereby repealed; new Annex XXa, on method for the detection of extraneous oils in olive oils, is inserted.

Commission Delegated Regulation (EU) No 611/2014 of 11 March 2014 supplementing Regulation (EU) No 1308/2013 of the European Parliament and of the Council as regards the

support programs for the olive-oil and table-olives sector. This Regulation lays down rules supplementing Regulation (EU) No. 1308/2013 establishing a common organization of the markets in agricultural products. These supplementing measures concern the measures eligible for European Union funding, the minimum allocation by the Member States of European Union funding to specific areas and the criteria and procedures for approving work programs in the olive-oil and table-olives sector.

Commission Implementing Regulation (EU) No 615/2014 of 6 June 2014 laying down detailed rules for the application of Regulation (EU) No 1306/2013 of the European Parliament and of the Council and Regulation (EU) No 1308/2013 of the European Parliament and of the Council in respect of work programs to support the olive oil and table olives sectors. The objective of this Regulation is to enable producer Member States to introduce measures to manage the olive oil and table olive sector aid scheme. To this end it establishes procedures concerning work programs and amendments to them, the disbursement of European Union financing, including advances, the amounts of securities to be lodged, checks, inspection reports, corrections and penalties in the event of irregularities or negligence in the implementation of the work programs.

No. 5746/157266 / 11.12.14 Ministerial Decision "Determining the necessary additional measures for the implementation of Regulation (EU) 1308/2013 of European Parliament and of the Council, as regards the recognition of Producer organizations and Associations of producer organizations in the olive oil and table olive sector.

No. 218/7541 / 01/21/15 Ministerial Decision "Additional measures for the implementation of Regulations (EC) 1308/2013 of the European Parliament and of the Council 611/2014 the Commission "to complement the Regulation (EU) No. 1308/2013 of the European Parliament and of the Council, as regards the sector support programs olive oil and table olives' and 615/2014 from the Commission "for details implementing Regulation (EU) No. 1306/2013 of the European Parliament and of And Council Regulation (EU) No. 1308/2013 of the European Parliament and of Council on the work programs to support the sectors of olive oil and table olives "(SAA: O14PSV3CHCH, Government Gazette 194 / B / 1.23.15)

No. 2623/57222 / 05.25.2015 Ministerial Decision "Modification of No. 218/7541/2112015 Decision of the Minister of Rural Development and Food "Additional measures for the implementation of Regulations (EC) 1308/2013 of the European Parliament and of Council 611/2014 Commission "to complement the Regulation (EU) No. 1308/2013 of the European Parliament and of the Council concerning programs support the olive oil sector and table olives "and 615/2014 Commission "For the application of Council Regulation (EU) No.

1306/2013 of the European Parliament and of the Council and Regulation (EU) No. 1308/2013 of the European Parliament and the Council on the work programs to support sectors of olive oil and table olives' "(V1012 / 02.06.15, appointing authority: 7T1G465FTHIZ3P).

No. 3119/70244 / 06.23.15 Ministerial Decision "Modification of No. 218/7541/2112015 Decision of the Minister of Rural Development and Food 'Supplementary measures the implementation of Regulations (EC) 1308/2013 of the European Parliament and of Council 611/2014 Commission "to complement the Regulation (EU) No. 1308/2013 of the European Parliament and of the Council concerning programs support the olive oil sector and table olives "and 615/2014 Commission "For the application of Council Regulation (EU) No. 1306/2013 of the European Parliament and of the Council and Regulation (EU) No. 1308/2013 of the European Parliament and the Council on the work programs to support sectors of olive oil and table olives' "(B 1250 / 06.24.15 appointing authority: 60AO465FTHIV7T).

No. 1802/36612 / 03.31.15 Ministerial Decision "Approval and disposal programs Work 'organizations (O.E.F) of Reg. (EC) 611/2014 of Commission (appointing authority: 7L49465FTHICHCHD) *No. 1234/2007 Ministerial Decision* as regards operators' organizations in the olive sector, their work programs and their financing Complementary measures for the implementation of Regulations (EC) 1234/2007 867/2008 and the Commission with regard to organizations in the olive sector, their work programs and their financing

1st Amendment of No. 266 342 / 12.02.2009 Ministerial Decision of the Ministers of Finance and Rural Development and Food "Complementary measures to implementation of Regulations (EC) 1234/2007 and 867/2008 of Commission, as amended and shall for organizations olive sector, their work programs and their financing "(FEK B '269 / 13.02.2009)

2nd Amendment of No. 266 342 / 12.02.2009 Ministerial Decision of the Ministers of Finance and Rural Development and Food "Complementary measures to implementation of Regulations (EC) 1234/2007 and 867/2008 of Commission, as amended and shall for organizations olive sector, their work programs and their financing" (FEK B '269 / 13.02.2012)

Details of implementation 266 342 / 12.02.2009 Ministerial Decision of Ministers Economy and

Finance and Rural Development and Food 'Additional measures for the implementation of Regulations (EC) 1234/2007 and 867/2008 of Commission on organizations in the olive sector, their work programs and their financing "

Modification of No. 320 858 / 04.08.2009 Ministerial Decision on 'Details application266 342 / 12.02.2009 decision of the Ministers of Finance and Rural Development and Food "Complementary measures to implementation of Regulations (EC) 1234/2007 and 867/2008 of Commission on organizations in the olive sector, their programs work and their financing "

DOMESTIC MARKET

Olive oil

During the last fourteen years domestic olive oil consumption has declined to approximately 110,000 tons. The period 2007/2008 was the beginning of a continuous reduction in olive oil consumption, whereas a 5% decline is expected in 2014/15 (equal to 11,000 tons). As a result, domestic olive oil consumption will be maintained at 160,000 tons.

Table 21: Domestic consumption per year.

Period	Quantity	Change
2001/02	270,000	-
2002/03	270,000	0.00%
2003/04	270,000	0.00%
2004/05	283,000	4.80%
2005/06	265,000	-6.40%
2006/07	269,500	1.70%
2007/08	264,000	-2.00%
2008/09	229,000	-13.30%
2009/10	228,500	-0.20%
2010/11	227,500	-0.40%
2011/12	200,000	-12.10%
2012/13	180,000	-10.00%
2013/14*	171,000	-5.00%
2014/15*	160,000	-5.00%
provisional data		
Quantity in tons		

Source: International Olive Council

However, according to a primary research focused on the companies of the olive oil sector, combined with estimations of several market factors, the actual domestic olive oil consumption ranged at lower levels. In 2013/14, the total actual olive oil consumption was estimated at 140,000 tons, presenting a reduction of -3.5% compared to 2012/13. The same was observed in branded olive oil consumption, the reduction of which was estimated at

2.9% (Table 22). Of course, the main reasons, that contributed to this decrease, were the prolonged financial crisis and the relatively high retail prices of branded olive oil compared to those of seed oil.

Table 22: Estimated actual domestic consumption of olive oil (2001/02-2013/14).

Period	Branded olive oil	Change	Total of olive oil	Change
2001/02	43,000	-	160,000	-
2002/03	41,000	-4.70%	165,000	3.10%
2003/04	45,000	9.80%	165,000	0.00%
2004/05	45,500	1.10%	170,000	3.00%
2005/06	42,000	-7.70%	155,000	-8.80%
2006/07	43,000	2.40%	160,000	3.20%
2007/08	45,000	4.70%	170,000	6.30%
2008/09	43,000	-4.40%	165,000	-2.90%
2009/10	41,000	-4.70%	160,000	-3.00%
2010/11	39,000	-4.90%	155,000	-3.10%
2011/12	36,000	-7.70%	150,000	-3.20%
2012/13	34,000	-5.60%	145,000	-3.30%
2013/14	33,000	-2.90%	140,000	-3.50%
Quantity in tons				

Source: I.C.A.P. Group S.A., market estimations

At this point, it should be clarified that the above table does not include the organic olive oil consumption. This happens because the organic olive oil consumption was diachronically limited and, in 2013, it was estimated at only 1,450 tons (Table 23).

Table 23: Domestic market size of organic olive oil (2000-2013).

Year	Production	Exports	Consumption
2000	1,350	970	380
2001	1,400	1,000	400
2002	1,580	1,130	450
2003	1,950	1,400	550
2004	2,600	1,900	700
2005	3,200	2,300	900
2006	3,500	2,400	1,100
2007	3,800	2,500	1,300
2008	4,100	2,600	1,500
2009	4,300	2,700	1,600
2010	4,450	2,800	1,650
2011	4,600	3,000	1,600
2012	4,750	3,250	1,500
2013	4,700	3,250	1,450
Quantity in tons			

Source: I.C.A.P. Group S.A., market estimations

As far as the structure of the domestic olive oil market is concerned, in 2013/14, bulk olive oil presented the largest share (ranged between 70 -75%, including the share of 30% of self-consumption) and the branded olive oil represented only 25-30% of the domestic olive oil consumption market (Figure 25). The most successful category of branded olive oil was the private label products promoted by supermarkets that showed an upward trend.

Figure 25: Structure of domestic olive oil consumption (2013/14).
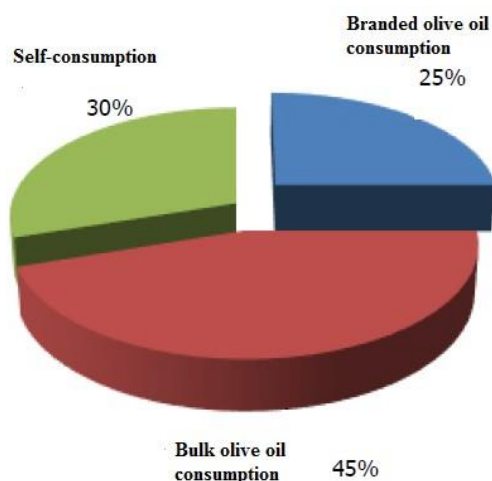
A paradox is that in 2013/14 olive oil consumption presented a decline, while the value was increased.

The total value of the domestic olive oil market (both bulk and branded olive oil) was estimated at 360,000,000 € (wholesale prices), presenting an increase of 2.9% over the previous time period. The same change is recorded in the branded olive oil value, which was 2.9%, corresponding to a value of approximately 140,000,000€ (Table 24).

Table 24: Value of domestic olive oil market (2008/09-2013/14).

Period	Bulk and Branded olive oil	Change	Branded olive oil	Change
2008/09	325,000	-	145,000	-
2009/10	320,000	-1.50%	135,000	-6.90%
2010/11	310,000	-3.10%	129,000	-4.40%
2011/12	290,000	-6.50%	126,000	-2.30%
2012/13	350,000	20.70%	136,000	7.90%
2013/14	360,000	2.90%	140,000	2.90%
Value in th. € (wholesale prices)				

The following tables show the results of the latest available Household budget Survey carried out by the Greek Statistical Authority (ELSTAT) related with the monthly average household expenditure for the olive oil purchase (Table 25). According to this survey, in 2013, the monthly average expenditure per household on the olive oil market amounted to 13.47€, covering 4.6% of the average monthly expenditure on buying food and 73.5% of the expenditure category "oils and fats". It is noticeable to recall that an important factor, which contributes to the shaping of the (comparatively low) average monthly expenditure of olive oil, is the high rate of self-consumption that characterizes the product.

Table 25: Average monthly oil markets in urban and rural areas (2011-2013).

Characteristics of households	All regions	Urban regions	Rural regions
2011			
Total number of households	4,148,860	3,376,833	772,027
Total purchases	1,824.02	1,921.46	1,397.82
Food items	334.51	345.85	284.9
Oils and fats	19.95	20.97	15.48
Olive oil	*14.34*	*15.15*	*10.8*
2012			
Total number of households	4,163,236	3,368,349	794,887

Total purchases	1,637.10	1,717.06	1,298.23
Food items	311.6	323.65	260.54
Oils and fats	19.82	21	14.83
Olive oil	*14.58*	*15.65*	*10.03*
2013			
Total number of households	4,178,116	3,301,831	876,285
Total purchases	1,509.39	1,578.25	1,249.90
Food items	290.96	295.06	275.53
Oils and fats	18.33	18.45	17.87
Olive oil	*13.47*	*13.61*	*12.94*
Value in €			

According to quantitative elements of the same investigation, it is noted that, in 2013, households bought on average 3.48 liters per month from the market whereas 1.05 liters were obtained from other sources (own production) (Table 26).

Table 26: Average monthly quantities of olive oil obtained from households in urban and rural areas (2011-2013).

Regions	Total olive oil markets	Olive oil from their own production
2011		
All regions	3.53	0.99
Urban regions	3.71	0.69
Rural regions	2.75	2.32
2012		
All regions	3.73	1.03
Urban regions	4	0.79
Rural regions	2.63	2.07
2013		
All regions	3.48	1.05
Urban regions	3.47	0.67
Rural regions	3.51	2.47
Quantity in liters		

Then, it is essential to present the market shares of the main Greek olive oil enterprises, in 2012/13 (Table 27). The market shares were estimated according to the total branded olive oil quantities provided by the companies in the Greek market and include all the brand names (and in some cases also private label products).

Table 27: Market shares of branded olive oil enterprises.

Enterprises	Market Shares
ELANTHI SA	33,0%-37,0%
MINERVA SA	21,0%-25,0%
KORE SA	≈22,0%
NUTRIA SA	≈11,5
HELLENIC FINE OILS SA	≈7,5
PEZA UNION CRETE SA	≈6,5
KRETA FOOD LTD	6,0%-6,5%
FOUFAS, BROS, SA	4,5%-5,0%
LATZIMAS SA	≈4,0%

Source: I.C.A.P. Group S.A., market estimations

It is necessary to estimate the concentration factor for the larger businesses in order to examine the intensity of the competition which prevails in the olive oil sector. In the branded olive oil sector, the degree of concentration is considered high, as the two largest companies covered more than half of the total market, in the period 2012/13. However, given that the bulk consumption refers to 'anonymous' products distributed by small producers, essentially it cannot be argued that there is a high concentration of overall olive oil market.

Table olives

According to the International Olive Council, in the period 2014/2015, table olive consumption in Greece is estimated at 20,000 tons, noting an increase of 33% compared with 2013/2014 (Table 28). It is worth noting here that the largest share of domestic table olive consumption concerns mainly table olives which are distributed and marketed in bulk.

Table 28: The domestic table olive consumption per year (2001/02-2014/15).

Period	Quantity	Change
2001/02	29,500	-
2002/03	33,000	11.90%
2003/04	30,000	-9.10%
2004/05	43,000	43.30%
2005/06	28,000	-34.90%
2006/07	26,000	-7.10%
2007/08	24,000	-7.70%
2008/09	20,000	-16.70%
2009/10	20,000	0%
2010/11	16,000	-20.00%
2011/12	15,000	-6.30%
2012/13	20,000	33.30%
2013/14*	15,000	-25.00%
2014/15*	20,000	33.30%

Estimation	
Quantity in tons	

In 2013/14, the value (in wholesale prices) of the domestic table olive market was estimated at around

30,000 €, presenting a reduction of approximately 25%, compared to 2012/13 (Table 29).

Table 29: The value of domestic table olive market.

Period	Domestic market	Change
2008/09	40,000,000	-
2009/10	41,000,000	2.50%
2010/11	33,600,000	-18.00%
2011/12	33,000,000	-1.80%
2012/13	40,000,000	21.20%
2013/14	30,000,000	-25.00%
Value in €(in wholesale prices)		

The following tables show the results of the latest available Household budget Survey carried out by the Greek Statistical Authority (ELSTAT) related with the monthly average household expenditure for table olives purchase. In 2013, the monthly average expenditure per household for preserved olives purchase was amounted to 1.14€ (very low participation of monthly table olive purchases throughout the food markets) (Table 30).

Table 30: Average monthly table olive purchases in urban and rural areas (2011-2013).

Household characteristics	All regions	Urban regions	Rural regions
2011			
Total number of households	4,148,860	3,376,833	772,027
Total purchases	1,824.02	1,921.46	1,397.82
Food items	334.51	345.85	284.9
Preserved vegetables and table olives	3.89	4.11	2.95
Table olives preserved in brine, olive oil, vinegar etc.	*1.1*	*1.16*	*0.87*
2012			
Total number of households	4,163,236	3,368,349	794,887
Total purchases	1,637.10	1,717.06	1,298.23
Food items	311.6	323.65	260.54

Preserved vegetables and table olives	3.73	3.85	3.21
Table olives preserved in brine, olive oil, vinegar etc.	*1.22*	*1.23*	*1.15*
2013			
Total number of households	4,178,116	3,301,831	876,285
Total purchases	1,509.39	1,578.25	1,249.90
Food items	290.96	295.06	275.53
Preserved vegetables and table olives	3.46	3.52	3.21
Table olives preserved in brine, olive oil, vinegar etc.	*1.14*	*1.16*	*1.11*
Value in €			

Source: EL.STAT.

In 2013, according to quantitative data of the same survey, it was observed that households, in all regions, bought approximately 236 grams of table olives per month and 89 grams were obtained by otherwise sources (i.e., own production).

Table 31: Average monthly quantities of table olives obtained from households in urban and rural areas (2011-2013).

Regions	Total table olive purchases	Table olives (from their own production)
2011		
All regions	218.09	41.74
Urban regions	228.67	23.01
Rural regions	171.82	123.69
2012		
All regions	254.76	53.73
Urban regions	253.17	37.91
Rural regions	261.5	120.8
2013		
All regions	235.66	89.31
Urban regions	235.14	40.05
Rural regions	237.63	274.91
Quantity in g		

Source: EL.STAT.

The following table presents the estimated market share of several table olive enterprises for the time period 2012/13. According to these data, Kordatos SA ranked first followed by and Papanikita Ormylia Bros, with market shares of approximately 11% and 10%, respectively.

Table 32: Market shares of branded olive oil enterprises.

Enterprises	Market Shares
KORDATOS SA	≈11,0%
PAPANIKITA, BROS, ORMYLIA SA	≈10,0%
DEAS SA	≈9,0%
ASSOCIATION OF AGRICULTURAL COOPERATIVES OF HALKIDIKI	≈7,5%
KONSTANTOPOYLOS OLYMP SA	≈7,5%
INTERCOMM FOODS SA	≈6,0%
LADAS SA	≈6,0%
SATIVA SA	5,5%-6,0%

Source: I.C.A.P. Group SA, market estimations

It is necessary to estimate the concentration factor for the larger businesses, in order to examine the intensity of the competition, which prevails in the table olive sector. In 2012/13, the above eight table olive enterprises comprised 63% of the total domestic table olive market, indicating that the degree of concentration in the domestic market table olive market is high.

GREEK EXPORTS

Introduction

During the last thirty years, European countries have turned into international trade. A series of occurrences such as the establishment of the European Economic Community (EEC) (1958), the subsequent establishment of the European Union (EU) and the completion of a single market (1993), aimed to strengthen free trade and the creation of a single market. As a result, all member-states, and especially smaller countries, supported that they would benefit more from the free trade application. Thus, smaller countries would manage to cause restructuring of external trade, due to the adjustment of production structure.

The period, between 1998 and 2003, Greek economy was stigmatized by significant economic events, such as changes in exchange rates (exchange rate crises and currency devaluations, e.g. Drachma devaluation), changes in oil price (due to the oil crisis or crises in oil producer countries) and changes in functioning of trade (due to terrorist activity, armed hostilities, the accession of new Member States to the EU, accession to EMU).

The entrance of Greece in the Eurozone was a historical benchmark because it brought about many changes in monetary and exchange rate policy. These changes were accompanied with the continued enlargement of the EU and international development. Thus, intense questions were spawned about whether Greek economy was able to exploit its comparative

advantages, in order to be competitive both in national and international level. The focal point of trade development was the liberalization of the credit system (1987-1994). This liberalization gave the opportunity to banks to finance sectors and economic activities, putting their conditions and freely negotiating interest rates.

According to the Hellenic Statistical Authority (EL.STAT.), from 1960 to 2000, the deficit, in current transactions balance, ranged from 0% to 5% of the Gross Domestic Product (GDP). From 2000 onwards, GPD has showed continuous reduction, with peak in year 2009, when the deficit surged to

14.9% of GPD. In fact, this reduction revealed the significant lack of the country's competitiveness.

Table 33: The enduring contribution of Greek exports, imports and trade balance to Greek GDP.

	2009	2010	2011	2012	2013
Exports % GDP	7.6%	9.5%	11.7%	14.2%	15.2%
Imports % GDP	22.5%	22.7%	23.2%	25.5%	25.8%
Trade balance % GDP	-14.9%	-13.2%	-11.6%	-11.2%	-10.6%

Source: EL. STAT.

From 2009 onwards, the deficit has gradually begun to decrease and in 2013, the contribution of Greek exports in GDP stood at 15.2%, approximately doubled percentage from those of 2009. However, this percentage was considered quite small, because in other European economies, exports contributed more than 50% in GDP.

	2013*	2014*	2015*	% Change	
				2014/2013	2015/2014
A. IMPORTS - ARRIVALS					
I. Ship imports included	31,361.1	31,452.2	28,337.1	0.3%	-9.9%
II. Ship imports excluded	30,505.4	29,811.9	27,763.7	-2.3%	-6.9%
III.Petroleum products excluded and ship imports included	19,892.5	21,252.2	20,834.7	6.8%	-2.0%
B. EXPORTS - DISPATCHES					
I. Ship imports included	18,438.3	17,835.9	17,241.1	-3.3%	-3.3%
II. Ship imports excluded	18,376.5	17,792.2	17,130.8	-3.2%	-3.7%
III. Petroleum products excluded and ship imports included	11,056.2	10,773.8	12,094.6	-2.6%	12.3%
C. TRADE BALANCE - ship imports included (=B.I-A.I)	-12,922.8	-13,616.3	-11,096.0	5.4%	-18.5%
D. TRADE BALANCE - ship imports excluded (=B.II-A.II)	-12,128.9	-12,019.7	-10,632.9	-0.9%	-11.5%

| E. TRADE BALANCE - petroleum products excluded and ship imports included(=B.III-A.III) | -8,836.3 | -10,478.4 | -8,740.1 | 18.6% | -16.6% |

Table 34 External trade of Greece (January-June).

*provisional data

Source: EL. STAT.

Table 35: Greek trade balance in million € (provisional data: January –May).

	2013	2014	Change 14/13	2015	Change 15/14
I. Exports	9,327.7	9,207.1	-1.3%	8,490.8	-7.8%
II. Imports	16,453.6	16,933.8	2.9%	15,307.2	-9.6%
Trade balance (I - II)	-7,125.9	-7,726.7		-6,816.4	

Source: Bank of Greece

From the above tables, it is obvious that in the first semester of 2015 the Greek trade balance showed improvement. However, both exports and imports of goods were reduced. <u>The reduction of imports was higher than those of exports and this was the reason of trade balance's reduction</u>. Thus, in recent years, the main concern of the Greek government should be a quick comeback to reinforce exports in order to regain the lost ground.

Table 36 Greek exports by economic union in million € (January-July).

Regions	Exports		% Change	% Structure	
			15/14	2015	2014
World			-3.1%	100.0%	100.0%
OECD	**2015**	**2014**	6.6%	56.8%	51.7%
E.U.(28)	**15,098.2**	**15,580.0**	14.1%	53.9%	45.8%
	8,579.3	8,050.9			
	8,140.3	7,135.3			
	5,758.4	4,929.3			
	4,758.7	3,972.5			
Eurozone			16.8%	38.1%	31.6%
G7			19.8%	31.5%	25.5%
North America	893.9	591.4	51.1%	5.9%	3.8%
BRICS	344.1	463.1	-25.7%	2.3%	3.0%
M. East & N. Africa	2,144.4	2,107.6	1.7%	14.2%	13.5%
OPEC	870.5	1,006.4	-13.5%	5.8%	6.5%
Gulf Countries			-4.5%	4.0%	4.1%

Black Sea Economic Cooperation	609.0	637.6	-24.0%	18.0%	22.9%
	2,715.2	3,574.5			
	142.1	233.9			
Eurasian-EEU			-39.2%	0.9%	1.5%
North Africa	941.7	993.4	-5.2%	6.2%	6.4%
Sub-Saharan African Countries	157.0	132.0	18.9%	1.0%	0.8%
MERCOSUR	59.0	60.0	-1.8%	0.4%	0.4%
Ship Supplies	148.6	879.5	-83.1%	1.0%	5.6%

Source: EL. STAT. Data processed by Export Research Centre (KEEM)

In 2013, as far as the Greek export value (€) is concerned, Greece ranked in the 19th place, among the EU-28 countries. This place could be characterized low and indicates that the world-famous Greek products (such as feta cheese, olive oil, etc.) were not presented on foreign markets and their position had been replaced by neighbor country's products such as Italy (5th place) and Spain (7th place). In particular, as far as community trade is concerned, in 2012 Greece took the 23rd place among the EU-28 and in 2013 the 22nd place. Nevertheless, Greek exports among the European community were quite low. With regard to Greek exports globally (excluding intra-community Greek exports) Greece ranked in the 17th place in 2013. It is a paradox fact that Greece ranked in higher place in extra community exports than in intra community exports.

Table 37: Greek merchandise trade in million € (January- July).

Products	Value		% Change	% Structure	
	2015*	2014*	15*/14*	2015*	2014*
AGRICULTURAL PRODUCTS	3,014.7	2,596.6	16.1%	20.0%	16.7%
Food and live animals	2,180.3	2,127.9	2.5%	14.4%	13.7%
Beverages and tobacco	384.3	317.6	21.0%	2.5%	2.0%
Animal and vegetable oils and fats	450.2	151.0	198.0%	3.0%	1.0%

RAW MATERIALS	565.0	542.8	4.1%	3.7%	3.5%
Crude materials inedible, except fuels	565.0	542.8	4.1%	3.7%	3.5%
FUELS	4,506.7	6,147.6	-26.7%	29.8%	39.5%
Mineral fuels, lubricants, etc.	4,506.7	6,147.6	-26.7%	29.8%	39.5%
INDUSTRIAL PRODUCTS	6,618.1	5,941.2	11.4%	43.8%	38.1%
Chemicals and related products	1,613.8	1,577.3	2.3%	10.7%	10.1%
Manufactured goods classified chiefly by raw material	2,532.7	2,179.2	16.2%	16.8%	14.0%
Machinery and transport equipment	1,474.7	1,218.5	21.0%	9.8%	7.8%
Miscellaneous manufactured articles	996.8	966.3	3.2%	6.6%	6.2%
OTHER	393.6	351.9	11.9%	2.6%	2.3%
Commodities and transactions not classified by category	393.6	351.9	11.9%	2.6%	2.3%
TOTAL EXPORTS	15,098.2	15,580.0	-3.1%	100.0%	100.0%

Source: KEEM calculations based on original EL. STAT. preliminary data

Based on the above provisional data table, the decline of Greek exports was due to the significant decline in fuel exports (-26.7%). This large reduction exceeded the increase in other major export sectors. The increase of agricultural product exports (16.1%), of industrial product exports (11.4%), of raw materials exports (4.1%) and of class types and transactions not classified by categories exports (11.9%) was very important but it was limited. More specifically, with regard to agricultural products, the large export increase (16.1%) from 2,127.9 million € to 3,0147 million € was due to the over triplication of the category " Animal and vegetable oils and fats" (from 151 million € to 450.2 million

€).

Regarding to subcategories of products, certainly buoyed the rise of virgin olive oil in the 3rd place. Furthermore, it is important to point out the emergence of processing machines (laptops, smartphones, tablets, GPS, etc) in the 8th place, the doubling of various types of pipes for oil and gas pipelines in the 15th and 19th place, respectively, and tobacco in the 20th place. They were all introduced in the TOP 20 ranking of Greek export products for the first time. It is also noticeable that the category of ''Olives and vegetables, prepared or preserved'' remained among the first places.

Table 38: Ranking of top 20 Greek export products (January –July 2015).

Ranking 2015	Ranking 2014	Product description	Value (mil.€)	Quantity (tons)
1	1	Mineral oil	3,661.3	7,946,869.6
2	2	Medicines for retail sale	362.2	9,609.5
3	14	Virgin olive oil	307.7	85,289.9
4	3	Aluminum plates, sheets and tapes > 0,2mm	303.1	100,378.6
5	4	Confidential products	271.5	70,859.2
6	5	Fish	208.9	39,481.5
7	6	Olives and vegetables, prepared or preserved	199.4	85,789.2
8	12	Automatic data-processing machines	188.8	1,820.4
9	8	Tubes and pipes	188.7	31,960.7
10	7	Cheese	186.1	31,929.1
11	11	Aluminum Alloys	133.6	62,051.1
12	16	Cigarettes	133.5	12,803.1
13	10	Cotton	124.8	92,886.5
14	13	Aluminum sheets <0,2mm	122.0	36,657.2
15	50	Pipes for oil and gas pipelines	114.5	123,756.1
16	9	Apricots, cherries and peaches	111.7	118,583.9
17	19	Aluminum ingot	110.8	37,069.7
18	15	Polypropylene	82.8	71,754.9
19	-	Other pipes, for oil or gas pipelines	78.1	82,426.3
20	25	Tobacco	74.6	14,978.4

Source: KEEM calculations based on original EL. STAT. preliminary data.

In summary, from the above table two important conclusions can be drawn. The first is the high growth of virgin olive oil exports and the second is the high place of "olives and vegetables, prepared or preserved" category, indicating that olive cultivation contributes extensively in the Greek external trade and generally in the Greek economy.

Greek virgin olive oil exports

Using the dataset of Eurostat, International Trade, in this section an analysis of the Greek virgin olive oil exports will be presented.. This analysis will cover the period from 2000 up to most resent years and the main countries destinations for the Greek olive oil. The

following figure illustrates the total Greek virgin olive oil exports, both in value (€) and quantity (kg), for the time period between 2000 and 2014.

Figure 26: The evolution of Greek olive oil exports, both in value (€) and quantity (Kg) (2000-2014).
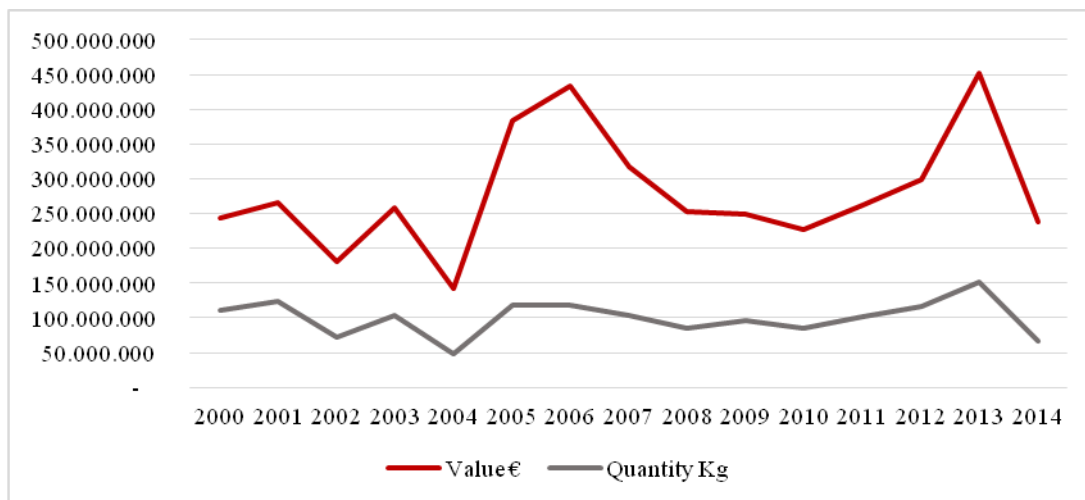
The most proper way, to examine the main olive oil export destination markets, is to estimate separately the Greek bulk and the branded olive oil exports. As it happens with most databases, Eurostat records the value and quantity of total exported virgin olive oil and thus it is essential to provide further information on this issue which is of major importance for the olive oil sector.

In 2012, the global market for branded olive oil was estimated at about 0.9 million tons. Spain and Italy covered up the highest percentages of branded olive oil (approximately 35%), while Greece was laggard (among the main olive oil producers), with a very low percentage (approximately 6%) (National Bank Of Greece, 2015) (Figure 28). The main difference, between branded and bulk olive oil export trade, is that the first one is more profitable (Figure 27).

Figure 27: International exports of branded olive oil (2012).
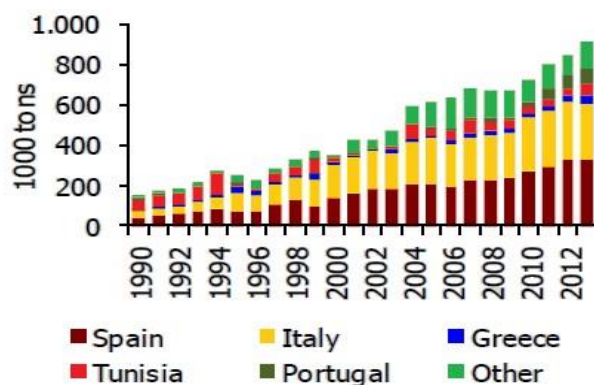
Source: Eurostat, Comtrade, NBG estimates

Indicatively, for the time period 2010-2013, the average price difference between branded and bulk olive oil was estimated at approximately 1.5€/Kg. It is common practice for some countries that import Greek olive oil in bulk to re-export olive oil as branded, in order to gain the added value of the product. However, the Greek olive oil had the highest price, in both categories (bulk and branded) and this was probably due to the quality excellence of the Greek olive oil.

Another significant result is that the export prices of branded olive oil reveal the different strategies followed by producer countries. Italy and Greece (to a lesser extent) offer high quality olive oil at a price of over 3.5€/kg, in order to penetrate the premium segment of the international market (Figure 28). Spanish olive oil offers a moderate level of quality and price (€2.6/kg) targeting the average consumer. Smaller producers such as Turkey, Tunisia and Morocco prefer to offer low price and quality olive oil in order to gain consumers who seek for low price products. **Figure 28: Export prices of virgin olive oil.**
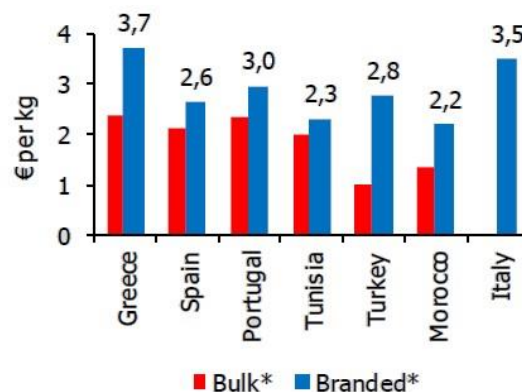
*Bulk exports are estimated as exports to Italy (and Spain for Greece)
** Average prices 2010-2013
Source: Eurostat, Comtrade, NBG estimates

Taking into account the above mentioned information, the next step was to identify the main export destinations of Greek virgin olive oil. Initially, the average percentage (both in terms of value and quantity) of Greek virgin olive oil exports per export destination market was estimated. The result was that the dominant export destination market was Italy. The percentages which Italy covers up were too high, with a market share 69.3% of the total exported value and 75.9% of the total exported quantity.

The main export destination markets are presented below (Table 39).

Table 39: Average percentages of the main Greek virgin olive oil export destination markets (2000-2014).

	% Value of Greek olive oil exports		% Quantity of Greek olive oil exports
Italy	69.3%	Italy	75.9%
Germany	5.9%	Germany	4.4%
U.S.A.	4.5%	U.S.A.	3.6%
Canada	2.6%	Canada	2.2%
United Kingdom	2.5%	Spain	1.9%
Spain	1.6%	United Kingdom	1.8%
Australia	1.5%	Australia	1.2%

Source: Eurostat

According to the data presented in Table 39, Italy ranked first and arguably was the most important export destination market. At this point, however, it should be noticed that the average percentage of quantity was higher than those of value, indicating that the marketing value was lower compared to other export markets. A remarkable fact is that the same phenomenon occurred with Greek exports in Spain. Thus, the question is why the two largest global producers traded olive oil from Greece. Many will support that the answer is complicated and depends on many factors, such as that Greece does not have an organized plan of brand name strengthening, the eruption of financial crisis and its effects in all sectors, the broken reliability of Greece's partners, etc. All these reasons are acceptable and certainly contribute to perpetuating this situation. Although, the key answer is the superior quality of Greek virgin olive oil. Italy and Spain are looking for this quality, in order to blend and upgrade their own olive oil production.

It should be noticed that the other export destination markets covered up smaller average percentage in terms of quantity than in terms of value. It is also remarkable that in these countries, the Greek virgin olive oil is exported mainly as branded.

Italy

Italy is considered as the strongest exporter of virgin olive oil. The paradox is that while Italy is the second largest olive oil producer globally, it introduces large quantities of bulk olive oil from Spain,

Greece and "third countries". In 2014, Italy imported approximately 478,334 tons (219,725 tons in 2013) from Spain, 45,051 tons (130,859 tons in 2013) from Greece, 20,513 (7,072 tons

in 2013) tons from Portugal and 20,243 tons (61,472 tons in 2013) from Tunisia. (Eurostat, 2014).

The increased Spanish production also benefited Italian industry of olive oil. In fact, Italian olive oil processing companies traditionally import bulk olive oil from different origins, qualities and specifications and then blend them to produce a branded product, which is then re-exported to international markets as Italian product for final consumption. These large international companies have used this strategy to dominate the international market of branded olive oil. This strategic plan is to combine the Spanish advantage of large production quantity (by Italian imports from Spain), the Greek advantage of high quality olive oil (by Italian imports from Greece) and the Italian extensive distribution networks and strong brand name.

Figure 29: Italian imports of virgin olive oil.
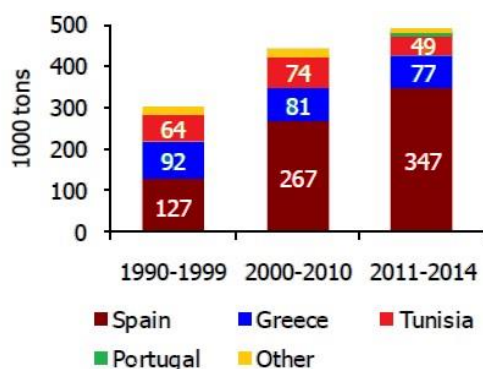
With regard to Greek virgin olive oil exports, 75.9% (2000-2014) of the total Greek exported quantity is directed to Italy (Figure 30). In recent years, a comforting fact is that Greek exports to Italian market have been reduced. The characterization of 'comforting' was used because exports to the Italian market mean exports of bulk olive oil which are not as profitable as the branded olive oil exports.

Figure 30: Exports of bulk olive oil to Italy.

change in share: -18%   -7%   -15%   -3%   15%   1%

1: Period 1990-1999
2: Period 2011-2014
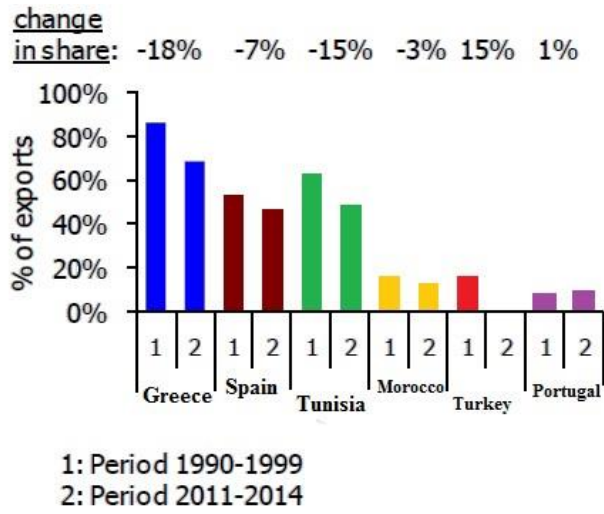
Source: Eurostat, Comtrade, NBG estimates

31: The annual average percentage (in terms of quantity and value) of Greek virgin olive oil exports to Italy (2000-2014).
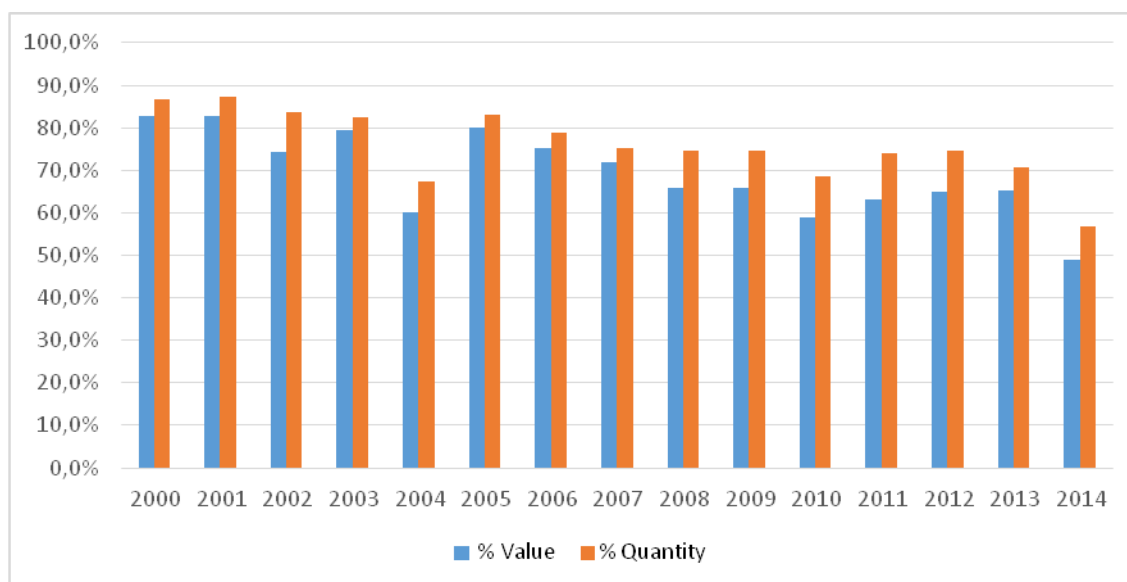
Source: Eurostat database

The conclusion of the above figures is that, in the time period 2000 to 2014, the percentage in terms of quantity is continuously higher than those of value. Nevertheless, the encouraging fact is that these percentages have decreased over 20%. Specifically, during the last 5 years, the contribution of bulk olive oil in Greek exports showed a slight reduction and it was replaced by branded olive oil exports to other destination markets. Of course, it shouldn't be forgotten that in the same time period the general Italian virgin olive oil imports noticed a high increase (in 2009, Italian imports were estimated at 433,832 tons, while in 2014 were estimated at 570,117 tons).

Germany

Firstly, it is essential to provide a brief description about the competition that the olive oil confronted in this market. In 2011, the olive oil had the largest market share (in terms of value) (19.9%) among vegetable oils. The rapeseed oil (16.7%) and sunflower oil (12.9%) were followers. However, in the time period 2006 to 2011, the olive oil's market share followed an overall downward trend (-9.5%), while the competing vegetable oils showed an upward trend (rapeseed oil (+ 9.5%) and sunflower oil

(+ 5%)). In terms of quantity, the olive oil's market share was 17.2% ranking third in German consumer preference. The rapeseed oil ranked in the first place (36.8%) and the sunflower oil ranked second (32.5%). In 2012, the market share of the rapeseed oil was increased (+ 1.9%), but the sunflower oil's market share was declined (-0.9%). The olive oil's market share

Figure

showed a small and encouraging increase (+ 0.4%). In 2010, for the first time, the rapeseed oil ranked first in sales, surpassing sunflower. In recent years its market share continues to grow (Ministry of Foreign Affairs, 2013).

During the last 20 years, in the German market, the olive oil consumption has almost sextupled. In 2012, Germany ranked in the 11th position on the global ranking of olive oil consumption (1.9% of global consumption). Thus, Germany is one of the most important olive oil import markets among the non-producer countries. At European level, Germany ranked in the 6th place among the EU-27, and in the 1st place among the EU-27, excluding producer countries. The largest percentage of olive oil imports in Germany was covered up by the category of virgin olive oil. In 2012, the virgin olive oil market share of total olive oil imports was 85.3% in terms of quantity and 86.9% in terms of value. Almost three quarters of total German olive oil imports were covered up by Italian exports followed by Greek and Spanish olive oil exports with similar but smaller market shares. Other supplier countries were France (1% of German olive oil imports), Turkey (0.4%), Tunisia (0.2%) and Portugal (0.2%). Therefore, Germany is an important export target-market, where the largest quantity of exported Greek virgin olive oil is branded resulting in higher profits for the country (Ministry of Foreign Affairs, 2013).

Between 2000 and 2014, the percentage of virgin olive oil value was higher compared to quantity, indicating that Germany is a more profitable market than Italy. Furthermore, the Greek virgin olive oil exports to the German market showed an incredible increase of 1% and 13% in the years 2000 and 2014, respectively. Generally, the German virgin olive oil market can be described as a growing market as in 2009, German imports were estimated at 52,645 tons and in 2014 at 60,383 tons) (Eurostat, 2014). Finally, it is noticeable that the year 2014 can be characterized as the most successful year for the Greek virgin olive oil exports in the German market.

32: The annual average percentage (in terms of quantity and value) of Greek virgin olive oil exports to Germany (2000-2014).
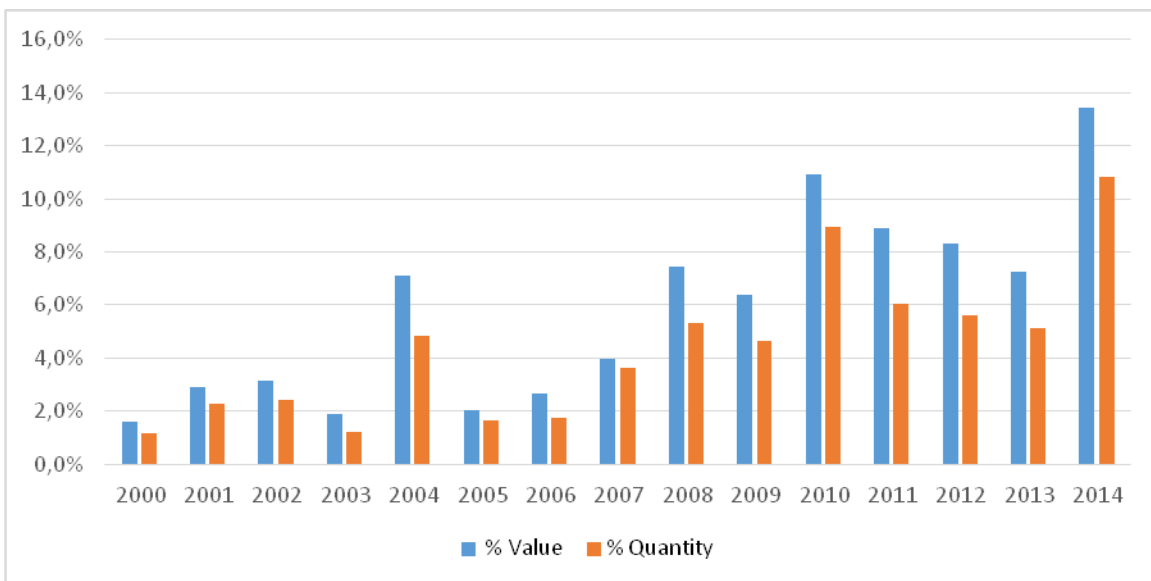
In Germany, the most popular olive oil packaging is the 500 mL glass bottle. This trend is due to the retail chains' view that larger packages (> 500 mL) are negatively correlated with the product's quality. Thus, the 500 mL glass bottle is widely used for private label products. In other distribution channels, such as cash & carry or olive oil specialty stores, larger containers are mostly used. Other important factors that limit the use of large packaging (>500 mL) in retail stores, are:

- The tendency of diminution of German households since 40% of total German households consists of one member and this trend is expected to continue in the future.

- The German consumers' sensitivity in price. As a result, it is more likely for a German consumer to try a new lower-priced product in a smaller package, e.g. a 250 mL bottle, even if the price per liter is higher.

- The bottle of olive oil should not remain open for a long time. The product should be consumed within approximately 2 months. Specifically, food magazines refer that bottled olive oil should be ideally consumed within 15 days from opening. So, this is feasible only by large households or households with per capita consumption higher than the German average.

Figure

As far as the material of the olive oil packaging is concerned, glass is the common choice, but there are some other options as well.

- The metal cans used both in the wholesale and retail sales (to a lesser extent than glass bottles). The use of metal packing is not prohibitive for premium olive oils, but it should be combined with an appropriate and modern design.

- The use of plastic packaging is combined with low quality and value olive oils. It is noticeable, however, that plastic can be used for innovative packages such as spray.

- Premium packaging products made of other materials (apart from glass), such as ceramic, etc.

- In some cases, foil wrapper or cardboard packaging (like spirits) can be used to improve the image of olive oil as a gift (Ministry of Foreign Affairs, 2013).

United States of America

In recent years, the olive oil consumption, in USA, has shown a continuous growth for two reasons. The first one is the beneficial effects of olive oil on health and the second is price reduction. If olive consumption is examined as an absolute number it could be characterized as relatively low, but if it is examined as percentage consumption per country, in 2012, USA ranked third globally (consuming about 9% of world olive oil production). This percentage, compared with Italy (21%) and Spain (19%), is quite low, but it surpasses the percentage of Greece (7%) (Greece holds the highest per-capita consumption). So, these numbers prove that the scope of increasing olive oil consumption, in USA, is enormous given the country's size and population. Thus, a small increase would have a significant impact on world consumption. In this market, there is an extremely small (but growing) percentage of consumers that are willing to pay quite dearly a top quality extra virgin olive oil (Ministry of Foreign Affairs, 2015).

USA is the largest olive oil importer worldwide (38%) followed by Italy where imports are mainly destined for re-export. From the early 1990s, the imported olive oil quantity has increased, but in the last five years, the growth rate has been retarded. In 2013-14, 59% of the total imported oil was introduced in packaged bottles. The remaining 41% was introduced in the country in bulk in order to be bottled by local firms (frequent occurrence is the blending with other olive oils). Then, firms package their products and sell them in retail stores (under a variety of brands and private labels) or in the food service sector. Italy ranked in the first place, in this market, of branded olive oil, while Spain ranked first in bulk

sales (United States Department of Agriculture, Economic Research Service, US Agricultural Trade: Imports) (Ministry of Foreign Affairs, 2015).

In the following figure, it is showed that the percentage of virgin olive oil value surpasses that of quantity indicating the profitability of the USA market. From 2009 onwards, Greek exports have shown a decline; however in 2014 this negative climate was reversed and Greek virgin olive oil exports showed a significant increase.

33: The annual average percentage (in terms of quantity and value) of Greek virgin olive oil exports to USA (2000-2014).
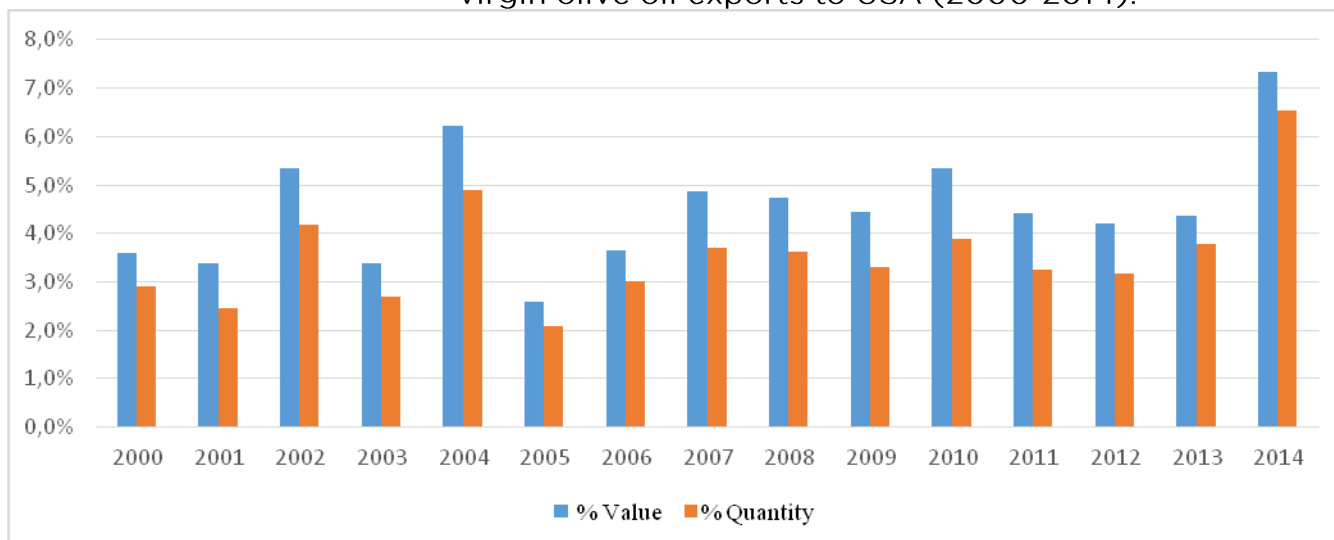
Source: Eurostat

The average American consumer gives great emphasis in product's packaging, which should be easy to use, in order consumer to cover quickly the everyday nutritional needs. The market seems to have a need for innovation in olive oil packaging. Some instances include olive oil packaging with built-in lid/measuring cup (which counts the desired quantity and enables the rest of olive oil to be channeled back into the pot), olive oil packaged with a spout which is applied to the bottle (very popular packaging), olive oil packaging which is accompanied by a small dish for olive oil serving as a dip, olive oil packaging which is accompanied by a box of spices (the product is ready to use in pasta, bread, etc.), etc.

Both olive oil and table olives, enriched with various flavors such as lemon, orange, basil, etc., are currently available only in gourmet shops. However, it could be a good idea to be displayed in retail chains because consumers are mostly willing to try new sophisticated flavors.

Moreover, in a recent survey, a large number of very frequent and fairly frequent olive oil consumers (37% and 51% respectively) were appeared to not present a particular preference to country's origin or in a specific brand, during the product selection process. Therefore, consumer's purchasing decisions are not determined by the product's quality, variety and

Figure

origin. So, the price remains the determining yardstick of buyers in the choice of olive oil (Ministry of Foreign Affairs, 2015).

The triptych of "quality – price – packaging" and their balance needs to conquer the Greek exporter in order to consolidate olive oil products into the American consumer's consciousness. The superior quality of Greek products, combined with a practical and easy packaging, at an affordable price, would be a good strategy for further penetration in the USA market (Ministry of Foreign Affairs, 2015).

Canada

Canada does not produce olive oil, so the consumed olive oil quantity comes exclusively from imports. It is essential to note that Canada produces one of the most important substitutes of olive oil, namely rapeseed oil. The rapeseed oil is advertised for its excellent quality, its vitamin and antioxidant content, although it is a genetically modified product. In 2012, in the Canadian market, the leader of virgin olive oil imports, in terms of value, was Italy (44.3%) followed by Greece (10%), Spain and Morocco (4.8%) (Ministry of Foreign Affairs, 2014).

The last five years (2010-2014) were considerably more successful for the Greek olive oil in the market of Canada than the period 2000-2005. For the time period between 2000 and 2014, Greek exports to the Canadian market have presented a three-fold increase (both in terms of value and quantity). The year

2014 can be characterized as one of the most successful year for Greek exports in this market (Figure 34).

Figure 34: The annual average percentage (in terms of quantity and value) of Greek virgin olive oil exports to Canada (2000-2014).

In 2011, the Canadian imports of olive oil in less than 18 kg packaging were estimated at 91,318,226

Canadian $. However, the Canadian imports of olive oil in ≥ 18 kg containers were estimated at 14,799,039 Canadian $. As a result the Canadian market prefers imports of branded olive oil. The dominant packaging of virgin olive oil is the squared glass packaging of 500 mL, accompanied by beautiful and attractive labels. The glass remains the main packaging material even though there are other materials such as plastic or metal. The retail chains prefer the squared shape for capacity reasons (Ministry of Foreign Affairs, 2014).

Finally, it should not be forgotten that, as it was referred in the USA market, Canadian consumers are price sensitive and price consists the basic criterion, in order to choose an olive oil (Ministry of Foreign Affairs, 2015).

8.2.5   United Kingdom

The United Kingdom is also an important export market destination, because it belongs to the non olive oil producer countries. In 2011-2012, the United Kingdom ranked in the 7th place among the EU-27, and in the 2nd place excluding EU olive oil producer countries. According to the available British statistics, during 2010-2014, British olive oil imports recorded important annual variation in terms of value. In 2011, an increase was recorded (+1.12%), followed by a reduction in 2012 (-11.9%), and a substantial increase in 2013 (+16.14%), while in 2014 a slight decrease was observed (-2.12%) (Ministry of Foreign Affairs, 2014).

The most important British market remains that of London and the surrounding area of Southeast England. From a commercial point of view, the importance of these regions is due to the population density, the large number of foreigners (originating from Mediterranean countries) and the high per capita income (Ministry of Foreign Affairs, 2014).

From 2010 onwards, concerning the British imports from Greece, a gradual but significant decrease was recorded. Specifically, in 2010, the Greek market share was 4.24% (in terms of quantity) and 4.97% (in terms of value). In 2014 the respective percentages shrank at 2.28% and 2.96%, respectively. It is noticeable that a large amount of Greek olive oil cannot be recorded because it is imported through Italy and big retail chains sell as a private label product (Ministry of Foreign Affairs, 2014).

From 2005 onwards, Greek virgin olive oil exports ranged in very low levels. In 2014, a slight increase was recorded but the percentage in terms of quantity was equal to those of value. This practically means that the United Kingdom could not be considered as a profitable market for olive oil (Figure 35).

Figure 35: The annual average percentage (in terms of quantity and value) of Greek virgin olive oil exports to United Kingdom (2000-2014).
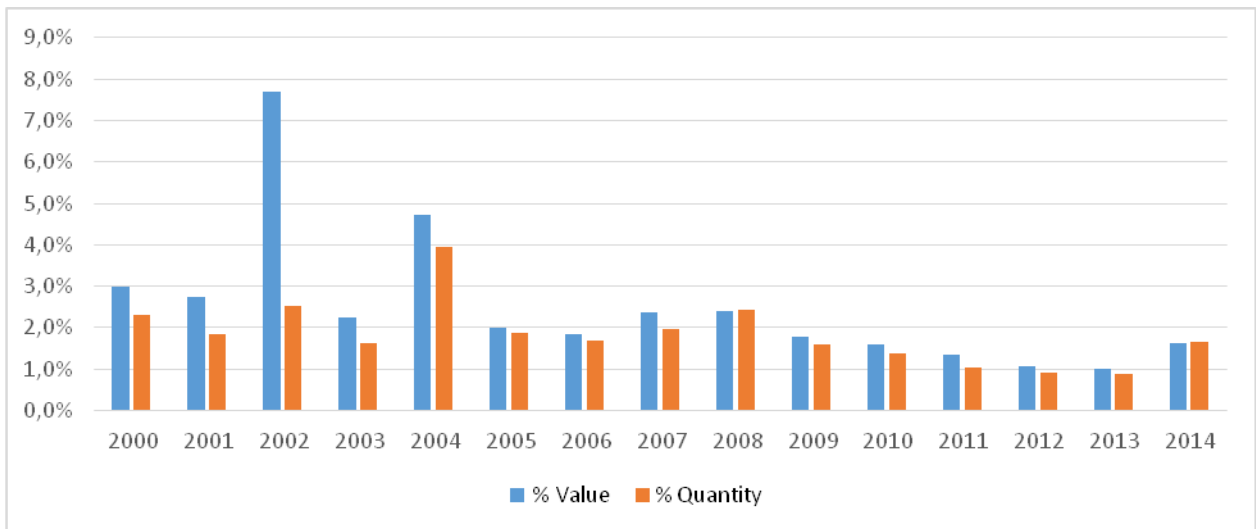
In 2010, the most widely used packaging was that of 500 mL (which was accounted for 37% of total sales). The packaging of 750, 1000, and 250 mL covered 23%, 17%, and 23% of total sales, respectively. In the perception of the British consumer, the packaging of 250 mL is inextricably linked with the superior quality of the product, and is usually used for aromatic oils. Food chains prefer squared bottles in order to save space on their shelves.

The glass remains the dominant form of packaging, because it is linked with the image of a superior quality, more natural and healthier product that gives the opportunity to assess the basic quality characteristics, such as color, etc. In recent years, many companies experimented with the use of cooking spray packaging. This package does not enjoy a positive response from British consumers. Of course, this low resonance is probably due to the poor olive oil quality and not to packaging. A higher quality product in the corresponding package would probably have higher resonance.

Finally, the label plays an important role, as it contributes to the aesthetic image of the product, but also it has the ability to transmit to the consumer the qualitative uniqueness of the product or information about the production process (Ministry of foreign affairs, 2012).

Greek table olive exports

In line with the previous section, in this section, will be presented a trade analysis of the annual Greek table olive exports. The data set which was employed for this purpose was the database of the Food and Agriculture Organization of the United Nations as derived by the **Statistics Division** (Faostat). The following figure illustrates the total Greek table olive

exports, both in value (1000$ U.S.) and quantity (tons), for the time period between 2000 and 2012.

Figure 36: The evolution of Greek table olive exports, both in value (1000 $ U.S.) and quantity (tons) (2000-
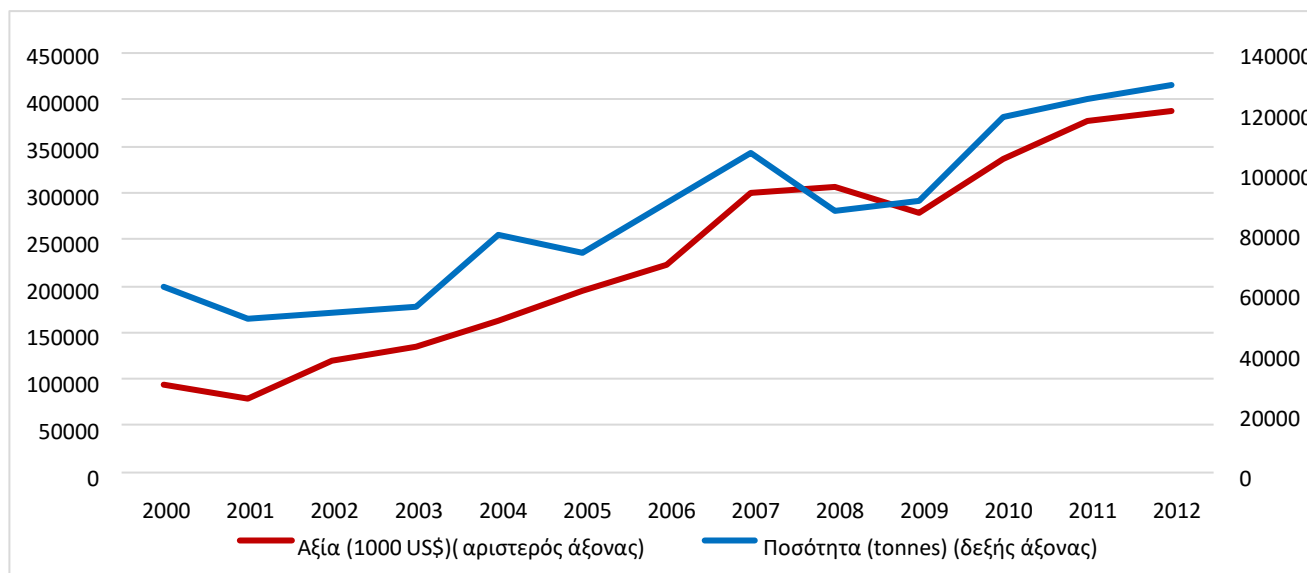
2012).

The most proper way, to examine the main table olive export destinations, is to estimate separately the Greek bulk and the branded table olive exports. As it happens with Eurostat's database, Faostat's database also records the value and quantity of total exported table olives and thus it is essential to provide further information on this issue, which is of major importance for the table olive sector. As it occurs with Greek olive oil exports, Greek table olives show an extremely high percentage of exports in bulk (75%). The average price of bulk table olives is approximately 1.5 €/kg, while the price of branded table olives is about 6.5 €/kg. The extra revenue, in the case where all Greek exports were branded products, could amount to around €0.5 billion/year (nowadays this extra income is lost) (National Bank Of Greece, 2015).

The following table shows the main export destinations of Greek table olives. First of all, for the time period between 2000 and 2012, the average percentage, in terms of value and quantity, of the Greek table olive exports per destination market were estimated indicating that the main export markets are the U.S.A., Italy, Germany and Australia (Table 40).

Table 40: Average percentages of the main Greek table olive export destination markets (2000-2012).

	% Value		% Quantity
U.S.A.	28%	U.S.A.	22%
ITALY	12%	ITALY	16%
GERMANY	10%	GERMANY	9%
AUSTRALIA	9%	AUSTRALIA	7%
CANADA	6%	CANADA	6%
UNITED KINGDOM	5%	UNITED KINGDOM	6%
BULGARIA	4%	BULGARIA	6%
ROMANIA	3%	ROMANIA	5%

Source: FAOSTAT

According to the data presented in Table 41, the U.S.A. raked first and arguably is the most important export destination market followed by Italy. At this point, however, it should be noticed that the percentage in terms of quantity is higher than in terms of value (the same observation holds for the Greek virgin olive oil exports). This indicates that Italy is a less profitable export market. Other export destinations with low marketing value are the United Kingdom, Bulgaria and Romania. On the other hand, the U.S.A., Germany, Australia and Canada covered up smaller average percentage in terms of quantity than in value, and they are considered more profitable export destinations.

United States of America

Until 1990, table olive consumption in the U.S.A. had been quite limited. The typical American diet was completely different from the European and especially from the Mediterranean diet. Table olives used to be consumed, in particular, through fast food consumption (e.g. in pizza) or through Mediterranean dishes in ethnic restaurants or through some ethnic food retail shops. At the end of 90s, the Mediterranean diet had affected a large proportion of Americans and table olive consumption begun to have more and more followers.

The U.S.A.'s table olive imports come from Spain, Greece, Italy, Turkey, Tunisia, Morocco and Argentina. Unlike the virgin olive oil sector, Greece is a strong competitor in the table olive sector. This view is based on the fact that, in 2012, Greece ranked first on six out of fourteen table olive categories (codes HTS 20057006, 20057012, 20057070, 20057075, 20057093

and 20057097) and was among the five first places in the rest categories (Ministry of Foreign Affairs, 2015).

In absolute and relative numbers, Greek table olive exports went far beyond the competing countries' exports. In most table olive categories, the Greek market share was remarkably high and reached up to

76.78% (Ministry of Foreign Affairs , 2012) .

Figure 37: The annual average percentage (in terms of quantity and value) of Greek table olive exports to U.S.A.

(2000-2012).
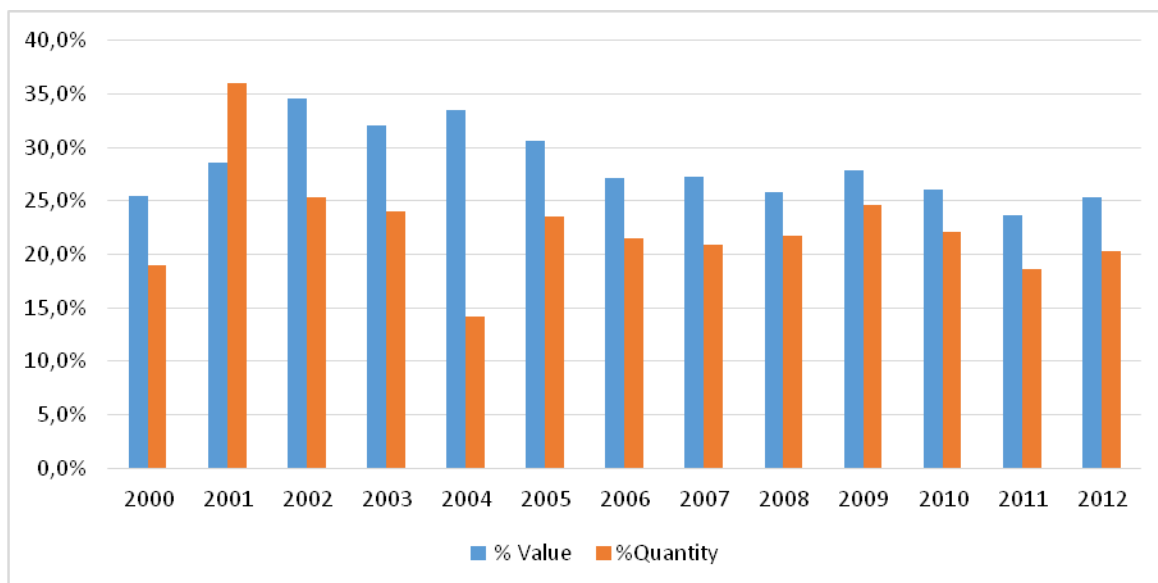
In the past, in the U.S.A. table olives were sold exclusively in glass containers or cans and, in most supermarkets, they were placed in the department of spices. However, with the advent of more sophisticated supermarket chains, table olives are available in greater variety, as part of sophisticated foodstuffs (delicatessen, olive bars) or are placed in the department of fresh fruit and vegetable where they are sold in bulk.

However, despite table olive promotion, sales show a continuous decline. This is due to the low product's penetration to American consumers. Initially, table olive promotion, as an exquisite product, led to the consumption by affluent consumers who are willing to pay more in order to buy higher quality products. In U.S.A., it prevails the view that bulk table olives are higher quality, compared to those contained in a glass or can packaging. Another important factor, which is responsible for this reduction, is the Americans' eating habits and their limited familiarity with the product. While the olive oil is promoted as a healthy product, table olives show almost an opposite image. For example, 19% of Americans who ate olives

at home said that they stopped their consumption because they were too salty. In recent years, the reduction of daily sodium (salt) intake has emerged as a key message, which has been promoted in order to protect the consumers' health. American consumers tend to minimize sodium and "bad" fats intake as a precaution. Therefore, the combination of high sodium levels and fat content (75-90%) in table olives prevents the widespread consumption of the product, although 75% of household consumers consider that table olives are a healthy snack (Ministry of Foreign Affairs, 2015).

The dominant table olive trade preparation is the black ripe olive in sliced form, because of its wide use in the food service industry (hospitals, prisons, restaurants, fast foods, etc.). More specifically, the average American consumer prefers depitted table olives but this preference comes in contrast with new consumer trends, which require table olives in whole form (for tasty and nutritious reasons). Regardless the type of table olives, American consumers prefer medium and large-sized table olives, whereas, in recent years, food industries try to introduce new table olive flavors (e.g. garlic, chili, nuts etc.) (Ministry of Foreign Affairs, 2015).

In the U.S.A., unlike the olive oil industry, the table olive industry delays to follow the market trends and satisfy consumers' demands. For instance, in the case of home entertainment, the American consumer seeks for packaged products into portions (such as meat, cheese, vegetables, crackers and sauces), which do not need preparation and are served directly. The same happens with consumers who need a quick meal or snack for consumption at home or work. So, the key to attract consumers is the convenience and versatility of the product. In the last few years, the most suitable packaging has been launched. The plastic pouch with modified atmospheres is available in various sizes and conquers more and more American consumers (Ministry of Foreign Affairs, 2015)

Nowadays, the expansion of olive bars can be considered as a big advantage for the current Greek production. Greece fails so far to face competitors' brand name although Greek table olives excel in quality. However, Greece should not become complacent. Thus, in the future, Greece should convert bulk exports to branded products through proper packaging and standardization in order to gain more profit and obtain a strong brand name. In the U.S.A. market, table olive adulteration has also been observed, as Greek table olives are mixed with cheaper table olives of foreign origin, in order to provoke a conscious deception of investors.

Italy

Italy is considered the strongest exporter of virgin olive oil but it is not the same with table olive exports. Italy imports table olives in bulk from different origins (Spain, Greece and third

countries), qualities and specifications. Between 2000 and 2012, 16% of Greek table olive exports, in terms of quantity, were directed to Italy. Greek table olives are mixed with inferior quality table olives, in order to produce a branded product, which is then re-exported to international markets as Italian product for final consumption.

Figure 38 The annual average percentage (in terms of quantity and value) of Greek table olive exports to Italy (2000-2012).
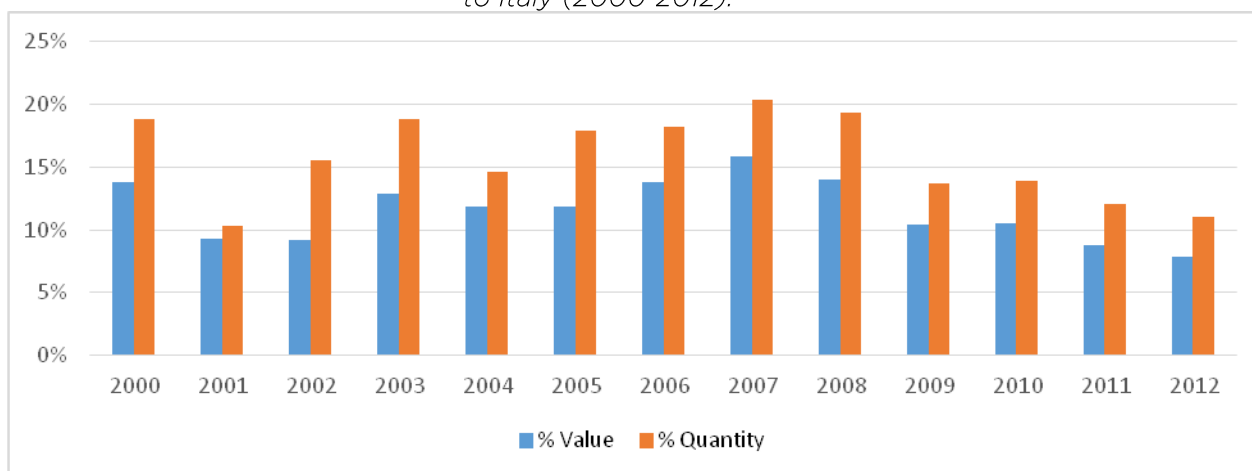
Between 2007 and 2012, the percentage of exported table olives in the Italian market, in terms of quantity, had been reduced by half. This significant reduction can be characterized as an ''encouraging'' outcome, due to the fact that the total Greek table olive exports are increased on a global level, while the proportion of Greek exports to Italy is constantly decreasing. As a result, the product is channeled into more profitable export markets. The continuous reduction of Greek exports to Italy should not disappoint the Greek enterprises; instead it should encourage them to standardize their product, invest on its high quality and target new more profitable markets.

Germany

At the end of 1990s and onward, Germans have changed their eating habits following healthier dietary patterns (e.g. Mediterranean diet). This switch has led to increased table olive consumption, which is an integral part of the Mediterranean diet. Thus, an increase in table olive imports in Germany has been recorded with Spain being the main supplier followed by Turkey, Greece and Morocco.

For the time period between 2007 and 2012, Greek table olive exports showed a continuous increase. However, an extremely worrying observation is that in 2012 the percentage of table olives in terms on quantity overcame the percentage in value, indicating that the trade price was lower than in previous years.

Figure 39: The annual average percentage (in terms of quantity and value) of Greek table olive exports to Germany (2000-2012).
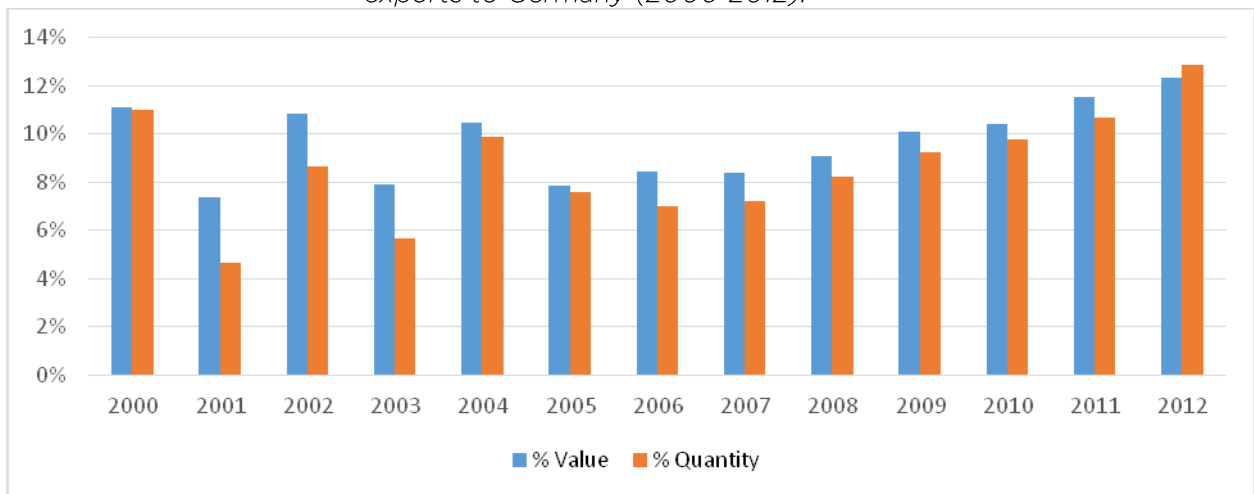
Source: FAOSTAT

The German table olive market has been flooded with import companies which trade delicatessen products and sell them under their own brand name. In addition, there are import companies that are specialized in trading products which come from a specific country or region (e.g. Lakudia and Greek products), or trading products which are sold under the producer firm's brand name (e.g. Gaea products). Of course, in the German market, the presence of the latter category products is quite limited. On the contrary, the presence of private label products is wide, as they are available at supermarkets and discounters (where there are exclusively private label products). In recent years, both table olives with new flavors and table olive specialties products (e.g. olives with pepper, almonds, cheese, garlic, etc.) occupy a prominent place on retail store shelves. These kinds of products together with organic table olives are broadly distributed in department stores and supermarkets (Ministry of Foreign Affairs , 2012).

The main table olive package, which is used extensively, is the glass container. However, during the last four years, table olives packaged in plastic pouches with modified atmospheres are very popular. Finally, the metal container (tin cans) is used both in some product specialties and in large packs (4kg) (Ministry of Foreign Affairs , 2012).

Australia

According to the recent data of the Australian Statistical Office, in 2010-2011, the value of Australian imports was amounted to 42,090,311 $. The Australian table olive imports coming from Greece were amounted to 25,525,629 $. Thus, in Australia, Greece can be characterized as the strongest table olive supplier country (Ministry of Foreign Affairs, 2012).

In Australia, 25-35% of imported table olives (exclusively from independent importers, apart from supermarkets-importers which make direct purchases) was channeled in supermarkets, while the rest was directed to the sectors of catering, foodservice and manufacturing. In Australia, the predominant view is that every non-Asian restaurant buys Greek table olives (excluding Dominos and Pizza Hut chains which buy Spanish table olives due to their low price) (Ministry of Foreign Affairs, 2012). In recent years, Greek table olive exports, in terms of value, to Australia have been stabilized at around 7-8%. An encouraging fact is that the percentage in terms of value is higher than those in quantity.

Thus, Australia is a profitable Greek export market.

Figure 40: The annual average percentage (in terms of quantity and value) of Greek table olive exports to Australia (2000-2012).

Source: FAOSTAT

In recent years, Australian supermarkets have made efforts to exclude middlemen who gain profit 3-4% of the price and purchase directly from Greece. A typical example is Woolworths Company which directly imports approximately 600 tons table olives from Greece. Of course, it is not uncommon for a company to use the services of middleman who operate subsidiary, when the products do not have the exact specifications, or need re-packaging, but the main reason is the storage and packing facilities which middleman can offer.

It is widely known that the PDO (protected designation of origin) "Kalamata" table olives are not recognized in non-EU countries. Australia supports the liberation of the agricultural sector and does not accept the recognition of geographical indications within the framework of the WTO's (World Trade Organization) agreement TRIPS (Trade Related Aspects of Intellectual Property Rights). The EU proposed the recognition of 41 product names (including the name "Kalamata" table olives) and met strong resistance from Australia.

"Kalamata" table olives are particularly prevalent in the market as shown by the products' abundance on store shelves. However, no "abuse" of the name "Kalamata" has been observed indicating that there are no recorded cases where purely Australian or non-Greek origin table olive products use this name.

It should be noticed that the main disadvantage with regard to Greek table olive exports, in Australia, is their high price (compared with Spanish table olives price which is lower). On the other hand, there are many Australian habitants of Greek origin, who are aware of the beneficial effects of table olives and consume them contributing to a further increase of the Greek table olive market in this country. The most widely used packages of Greek exports are in bulk (barrels of 220 L total capacity) and glass containers of various sizes (Ministry of Foreign Affairs, 2012).

Canada

Canada is one of the main Greek table olive export markets for which there is no available data for a market analysis. In general, the Greek table olive exports to the markets of North America (where Canada belongs) show great interest.

From 2009 and onwards, Greek exports showed a continuous reduction. An encouraging fact is that the percentage in terms of value is higher than in quantity (except for 2007). This indicates that Canada is a profitable export market.

Figure 41: The annual average percentage (in terms of quantity and value) of Greek table olive exports to Australia (2000-2012).
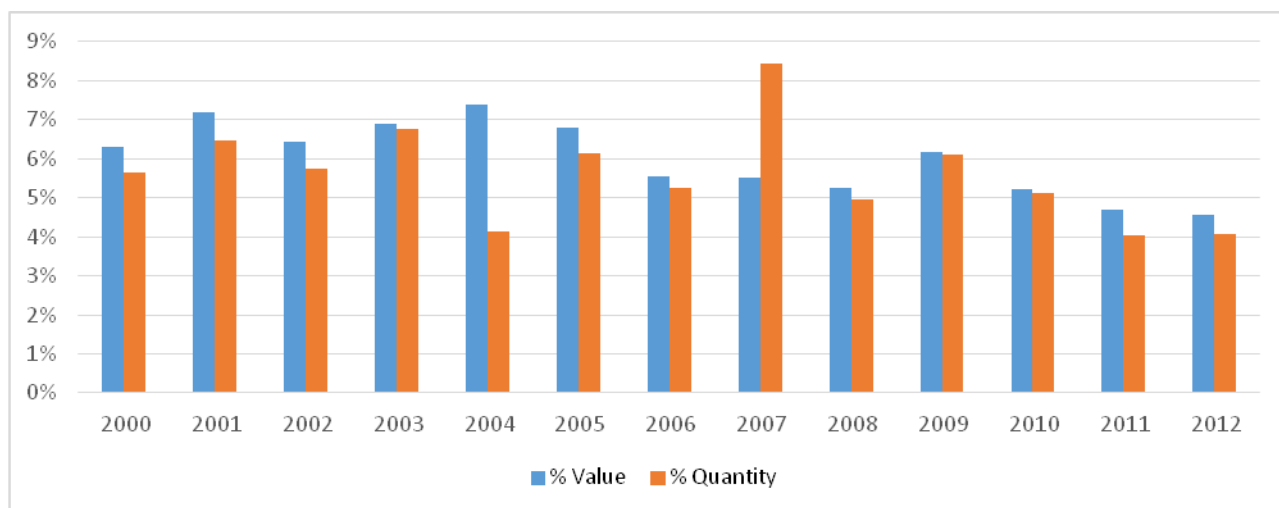
The preferred varieties of table olives are "Kalamata" and "Chalkidikis" and their demand is constantly increasing. More specifically, "Kalamata" table olives have an excellent acceptance by Canadian consumers and they are considered to be on the top of table olive categories. In addition, table olives without pit are preferred more by Canadian consumers. As it was stated before for the U.S.A. market, it is necessary to reduce the salt content of the olives to address health issues.

COMPETITIVENESS

Theoretical framework of Balassa index

In 1979, Porter was the first who introduced the notion of "competitive forces". Since that year, competitiveness has been used in every economic analysis. There are abundant definitions that have been proposed, in order to describe competitiveness but the conceptual meaning is difficult to convey in absolute terms.

As mentioned before, competitiveness is a multidimensional concept that can be approached on three different levels, namely country, industry, and firm. The word "competitiveness" comes from the Latin word, *competer*, which means involvement in a business rivalry for markets. It has become common to describe economic strength of an entity with respect to its competitors in the global market economy in which goods, services, people, skills, and ideas move freely across geographical borders (Murths, 1998).

The measurement of a multidimensional concept, such as competitiveness, possibly shows deficiencies in methodology. For this reason, supernumerary competitiveness indicators have been presented by international organizations, national administrations and scientists, which intend to record the evolution of competitiveness of countries, sectors, businesses and products.

The R.C.A. (Revealed Comparative Advantage) indicator is a fairly important and overused index that identifies the comparative advantage of an economic sector or product.

In 1958 Liesner proposed the first mathematical formula in order to estimate the RCA index:

$$RCA_1 = X_{i,j}^k / X_{n,j}^k$$

Where:
X: Exports
K: Under examination product or sector
I: Under examination country

J: Trader country or group of countries (with i country and n total countries) and **N**:Group of countries (as basis for comparison)

The RCA index presented deficiencies and for this reason, in 1965, Balassa came to fill them and evolve this indicator. The Balassa approach is the most well-known and used empirically in order to identify in which countries' sectors exports predominate and in which is lagging behind. The formula of Balassa index is the following:

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$$RCA_2 = \frac{X_{i,j}^k / X_{i,j}^t}{X_{n,j}^k / X_{n,j}^t} = \frac{X_{i,j}^k / X_{n,j}^k}{X_{i,j}^t / X_{n,j}^t}$$

Where t corresponds to the sum of total exported products.

The index ranges from 0 to infinite and values greater than 1 indicate that the country has competitive advantage in a certain product, compared to a group of countries.

The main disadvantage of the index is that it does not include the country's imports. Imports are an integral and important part of trade, particularly when imports exceed by far the exports or when the country under examination is large enough. This index was subjected to amendments in order to be improved. Nevertheless, it is widely employed even today because it is easy to use and gives a picture of a country's competitiveness.

Greek virgin olive oil

The aim of the competitiveness analysis is to calculate the index RCA_2 (Balassa) for the main virgin olive oil export destinations in order to identify if Greece has a competitive advantage compared to EU27. All the export figures were obtained from the database of Eurostat.

Figure 42: Balassa index evolution of Greek virgin olive oil in the main export destinations.
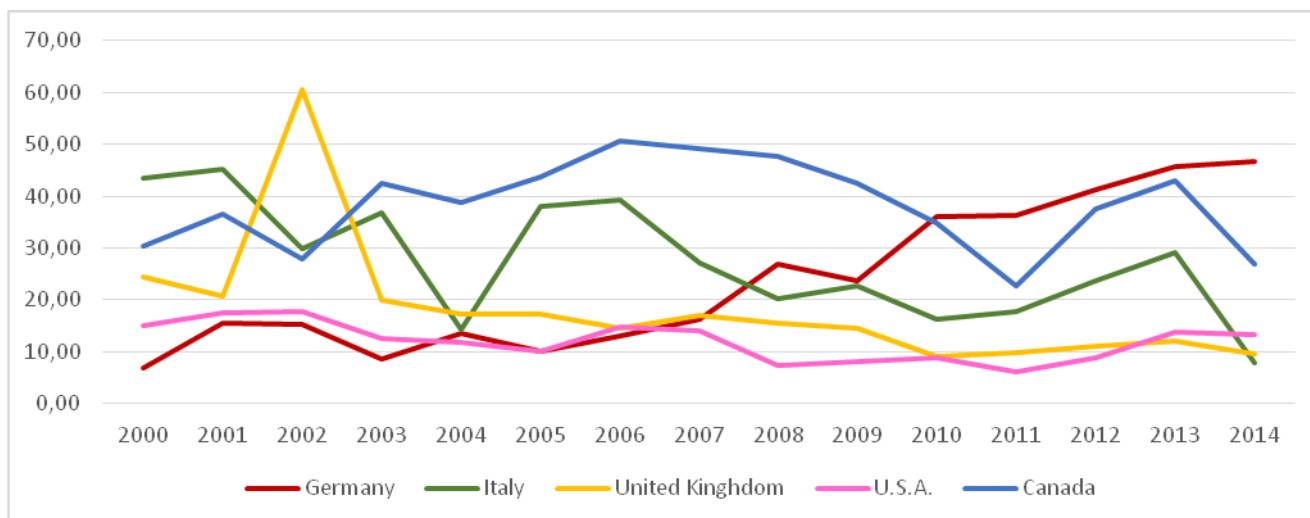
According to the above figure, the RCA$_2$ index took values higher than 1 indicating that in the main Greek virgin olive oil export destinations, the country showed comparative advantage in this product compared to EU-27.

In 2014, the Greek virgin olive oil seemed to be more competitive in the **German market**. Between 2000 and 2014, the competitiveness index has increased over five times. This increase should mobilize Greek companies to invest in this market and to awake them in order to avoid discounts on marketing price.

The same year, in the **Italian market,** the Greek virgin olive oil competitiveness was the second highest, although the index value showed an important decrease. During the examined time period, the Greek competitiveness presented intense fluctuation. Specifically, in 2014, the index noted an extreme reduction that did not affect the Greek olive oil enterprises; on the contrary, it should serve as trigger for searching new alternative markets instead of Italy. The Greek olive oil export businesses' strategy should not focus on the export of large olive oil quantities in bulk, but export branded olive oil in order to penetrate new, more profitable export destinations.

From 2011 onwards, in the **Canadian** market, the Greek virgin olive oil competitiveness seems to have been stabilized (with minor fluctuation) at high levels. However, in 2014, the Greek competitiveness showed a reduction. This should not disappoint Greek enterprises, but warn them for further investments, taking into account that Canada is classified in the profitable export markets.

In the **United Kingdom** market, in 2002, the extreme increase of the competitiveness index was rather unexpected and could not be justified. It would be very interesting and yet

impossible to know the reason for this increase. However, from 2002 onwards, there has been a notable decrease, which, from 2008 to 2014, has been stabilized at a relatively low index value.

In the USA market, Greek olive oil competitiveness has remained almost stable at low levels. It should not be forgotten that USA is a promising market for Greek branded olive oil exports, as analyzed before.

Ultimately, in the virgin olive oil sector, Greek enterprises should give emphasis to the index results and try to improve them, primarily in more profitable markets. Greece needs to adopt a comprehensive marketing plan, in order to realize high exports in terms of value and quantity, in markets where virgin olive oil is exported as branded.

Greek table olive

According to the RCA_2 indicator estimation, Greece shows comparative advantage on table olives in the total of main export destinations compared to EU-28.

Figure 43: Balassa index evolution of Greek table olives in the main export destinations.
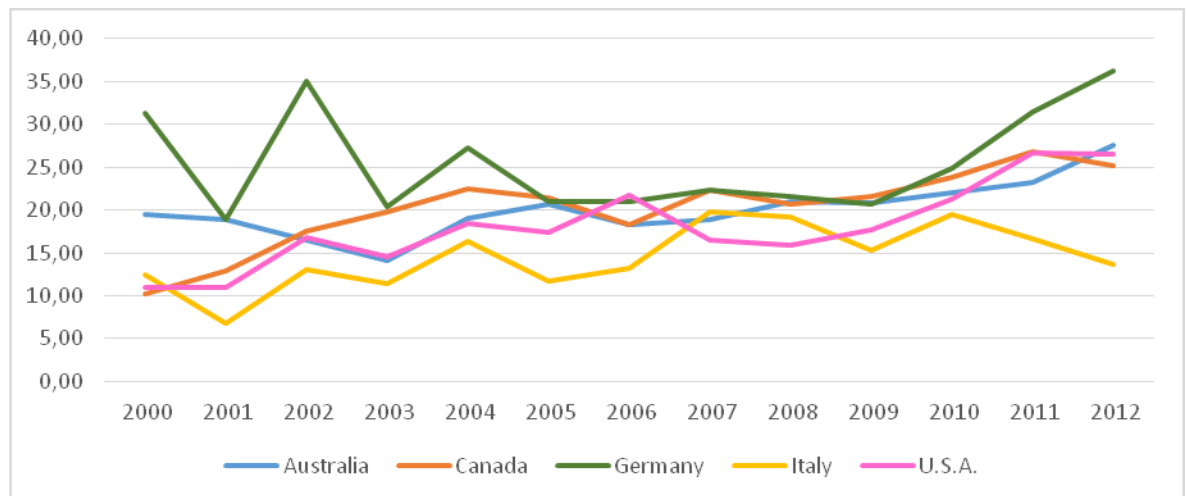
The indicator's value, for Greece, is diachronically higher than 1, demonstrating that Greece has comparative advantage on table olives compared to EU-27 on the total of the main export markets. In 2012, the competitiveness index took the highest value in the **German market**. From 2000 to 2005 the index presented intense fluctuation. From 2005 to 2009 it was stabilized, while from 2009 to 2012 showed significant growth. This increase should mobilize the Greek table olive enterprises in order to avoid the product's marketing price retreat that was happened in 2012.

From 2006 onwards, the competitiveness index showed a significant increase in the **Australian** market. This incident combined with the fact that Greece ranked first in Australian table olive imports (although Greek table olives are the most expensive) should alert Greek enterprises in order to investigate further in this market.

From 2000 to 2012, the competitiveness index, in the **USA market,** had approximately triplicated. In the same period, the competitiveness index, in the **Canadian market,** had exhibited an equally significant two-fold increase. This increase in both markets, is not high but could be considered quite important to attract the interest of Greek export enterprises for further investments.

In the **Italian market**, the competitiveness indicator showed fluctuation. In 2010, the indicator captured one of the higher values, while in the next two years it presented a steady decline. This reduction should not concern the Greek firms, because Italy should not be a target market, for reasons already stated.

Finally, an important conclusion is that Greek enterprises should follow a strategic plan. A share of this plan is the detailed study of competitiveness. Thus, enterprises could learn in which market the product is competitive, in which less competitive, and which would be the upcoming export destination As a result, enterprises would follow the appropriate strategy depending the case.

As it will be analyzed in the following section, there are many ways to enhance the olive oil competitiveness.

SYNERGIES

Organic Sector

Having analyzed both olive oil and table olives domestic and export markets, it is observed that a possible synergy with the other sectors/sectoral studies will be those with the 9th sectoral study "Organic products in Greece." There are many supporters of organic extra virgin olive oil and table olives, worldwide. Thus, it would be useful to understand the trends and the potential of this sector in order to increase the loyalty to Greek extra virgin olive oil and table olives.

According to Eurostat database, in 2013 the total organic arable land was estimated at 44,028.52 ha and in 2014 was increased at 86,412.14 ha. The largest part of organic crops covered up by olive crops.

Table 41: Greek organic Olive crop.

Organic olive crops (in ha)	2013	2014
Fully converted to organic farming	24,996.89	29,766.60
Under conversion to organic farming	19,951.60	17,292.10
Organic olive crops (in tons)	2013	2014
Fully converted to organic farming	20,758.32	13,925.15
Under conversion to organic farming		
Organic olive crops (in percentage of total utilized agricultural area)	2013	2014
Fully converted to organic farming		0.61
Under conversion to organic farming		0.36

Source: Eurostat

Moreover, except for the increase of organic olive crops, an extra increase concerned the number of Greek processors for the manufacturing of organic Greek olive oil and table olives .

Table 42: Number of Greek processors for the manufacturing of organic products.

Number	2013	2014
Processing and preserving of meat and production of meat products	39	49
Processing and preserving of fish, crustaceans and mollusks	7	5
Processing and preserving of fruits and vegetables	260	286
Manufacture of vegetable and animal oils and fats	746	788
Manufacture of dairy products	47	55
Manufacture of grain mill products, starches and starch products	38	57
Manufacture of bakery and farinaceous products	55	59
Manufacture of other food products	187	241
Manufacture of prepare animal feeds	24	29
Manufacture of beverages	181	197
Manufacture of wine from grape	179	176

*Each unit may operate in more than one manufacturing activities.
Source: Eurostat

The characteristics of Greek organic market are its small size, low degree of production concentration, lack of strong distribution networks and limited products offering of domestic production.

Many Greek and international surveys show that the factors which contribute to producers' decision to deal with organic agriculture are the level of education-information,

environmental awareness and the level of subsidies. In financial terms the main motivation seems to be the higher profitability and the easier disposal of organic production. An important role seems to play the producers' concern about their health (due to the use of pesticides and other chemicals) or resentment from the low efficiency of inputs (fertilizers, pesticides, etc.) in comparison with their cost.

The most important factors affecting the demand are primarily subjective (emotional or ideological) and to a lesser extent, economic or demographic. The need of consumers for consume organic products, comes from their belief that they are more beneficial to health and more secure than conventional. Another important factor is the consumers' environmental concerns, since organic production methods is considered environmentally friendly. The disposable income, educational level, age, marital status, place of residence, etc., also affect demand, but their exact role is difficult to be determined. The last six years, Greece is a victim of financial crisis, as a result the reduction of disposable income was inevitable and the significant organic products high prices create a higher demand elasticity in relation to the price, not only compared to conventional, but also in organic compared with other European countries.

The annual household budget surveys do not distinguish the organic product consumption from the conventional. As a result, they can be used for investigating market trends and it is very difficult to estimate the factors which affect demand. The various surveys that have been realized, in our national universities and other organizations, were based on few samples or had methodological deficiencies resulting in limited reliability. From these surveys, however, emerges as a general conclusion the critical role paly the "security", "health", "ecological awareness" , some degree of disposable income and the purchase price. On the other hand, factors such as "age", "marital status" or "residential area" (within the large urban centers) do not seem to be particularly important.

As it was mentioned in chapter 8 and especially in Table 23, the organic olive oil show a steadily diachronic increase in all levels (consumption, exports and production). Despite the economic crisis, the potential for growth of the domestic market for organic products is important, because the penetration of organic in the overall food consumption is among the lowest in Europe.

At an international level, it was recorded a global demand for organic products originating in the majority of (> 90 +%) from developed countries. Indicatively, in 2011, the size of the global organic product market amounted to $ 62.9 billion of which the US accounted for about 43%, Germany 13.8%, France 7.9%, Canada 4%, UK 3.9, Italy in 3.6%, Japan 2.1% and China only 1.7% (Figure 44).

Figure 44: International organic product market (2011).
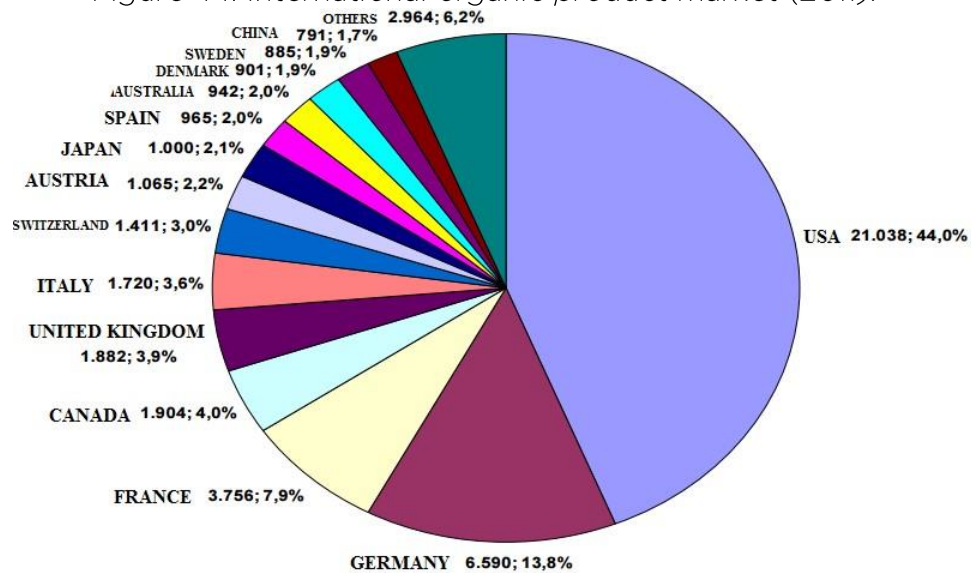
From the above figure, it is concluded that the main export destinations of Greek virgin olive oil and table olives (U.S.A., Germany, Canada, Australia, United Kingdom etc.) are countries which recorded high percentages in organic product market.

According Research KEN estimates for years 2013-2016,it will be recorded high growth rate of the organic products market globally. For the North America projected average annual increase of 9.4%, primarily because of the Government's initiatives for consumer awareness on nutritional topics. In Europe, by Community legislation, taking over government initiatives to encourage the consumption of organic products and the increasing awareness of the population on the environment projected average annual growth of 7.5%. Extremely high growth rates are anticipated for several Asian countries, including Singapore, Malaysia

and Taiwan while very satisfactory pace are also planned for China and India, where only the last four years breakthrough in organic farming. Developments in major markets for organic products in Europe is particularly favorable to attempted mass penetration of Greek products therein, provided of course that the country will substantially increase its production.

The conditions for the development of organic agriculture in Greece is positive. Except for favorable climatic and soil conditions in several regions of the country and the increasing international demand, there is keen interest to conduct business in the industry. This interest comes from both farmers and urban residents interested in environmental issues. The prospects of the Greek market despite the ongoing economic crisis remain positive while global market growth continues with high indeed. Other positive elements for the development of the sector is the increasing attractiveness of organic products because of food scandals and the sensitivity shown by the consumers on health issues.

An important motivation for engaging in organic farming is the possibility of achieving higher income compared to conventional. Despite the smaller yields and higher production cost of organic farming, farmers seem to achieve satisfactory efficiency due to higher producer prices and subsidies.

Nowadays, Greece suffers from a severe economic crisis and the development of organic farming can contribute decisively to combat unemployment and to more rational use of the limited financial resources available. The organic farming jobs are more than those of conventional farming. This happens because chemicals is not used, so the respective operations should be realized manually or by mechanical means. The existence of more available jobs illustrated by several studies in which compare the organic with conventional farms (with same aim and in the same area), where employment per unit area increases from 20 to 60%, depending on the manufactured items. As regards lower inputs (which mainly are imported), this seems to apply to almost all products, since the cost of fertilizers and pesticides is quite lower, while other inputs (labour costs, mechanization, production insurance, etc.) are higher in organic production.

Oleo tourism

Greek tourism sector is a well-established industry. Greece is one of the most popular destinations because of its rich cultural heritage, natural beauty and geographical variety. It is essential to notice that despite the financial crisis, Greek tourism consist one of the most significant economic sectors which shows increase and enhance the unemployment.

An important form of tourism is the Agro-tourism. This kind of tourism give the opportunity to tourists to get closer to nature, to spend their holidays at farms, to sample the local gastronomy and to enjoy the cultural characteristics of the place. Greek varied geographical, biological and cultural wealth makes Greece the ideal destination for many different activities. The interest for agro tourism (or rural tourism) shows a continuous growth. The urbanization is probably the dominant reason for the tourists' tendency to agro tourism (because allow them to try multi agricultural activities and to live the life of the local inhabitants).

The combination of food product and tourism is an important opportunity both for a new investment and for the rural areas. Indeed, a sub category of agro tourism is the Oleo tourism which is related also to gastronomy tourism. An attractive characteristic for an olive tourist is the certificated products, in order to be different from competitors' tourist products. In Europe countries, the system that certifies the food quality is based on the granting of Protected Designations of Origin (PDO) and Protected Geographical Indications (PGI). Greece produces 17 PDO olives oils, 11 PGI olives oil and 11 PDO table olives.

Oleo tourism includes a set of activities that revolve around the olive oil and table olive production. More specifically, a typical program includes visits to olive cultivations and olive oil mills (sometimes coinciding with the olive harvest), conducting oil tastings and tasting typical local dishes in which olive oil is the dominant component. Furthermore, tourists can do other cultural activities which give them the opportunity to focus on the local culture of the environment and territory.

The inner circles are smaller and represent experiences that have the greatest impact on tourists (especially the visit to the oil mill) and the activities represented in the external, larger sized circles cause less impact. Similarly, the situations separated by a horizontal line represent activities that are controllable by tourist companies and those that are not. Interactions between the service provider and customer, or "service encounters or moments of truth" take place throughout the buying and consumption process. A tourist builds his or her perception and satisfaction of the tourist product based on these moments of truth. In each of these service encounters the customer evaluates the quality of the service, and although the first encounters may be especially important due to a risk of dissatisfaction reflecting on subsequent services, any meeting can be potentially critical when it comes to determining satisfaction and customer loyalty. This tourist product model is designed to generate multiple "service encounters" as a result of the participation of different businesses (hotels, restaurants, museums, mills, tourist service companies, etc.) and their interactions with a client. The interdependence of these companies creates the need to strengthen

partnerships between them since the degree of customer satisfaction does not depend on a single agent or operator, but on all service providers as a whole. Thus, positive experiences with each service provider will result in a perception of overall quality of the tourist product and vice versa. However, a combination of positive and negative experiences will increase the level of insecurity in the client and therefore the product will be more vulnerable in the market (Murgado, et al., 2011).

Figure 45: Components of an olive oil tourist experience.
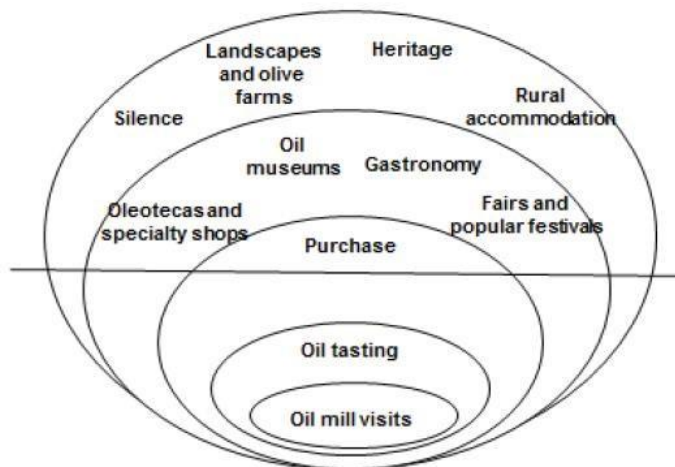
Source: (Murgado, et al., 2011)

In Greece, olive routes are in an embryonic state because of primarily to the restricted offering of activities (visits in specialized museums, oil fairs and festivals etc.), and secondly to marketing and management difficulty. It can be considered as an economic agent which has a set of characteristics or qualities that characterize it as being a bit out of the ordinary. However, oleo tourism cannot become the exclusive source of income in rural areas, but it can offer an additional revenue to rural inhabitants. Of course, a deeper analyses of demand is required in order to define and segment the target olive oil tourism market and to identify the main motivations and expectations of visitors, in order to design commercial offers adapted to each segments' needs. At a second stage, with proper marketing and agro-tourism activities in oil-producing regions, high quality olive oil could become part of the

experience of their visit to Greece (linking the images of Greece with the branded olive oil). The potential of such initiatives could be substantial – indicatively, if 1 in 10 tourists decides to consume olive oil when they return to their countries (with a low annual consumption of 5 kg), they could absorb the current bulk exports and thus transform them to branded in the course of 6 years (National Bank Of Greece, 2015).

E-commerce

The definition of e-commerce refers to the trading of goods or services over computer networks such as the Internet. It can be divided into e-commerce sales and e-commerce purchases according to the way in which an enterprise receives or places orders respectively. Essentially, e-commerce is part of the business model of enterprises, complementing their conventional commercial activities for selling and buying aimed at enhancing their performance.

There are many categories of e-commerce but only three of them are the most popular in the olive oil and table olive sector.

Business-to-business (B2B) describes commerce transactions between businesses, such as between a manufacturer and a wholesaler, or between a wholesaler and a retailer. In the olive oil and table olives sector, the volume of B2B (Business-to-Business) transactions is much higher than the volume of B2C transactions. The primary reason for this is that in a typical supply chain there will be many B2B transactions involving sub components or raw materials, and only one B2C transaction, specifically B2B is also used in the context of communication and collaboration. Many businesses are now using social media to connect with their consumers (B2C); however, they are now using similar tools within the business so employees can connect with one another. When communication is taking place amongst employees, this can be referred to as "B2B" communication. The term "business-to-business" was originally coined to describe the electronic communications between businesses or enterprises in order to distinguish it from the communications between businesses sale of the finished product to the end customer (Abdollahi, 2011).

The B2B environment is based on a data warehouse to support every necessary contracting or related activity such as market report, market intelligence, finance, auction, etc. By doing so, the whole (olive oil) supply chain is enhanced from producers to retailers and caterers using B2B as the coordinating and integrating device. Particularly, the B2B olive oil e-commerce would (Vlachos, n.d.):

- Improve and simplify logistical processes, such as consolidation of consignments, item trailing using bar-coding, etc.

- Improve cash flows by earlier invoicing and earlier payments.

- Match market demand to production capacity he losses associated with production operating without accurate information can be enormous.

- Reduce data entry costs and improve efficiency at each stage of the supply chain

- Eliminate data re-entry along the supply chain resulting in cost savings

- Reduce telecommunications costs (phone and fax costs).

- Apply Business Process Re-engineering (BPR) (Vlachos, n.d.)

Business-to-consumer (B2C, sometimes also called Business-to-Customer) describes activities of businesses serving and consumers with products and/or services. While the term e-commerce refers to all online transactions, B2C stands for "business-to-consumer" and applies to any business or organization that sells its products or services to consumers over the Internet for its own use (Abdollahi, 2011).

In 2013, in Greece, e-commerce services were noted growth approximately 25- 30%. The leader was tourist services (electronic booking of transport tickets and accommodation etc.), while food purchases are limited to low levels (around 2% -3%).

Despite development, e-commerce in Greece lags far behind the EU average, with basic causes of halting the dynamic of a) Greek consumers distrust in the reliability of on-line markets and b) the high transportation costs.

According to the annual survey on electronic commerce carried out by the Laboratory of Electronic Commerce (ELTRUN) of Economic University of Athens, the annual turnover through online shops amounted to 3.2 billion €, showing an increase of 25% compared to 2012.

According to the same survey, 35% of Internet users in Greece (about 2.2 million.) made at least one purchase of product or service on line. Although the electronic retail moved strongly upward even compared with traditional retail trade (remains low), since the respective European market will reach

350 billion € with 70% of Internet users buying on line.

An important parameter that affects the development of electronic commerce in Greece is the high transport costs and logistics of natural products purchased through e-shops.

According to Greek e-Commerce Association and Hellenic Association for Electronic Commerce product's transportation costs of transport from Athens to London is six times higher than transport costs for the same product from London to Athens. As a result, Greek

e-shops become uncompetitive ,because sell similar products with similar abroad businesses which sell highly and uniquely Greek products (such as the Greek olive oil), and the final price to the consumer additional costs incorporated

.

Conditional on the Greek on line market could reach 6 billion € and accounts for 2% of GDP from 1% today. The survey also shows that only 60-65% of the total on line purchases of Greek consumers directed to Greek sites. This demonstrates the prospect of Greek digital companies under conditions in the future, since the figure in Europe is close to 90%.

Business-to-employee (B2E) electronic commerce uses an intra business network which allows companies to provide products and/or services to their employees. Typically, companies use B2E networks to automate employee-related corporate processes. Examples of B2E applications include:

- Online insurance policy management
- Corporate announcement dissemination

- Online supply requests

- Special employee offers

- Employee benefits reporting

- Management (Abdollahi, 2011)

CONCLUSION

The olive sector can be characterized as an attractive Greek economic sector. Especially, the sector of olive oil and table olive processing/standardization do not have substantial obstacles (institutional and/or legal), so the entrance of new enterprises is easy and accessible. Furthermore, the capital requirements are medium, there are no economies of scale and experience curves as "Know-how" of production.

The basic critical success factors for this sector is the superior products' quality and a targeted marketing campaign from the whole sector and the government. It should be made clear that Greece is not able to compete in quantity and low prices the other Mediterranean countries. On the contrary, Greece should take the advantage of its products top quality. Furthermore, the sector of Greek olive oil and table olives should develop a marketing campaign based on Mediterranean diet and the brand "made in Greece". Moreover, the

millions of tourists that visit Greece every year should taste, learn and admire Greek traditional-based on Mediterranean diet- food. In this way, the brand "made in Greece" is able to attract many supporters from all around the world who are going to search and buy Greek products when they return to their countries.

Consequently, tourism and especially oleo tourism should be an important supplementary activity in order to promote Greek olive sector and simultaneously to support rural areas. In this way, the potential of such initiatives could be substantial – indicatively, if 1 in 10 tourists decides to consume olive oil when they return to their countries (with a low annual consumption of 5 kg), they could absorb the current bulk exports and thus transform them to branded in the course of 6 years.

Between 2000 and 2014, Greek virgin olive oil exports show that the main export destinations for Greece were Italy, Germany, U.S.A., United Kingdom and Canada. Between 2000 and 2012, Greek table olive exports show that the main export destinations were Italy, Germany, U.S.A., Australia and Canada. In the chapter 9, there is a detailed reference of consumer habits, trends, growth and export potential for each main export market. At this point, it is essential to analyze and other upcoming export destinations such as BRICS, Four Asian Tigers an d Arabic Countries, which has recently shown a sudden increase.

Another possible synergy is with e-commerce sector. There are not recorded surveys about the food and e-commerce synergy and it was difficult to collect data. So, it should be realized a further research with questionaries' in olive companies which use e commerce in order to evaluate if this synergy has a potential growth. Nowadays, youth are keen on internet and it is easier to consolidate e commerce to their enterprises both in B2B and B2C level.

The last possible synergy is related with the 9th sectoral study of "organic products". The conditions for the development of organic agriculture in Greece is positive. Except for favorable climatic and soil conditions in several regions of the country and the increasing international demand, there is keen interest to conduct business in the industry. This interest comes from both farmers and urban residents interested in environmental issues. The prospects of the Greek market despite the ongoing economic crisis remain positive while global market growth continues with high indeed. Other positive elements for the development of the sector is the increasing attractiveness of organic products because of food scandals and the sensitivity shown by the consumers on health issues.

BIBLIOGRAPHY

Abdollahi, G., 2011. *A classification for Business Model Types in E-commerce,* s.l.: s.n.

Boskou, D., 2006. *Olive Oil Chemistry and Technology.* 2nd επιμ. Thessaloniki: AOCS Press.

Eurostat, 2014. *Eurostat.* [Ηλεκτρονικό]
Available at: http://epp.eurostat.ec.europa.eu/newxtweb/submitdimselect.do [Πρόσβαση 06 11 2015].

FAO, 2013. *FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS.* [Online]
Available at: http://faostat3.fao.org/download/T/TM/E [Accessed 19 09 2015].

Frega, N., Bocci, G. & Lercker, 1993. Free Fatty Acids and Diacylglycerols as Quality Parameters for Extra Virgin Olive Oil. *Riv. Ital. Sost.,* pp. 153-156.

IOC, n.d. *International Olive Council.* [Ηλεκτρονικό]
Available at: http://www.internationaloliveoil.org/estaticos/view/77-about-olives [Πρόσβαση 23 09 2015].

Kailis & Harris, 2007. *Producing table olives.* Collingwood: Landlinks Press.

Kiritsakis, 2007. *Olive oil.* 4th επιμ. Thessaloniki: Thessaloniki.

Kiritsakis, A., 1993. *Olive oil.* 1η επιμ. Thessaloniki: Private.

Kiritsakis, A., 2007. *Olive oil (conventional and organic), edible olives - Olive Paste.* 1 ed. Thessaloniki: Private.

Lanzón, Albi, Cert & Gracián, 1994. The hydrocarbon fraction of virgin olive oil and changes resulting from refining. *Journal of the American Oil Chemists' Society,* 71(3), pp. 285-291.

Ministry of Foreign Affairs , 2012. *Υπουργείο Εξωτερικών.* [Ηλεκτρονικό] Available at:
http://www.agora.mfa.gr/frontoffice/portal.asp?cpage=NODE&cnode=57&cid=199&ord=&p=5&xcc=
[Πρόσβαση 13 09 2015].

Ministry of foreign affairs, 2012. *Υπουργείο Εξωτερικών.* [Ηλεκτρονικό] Available at:
http://www.agora.mfa.gr/frontoffice/portal.asp?cpage=NODE&cnode=57&cid=199&ord=&p=5&xcc=
[Πρόσβαση 13 09 2015].

Ministry of Foreign Affairs, 2013. *Ministry of Foreign Affairs.* [Ηλεκτρονικό]
Available at:
http://www.agora.mfa.gr/agora/images/docs/rad3917Edeutscher_olivenoel_markt_2013.pdf
[Πρόσβαση 15 11 2015].

Ministry of Foreign Affairs, 2015. *Ministry of Foreign Affairs.* [Ηλεκτρονικό]
Available at:
http://www.agora.mfa.gr/agora/images/docs/rad3BB1FEreunaAgorasEliesElaiolado2015.pdf
[Πρόσβαση 15 11 2015].

Ministry of Rural development and Food, 2015. *Ministry of Rural development and Food.* [Online]
Available at: http://www.minagric.gr/index.php/en/farmer-menu-2/establishments-menu/foodestab-menu [Accessed 30 09 2015].

Murgado, Torres, Parras & Vega, 2011. *El aceite de oliva como elemento nuclear para el desarrolo del turismo,* Zaragosa: s.n.

National Bank Of Greece, 2015. *Εθνική Τράπεζα.* [Ηλεκτρονικό]
Available at: https://www.nbg.gr/el/the-group/press-office/e-spot/reports/olive-oil-2015
[Πρόσβαση 21 09 2015].

Paul, A. D., D, M. & Widdowson's, 1988. *The Composition of foods.* 4th ed. London: Her Majesty's Stationery Office.

Psomiadou & Tsimidou, 2001. Pigments in Greek virgin olive oils: occurrence and levels. *Journal of the Science of Food and Agriculture,* 81(7), pp. 640-647.

Rao, Newmark & Reddy, 1998. *Chemopreventive effect of squalene on colon cancer.,* s.l.: oxford journals.

Rojas & Mosquera, 1996. Chlorophyll and Carotenoid Composition in Virgin Olive Oils from Various Spanish Olive Varieties. *Journal of the Science of Food and Agriculture,* 72(1), pp. 31-39.

Romero, C. και συν., 2004. *The role of table olives in the Mediterranean diet..* Athens, 1st International Conference "Traditional Mediterranean Diet: Past, Present and Future",, pp. 177-182.

Smith, και συν., 1998. *Inhibition of 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone-induced lung tumorigenesis by dietary olive oil and squalene.,* s.l.: oxford journals.

Vlachos, n.d. *BUSINESS-TO-BUSINESS E-COMMERCE: AN INNOVATIVE TOOL FOR FOOD CHAIN MANAGEMENT,* Athens: s.n.

Ayerza, R., Coates, W., 2004. Supplemental pollination increasing olive (*Olea europaea*) yields in hot, arid environments. Exploratory Agriculture 40, 480–491.

Castro, J., Fernandez, A., Aguilera, P., Orgaz, F., Garcia, J.A., Jimenez, B., 2006. Oil quality and response to irrigation in traditional olive orchards. In: Proceedings of the 2nd International Seminar Olivebioteq, 5–10 November 2006, Marsala-Mazara del Vallo, Italy, 2, pp. 157–160.

D'Andria, R., Morelli, G., Patumi, M., Fontanazza, G., 2002. Irrigation regime affects yield and oil quality of olive trees. Acta Horticulturae 586, 273–276.

Herenguer, M.J., Vossen, P.M., Grattan, S.R., Connell, J.H., Polito, V.S., 2006. Tree irrigation levels for optimum chemical and sensory properties of olive oil. HortScience 41, 427–432.

Metzidakis, I.T., Koubouris, G.C., 2006. Olive cultivation and industry in Greece. In: Proceedings of the 2nd International Seminar Olivebioteq, 5–10 November 2006, Marsala-Mazara del Vallo, Italy, Seminars and invited lectures, pp. 133–140.

Motilva, M.J., Tovar, M.J., Alegre, S., Girona. J., 2002. Evaluation of oil accumulation and polyphenol content in fruits of olive tree (*Olea europaea* L.) related to different irrigation strategies. Acta Horticulturae 586, 345–348.

Roussos, 2015. Olive training and pruning.
 HYPERLINK

"http://www.aua.gr/roussos/Roussos/Papers%20PDF/Olive%20training%20and%20pruning.pdf"   \t

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http://www.aua.gr/roussos/Roussos/Papers%20PDF/Olive%20training%20and%20pruni ng.pdf (last visited on 21-10-2015).

Sibbett, G.S., Ferguson, L., 2005. Olive Production Manual. University of California, Agriculture and Natural Resources, Berkeley, California, Publication 3353.

Therios, I., 2009. Olives: Crop Production Science in Horticulture 18. Wallingford, UK: CABI Publishing.

Kostelenos, D.K., 2011. Data of olive culture. History, description and geographical distribution of olive cultivars in Greece. Private Edition (In Greek).

Pontikis, K., 2000. Olive culture, Volume 3, Stamoulis (Ed), Athens (In Greek).

Appendix I:

Table Olives Business Plan

General

A.1.1 Description of the business plan

The purpose of this business plan is to estimate the profits of an investment on Greek table olives. The company will buy just harvested olive fruits and will take care of the fermentation which is the main process that affects the final product. In order to evaluate the project of standardization and commerce will be used business and financial ratios.

A.1.2 Products' analysis

The company's portfolio will have 3 products: natural black table olives, natural green table olives and olive paste. All the categories of olives will raw olive fruits which will be just harvested. This will happen, because the company should be sure that all the processes of fermentation will be correct. Thus, the final product will be of top quality. The characteristics of raw olive fruits are as they are presented at the table below.

Table A-1: Components of raw olives.

Component	Levels
Moisture (%)	60-68
Olive Oil (%)	12-28
Saturated Fatty Acids (%)	12-20
Polyunsaturated Fatty Acids (%)	5-18
Monounsaturated Fatty Acids (%)	60-80
Carbohydrate	
Total (%)	8-12
Soluble Sugars (%)	0.5-5.5
Protein (%)	0.7-2.0
Minerals	

Phosphorus (%)	0.02-0.25
Potassium (%)	0.5-3.4
Sodium (%	0.01-0.2
Calcium (%)	0.02-0.2
Magnesium (%)	0.01-0.06
Sulfur (%)	0.01-0.13
Boron (mg/Kg)	4-22
Copper (mg/Kg)	0.3-5.8
Iron (mg/Kg)	3-95
Manganese (mg/Kg)	0.91-5.5
Zinc (mg/Kg)	1.5-33.0
Ash-Minerals (%)	0.4-1.1

Source: Kailis & Harris, 2007. Producing Table Olives

The first product, natural black table olives, will be the main product of the company (75% of the total volume). The second product will the natural green table olives, which is 24% of the total volume. The third product will be olive paste which will be the 0.01% of the company's total volume. After the quality control, the olive fruits will be placed in tanks in order to get fermented.

A.1.3 Location

The establishment of the company will be in Amfissa which belongs to Central Greece and is the capital of the regional unit of Fokida. First of all, the location is at the center of a table-olive producer regional unit. It is worth saying here that table olives from Conservolea (Amfissa) variety which are produced and packed in the regional unit of Fokida can be certificated and labeled as Protected Designation of Origin (P.D.O.) products. The European consumers admire P.D.O. products which are considered superior with unique characteristics foods. Moreover, Conservolea (Amfissa) is a well-known variety for the high quality table olives which produces. Finally, the company will be established in the industrial area of Amfissa, which is 14km away from the port of Itea.

A.1.4 Goals

The main goal of this business plan is to standardize and commerce top quality table olives and olive paste. It should be made clear that Greece is not able to compete in quantity and low prices with other Mediterranean countries which produce table olives. The only sector where Greece is able to compete is the top quality of these products. Furthermore, the company and the whole sector of natural Greek table olives should develop a marketing campaign based on Mediterranean diet and the brand "made in Greece". Mediterranean diet has earned many supporters who consume olive oil. However, table olives have not the same reputation as extra virgin olive oil. Greek companies have a lot work to do on the field of training and information the Mediterranean's diet supporters that the natural table olive is a basic viand of Mediterranean diet. The trend in healthy diet is foods with less salt and the company will follow the consumers' desire. Moreover, it should be mentioned that natural table olives have more health benefits and nutritional value (e.g. total phenols contents) than the other types of table olives (spanish and californian method). Finally, the millions of tourists that visit Greece every year should taste, learn and admire Greek traditional-based on Mediterranean diet-foods. In this way, the brand "made in Greece" is able to attract many fans from all around the world who are going to search and buy Greek products when they return to their countries.

Products & Price

The ten-year length business plan starts with 30,000 Kg table olives and at the 10th year is going to standardize and commerce approximately 335,000 Kg. The project starts with low volume of table olives in order to reduce the risk and the whole budget of the investment.

Table A-2: Total input of raw table olives.

Years	Total (Kg)	Green (Kg)	Black (Kg)	Olive Paste (Kg)
1	30,000.00	7,200.00	22,500.00	300.00
2	42,000.00	10,080.00	31,500.00	420.00
3	58,800.00	14,112.00	44,100.00	588.00
4	82,320.00	19,756.80	61,740.00	823.20
5	115,248.00	27,659.52	86,436.00	1,152.48
6	161,347.20	38,723.33	121,010.40	1,613.47
7	193,616.64	46,467.99	145,212.48	1,936.17
8	232,339.97	55,761.59	174,254.98	2,323.40
9	278,807.96	66,913.91	209,105.97	2,788.08

| 10 | 334,569.55 | 80,296.69 | 250,927.17 | 3,345.70 |

As the company standardize and commerce low volumes of high quality natural table olives the destination of its products will be at delicatessen shops. The price of natural table olives at these shops is between 8€/Kg to 30€/Kg[1]. At the following table is presented the way that is calculated the selling prices, of 0.5Kg and 0.25 Kg (olive paste) packages among the distribution channels. The company is going to sell its products ex-works. It is worth saying here that the retail shops earn 25% and the wholesalers 20% of the price of each package.

Table A-3: Products' Price.

	Retail Price	Price without V.A.T.	Price of the wholesaler	Ex-works Price
Black Olives	4.99 €	4.64 €	3.48 €	2.43 €
Green Olives	4.20 €	3.91 €	2.93 €	1.99 €
Olive Paste	2.99 €	2.78 €	2.09 €	1.32 €

Raw & Other Materials

The following table presents all the materials which are used during the first year of operation. The total cost is about 82,000€ and the 40% of it, is the cost of olives.

Table A-4: Cost & quantities of materials.

Input	Units	Cost/Unit	Cost 1st Year
Green Olives P.D.O. (kg)	7,200	0.60	4,320.00
Black Olives P.D.O. (kg)	22,500	1.20	27,000.00
Olives for Paste (Kg)	300	0.50	150.00
Electricity (kwh)	11,462	0.08	946.67
Water (m^3)	50,000	0.08	4,000.00
Packages	84,857	0.20	16,971.43
Caps	84,857	0.13	11,031.43
Labels	84,857	0.02	1,697.14
Cartons	14,143	0.46	6,505.71
Packages Separators	14,143	0.15	2,121.43
Europallets	126	6.40	808.16
Packages (for olive paste)	1,304	0.20	260.87

Caps (for olive paste)	1,304	0.13	169.57
Labels (for olive paste)	1,304	0.02	26.09
Cartons (for olive paste)	130	0.25	32.61
Packages Separators (for olive paste)	130	0.10	13.04
Europallets (for olive paste)	1	6.40	6.42
Materials for fermentation and conservation	270	9.90	2,673.00
Mechanical Parts			300.00
Equipment Maintenance			100.00
Clothing and Footwear	2	109.90	219.80
Pharmaceutical Equipment	1	299.75	299.75
Office Supplies	2	12.00	24.00
Workshop Supplies	2	25.00	50.00
Communication Costs	12	52.00	624.00
Insurance			800.00
Disinfestation – Deratization	5	111	555.00
Cleaning Products	10	3.76	37.60
Total			81,743.72 €

Equipment & Flow Chart

The following table shows the appropriate equipment, in each section of the company, in order to get standardized the table olives and the olive paste, resulting from agents of mechanical equipment.

Table A-5: Cost of equipment.

	Units	Cost
Storage Section		
Tanks	30	12,000.00 €
Total		12,000.00 €
Packaging Section		
Shorting machine	1	4,280.00 €
Filling machine	1	6,500.00 €
Labelling machine	1	2,800.00 €
Scale	1	250.00 €
Shorting table	1	2,400.00 €
Blender	1	1,000.00 €
Filling machine	1	2,000.00 €
Pasteurizer	1	7,200.00 €
Total		26,430.00 €
Standardization Line Total		38,430.00 €
Chemical Laboratory		
Ph meter	1	300.00 €
Auto Pipette	1	500.00 €
Scale	1	260.00 €
Workbench	1	1,950.00 €
Total		3,010.00 €
Offices		
Pc	2	697.56 €

Printer	1	259.35 €
Air Condition	1	1,219.51 €
Desks	2	406.50 €
Chairs	2	162.60 €
Shelves	1	135.76 €
Chairs	5	121.95 €
Tables	1	16.18 €
Total		3,019.41 €
Total of Other Sections		6,029.41 €
Total Equipment		44,459.41 €

A.4.1 Flow Chart

The olive fruits are placed in the tanks with potable water, salt, lactic and citric acid. It is worth saying here that is necessary the use of KCl instead of NaCl and the pasteurization after packaging to reduce salt content at the final products

Figure A-1: Flow charts of natural black, natural green and olive paste.

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┌─────────────────┐
│  Raw material   │
└─────────────────┘
         │
┌─────────────────┐          ┌─────────────────┐
│  First shorting │          │  Raw material   │
└─────────────────┘          └─────────────────┘
         │                            │
┌─────────────────┐          ┌─────────────────┐          ┌─────────────────┐
│ Covering in brine│         │  First shorting │          │  Raw material   │
└─────────────────┘          └─────────────────┘          └─────────────────┘
         │                            │                            │
┌─────────────────┐          ┌─────────────────┐          ┌─────────────────┐
│  Fermentation   │          │ Covering in brine│         │  First shorting │
└─────────────────┘          └─────────────────┘          └─────────────────┘
         │                            │                            │
┌─────────────────┐          ┌─────────────────┐          ┌─────────────────┐
│  Final shorting │          │  Fermentation   │          │ Covering in brine│
└─────────────────┘          └─────────────────┘          └─────────────────┘
         │                            │                            │
┌─────────────────┐          ┌─────────────────┐          ┌─────────────────┐
│  Exposure to air│          │  Final shorting │          │  Fermentation   │
└─────────────────┘          └─────────────────┘          └─────────────────┘
         │                            │                            │
┌─────────────────┐          ┌─────────────────┐          ┌─────────────────┐
│   Packaging     │          │   Packaging     │          │     Pulp        │
└─────────────────┘          └─────────────────┘          └─────────────────┘
                                                                   │
                                                          ┌─────────────────┐
                                                          │   Packaging     │
                                                          └─────────────────┘
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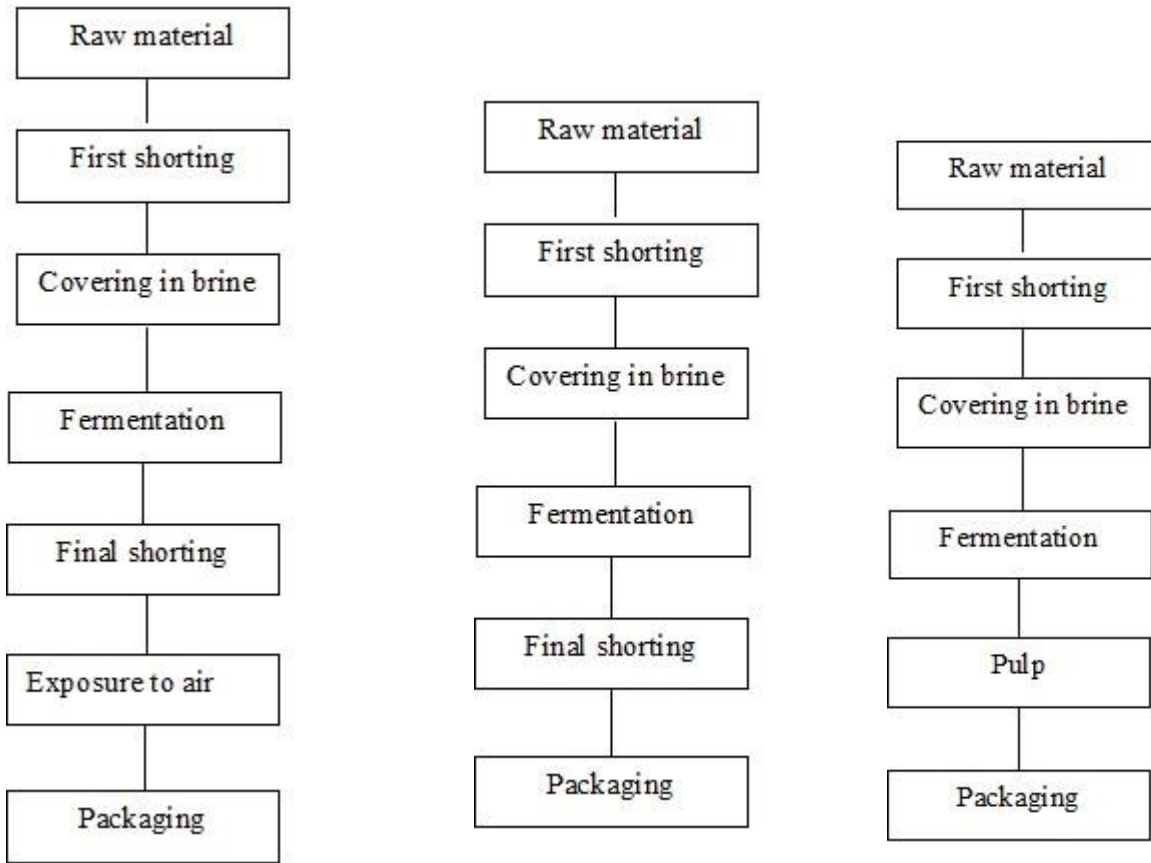
Human Resources

In the first year of operation, the company will hire a general manager and a production manager. Also, an accountant will work as external partner and a worker will be employed during the packaging period. As long as, the volume of products will be increased, the company will hire new employees. Thus, in the 5th year will be hired a financial manager and in the 8th year a sales & marketing manager. The annual cost of human resources has been calculated as it is seemed at the following table .

Table A-6: Cost of human resources.

A.6.1 Total Investment

The total investment is about 318,000€, which is separated in fixed assets and working capital as it is presented on the following table.

Annual Cost of Human Resources									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
General Manger	23,100 €	24,717 €	26,447 €	28,298 €	30,279 €	32,399 €	34,667 €	37,094 €	39,690 €
Production Manager	15,900 €	17,013 €	18,204 €	19,478 €	20,842 €	22,301 €	23,862 €	25,532 €	27,319 €
Accountant-Financial Manager	1,500 €	1,500 €	1,500 €	1,500 €	18,500 €	19,795 €	21,181 €	22,663 €	24,250 €
Sales & Marketing Manager	0 €	0 €	0 €	0 €	0 €	0 €	0 €	22,100 €	23,647 €
Worker	1,716 €	2,403 €	3,364 €	4,709 €	6,593 €	9,230 €	11,076 €	13,292 €	15,950 €
Total	42,216 €	45,633 €	49,515 €	53,986 €	76,214 €	83,725 €	90,786 €	120,681 €	130,856 €

Table A-7: Total investment.

Land	48,300.00 €
Production Equipment	44,459.41 €
Building	110,000.00 €
Fixed Assets	202,759.41 €
Working Capital	113,402.41 €
Total Investment	316,161.82 €

A.6.2 Funding

The project will be financed by European subsidy, loans and owners' funds as it is presented at the following tables.

Table A-8: Funding of fixed assets.

Funding of Fixed Assets	%Total	Funds

European Subsidy	40%	65,103.77 €
Owners' Funds	25%	80,689.85 €
Loan for fixed assets	35%	56,965.80 €
Total	100%	202,759.41 €

Table A-9: Funding of working capital.

Funding Working Capital	%Total	Funds
Loan for working capital	44%	50,000.00 €
Owners' Funds	56%	63,402.41 €
Total	100%	113,402.41 €

Table A-10: Financial expenses (amounts in €).

	Grace Period	Rate	Interest Loans Installments	Year 1	Year 2 / Year 10	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Loan for working capital	50,000.00	6months	6.00%	Every 3 months	7,678.08								
	56,965.80	24months	6.25%			8,712.90	8,712.90	8,712.90	8,712.90	8,712.90	8,712.90	8,712.90	8,712.90
						15,356.15	15,356.15	15,356.15					
						15,356.15	24,069.05	24,069.05	8,712.90	8,712.90	8,712.90	8,712.90	
						8,712.90	8,712.90						
						86,622.54	69,012.29	46,977.71	39,781.67	32,353.02	24,676.88	16,737.40	
						8,517.75	0.00						
Loan for fixed assets			Every 3 months									
Total	106,965.80			7,678.08								
Remaining Loans	106,965.80				100,791.01							

A.6.3 Profit & Loss

The profit and loss account measures the gains or losses over a period of time. It measures total income and deducts total cost. Both income and cost are calculated according to strict accounting rules.

Table A-11: Profit & Loss (amounts in €).

Profit and Loss (P&L)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year
Sales	0	199,229	278,921	390,489	546,685	765,359	1,071,503	1,285,804	1,542,964	1,851,557	2,221,
- Cost of Goods Sold		76,872	120,823	162,075	235,322	317,587	429,165	507,521	600,610	712,087	845,6
= Gross Margin	0	122,357	158,098	228,415	311,364	447,772	642,338	778,282	942,354	1,139,470	1,376,
- Operating Expenses	0	32,468	33,620	36,451	38,902	50,378	54,517	58,389	75,169	80,788	86,9
- Annual Depreciation		6,320	6,320	6,320	6,320	6,320	6,320	6,320	6,320	6,320	6,32
+ Other Operating Income	0	0	0	0	0	0	0	0	0	0	0
= EBIT	0	83,569	118,158	185,644	266,142	391,074	581,501	713,573	860,865	1,052,363	1,282,
- Net Interest Expense		7,678	15,356	24,069	24,069	8,713	8,713	8,713	8,713	8,713	8,71
= EBT	0	75,891	102,802	161,575	242,073	382,361	572,788	704,861	852,153	1,043,650	1,274,
- Tax		19,732	26,729	42,009	62,939	99,414	148,925	183,264	221,560	271,349	331,2
= EAT	0	56,160 0	76,073 0	119,565	179,134	282,947	423,863	521,597	630,593	772,301	942,9
- Dividends Paid	0			5,978	26,870	70,737	127,159	208,639	315,296	463,381	660,0
= Retained Earnings		56,160	76,073	113,587	152,264	212,211	296,704	312,958	315,296	308,920	282,8

A.6.4 Cash Flow

The statement of cash flow is a very powerful document. Cash flows into the company when checks are received and it flows out when checks are issued, but an understanding of the factors that cause these flows is fundamental.

CASH FLOW	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cash from Operations	-316,162	-39,505	53,437	88,268	140,688	232,372	**361,204** / 587,821	458,623 / 719,893	553,578 / 867,185	**678,574** / 1,058,683	829,145
EBIT + Depreciations		89,889	124,478	191,964	272,462	397,394					1,289,261
- Net Interest Expense		7,678	15,356	24,069	24,069	8,713	8,713	8,713	8,713	8,713	8,713
-Tax Paid		19,732	26,729	42,009	62,939	99,414	148,925	183,264	221,560	271,349	331,299
-Increase of Inventories		39,846	15,938	22,314	31,239	43,735	61,229	42,860	51,432	61,719	74,062
-Increase of Receivables		66,410	18,816	23,243	28,202	33,409	38,268	41,670	50,003	60,004	72,005
+ Increase of Payables		4,271	5,798	7,940	14,675	20,248	30,518	15,236	18,101	21,676	25,963
Cash from Investments	0	0	0	0	0	0	0	0	0	0	0
-Increase of Fixed Assets		0	0	0	0	0	0	0	0	0	0
Cash from Financing	0	-6,175	-14,168	-17,610	-22,035	-7,196	-7,429	-7,676	-7,939	-8,220	-8,518
+Increase of Capital		0	0	0	0	0	0	0	0	0	0
+Increase of Loans		-6,175	-14,168	-17,610	-22,035	-7,196		-7,676	-7,939	-8,220	-8,518
Net Annual Cash Flow	-113,402	-45,680	39,268	70,658	118,653	225,176	-7,429 / **353,775**	450,947	545,638	670,355	820,627
Accumulated Cash Flow	-113,402	-159,083	-119,814	-49,156	69,497	294,672	648,448	1,099,395	1,645,033	2,315,388	3,136,015
Free Cash Flow before Financing		-39,505	53,437	88,268	140,688	232,372					829,145

Accumulated Free Cash Flow before Financing		-39,505	13,932	102,200	242,887	475,259	361,204	458,623	553,578	678,574		3,356,383
							836,463	1,295,086	1,848,664	2,527,238	
Cash – Loans before Dividends	*6,437*	*-33,069*	*20,368*	*108,636*	*243,346*	*448,847*	*739,314*	*1,070,779*	*1,415,718*		*1,778,995*	*2,144,760*

Table A-12: Cash flow (amounts in €).

A.6.5 Balance Sheet

Balance sheet is simply an instant 'snapshot' of the assets used by the company and of the funds that are related to those assets. It is a static document relating to one point in time.

Table A-13: Balance sheet (amounts in €).

Balance Sheet	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	
Assets	316,162	370,417	438,120	542,037	686,941	912,203	1,231,996	1,552,514	1,877,972	2,200,348	2
Net Fixed Assets (FA)	202,759	196,439	190,119	183,799	177,479	171,159	164,839	158,519	152,199	145,879	
Inventories (INV)		39,846	55,784	78,098	109,337	153,072	214,301	257,161	308,593	370,311	
Receivables (AR)		66,410	85,226	108,469	136,671	170,080	208,348	250,017	300,021	360,025	
Cash	113,402	67,722	106,991	171,670	263,453	417,892	644,508	886,817	1,117,159	1,324,133	1
Liabilities & Equity	316,162	370,417	438,120	542,037	686,941	912,203	1,231,996	1,552,514	1,877,972	2,200,348	2
Capital (Cap)	209,196	209,196	209,196	209,196	209,196	209,196	209,196	209,196	209,196	209,196	
Reserves (Res)		56,160	132,233	245,820	398,084	610,294	906,998	1,219,957	1,535,253	1,844,173	2
Loans (L)	106,966	100,791	86,623	69,012	46,978	39,782	32,353	24,677	16,737	8,518	
Payables (AP)		4,271	10,069	18,008	32,684	52,931	83,449	98,685	116,785	138,461	

A.7.1 Operation Ratios
Financial & Investment Ratios

Financial Ratios	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Operation										
Profit Margin -ROS- (EBIT / Sales)	0%	42%	42%	48%	49%	51%	54%	55%	56%	57%
* *Assets Turnover (Sales / Assets)*	0%	54%	64%	72%	80%	84%	87%	83%	82%	84%
= Return on Total Assets - ROTA - (EBIT/Assets)	0%	23%	27%	34%	39%	43%	47%	46%	46%	48%

Table A-14: Operation ratios.

A.7.2 Profitability Ratios

Profitability	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Return on Total Assets - ROTA - (EBIT/Assets)	0%	23%	27%	34%	39%	43%	47%	46%	46%	48%	51%
Return on Equity – ROE - (EAT / Equity)	0%	21%	22%	26%	29%	35%	38%	36%	36%	38%	40%

Table A-15: Profitability ratios (a).

Table A-16: Profitability ratios (b).

	1st to 5th Year	1st to 10th Year
Return on Investment - ROI – (EAT/Total Investment)	50%	82%

A.7.3 Efficiency Ratios

Table 17: Efficiency ratios.

Efficiency	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Inventory Turnover	0.00	1.93	2.17	2.08	2.15	2.07	2.00	1.97	1.95	1.92	1.90
Receivables Turnover	0.00	3.00	3.27	3.60	4.00	4.50	5.14	5.14	5.14	5.14	5.14
Payables Turnover	0.00	18.00	12.00	9.00	7.20	6.00	5.14	5.14	5.14	5.14	5.14

A.7.4 Break Even Analysis

Break-even analysis is a form of analysis that relates activity to totals of revenue and costs based on the classification of costs into fixed and variable types. The level of activity at which the fixed costs of an operation are just covered by the contribution from sales. At these break even points neither a profit nor a loss ensues.

Table A-18: Break even points.

RESULTS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
BREAK EVEN POINT Black Olives (UNITS):	20,878	24,060	25,222	26,560	30,617	31,908	33,548	41,805	44,293	47,095
BREAK EVEN POINT Green Olives (UNITS):	8,007	9,452	9,861	10,375	11,750	12,176	12,774	15,886	16,803	17,842
BREAK EVEN POINT Olive Paste (UNITS):	426	303	324	343	430	461	491	618	661	708

A.7.5 Investment Ratios

Payback period is a term used in investment appraisal. It refers to the time required for the non-discounted cash in-flow to accumulate to the initial cash out-flow in the investment. Here this period is between 4 and 5 years.

A positive or negative NPV arrived at by discounting the cash flow from a capital project by the desired rate of return. If the value is positive, it means that the project is financially desirable and vice versa.

IRR is the rate of discount that brings the present value of all the cash flows associated with a capital investment to zero. It measures the effective yield on the investment. If this yield is greater than the 'hurdle rate' the investment is deemed to be financially desirable and vice versa.

Table A-19: Investment ratios

Investment Ratios	
Present Value of Total Investment =	316,161.82 €
Payback Period (yrs) greater than =	4
Net Present Value of Investment (5yr) =	11,034.98 €
Investment IRR (5yr) =	32.13%
NPV (10yr) approx =	1,900,726.92 €
IRR (10yr) approx =	59.6%

Appendix II

Olive Oil Business Plan

B.1 General

The purpose of this business plan is to estimate the profits of an investment on Greek extra virgin olive oil. The company will buy bulk extra virgin olive oil from olive mills with standard characteristics. Business and financial ratios will be used in order to evaluate the project of standardization and commerce.

In this business plan two different products will be presented. The first product is a P.D.O. (E.V.O.O.) monocultivar olive oil which will have the appropriate characteristics in order to classified as extra virgin[2].

These chemical and organoleptic characteristics are mentioned below:

- acidity ≤ 0.8%

- K_{270} ≤ 0.22

- K_{232} ≤ 2.50

- ΔK ≤ 0.01

- number of peroxides ≤ 20 meqO_2/kg olive oil

- halogenated solvents ≤ 0.20

- waxes ≤ 250 mg/kg

- stigma diene ≤ 0.15 mg/kg

- fruit intensity > 0

- median of defects = 0

The second product, is a blend (different varieties) olive oil, which also belongs to extra virgin category but the company would like to standardize and commerce a premium extra virgin olive oil. Thus, the chemical and organoleptic characteristics would be the same as the first product besides some points which will be stricter.

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[2] Kiritsakis A. K., 2007. Olive Oil

- ➤ acidity ≤ 0.3%

- ➤ number of peroxides ≤ 10 meqO$_2$/kg olive oil

- ➤ polyphenols ≥ 250 p.p.m.

- ➤ fruit intensity > 4

- ➤ pungency > 3

- ➤ bitterness > 2

The quantity of the first product, P.D.O. extra virgin olive oil (E.V.O.O.), will be the 90% of the company's total olive oil. As far as the second product (Premium), will be the 10% of the total extra virgin olive oil because of the top quality and its low production.

<div align="center">B.1.3 Location</div>

The establishment of the company will be in Kalamata which belongs to southwestern part of Peloponnese and is the capital of the regional unit of Messinia. First of all, the location is at the center of an olive oil producer regional unit. It is worth saying here that the extra virgin olive from Koroneiki variety which is produced and bottled in the regional unit of Messinia can be certificated and labeled as Protected Designation of Origin (P.D.O.) product. The European consumers admire P.D.O. products which are considered superior with unique characteristics foods. Moreover, Koroneiki is a well-known variety for the high quality olive oil which produces. Finally, the company will be established in the industrial area of Kalamata, which is 9 km away from the port, 1 km away from the airport and 1 km away from the national high way.

<div align="center">B.1.4 Goals</div>

The main goal of this business plan is to standardize and commerce top quality extra virgin olive oil. It should be made clear that Greece is not able to compete in quantity and low prices other Mediterranean countries which produce olive oil. The only sector where Greece is able to compete is the top quality of this product and there is a lot work to do on it[3]. Furthermore, the company and the whole sector of Greek olive oil should develop a marketing campaign based on Mediterranean diet and the brand "made in Greece". Olive oil is the basis of the Mediterranean diet, with many supporters around the world and great benefits on humans' health. Finally, the millions of tourists that visit Greece every year should taste, learn and admire Greek traditional-based on Mediterranean diet-food. In this way, the brand "made in Greece" is able to attract many fans from all around the world who are going to search and buy Greek products when they return to their countries.

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[3] Vlontzos, G. & Duquenne, M. N., 2008. Greek Olive Oil: How Can Its International Market Potential Be Realized?. *The Estey Centre Journal of International Law and Trade Policy, Volume* 9, p. 33

B.2 Products & Price

The ten-year length business plan starts with 10,000 Kg olive oil and at the 10th year is going to standardize and commerce almost 100,000 Kg. The project starts with low volume in order to reduce the risk and the whole budget of the investment.

Table B-1: Input of raw olive oil.

Years	Total (Kg)	Prime (Kg)	E.V.O.O. (Kg)
1	10,000.00	1,000.00	9,000.00
2	15,000.00	1,500.00	13,500.00
3	22,500.00	2,250.00	20,250.00
4	33,750.00	3,375.00	30,375.00
5	50,625.00	6,075.00	54,675.00
6	60,750.00	7,290.00	65,610.00
7	72,900.00	8,019.00	72,171.00
8	80,190.00	8,019.00	72,171.00
9	88,209.00	8,820.90	79,388.10
10	97,029.90	9,702.99	87,326.91

As the company standardize and commerce low volumes of high quality extra virgin olive oil the destination of its products will be at delicatessen shops. The price of the extra virgin olive oil at these shops starts from 18€/lt even to 50€/lt[4]. At the following table it is seemed the way that is calculated the selling prices. of 0.5lt bottles among the distribution channels. The company is going to sell its products ex-works. It is worth saying here that the retail shops earn 25% and the wholesalers 20% of the price of each bottle.

Table B-2: Products' Price.

	Retail Price	Price without V.A.T.	Price of the wholesaler	Ex-works Price
EVOO	11.50 €	10.70 €	8.02 €	6.07 €
Ultra-premium EVOO	13.00 €	12.09 €	9.07 €	6.90 €

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[4] Hellenic Republic-Ministry of Foreign Affairs

B.3 Raw & Other Materials

The following table presents all the materials from extra virgin olive oil to cleaning products which are used during the first year of operation. The total cost is about 44.000€ and the 70% of it. is the cost of extra virgin olive oil with the quality standards of the company.

Table B-3: Cost & quantities of materials.

Input	Units	Cost/Unit	Cost 1st Year
Premium Olive Oil (kg)	1,000	3.60	3,600.00
PDO Olive Oil (kg)	9,000	3.00	27,000.00
Electricity (kwh)	10,128	0.08	836.49
Water (m^3)	188	2.07	388.24
Bottles	21,739	0.20	4,347.83
Caps	21,739	0.13	2,826.09
Labels	21,739	0.02	434.78
Cartons	1,812	0.46	833.33
Bottles Separators	1,812	0.15	271.74
Europallets	19	6.40	122.04
Nitrogen Bottles (50lt)	5	50.00	250.00
Mechanical Parts			300.00
Equipment Maintenance			100.00
Clothing and Footwear	2	109.90	219.80
Pharmaceutical Equipment	1	299.75	299.75
Office Supplies	2	12.00	24.00
Workshop Supplies	2	25.00	50.00
Communication Costs	12	52.00	624.00
Insurance			800.00

	Units		Cost
Disinfestation – Deratization	5	111	555.00
Cleaning Products	10	3.76	37.60
Total			43,920.70 €

B.4 Equipment & Flow Chart

At the table below there is a presentation of the mechanical equipment of the company. The equipment's total cost is approximately 29.200€ resulting from agents of mechanical equipment.

Table B-4: Cost of equipment.

	Units	Cost
Storage Section		
Filter	1	3,450.00 €
Tank 1,000kg	2	1,900.00 €
Tank 10,000kg	1	3,850.00 €
Nitrogen Charging System	1	350.00 €
Total		9,550.00 €
Bottling Section		
Filling, Capping & Labelling Machine	1	11,815.00 €
Total		11,815.00 €
Standardization Line Total		21,365.00 €
Chemical Laboratory		
CDR Mini Food Olive	1	2,100.00 €

Auto Pipette	1	500.00 €
Scale	1	260.00 €
Workbench	1	1,950.00 €
Total		4,810.00 €
Offices		
Pc	2	697.56 €
Printer	1	259.35 €
Air Condition	1	1,219.51 €
Desks	2	406.50 €
Chairs	2	162.60 €
Shelves	1	135.76 €
Chairs	5	121.95 €
Tables	1	16.18 €
Total		3,019.41 €
Total of Other Sections		7,829.41 €
Total Equipment		29,194.41 €

B.4.1 Storage and conservation of extra virgin olive oil

When the company receives the bulk extra virgin olive oil. checks. filters and storages it in the tanks. The olive oil should be filtered in order to get rid of sediment which precipitates at the bottom of the tanks and downgrades the extra virgin olive oil. The appropriate conditions to conserve olive oil is at 13-20°C with the presence of Nitrogen gas instead of atmospheric air and Oxygen gas.[5]

Figure B-1: Flow Chart.

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[5] Kiritsakis A. K., 2007. Olive Oil

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┌──────────────┐        ┌──────────────┐        ┌──────────────┐
│  SUPPORTING  │        │     RAW      │        │  PACKAGING   │
│  MATERIALS   │        │  MATERIALS   │        │  MATERIALS   │
└──────┬───────┘        └──────┬───────┘        └──────┬───────┘
       │                       │                       │
┌──────┴───────┐        ┌──────┴───────┐        ┌──────┴───────┐
│  RECEIPT &   │        │  RECEIPT &   │        │  RECEIPT &   │
│   CONTROL    │        │   CONTROL    │        │   CONTROL    │
└──────┬───────┘        └──────┬───────┘        └──────┬───────┘
       │                       │                       │
┌──────┴───────┐        ┌──────┴───────┐        ┌──────┴───────┐
│   STORAGE    │────────│  FILTERING   │        │   STORAGE    │
└──────────────┘        │      &       │        └──────────────┘
                        │   STORAGE    │
                        └──────┬───────┘
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SUPPORTING MATERIALS

RAW MATERIALS

PACKAGING MATERIALS

RECEIPT & CONTROL

RECEIPT & CONTROL

RECEIPT & CONTROL

STORAGE

FILTERING & STORAGE

STORAGE

FILLING OPERATION

PLACEMENT OF BOTTLES (CLEANED WITH COMPRESSED AIR)

CAPPING

LABELLING

PLACEMENT IN CARDBOARD CONTAINERS

STORAGE OF FINAL BRANDED OLIVE OIL

DISTRIBUTION

B.5 Human Resources

The company will hire a general manager and a production manager in the first year of the operation. Also. an accountant will work as external partner and a worker will be employed during the bottling period. As long as. the volume of products will be increased. the company will hire new employees. Thus. in the 5th year will be hired a financial manager and in the 8th year a sales & marketing manager.

The annual cost of human resources has been calculated as it is seemed at the table below.

Table B-5: Cost of human resources.

Annual Cost of Human Resources										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
General Manger	23,100 €	24,717 €	26,447 €	28,298 €	30,279 €	32,399 €	34,667 €	37,094 €	39,690 €	42,468 €
Production Manager	15,900 €	17,013 €	18,204 €	19,478 €	20,842 €	22,301 €	23,862 €	25,532 €	27,319 €	29,232 €
Accountant-Financial Manager	1,500 €	1,500 €	1,500 €	1,500 €	18,500 €	19,795 €	21,181 €	22,663 €	24,250 €	25,947 €
Sales & Marketing Manager	0 €	0 €	0 €	0 €	0 €	0 €	0 €	22,100 €	23,647 €	25,302 €
Worker	1,208 €	1,812 €	2,717 €	4,076 €	7,337 €	8,804 €	9,685 €	9,685 €	10,653 €	11,719 €
Total	41,708 €	45,042 €	48,868 €	53,353 €	76,958 €	83,299 €	89,394 €	117,074 €	125,559 €	134,668 €

B.6 Financial Analysis

The total investment is about 268.000€. which is separated in fixed assets and working capital as it is presented on the table.

Table B- 6: Total Investment.

Land	48,300.00 €
Production Equipment	29,194.41 €
Building	110,000.00 €
.Fixed Assets	187,494.41 €
Working Capital	78,159.79 €
Total Investment	265,654.20 €

The fixed assets and the working capital of the projects will be financed by European subsidy. loans and owners' funds as it is presented at the following tables.

Table B-7: Funding of fixed assets.

Funding of Fixed Assets	%Total	Funds
European Subsidy	40%	58,997.77 €
Owners' Funds	25%	76,873.60 €
Loan for fixed assets	35%	51,623.05 €
Total	100%	187,494.41 €

Table B-8 : Funding of working capital.

Funding Working Capital	%Total	Funds
Loan for working capital	51%	40,000.00 €
Owners' Funds	49%	38,159.79 €
Total	100%	78,159.79 €

The loans of the company will be approximately 92.000€. the 50% of them are interest free and the installments every 3 months. At the table below are calculated the two loans.

Table B.9: Financial expenses (amounts in €).

Loans		Grace Period	Interest Rate	Installments	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Loan for fixed assets	51,623.05	24months	6.25%	Every 3 months			7,895.73	7,895.73	7,895.73	7,895.73	7,895.73	7,895.73	7,895.73	7,895.73
Loan for working capital	40,000.00	6months	6.00%	Every 3 months	6,142.46	12,284.92	12,284.92	12,284.92						
Total	91,623.05				6,142.46	12,284.92	20,180.65	20,180.65	7,895.73	7,895.73	7,895.73	7,895.73	7,895.73	7,895.73
Remaining Loans	91,623.05				86,683.22	75,348.44	60,940.47	42,571.73	36,050.60	29,318.67	22,362.46	15,167.62	7,718.88	0.00

The profit and loss account measures the gains or losses over a period of time. It measures total income and deducts total cost. Both income and cost are calculated according to strict accounting rules.

Table B-10: Profit & Loss (amounts in €).

Profit and Loss (P & L)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Sales	0	133,711	200,566	300,849	451,274	812,294	974,752	1,072,227	1,072,227	1,179,450	1,297,395
- Cost of Goods Sold		43,119	78,722	109,420	170,958	281,330	331,269	361,147	362,352	395,261	431,419
= Gross Margin	0	90,592	121,845	191,430	280,317	530,964	643,484	711,081	709,876	784,189	865,976
- Operating Expenses	0	32,178	33,283	36,082	38,541	50,802	54,274	57,595	73,110	77,764	82,761
- Annual Depreciation		4,183	4,183	4,183	4,183	4,183	4,183	4,183	4,183	4,183	4,183
+ Other Operating Income	0	0	0	0	0	0	0	0	0	0	0
= EBIT	0	54,232	84,379	151,165	237,593	475,978	585,027	649,303	632,583	702,242	779,032
- Net Interest Expense		6,142	12,285	20,181	20,181	7,896	7,896	7,896	7,896	7,896	7,896
= EBT	0	48,089	72,094	130,984	217,412	468,083	577,131	641,407	624,687	694,346	771,136
- Tax		12,503	18,745	34,056	56,527	121,702	150,054	166,766	162,419	180,530	200,495
= EAT	0	35,586	53,350	96,928	160,885	346,381	427,077	474,642	462,268	513,816	570,641
- Dividends Paid	0	0	0	4,846	24,133	86,595	128,123	189,857	231,134	308,290	399,448

| = Retained Earnings | 35,586 | 53,350 | 92,082 | 136,752 | 259,786 | 298,954 | 284,785 | 231,134 | 205,526 | 171,192 |

B.6.4 Cash Flow

The statement of cash flow is a very powerful document. Cash flows into the company when checks are received and it flows out when checks are issued. but an understanding of the factors that cause these flows is fundamental.

Table B-11: Cash flow (amounts in €).

CASH FLOW	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cash from Operations	-265,654	-29,148	31,612	64,367	117,320	233,813	407,268	446,186	466,686	482,105	535,332
EBIT + Depreciations		58,415	88,562	155,348	241,776	480,161	589,210	653,486	636,766	706,425	783,215
- Net Interest Expense		6,142	12,285	20,181	20,181	7,896	7,896	7,896	7,896	7,896	7,896
-Tax Paid		12,503	18,745	34,056	56,527	121,702	150,054	166,766	162,419	180,530	200,495
-Increase of Inventories		26,742	13,371	20,057	30,085	72,204	32,492	19,495	0	21,445	23,589
-Increase of Receivables		44,570	16,714	22,285	29,249	67,691	9,025	18,954	0	20,849	22,934
+ Increase of Payables		2,395	4,165	5,598	11,586	23,144	17,525	5,810	234	6,399	7,031
Cash from Investments	0	0	0	0	0	0	0	0	0	0	0
-Increase of Fixed Assets		0	0	0	0	0	0	0	0	0	0
Cash from Financing	0	-4,940	-11,335	-14,408	-18,369	-6,521	-6,732	-6,956	-7,195	-7,449	-7,719

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
+Increase of Capital		O	O	O	O	O	O	O	O	O	O
+Increase of Loans		-4,940	-11,335	-14,408	-18,369	-6,521	-6,732	-6,956	-7,195	-7,449	-7,719
Net Annual Cash Flow	-78,160	-34,088	20,278	49,959	98,952	227,292	400,536	439,229	459,491	474,656	527,613
Accumulated Cash Flow	-78,160	-112,248	-91,970	-42,011	56,941	284,233	684,769	1,123,998	1,583,489	2,058,144	2,585,757
Free Cash Flow before Financing		-29,148	31,612	64,367	117,320	233,813	407,268	446,186	466,686	482,105	535,332
Accumulated Free Cash Flow before Financing		-29,148	2,464	66,831	184,152	417,965	825,233	1,271,418	1,738,104	2,220,208	2,755,540
Cash – Loans before Dividends	-13,463	-42,611	-10,999	53,368	165,842	375,523	696,195	1,014,257	1,291,086	1,542,057	1,769,099

B.6.5 Balance Sheet

Balance sheet is simply an instant 'snapshot' of the assets used by the company and of the funds that are related to those assets. It is a static document relating to one point in time.

Table B-12: Balance sheet (amounts in €).

Balance Sheet	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Assets	265,654	298,696	344,875	428,147	558,117	834,526	1,144,273	1,427,911	1,652,085	1,856,562	2,027,066
Net Fixed Assets (FA)	187,494	183,312	179,129	174,946	170,763	166,580	162,397	158,214	154,031	149,848	145,665
Inventories (INV)		26,742	40,113	60,170	90,255	162,459	194,950	214,445	214,445	235,890	259,479
Receivables (AR)		44,570	61,284	83,569	112,819	180,510	189,535	208,489	208,489	229,338	252,271
Cash	78,160	44,072	64,349	109,462	184,281	324,978	597,391	846,763	1,075,120	1,241,486	1,369,650
Liabilities & Equity	265,654	298,696	344,875	428,147	558,117	834,526	1,144,273	1,427,911	1,652,085	1,856,562	2,027,066

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital (Cap)	174,031	174,031	174,031	174,031	174,031	174,031	174,031	174,031	174,031	174,031	174,031
Reserves (Res)		35,586	88,936	181,018	317,770	577,556	876,510	1,161,295	1,392,429	1,597,955	1,769,148
Loans (L)	91,623	86,683	75,348	60,940	42,572	36,051	29,319	22,362	15,168	7,719	0
Payables (AP)		2,395	6,560	12,158	23,744	46,888	64,413	70,223	70,457	76,856	83,887

B.7 Financial & Investment Ratios

B.7.1 Operation Ratios

Table B-13: Operation ratios.

Financial Ratios	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Operation											
Profit Margin -ROS- (EBIT / Sales)	0%	41%	42%	50%	53%	59%	60%	61%	59%	60%	60%
* *Assets Turnover (Sales / Assets)*	0%	45%	58%	70%	81%	97%	85%	75%	65%	64%	64%
= Return on Total Assets - ROTA - (EBIT/Assets)	0%	18%	24%	35%	43%	57%	51%	45%	38%	38%	38%

B.7.2 Profitability Ratios

Table B-14: Profitability Ratios (a).

Profitability	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10

Return on Total Assets - ROTA - (EBIT/Assets)	0%	18%	24%	35%	43%	57%	51%	45%	38%	38%	38%
Return on Equity – ROE - (EAT / Equity)	0%	17%	20%	27%	33%	46%	41%	36%	30%	29%	29%

Table B-15: Profitability (b).

	5-years period	10-years period
Return on Investment - ROI – (EAT/Total Investment)	61%	93%

B.7.3 Efficiency Ratios

Table B- 16: Efficiency Ratios.

Efficiency	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Y
Inventory Turnover	0.00	1.61	1.96	1.82	1.89	1.73	1.70	1.68	1.69	1.68	
Receivables Turnover	0.00	3.00	3.27	3.60	4.00	4.50	5.14	5.14	5.14	5.14	
Payables Turnover	0.00	18.00	12.00	9.00	7.20	6.00	5.14	5.14	5.14	5.14	

B.7.4 Break Even Analysis

Break-even analysis is a form of analysis that relates activity to totals of revenue and costs based on the classification of costs into fixed and variable types. The level of activity at which the fixed costs of an operation are just covered by the contribution from sales. At these break even points neither a profit nor a loss ensues.

RESULTS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
BREAKEVEN POINT EVOO (UNITS):	7,747	9,116	9,436	9,898	11,509	12,095	12,715	15,933	16,810	17,755
BREAKEVEN POINT PREMIUM (UNITS):	1,632	2,199	2,182	2,261	2,386	2,483	2,598	3,260	3,426	3,605

Table B-17: Break even points (amounts in units).

B.7.5 Investment Ratios

Payback period is a term used in investment appraisal. It refers to the time required for the non-discounted cash in-flow to accumulate to the initial cash out-flow in the investment. Here this period is between 4 and 5 years.

A positive or negative NPV arrived at by discounting the cash flow from a capital project by the desired rate of return. If the value is positive. it means that the project is financially desirable and vice versa.

IRR is the rate of discount that brings the present value of all the cash flows associated with a capital investment to zero. It measures the effective yield on the investment. If this yield is greater than the 'hurdle rate' the investment is deemed to be financially desirable and vice versa.

Table B-18: Investment ratios.

Investment Ratios	
Present Value of Total Investment = €	265,654.20
Payback Period (yrs) greater than =	4
Net Present Value of Investment (5yr) =	22,927.11 €
Investment IRR (5yr) =	37.82%
NPV (10yr) approx = €	1,574,842.43
IRR (10yr) approx =	65.6%