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Deliverable: 4.2.2	Market analysis and opportunities in Greek CB area: Agricultural sector

PROJECT: Social agri-entrepreneurship for people with disabilities in the crossborder area

AGRI-ABILITY

(Subsidy Contract No: SC: B2.9c.09-AGRI-ABILITY)

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Preface

The report entitled ‘‘Market analysis and opportunities in the Greek Cross Border Area: Agricultural sector’’ is the Deliverable 4.2.2 of the Democritus University of Thrace within the framework of the project ‘‘Social agri-entrepreneurship for people with disabilities in the crossborder area’’ (SC: B2.9c.09-AGRI-ABILITY) implemented under the framework of INTERREG V-A Greece-Bulgaria 2014-2020 Cooperation Programme. The report was designed to promote understanding of the current situation of agribusiness and identify relevant opportunities in the Region of Central Macedonia and the Region of East Macedonia and Thrace that is the eligible areas of the Programme INTERREG Greece-Bulgaria 2014-2020. The report does not contain data and assessments relevant to the livestock sector which is out of the scope of the AGRI-ABILITY project.

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1. Introduction

The last decade the World Health Organization (WHO) reported that over a billion people, about 15% of the total population, live with disabilities. According to the EU 2020 Strategy, development should be equitable, inclusive and accessible for all in order to benefit all of society. Including persons with disabilities by boosting their involvement in the agricultural sector can improve employment opportunity and income generation. This report was designed to promote understanding of the current situation of agribusiness and identify relevant opportunities in the Region of Central Macedonia and the Region of East Macedonia and Thrace that is the eligible areas of the Programme INTERREG Greece-Bulgaria 2014-2020.

The agricultural sector is an important factor of economic and social cohesion in Greece, both on national and regional level. Greece's integration into the European Community has led to the immediate implementation of the Common Agricultural Policy (CAP) and the gradual liberalization of trade in agricultural products with other Member States. Consequently, the institutional framework in which Greek agriculture developed has changed radically and the regulatory capacities of national agricultural policy have been significantly reduced.

Agricultural landscapes affect regional development and competitiveness in a way far beyond the production of agricultural commodities. However, comprehensive assessments of the relevant cause-effects between agricultural landscape and regional agricultural entrepreneurship and competitiveness are complex and they require a range of ecological, economic and social aspects to be considered (Schaller et al. 2018)

According to Kyrkilis and Semasis (2015), the picture of Greek agriculture has not changed dramatically during the recent economic crisis. Since 2008, the first year of the recent international crisis that became a debt crisis in the case of Greece, the latter's agriculture has managed to rather maintain the absolute number of employment and to improve it as percentage of total. In 2013 the sector accounted for more than 14% of total employment while industry reduced it to 16%, and

services improved it to almost 70% with unemployment mounted up to 27%. However, employment losses in the latter two sectors account for almost the entire unemployment in the country. In the same period the primary sector lost the 13.96% of its value added, ending up with a share of 3.7% to the total gross value added compared with a loss of more than 40% of gross value added for industry (share of 16.5% of total in 2013) and almost 25% for services. However, the agriculture's output rose by 6.6% in constant prices in 2013 although the sector's productivity, i.e. gross value added over employment declined by almost 12% during the period between 2008 and 2013 compared with an increase in industry by almost 4% in the same period but a decline in services by just above than 9%.

However, Greek agriculture seems to has changed course since 2008. Agriculture imports started to decline, the reduction of domestic demand due to economic crisis has certainly contributed to this and exports to revive while the agriculture's share to total exports started rising and it approached 20% in average for the 2008 - 2013 period's total exports. Overall, the sector's trade deficit is reduced. Agricultural exports improved their ranking among Greek exports excluding petroleum, as fishery products occupy the 3rd place with export value Euros 450 million, cotton the 4th place with a value of Euros 426 million, vegetables the 6th place with a value of Euros 300 million, extra virgin olive oil the 7th place with a value of Euros 290 million, some fruits (apricots, cherries and peaches) the 8th place with a value of Euros 289 million, dairy products the 9th place and value of Euros 266 million, etc. These developments do not necessarily imply that Greek agriculture has improved its international competitiveness since they may partly be the outcome of the decline of other exporting sectors of the Greek economy due to the economic crisis that has led to the restructuring of exports. In any case though, they show in conjunction with the fact that it maintained employment and it reduced its output much less than the other economic sectors the resilience of Greek agriculture to the economic crisis and its potential.

Within the above mentioned framework the agricultural sector in the Region of Central Macedonia and the Region of East Macedonia and Thrace provides several

opportunities for entrepreneurship that can be exploited by people with disabilities offering both economic and social benefits at multiple levels.

2. General description of the Greek Cross Border Area

The Cooperation Programme "Greece-Bulgaria 2014-2020" was approved by the European Commission on 13/12/2016 by Decision C(2016)8708. The Greek part of the eligible area of the Programme consists of the **Region of Eastern Macedonia and Thrace** (Regional Units of Evros, Kavala, Xanthi, Rodopi and Drama) and part of the **Region of Central Macedonia** (Regional Units of Thessaloniki and Serres) (Map 1).

Map 1. The eligible area of the Cooperation Programme "Greece-Bulgaria 2014-2020"

The **Region of Eastern Macedonia and Thrace** consists of the northeastern part of Greece, and is divided into 6 Regional Units:

- **Regional Unit of Drama**
- **Regional Unit of Kavala**
- **Regional Unit of Thassos**
- **Regional Unit of Xanthi**
- **Regional Unit of Rodopi**
- **Regional Unit of Evros**

The Region covers 14.157 sq. km corresponding to 10,7% of the total area of Greece. It borders Bulgaria and Turkey to the north, the prefecture of Serres to the west and the Thracian Sea to the south.

The **Region of Central Macedonia** is the largest and second most populous region of Greece and is divided into 7 Regional Units:

- **Regional Unit of Thessaloniki**
- Regional Unit of Imathia
- Regional Unit of Kilkis
- Regional Unit of Pella
- Regional Unit of Pieria
- **Regional Unit of Serres**
- Regional Unit of Chalkidiki

It is highlighted that only the Regional Unit of Thessaloniki and the Regional Unit of Serres are included in the eligible area of the Programme.

The Region has a total area of about 18,810 square kilometers of which 3,683 km² occupied by the Regional Unit of Thessaloniki, 3,968 km² by the Regional Unit of Serres.

The Region of Central Macedonia along with the Region of East Macedonia and Thrace, are supervised by the Decentralized Administration of Macedonia and Thrace which is based in Thessaloniki.

2.1 Natural Resources and Environment

The Greek CB area is characterized by many and important natural resources, including a large number of protected areas, many of which are of pristine character. The CB landscape consists of densely forested mountains with predominant the Rodopi mountains, valleys, plains, lakes and wetlands such as Koronia, Volvi, Kerkini,

and Ismaritida, seasides and the cross-border rivers of Strymon (Struma), Nestos (Mesta), Ardas (Arda) and Evros (Maritsa).

The Greek CB area is known, from the ancient years, for its rich mineral wealth. In the prefecture of Drama the marble quarries are among the largest and most developed in Greece. Moreover, there are important mineral resources of manganese at the foot of Mt Phalakro, uranium deposits and industrial minerals in Paranesti and a lignite field has been recently located in Mavrolefki. There are also industrial minerals, lignite deposits and turf, mainly in the flat land of the south. The prefecture of Kavala is rich in iron ore (in Thassos) and in marble (near the village Limnias).

Furthermore the area is characterized by important energy resources such as hydroelectric power plants and geothermal fields with several potential applications in the agricultural sector.

2.2 Socioeconomic characteristics

The economy in the Greek CB-area is based on agriculture, on construction and industrial activity, trade, commerce, transport, education, and public administration. The manufacturing sector has a high concentration of firms in clothing, textiles, food packaging, wood, paper and metal processing. In the tertiary sector, there are considerable opportunities for the development of tourism due to important natural and cultural resources. The Greek CB area has been gradually converting from an agricultural/industrial economy to an industrial/service economy, however this conversion has been rather slow. The Greek CB-area is considerably less agricultural and industrial than the BG CB-area part, and more service-oriented. The total labour productivity in the CB area is significantly lower than the EU28 avg. (approx. 1/5), however is higher in the Greek part (32.800€/employee) comparing to the Bulgarian (5.800€/employee). Furthermore the productivity is also below the respective national average since for the Greek part is ranging from 60% to 84% of the GR national average. It is underlined that even within the study area there is an uneven

development between the rural and urban areas, with the last attracting most of the population and economic activities of the area.

The Greek CB area has significant research facilities and academic facilities with predominant the Aristotle University of Thessaloniki and the Democritus University of Thrace. In terms of transport, the Egnatia Motorway crosses the Regions of Central Macedonia and Eastern Macedonia and Thrace starting from the Igoumenitsa Port, which provides links by boat to Italy, and ending to Kipi in Evros (Greek-Turkish borders). On a national level, the Egnatia Motorway will increase investments in sectors like transport (e.g. new freight centers), industry and tourism, thus playing an important role as a major development axis in Northern Greece. The major ports and airports in the study area are established in Thessaloniki, Alexandroupoli and Kavala. Furthermore there is a railway network connecting the major cities of the study area.

3. Economy and employment

3.1 Economy

Gross domestic product (GDP) is a monetary measure of the market value of all the final goods and services produced in a period of time (annually). The GDP of the study area was increasing until 2008 (Figure 1) when the economic crises affected the country. After a 5 year depression period (2008-2013) the GDP seems to be stabilized at levels that are higher than those before 2002, with an increasing tendency. According Eurostat (2019) the Region of Eastern Macedonia and Thrace in 2017 was among the poorest regions of Greece with just 11.500 Euros GDP per capita and 13.900 Purchasing power parity (PPP) while in Central Macedonia the GDP per capita and PPP was 13.300 Euros and 16.000 respectively.

Gross value added (GVA) is defined as output (at basic prices) minus intermediate consumption (at purchaser prices); it is the balancing item of the national accounts' production account. GVA can be broken down by industry and institutional sector. The sum of GVA over all industries or sectors plus taxes on products minus subsidies on products gives gross domestic product. The Gross Value Added in the study area reflects the contribution of labour and capital to production. Value added by activity breaks down the total value added by sector, namely agriculture, industry, utilities, and other service activities (Figure 2). The shares of each sector are calculated by dividing the value added in each sector by total value added. The breakdown of value added by activity has changed in the study area over the last 20 years but not dramatically. The share of agriculture is now relatively smaller compared to 2000, while industry and services have been increased.

With regards to the economic activity, the primary sector, despite its decline, remains quite significant for the local economy, with high productivity above the national average. It is important to note the high proportion of arable and irrigated areas, the above national average production of cereals, industrial and aromatic plants, the improved structure of agricultural holdings compared to the national average and the relatively high degree of mechanisation and organisation of animal

farming. Nevertheless the primary sector remains vulnerable because of its dependence on agricultural subsidies and the replacement of products by imports. The secondary (manufacturing) sector remains highly specialized in certain medium to low technology and labour intensive sectors. It accounts for a significant part of regional employment and thus is a factor of social cohesion and a key component of economic activity due to the intense and interactive relationship with other productive activities in all three sectors of the economy. However recent negative trends in investment have been noted, accompanied by relatively lower labour productivity and growth. Until 2016, the rates of setting up new and modern manufacturing enterprises remain low and far from internationally competitive manufacturing standards. The difficulties in attracting Foreign Direct Investments are indicative of the fact.

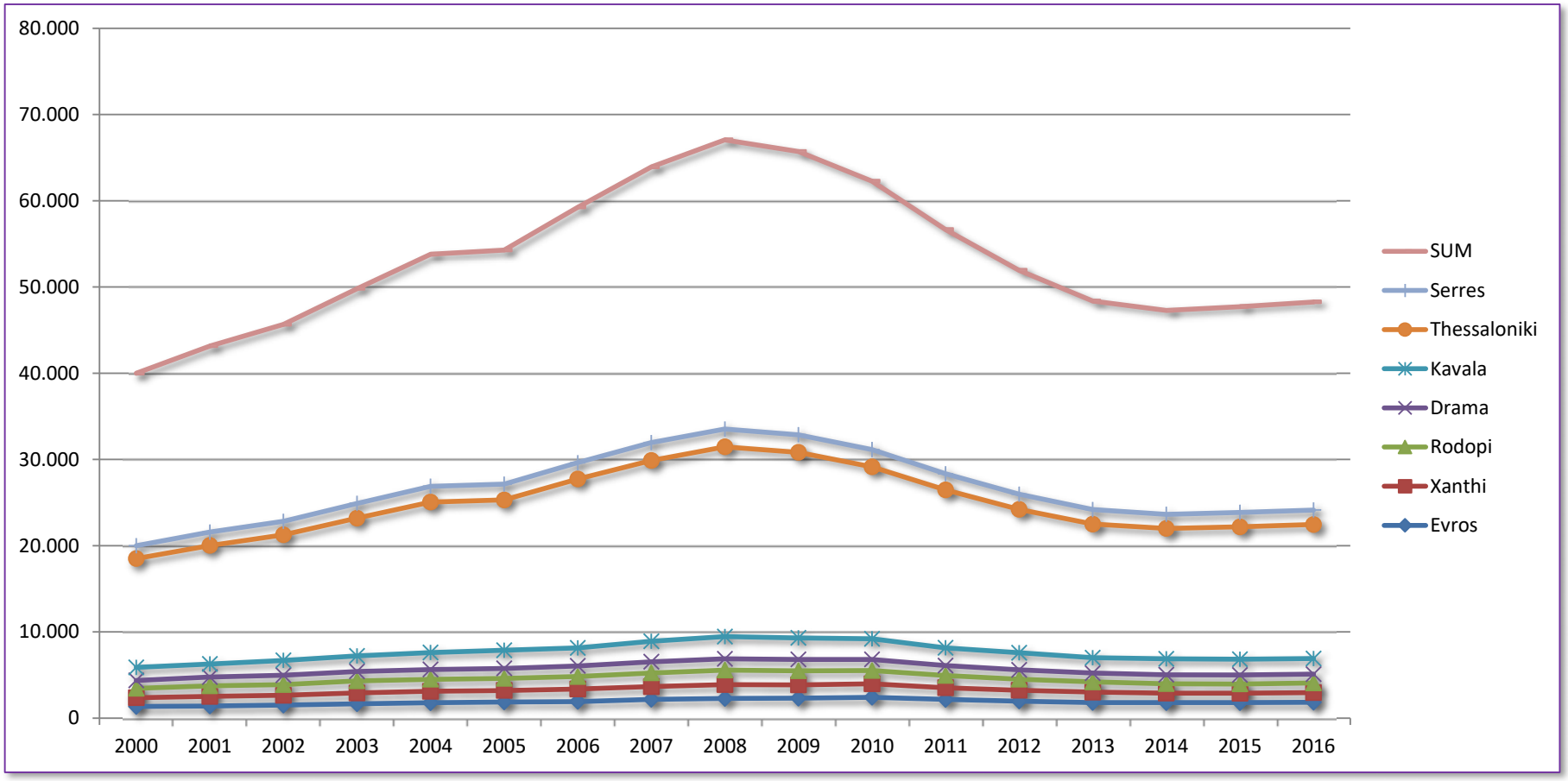


Figure 1. Gross domestic product by Regional Unit (*In million euro. At current prices).*

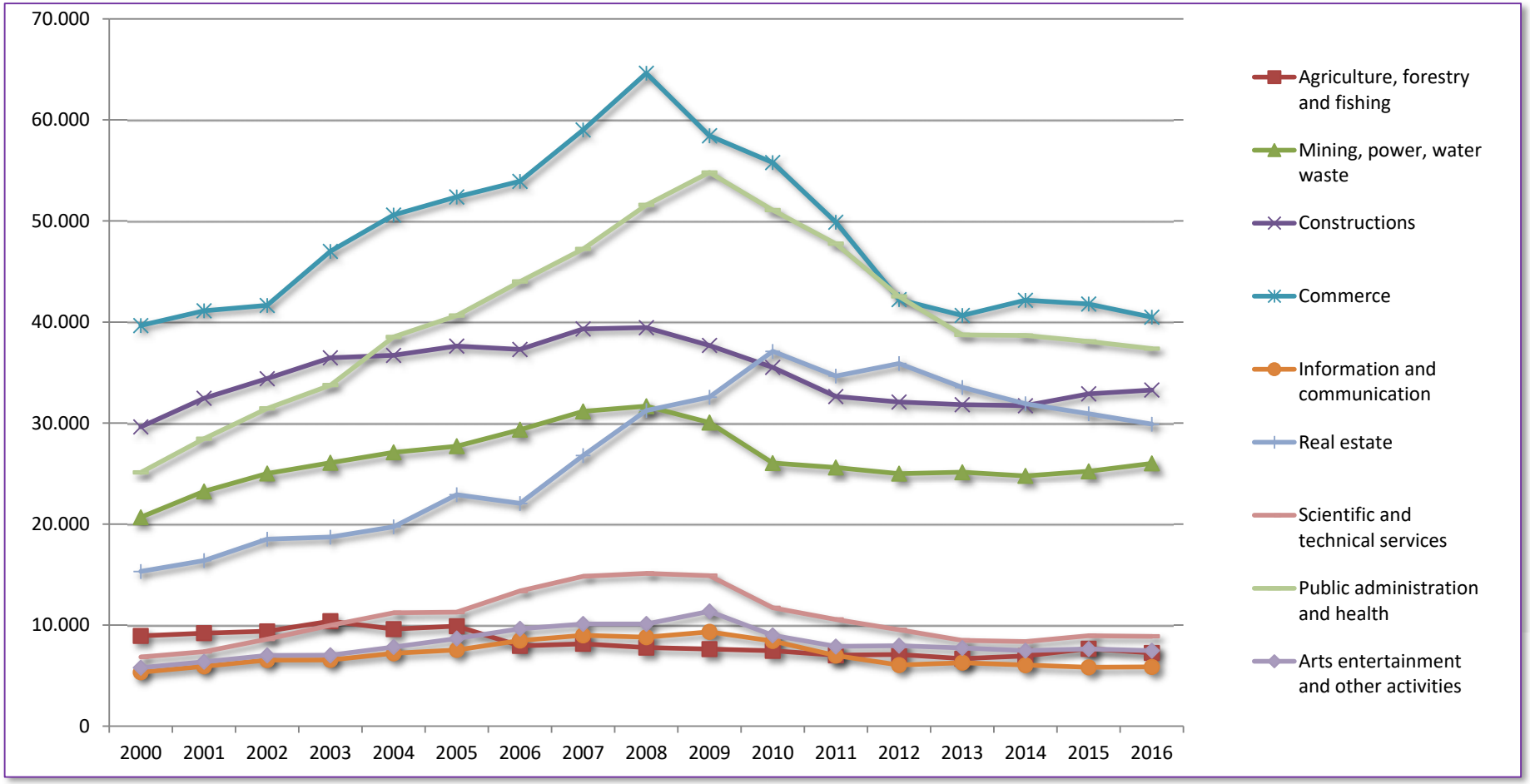


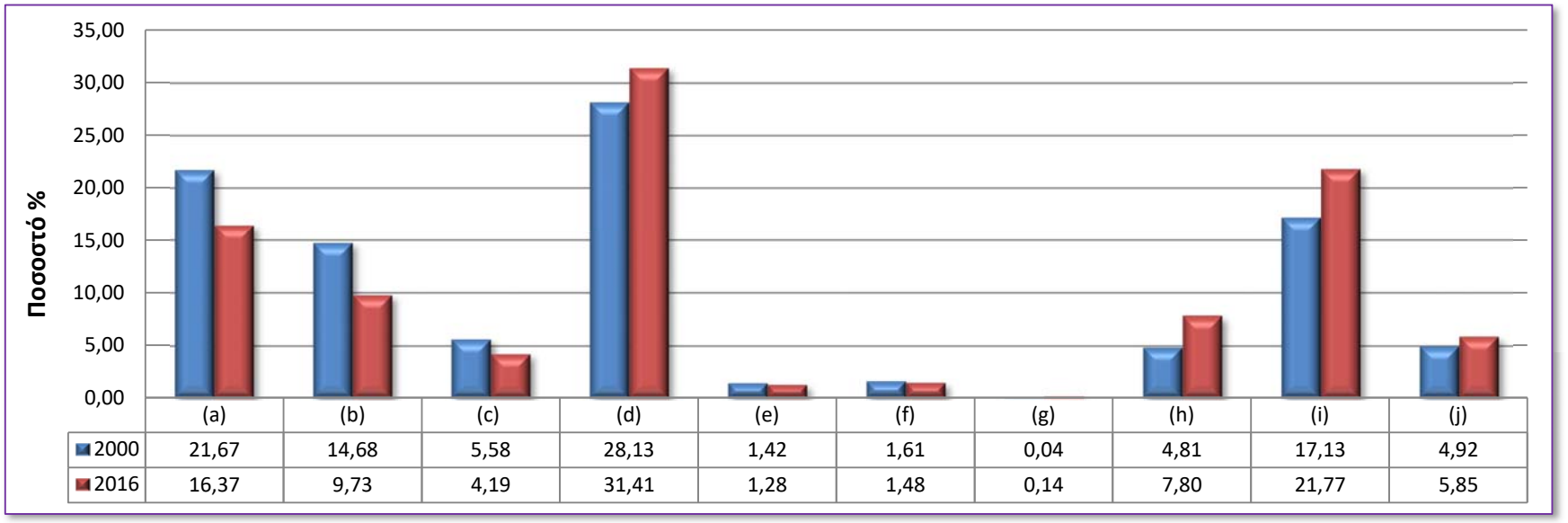
Figure 2. Gross value added by industry *In million euro. At current prices.*

3.2 Employment

The latest employment and social trends after the EU economic crisis seems to be are promising for all European regions sine economic growth continues to favor employment growth and improvements. The unemployment rates started to rapidly increase in Greece soon after the wake of the economic crisis in 2008 reaching record high levels in 2013: Xanthi 37,5%, Drama 36,8%, Thessaloniki 32,1%, Serres 22,9%, Kavala 22,8%, Evros 22%, and Rodopi 16,8%. Furthermore, the CB area shows significantly higher values of long-term unemployed persons compared to the EU28. Youth unemployment rates display similar trends and are attributed to the lackluster economic growth, the rigid labour market, and the mismatch between potential employee skills and employers' needs. An additional Important issue for the area is the considerably higher than EU28 percentages of population at risk of poverty or social exclusion (3-4 times higher). The main reason for the large divergence is the comparatively higher long term unemployment rates, and the higher share of people living in areas with low work intensity and low income levels. The large number of people experiencing poverty and social exclusion in the CB area is also attributable to the presence of various vulnerable groups such as minorities, internal migrants, asylum seekers and foreign persons under subsidiary protection. The higher risk of poverty and social exclusion among these groups is primarily connected to long-term unemployment and economic inactivity. The last 5 years brought significant improvements in the labor markets of the majority of Member States and in case of Greece according to EUROSTAT (2019) the unemployment decreased from 27% in 2013 to 18% in 2019 (Figure 3). However the rates of unemployment in the study area are higher that the EU and Greek average, while in case of the Region of East Macedonia and Thrace the percentage is still one of the highest in European Union.

Figure 3. Percentage of unemployment in EU (blue line) and Greece (red line) for the period 2000 to 2019.

In terms of employment per economic activity in the GR eligible area of Interreg GR-BL 2014-2020 several changes have been recorder by ELSTAT between the years 2000 and 2016 (Figure 4). More specifically, there was a significant decrease in the percentage of employment in: (1) Agriculture, forestry and fishing, (2) Mining and quarrying, manufacturing, electricity, gas, steam, air conditioning and water supply, sewerage, waste management and remediation activities, and (3) Constructions. On the other hand, the employment in other sectors such and trade/commerce and services was significantly increased.



	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2000	21,67	14,68	5,58	28,13	1,42	1,61	0,04	4,81	17,13	4,92
2016	16,37	9,73	4,19	31,41	1,28	1,48	0,14	7,80	21,77	5,85

Figure 4. Percentage of employment in the GR eligible area of Interreg GR-BL 2014-2020 per economic activity for the years 2000 and 2016.

Where: (a) Agriculture, forestry and fishing, (b) Mining and quarrying, manufacturing, electricity, gas, steam, air conditioning and water supply, sewerage, waste management and remediation activities, (c) Construction, (d) Wholesale and retail trade, repair of motor vehicles and motorcycles, transportation and storage, accommodation and food service activities,(e) Information and communication, (f) Financial and insurance activities, (g) Real estate activities,(h) Professional, scientific and technical activities, administrative and support service activities, (i) Public administration and defense, compulsory social security, education, human health and social work activities, (j) Arts, entertainment, recreation, other service activities, activities of households as employers, undifferentiated goods and services producing activities of households for own use, activities of extraterritorial organizations and bodies.

4. Agricultural production and development

The agricultural sector in the eligible area despite its diminishing contribution in GDP and employment, maintains a relatively high role in the Regional economy. Crop and livestock production support manufacturing and the multiplicative effects of relevant investments boost rural economy. At the local level, agriculture supports rural family incomes and employment and reverses depopulation and marginalization of remote, mountainous and less-favored areas. This rough presentation of the farming sector illustrates its potential for supporting activities which would assist the recovery of economy (Ragkos et al 2015). The farm holdings in the study area are 88.392 while 398.308 persons are employed in the agricultural sector (Table 1). According to data of Hellenic Statistical Authority (2016), the total agricultural area is 2,183,2 hectares with more than 30% arable land (Table 2 and Table 3).

Within this context, the structure of agricultural production and its spatial evolution as presented in Tables 4-15 of the following chapters, provides valuable information concerning the prospects of the sector. Such an examination will reveal activities of major importance, in terms of their expansion at the level of Regional Units, and small-scale activities at local level, which take advantage of local particularities and comparative advantages and play a vital role in local economies. Furthermore, it permits the examination of the degree to which agricultural production is diversified at the certain geographical level. In this perspective key characteristics of agriculture in the study area include:

- Cereals are the main crops in non-irrigated, mountainous and less-favored areas.
- Rice production is highly concentrated in the Regional Units of Thessaloniki and Serres. Cotton is a predominant crop in Greece and of particular importance for RCM.
- Tobacco is an Important crop for REMTH.

- The production of vegetables is scattered in numerous areas. The vegetable crops stand for a small percentage of the total agricultural area but they constitute the basic perspective for the farming sector as they are predominantly market-oriented. Opportunities of the sector are linked to the improvement of transportation, marketing and processing infrastructure, which would induce the creation of production cells in several areas.
- Edible legumes are typical examples of locally important crops, which use excessive farm family labor and are oriented to market demand.
- Tree crops exhibit high concentration in specific areas with favorable climate and soil conditions. These activities are vital to the economy of both Prefectures, as they provide income and employment to many farm families and they support considerable investments in processing and transportation.
- The beans and the potatoes of Kato Nevrokopi are the most well known products of the area.
- Recently the vineyards in the Prefecture of Drama have significantly developed for the production of wines of appellation, achieving international recognition.
- In the Nestos Delta the agriculture of asparagus and rice is widespread. In north Evros and in Tychero the asparagus plant is systematically cultivated.

Apparently, this approach becomes highly relevant to the design of development projects and agricultural entrepreneurship initiatives. The development of the agricultural sector in the eligible area is linked to the efficient use of existing natural resources and to transportation, marketing and processing infrastructures.

It is underlined that the rural economy of the study area is strongly depends on the Rural Development Programme (RDP) for Greece which was formally adopted by the European Commission on 11 December 2015 and last modified on 16 December 2017, outlining Greece's priorities for using the € 5.7 billion of public money that is available for the period 2014-2020 (€ 4.7 billion from the EU budget and € 1 billion of national co-funding).

The Greek RDP focuses mainly on enhancing farm viability and competitiveness, preserving and enhancing ecosystems and promoting local development in rural areas. Farmers will receive support to put 19.20% of the Greek farmland under contracts to preserve biodiversity, 18.72% to improve water management and 25.38% to improve soil management and/or prevent soil erosion. Investment support for restructuring and modernisation will be provided to 6300 agricultural holdings and 23900 young farmers will receive start up aid. In addition, 6900 agricultural holdings will receive support to participate in quality schemes, local markets and develop short supply chains and about 600 agri-food businesses will receive support for investments in processing and marketing of agricultural products. Support for knowledge and innovation activities makes up almost 5% of the planned public expenditure and the programme will create around 71 268 training places for farmers and other rural businesses. The RDP will also support local development via LEADER Local Action Groups covering nearly half of the country's rural population and improve access to basic services for approximately 10% of the rural population, including IT infrastructures (e.g. broadband internet). In general, according to Kyrkilis and Semasis (2015) the sector has potential as it becomes evident by its resilience during the recent economic crisis maintaining employment, reducing output much less than any other sector in the economy, and improving exporting.

Table 1. Number of persons employed in agricultural holdings, by category, number of workdays, regional unit

Kallikratis Codes		Regional Units	Total			
			Holdings	U.A.A	Employed Persons	Workdays
00		**Greece**	**684.902**	**31.525.821**	**2.883.152**	**131.369.504**
11	02	Drama	5.480	550.474	24.459	1.291.086
11	04	Kavala	2.716	49.719	6.968	424.797
11	05	Evros	8.075	379.707	56.534	2.222.934
11	03	Xanthi	14.047	1.557.198	59.717	2.568.874
11	06	Rodopi	8.062	335.747	40.671	2.048.812
11	01	Drama	13.248	761.000	59.687	3.806.493
12	07	Thessaloniki	17.735	1.393.786	68.098	3.372.238

Table 2. Agricultural Land in the GR Eligible Area

Regions and Regional Units (NUTS 2)	Total Surface Area	Agricultural Areas			
		Arable Land	Permanent Cultivations/ Crops	Various types of Grasslands	Various types of Agricultural Lands
Greece	131.981,80	21.181,4	7.491,8	14.452,20	22.011,0
Drama	3.468,9	652,8	0,6	313,8	80,0
Kavala	2.116,6	503,5	74,0	188,1	148,2
Evros	4.248,0	1.799,0	53,5	182,5	365,0
Xanthi	1.795,8	486,4	1,8	119,1	90,1
Rodopi	2.550,3	947,0	18,8	135,2	111,3
Thessaloniki	3.680,9	1.318,3	27,6	254,9	627,2
Serres	3.971,5	1.890,2	9,9	286,2	161,4

Areas in stremmas (1 stremma = 0.1 ha)
Source: Hellenic Statistical Authority 2016

Table 3. Crop areas and Fallow Land, by category, Region and Regional Unities (ELSTAT 2016)							
Regions and Regional Units (NUTS 2)	**Total Cultivated Agricultural and Fallow Land**	**Crops**				**Fallow Land (1 - 5 years)**	***Of which land eligible for the payment of subsidies***
		Arable Land	**Garden area**	**Areas under Trees (Compact Plantations)**	**Vines (Grapes and Raisins)**		
Greece Total	**32.540.789**	**17.240.436**	**634.289**	**10.225.155**	**911.312**	**3.529.597**	**1.855.808**
Region of Eastern Macedonia and Thrace	**3.775.315**	**2.994.396**	**55.212**	**271.377**	**46.841**	**407.489**	**341.980**
Rodopi	782.672	678.909	9.264	24.871	2.919	66.709	65.281
Drama	556.108	452.139	6.250	13.342	6.556	77.821	27.686
Evros	1.545.402	1.237.231	17.423	82.827	5.932	201.989	197.663
Thasos	63.643	1.006	395	61.111	342	789	781
Kavala	382.671	254.187	12.010	63.159	29.575	23.740	14.862
Xanthi	444.819	370.924	9.870	26.067	1.517	36.441	35.707
Region of Central Macedonia	**6.738.834**	**4.808.513**	**100.001**	**1.125.209**	**56.298**	**648.813**	**463.983**
Thessaloniki	1.499.693	1.242.019	23.642	53.386	13.613	167.033	62.006
Serres	1.470.656	1.233.345	12.851	87.095	7.403	129.962	129.951

Areas in stremmas (1 stremma = 0.1 ha)
Source: Hellenic Statistical Authority 2016

4.1 Cereals

Table 4. Cereals for Grain (Part A)											
Regions and Regional Units (NUTS 2)	Total Area	Wheat				Barley		Oats		Rye	
		Soft		Hard							
		1	2	1	2	1	2	1	2	1	2
Greece Total	**9.153.616**	**1.487.833**	**428.869**	**3.907.547**	**1.131.908**	**1.325.418**	**381.650**	**443.232**	**103.196**	**124.665**	**28.558**
Region of Eastern Macedonia and Thrace	**1.285.277**	**308.619**	**90.644**	**471.032**	**131.975**	**126.215**	**34.067**	**14.918**	**3.260**	**9.815**	**1.975**
Rodopi	184.757	56.063	16.830	65.616	18.100	37.451	10.015	2.675	501	1.219	238
Drama	252.235	58.710	19.865	54.721	16.408	33.404	10.550	9.592	2.191	1.857	381
Evros	497.825	93.926	26.864	338.461	94.239	30.723	7.102	791	164	4.812	957
Thasos	11	—	—	—	—	—	—	—	—	—	—
Kavala	171.603	20.853	6.038	4.471	1.164	8.656	2.190	212	51	423	142
Xanthi	178.846	79.067	21.047	7.763	2.065	15.981	4.209	1.648	354	1.504	257
Region of Eastern	**2.952.293**	**574.316**	**153.456**	**1.281.592**	**311.270**	**297.001**	**85.063**	**50.075**	**10.007**	**20.011**	**4.036**

Macedonia and Thrace											
Thessaloniki	786.826	164.187	50.595	264.845	72.154	73.930	24.806	16.302	3.550	4.425	880
Serres	711.088	83.311	23.877	327.091	76.860	78.774	22.797	2.196	408	3.776	914

1=Areas in stremmas, 2=Yield in tons
Source: Hellenic Statistical Authority 2016

Cereals for Grain (Part B)										
Regions and Regional Units (NUTS 2)	**Maize**				**Rice**		**Sorghum**		**Other (triticale etc)**	
	Grown alone		**Grown with beans and other crops**							
	1	2	1	2	1	2	1	2	1	2
Greece Total	**1.326.633**	**1.504.771**	**1.667**	**691**	**321.501**	**277.482**	**1.710**	**474**	**213.410**	**50.300**
Region of Eastern Macedonia and Thrace	**315.356**	**371.053**	**15**	**15**	**20.982**	**16.785**	**819**	**140**	**17.506**	**3.856**
Rodopi	17.200	17.962	—	—	—	—	460	90	4.073	829
Drama	88.316	116.295	15	15	—	—	—	—	5.620	1.084
Evros	16.361	19.709	—	—	5.240	4.192	3	1	7.508	1.874

Thasos	11	11	—	—	—	—	—	—	—	—
Kavala	120.770	138.965	—	—	15.742	12.593	344	46	132	35
Xanthi	72.698	78.112	—	—	—	—	12	3	173	35
Region of Eastern Macedonia and Thrace	**350.197**	**383.704**	**1**	**0**	**275.086**	**242.687**	**344**	**132**	**103.670**	**21.232**
Thessaloniki	49.920	61.250	—	—	196.452	186.994	—	—	16.765	3.963
Serres	169.091	191.072	—	—	41.247	26.636	181	81	5.421	1.120

1=Areas in stremmas, 2=Yield in tons
Source: Hellenic Statistical Authority 2016

4.2 Legumes

Table 5. Edible Pulse (Part A)											
Regions and Regional Units (NUTS 2)	Total Area	Beans				Broad beans		Lentil		Chick-peas	
		Grown alone		Grown with other crops							
		1	2	1	2	1	2	1	2	1	2
Greece Total	**288.449**	**76.831**	**17.092**	**1.302**	**166**	**9.383**	**1.889**	**95.589**	**12.231**	**92.154**	**15.001**
Region of Eastern Macedonia and Thrace	**25.062**	**12.144**	**3.023**	**13**	**3**	**51**	**14**	**1.293**	**155**	**11.251**	**2.099**
Rodopi	2.778	1.522	290	—	—	10	3	149	29	1.096	214
Drama	5.306	4.306	1.151	13	3	—	—	233	37	754	143
Evros	11.520	2.135	438	—	—	13	2	835	82	8.532	1.616
Thasos	126	116	30	—	—	10	2	—	—	—	—
Kavala	4.380	3.655	1.024	—	—	18	8	75	8	346	61
Xanthi	952	410	90	—	—	—	—	1	0	523	65
Region of Eastern	**43.762**	**10.351**	**1.996**	**4**	**1**	**1.348**	**277**	**14.140**	**1.381**	**17.555**	**2.481**

Macedonia and Thrace											
Thessaloniki	21.935	1.779	288	—	—	269	34	9.580	660	10.288	1.110
Serres	7.073	3.935	942	—	—	7	3	975	200	2.129	435

1=Areas in stremmas, 2=Yield in tons
Source: Hellenic Statistical Authority 2016

Edible Pulse (Part B)								
Regions and Regional Units (NUTS 2)	**Chick-peas**		**Lathyrus (Faba beans)**		**Peas**		**Other Edible Pulse**	
	1	2	1	2	1	2	1	2
Greece Total	**92.154**	**15.001**	**10.007**	**1.348**	**2.153**	**565**	**1.030**	**166**
Region of Eastern Macedonia and Thrace	**11.251**	**2.099**	**50**	**10**	**24**	**6**	**236**	**33**
Rodopi	1.096	214	—	—	1	0	—	—
Drama	754	143	—	—	—	—	—	—

Evros	8.532	1.616	—	—	5	2	—	—
Thasos	—	—	—	—	—	—	—	—
Kavala	346	61	50	10	—	—	236	33
Xanthi	523	65	—	—	18	4	—	—
Region of Eastern Macedonia and Thrace	**17.555**	**2.481**	**50**	**8**	**125**	**17**	**189**	**28**
Thessaloniki	10.288	1.110	10	1	9	1	—	—
Serres	2.129	435	27	5	—	—	—	—

1=Areas in stremmas, 2=Yield in tons
Source: Hellenic Statistical Authority 2016

Table 6. Fodder Seeds

Regions and Regional Units (NUTS 2)	Total Area	Veltch		Bitter Veltch		Lupine		Veltching (Lathyrus)		Clover Seeds		Other (Peas, Broad beans, lentil and other fodder plants for seed etc)	
		1	2	1	2	1	2	1	2	1	2	1	2
Greece Total	**458.931**	**183.315**	**33.978**	**1.387**	**210**	**32.162**	**5.715**	**2.042**	**415**	**25.835**	**1.746**	**214.190**	**42.589**
Region of Eastern Macedonia and Thrace	**21.490**	**12.494**	**2.309**	**62**	**11**	**457**	**112**	**0**	**0**	**543**	**57**	**7.934**	**1.766**
Rodopi	3.702	2.581	543	62	11	2	1	—	—	—	—	1.057	208
Drama	4.198	2.648	654	—	—	366	92	—	—	—	—	1.184	274

Evros	6.364	3.658	465	—	—	83	18	—	—	543	57	2.080	569
Thasos	0	—	—	—	—	—	—	—	—	—	—	—	—
Kavala	3.236	446	93	—	—	6	2	—	—	—	—	2.784	514
Xanthi	3.990	3.161	554	—	—	—	0	—	—	—	—	829	201
Region of Central Macedonia	**227.791**	**73.372**	**13.223**	**38**	**7**	**29.226**	**5.049**	**64**	**10**	**1.744**	**200**	**123.347**	**22.846**
Thessaloniki	78.101	21.126	3.261	—	—	16.062	2.452	—	—	—	—	40.913	5.721
Serres	13.104	1.798	372	—	—	1.676	575	—	—	883	145	8.747	3.568

1=Areas in stremmas, 2=Yield in tons
Source: Hellenic Statistical Authority 2016

4.3 Industrial plants

Table 7. Industrial Plants (Part A)													
Regions and Regional Units (NUTS 2)	Total Area	Tobacco				Cotton				Sesame		Sunflower	
		Eastern type		Berley Virginia		Irrigated		Non-irrigated					
		1	2	1	2	1	2	1	2	1	2	1	2
Greece Total	**3.658.060**	**151.894**	**25.923**	**35.696**	**11.942**	**2.220.935**	**700.446**	**242.823**	**38.675**	**6.159**	**685**	**764.189**	**186.296**
Region of Eastern Macedonia and Thrace	**1.280.872**	**72.996**	**9.634**	**6.285**	**1.935**	**437.033**	**136.640**	**206.277**	**32.229**	**3.627**	**440**	**483.592**	**118.054**
Rodopi	412.689	55.270	6.435	—	—	259.791	83.365	76.815	13.371	418	69	16.274	3.528
Drama	104.249	2.591	761	92	26	35.595	11.788	—	—	—	—	62.968	17.869
Evros	584.676	3.355	419	—	—	118.647	34.540	126.406	18.453	2.753	287	310.983	74.824
Thasos	79	—	—	—	—	—	—	—	—	—	—	—	—
Kavala	55.082	916	201	—	—	298	102	—	—	104	19	24.961	7.533
Xanthi	124.097	10.864	1.818	6.193	1.909	22.702	6.844	3.056	405	352	65	68.406	14.300
Region of Central Macedonia	**989.583**	**68.341**	**13.793**	**1.790**	**561**	**562.433**	**148.765**	**18.865**	**3.152**	**2.123**	**186**	**225.156**	**54.437**

Thessaloniki	184.318	7.777	1.157	426	122	90.736	26.711	6.860	800	175	24	42.342	6.797
Serres	363.375	19.031	3.260	4	1	158.384	39.302	251	48	1.368	75	140.029	39.287

1=Areas in stremmas, 2=Yield in tons
Source: Hellenic Statistical Authority 2016

Industrial Plants (Part B)															
Regions and Regional Units (NUTS 2)	**Sorgum**			**Groundnuts**		**Sugarbeets**		**Soya Seed**		**Pumpkin Seeds**		**Rapeseed**		**Cultivated Aromatic Plants**	**Other**
	Total	**Broom**	**Seed**												
	1	2	2	1	2	1	2	1	2	1	2	1	2	1	1
Greece Total	**1.008**	**72**	**87**	**13.284**	**3.965**	**51.583**	**313.890**	**32.609**	**9.465**	**10.690**	**1.539**	**77.289**	**15.510**	**35.148**	**14.753**
Region of Eastern Macedonia and Thrace	**267**	**12**	**41**	**141**	**40**	**12.910**	**78.631**	**29.935**	**8.487**	**10.633**	**1.531**	**15.440**	**3.167**	**1.603**	**133**
Rodopi	123	12	41	1	0	518	3.006	58	14	1.676	277	901	171	813	31
Drama	—	—	—	29	10	264	1.716	1.649	472	122	15	685	155	217	37
Evros	114	—	—	89	25	11.755	73.014	—	—	8.816	1.236	1.527	259	181	50

Thasos	—	—	—	—	—	—	—	—	—	—	—	—	—	79	—
Kavala	—	—	—	22	5	373	895	26.465	7.593	13	2	1.743	519	172	15
Xanthi	30	—	—	—	—	—	—	1.763	407	6	1	10.584	2.064	141	—
Region of Central Macedonia	**430**	**0**	**17**	**7.154**	**2.534**	**21.080**	**121.338**	**2.464**	**917**	**7**	**1**	**60.497**	**12.043**	**14.560**	**4.683**
Thessaloniki	—	—	—	175	43	1.597	10.543	93	10	—	—	26.467	5.021	7.670	—
Serres	336	—	17	6.973	2.489	6.434	36.315	2.261	890	2	1	22.931	5.228	1.288	4.083

1=Areas in stremmas, 2=Yield in tons

Source: Hellenic Statistical Authority 2016

4.4 Fodder plants

Table 8. Fodder Plants for Hey													
Regions and Regional Units (NUTS 2)	Total Area	Barley		Oats		Veltch		Clovers				Grass cut for Hey	
								Multiannual (alfalfa, etc)		Annual			
		1	2	1	2	1	2	1	2	1	2	1	2
Greece Total	**2.615.593**	**244.374**	**83.168**	**284.030**	**106.172**	**174.459**	**72.660**	**1.197.227**	**1.369.377**	**358.865**	**362.983**	**252.664**	**96.850**
Region of Eastern Macedonia and Thrace	**303.055**	**11.895**	**4.810**	**7.052**	**2.765**	**9.526**	**3.977**	**169.259**	**191.753**	**58.821**	**53.341**	**43.745**	**20.477**
Rodopi	67.714	1.823	843	784	303	2.159	1.036	17.826	15.878	27.491	19.352	17.629	8.898
Drama	61.401	3.376	1.887	3.119	1.265	2.739	1.403	28.501	28.327	9.944	10.955	13.493	4.295
Evros	112.679	2.702	799	1.357	407	2.360	594	93.511	115.640	3.499	4.350	8.482	4.196
Thasos	689	12	7	10	8	6	5	83	80	1	1	569	247
Kavala	16.010	299	82	296	243	547	304	3.685	4.897	9.051	11.067	1.602	1.928
Xanthi	44.562	3.683	1.192	1.486	539	1.715	636	25.653	26.932	8.835	7.616	1.970	913
Region of Central	**473.894**	**42.197**	**14.349**	**25.217**	**6.832**	**56.059**	**19.805**	**237.931**	**286.281**	**66.190**	**65.464**	**5.095**	**1.794**

Macedonia													
Thessaloniki	125.079	16.532	4.447	5.214	1.314	27.430	7.434	39.935	44.124	12.877	8.130	2.302	462
Serres	133.655	5.556	2.783	554	319	5.562	4.152	114.386	144.866	4.498	4.671	836	279

1=Areas in stremmas, 2=Yield in tons
Source: Hellenic Statistical Authority 2016

4.5 Vegetables

Table 9. Vegetables (Part A)

Regions and Regional Units (NUTS 2)	Total Area	Broccoli		Cabbages		Cauliflowers		Spinach		Leeks		Onions, fresh		Onions, dry	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2
Greece Total	**681.822**	**17.478**	**30.440**	**30.832**	**75.395**	**18.775**	**37.137**	**59.229**	**63.162**	**10.663**	**22.327**	**11.689**	**17.478**	**41.114**	**130.543**
Region of Eastern Macedonia and Thrace	**54.823**	**694**	**1.096**	**1.689**	**5.470**	**490**	**850**	**5.489**	**6.321**	**607**	**1.222**	**540**	**829**	**2.114**	**5.594**
Rodopi	8.997	78	119	282	478	74	92	959	933	108	144	70	76	439	730
Drama	6.464	155	293	263	853	130	197	562	900	118	222	151	262	627	2.484

Evros	17.235	262	315	217	489	40	58	2.354	1.783	127	251	53	62	735	1.641
Thasos	394	10	18	26	39	9	12	11	11	9	9	15	13	23	22
Kavala	11.732	122	218	395	1.029	183	329	580	757	132	212	111	142	55	91
Xanthi	10.001	67	134	506	2.583	54	162	1.023	1.936	113	384	140	273	235	626
Region of Central Macedonia	**120.617**	**4.342**	**7.281**	**7.396**	**23.208**	**3.341**	**7.054**	**26.966**	**25.609**	**3.275**	**7.066**	**1.804**	**2.497**	**2.676**	**6.626**
Thessaloniki	32.381	1.455	2.617	3.381	13.401	1.499	2.868	6.413	6.612	1.055	2.085	936	1.312	259	729
Serres	20.481	247	453	962	2.724	311	470	6.321	6.247	272	530	275	333	1.313	3.015

1=Areas in stremmas, 2=Yield in tons

Source: Hellenic Statistical Authority 2016

Vegetables (Part B)																
Regions and Regional Units (NUTS 2)	Garlic, dry		Peas		Lettuce		Chicories and Endives		Carots		Tomatoes					
											Industrial		Table			
													Grown in the open		Grown in greenhouses	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Greece Total	**7.251**	**5.605**	**19.029**	**12.067**	**34.081**	**51.859**	**12.284**	**21.445**	**10.127**	**28.007**	**61.148**	**462.774**	**70.053**	**208.887**	**25.241**	**226.030**
Region of Eastern Macedonia and Thrace	**2.584**	**1.961**	**3.712**	**2.451**	**891**	**1.259**	**302**	**435**	**178**	**329**	**980**	**5.295**	**3.104**	**10.238**	**455**	**3.096**
Rodopi	27	22	42	29	185	222	27	22	34	34	135	493	665	1.556	36	200
Drama	34	28	181	109	176	328	35	68	53	98	18	63	450	1.611	167	1.121
Evros	2.505	1.896	3.375	2.220	112	126	12	4	36	58	60	381	555	1.629	41	310
Thasos	6	4	5	3	34	39	9	9	1	1	6	12	109	200	—	—
Kavala	3	2	86	62	164	153	62	30	34	103	675	3.815	771	2.699	126	825
Xanthi	9	10	23	29	220	390	157	303	20	36	86	532	554	2.544	85	640
Region of Central Macedonia	**89**	**109**	**9.610**	**6.100**	**9.488**	**10.430**	**1.503**	**1.437**	**989**	**2.290**	**4.263**	**19.945**	**3.575**	**14.110**	**1.875**	**14.606**
Thessaloniki	4	3	1.944	1.359	4.039	5.168	679	769	439	1.236	584	2.176	828	3.405	469	3.763
Serres	14	16	119	102	540	768	171	146	139	140	1.852	9.015	543	2.228	143	960

1=Areas in stremmas, 2=Yield in tons
Source: Hellenic Statistical Authority 2016

Vegetables (Part C)														
Regions and Regional Units (NUTS 2)	**Beens**		**Okras**		**Pumpkins**		**Cucumbers, grown in the open**		**Cucumbers, grown in greenhouses**		**Eggplants, grown in the open**		**Eggplants, grown in greenhouses**	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Greece Total	**50.922**	**51.964**	**13.032**	**8.047**	**23.734**	**58.475**	**12.176**	**33.966**	**9.622**	**118.338**	**15.280**	**36.241**	**3.176**	**20.511**
Region of Eastern Macedonia and Thrace	**5.613**	**4.474**	**4.707**	**2.448**	**514**	**1.292**	**340**	**621**	**108**	**725**	**1.239**	**2.883**	**74**	**307**
Rodopi	328	244	4.052	2.036	109	186	55	59	10	45	185	327	14	69
Drama	1.182	713	152	127	96	229	44	78	19	219	93	253	14	77
Evros	2.500	1.640	398	179	68	148	68	86	25	119	349	732	16	52
Thasos	47	43	1	1	11	15	11	15	—	—	13	16	—	—
Kavala	1.027	969	9	6	140	368	44	83	49	325	163	360	7	36
Xanthi	529	865	95	99	90	346	118	300	5	18	436	1.195	23	73
Region of Central	**16.477**	**16.131**	**3.021**	**1.207**	**2.298**	**6.182**	**244**	**564**	**830**	**7.180**	**1.452**	**3.914**	**332**	**1.236**

Macedonia														
Thessaloniki	1.881	2.214	637	385	1.192	3.518	72	184	312	2.733	414	937	94	284
Serres	5.350	6.527	231	185	147	404	24	74	38	216	188	461	20	66

1=Areas in stremmas, 2=Yield in tons
Source: Hellenic Statistical Authority 2016

Vegetables (Part D)												
Regions and Regional Units (NUTS 2)	**Peppers, grown in the open**		**Peppers, grown in greenhouses**		**Artichokes**		**Asparagus**		**Strawberries**		**Other Vegetables**	
	1	2	1	2	1	2	1	2	1	2	1	2
Greece Total	**32.019**	**73.776**	**6.987**	**61.508**	**10.824**	**10.667**	**17.143**	**12.681**	**14.412**	**77.327**	**43.501**	**60.546**
Region of Eastern Macedonia and Thrace	**5.981**	**14.533**	**189**	**1.970**	**19**	**14**	**10.505**	**9.076**	**20**	**34**	**1.685**	**2.282**
Rodopi	285	455	10	46	12	10	605	302	4	1	167	198
Drama	1.158	2.379	124	1.671	—	—	—	—	2	4	460	796
Evros	128	257	22	94	—	—	2.635	1.597	10	21	532	512

Thasos	14	21	—	—	—	—	—	—	—	—	24	25
Kavala	711	2.262	25	132	7	5	5.731	4.053	2	5	318	520
Xanthi	3.685	9.159	8	27	—	—	1.534	3.123	2	3	184	230
Region of Central Macedonia	**3.327**	**7.061**	**1.039**	**3.522**	**77**	**103**	**4.209**	**2.017**	**201**	**511**	**5.918**	**7.870**
Thessaloniki	781	2.010	236	494	9	13	83	46	—	—	2.686	3.263
Serres	393	627	56	278	3	6	304	215	34	41	471	823

1=Areas in stremmas, 2=Yield in tons
Source: Hellenic Statistical Authority 2016

Table 10. Horticulture Area. Areas under Vegetables and Other Crops (Ornamental plants, Seedbeds, Nurseries)												
Regions and Regional Units (NUTS 2)	**Grand Total**	**Holticultural land**		**Ornamental plants - Seedbeds - Nurseries**								
		Areas under Vegetables	***Thereof lands under Vegetables in greenhouses***	**Total**	**Commercial flower gardens**		**Seedbeds**		**Nurseries**			
					Lands under Flower and Ornamental plants	***There of lands under Flower and Ornamental plants in greenhouses***	**Tobacco Seedbeds**	**Seedbeds for producing seedlings exclusively for transplanting**	**Fruit Trees**	**Forest Trees**	**Decorative Plants**	**American Vines**
Greece Total	**634.289**	**615.830**	**58.478**	**18.459**	**5.534**	**1.672**	**3.284**	**1.164**	**4.516**	**1.799**	**1.588**	**574**
Region of Eastern Macedonia and Thrace	**55.212**	**53.440**	**904**	**1.772**	**284**	**156**	**1.022**	**39**	**50**	**38**	**339**	**0**
Rodopi	9.264	8.911	80	353	4	4	327	14	1	—	7	—
Drama	6.250	6.180	335	70	55	24	8	—	—	7	—	—
Evros	17.423	17.234	144	189	29	1	120	1	6	31	2	—
Thasos	395	394	—	1	1	—	—	—	—	—	—	—
Kavala	12.010	11.447	221	563	191	125	—	3	43	—	326	—
Xanthi	9.870	9.274	124	596	4	2	567	21	—	—	4	—
Region of Central Macedonia	**100.001**	**90.652**	**4.669**	**9.349**	**2.578**	**220**	**1.913**	**653**	**2.114**	**1.421**	**662**	**8**
Thessaloniki	23.642	21.233	911	2.409	1.815	78	7	389	25	6	167	—
Serres	12.851	12.092	223	759	109	84	435	18	34	17	146	—

1=Areas in stremmas, 2=Yield in tons
Source: Hellenic Statistical Authority 2016

4.6 Vineyards

Table 11. Vines (Grapes and Raisins)				
Regions and Regional Units (NUTS 2)	Sum of Vines			
	Areas	Production of Grapes for:		
		Wine	Table use	Raisins
Greece Total	**911.312**	**534.770**	**245.692**	**53.383**
Region of Eastern Macedonia and Thrace	**46.841**	**24.692**	**53.934**	**0**
Rodopi	2.919	2.360	1.058	0
Drama	6.556	7.718	408	0
Evros	5.932	3.728	1.575	0
Thasos	342	528	9	0
Kavala	29.575	9.505	50.734	0
Xanthi	1.517	854	150	0
Region of Central Macedonia	**56.298**	**47.833**	**21.642**	**53**

Thessaloniki	13.613	10.892	3.135	0
Serres	7.403	5.873	2.849	1

Yield in tons
Source: Hellenic Statistical Authority 2016

4.7 Arboriculture

Table 12. Areas of Compact Plantations (Part A)						
Regions and Regional Units (NUTS 2)	**Grand Total**	**Citrus Trees**				
		Total Citrus Trees	**Lemon Trees**	**Orange Trees**	**Mandarin Trees**	**Other Citrus Trees**
Greece Total	**10.225.155**	**416.980**	**43.490**	**296.884**	**73.949**	**2.657**
Region of Eastern Macedonia and Thrace	**271.377**	**8**	**0**	**5**	**2**	**1**
Rodopi	24.871	0	—	—	—	—
Drama	13.342	1	—	—	—	1
Evros	82.827	5	—	5	—	—
Thasos	61.111	0	—	—	—	—
Kavala	63.159	2	—	—	2	—
Xanthi	26.067	0	—	—	—	—

Region of Central Macedonia	**1.125.209**	**32**	**7**	**16**	**9**	**0**
Thessaloniki	53.386	2	1	1	—	—
Serres	87.095	0	—	—	—	—

Areas in stremmas
Source: Hellenic Statistical Authority 2016

Areas of Compact Plantations (Part B)							
Regions and Regional Units (NUTS 2)	**Fruit Trees**						
	Total Fruit Trees	**Apple Trees**	**Pear Trees**	**Peach Trees**	**Apricot Trees**	**Cherry Trees**	**Other Fruit Trees**
Greece Total	**895.276**	**96.829**	**39.315**	**397.291**	**77.595**	**148.867**	**135.379**
Region of Eastern Macedonia and Thrace	**33.035**	**2.263**	**1.090**	**1.969**	**1.121**	**5.997**	**20.595**
Rodopi	7.130	430	253	143	44	5.043	1.217
Drama	2.421	277	107	104	20	126	1.787
Evros	1.919	746	175	183	127	348	340
Thasos	4	1	—	2	—	1	—
Kavala	13.238	407	405	923	709	261	10.533
Xanthi	8.323	402	150	614	221	218	6.718
Region of Central Macedonia	**606.137**	**24.236**	**9.320**	**342.082**	**38.886**	**118.663**	**72.950**

Thessaloniki	4.744	696	641	713	255	929	1.510
Serres	4.825	493	199	344	85	1.197	2.507

Areas in stremmas
Source: Hellenic Statistical Authority 2016

Regions and Regional Units (NUTS 2)	Nut-bearing Trees					Other Trees Total	Olive Trees
	Total Nut-bearing Trees	Almond Trees	Walnut Trees	Hazelnut Trees	Other Nut-bearing Trees		
Greece Total	**390.499**	**121.279**	**102.492**	**2.570**	**164.158**	**259.699**	**8.262.701**
Region of Eastern Macedonia and Thrace	**19.955**	**11.425**	**7.523**	**340**	**667**	**73.519**	**144.860**
Rodopi	1.136	423	659	14	40	6.320	10.285
Drama	933	384	345	138	66	3.177	6.810
Evros	5.255	1.164	3.885	75	131	54.202	21.446
Thasos	10	5	5	—	—	—	61.097
Kavala	9.976	9.107	565	35	269	2.105	37.838
Xanthi	2.645	342	2.064	78	161	7.715	7.384
Region of Central Macedonia	**66.210**	**28.131**	**15.285**	**1.045**	**21.749**	**50.297**	**402.533**

Thessaloniki	6.733	3.506	2.482	69	676	8.912	32.995
Serres	23.200	19.650	3.117	84	349	5.241	53.829

Areas in stremmas
Source: Hellenic Statistical Authority 2016

Regions and Regional Units (NUTS 2)	Orange	Lemon	Mandarin	Apple	Pear	Peach - Nectarine	Apricot	Cherry	Figs	Almond	Walnut	Chestnut	Hazelnut	Olives	
														Edible Olives	for Olive Oil
Greece Total	**805.860**	**64.788**	**162.868**	**279.665**	**99.839**	**528.723**	**94.630**	**83.194**	**9.471**	**38.563**	**28.788**	**29.628**	**465**	**453.504**	**2.426.035**
Region of Eastern Macedonia and Thrace	**1**	**1**	**4**	**3.694**	**1.491**	**2.093**	**1.502**	**3.806**	**240**	**3.039**	**2.087**	**258**	**62**	**31.508**	**48.420**
Rodopi	—	—	—	827	250	117	27	3.287	32	203	470	3	2	1.066	2.287
Drama	—	—	—	516	221	119	8	46	35	77	71	10	27	369	1.482
Evros	1	0	—	780	136	175	184	165	21	235	984	10	11	1.120	4.503
Thasos	—	—	—	2	—	4	—	1	104	3	5	—	—	30	8.981
Kavala	—	1	4	1.358	808	1.189	1.237	255	12	2.484	301	214	6	28.552	27.298
Xanthi	—	—	—	211	76	489	46	52	36	38	257	21	17	371	3.869
Region of Central Macedonia	**17**	**5**	**5**	**68.421**	**19.006**	**378.522**	**32.268**	**53.224**	**759**	**6.823**	**3.134**	**4.484**	**132**	**107.563**	**90.501**
Thessaloniki	—	—	—	733	864	1.085	92	412	124	998	615	79	9	3.569	6.810
Serres	—	—	—	1.480	182	408	79	727	75	4.533	695	55	20	2.326	17.871

Source: Hellenic Statistical Authority 2016

4.8 Olive oil and Must for Wine

Table 14. Production of Olive Oil and Must (in tons)		
Regions and Regional Unities (NUTS 2)	**Olive Oil**	**Must**
Greece Total	**328.021**	**302.493**
Region of Eastern Macedonia and Thrace	**6.784**	**7.034**
Rodopi	100	326
Drama	119	1.950
Evros	717	2.465
Thasos	704	136
Kavala	4.701	1.612
Xanthi	444	545
Region of Central Macedonia	**8.825**	**31.619**

Thessaloniki	201	7.278
Serres	1.321	3.574

Source: Hellenic Statistical Authority 2016

4.9 Other products

Table 15. Area and Production of Other Crops									
Regions and Regional Unities (NUTS 2)	**Total Area**	**Watermelons**		**Melons**		**Potatoes harvested**		**Sweet Potatoes**	
		1	2	1	2	1	2	1	2
Greece Total	**349.699**	**92.955**	**389.155**	**47.819**	**103.460**	**207.548**	**491.973**	**1.377**	**3.477**
Region of Eastern Macedonia and Thrace	**38.756**	**5.465**	**15.655**	**5.084**	**7.768**	**28.205**	**111.643**	**2**	**3**
Rodopi	4.026	1.986	3.715	1.006	1.565	1.033	2.046	1	3
Drama	22.041	156	930	113	323	21.772	99.966	—	—
Evros	6.104	1.738	4.596	3.508	4.564	857	2.467	1	1
Thasos	101	5	10	2	3	94	133	—	—
Kavala	2.759	1.293	5.303	369	1.130	1.097	1.834	—	—
Xanthi	3.725	287	1.101	86	183	3.352	5.197	—	—
Region of Central Macedonia	**26.812**	**11.180**	**49.206**	**5.415**	**10.460**	**10.113**	**25.872**	**104**	**239**

Thessaloniki	6.836	4.274	22.305	1.821	3.591	741	1.998	—	—
Serres	7.053	1.877	8.024	1.470	2.704	3.668	11.293	38	93

1=Areas in stremmas, 2=Yield in tons
Source: Hellenic Statistical Authority 2016

5. Agricultural economics and future market trends

The Provisional data of Hellenic Statistical Authority (2016), as presented in Table 15, reveals that in terms of economic importance the cereals, vegetables and horticultural products are important crops in the Region of Central Macedonia while industrial crops are more important in the Region of Eastern Macedonia and Thrace. Based on the prices of agricultural products and production factors costs for 2016, the enterpreunial income in the agricultural sector was 896,30 million Euros and 344,36 million Euros for the Region of Central Macedonia and the Region of Eastern Macedonia and Thrace respectively.

Table 16. Economic Accounts for Agriculture

*In million euro / Year 2016**

CATEGORIES	DESCRIPTION	Greece	Eastern Macedonia and Thrace	Central Macedonia
01	CEREALS (including seeds)	823,44	131,85	277,18
01.1	Wheat and spelt	346,09	47,26	101,21
01.11	Soft wheat and spelt	72,94	15,42	26,10
01.12	Durum wheat	273,15	31,85	75,12
01.2	Rye and meslin	7,23	0,49	1,01
01.3	Barley	62,99	5,62	14,04
01.4	Oats and summer cereal mixtures	16,83	0,53	1,63
01.5	Grain maize	293,40	72,08	74,53
01.6	Rice	96,90	5,86	84,75
01.9	Other cereals	0,00	0,00	0,00
02	INDUSTRIAL CROPS	824,90	218,69	189,98
02.1	Oil seeds and oleaginous fruits (including seeds)	90,84	55,06	27,91
02.11	Rape and turnip rape seed	0,00	0,00	0,00
02.12	Sunflower	85,52	54,19	24,99
02.13	Soya	0,40	0,36	0,04
02.19	Other oleaginous products	4,92	0,51	2,88
02.2	Protein crops (including seeds)	18,63	0,21	1,95
02.3	Raw tobacco	80,98	24,74	30,70

02.4	Sugar beet	31,40	7,87	12,14
02.5	Other industrial crops	603,05	130,80	117,28
03	FORAGE PLANTS	653,11	27,39	112,01
04	VEGETABLES AND HORTICULTURAL PRODUCTS	1.758,49	39,09	141,26
04.1	Fresh vegetables	1.666,16	34,35	98,25
04.2	Plants and flowers	92,33	4,74	43,01
05	POTATOES (INCLUDING SEEDS)	278,19	63,13	14,63
06	FRUITS	1.986,16	65,98	623,95
06.1	Fresh fruit	1.149,71	15,12	571,41
06.2	Citrus fruits	245,73	0,00	0,01
06.3	Tropical fruit	46,69	0,00	0,00
06.4	Grapes	375,92	46,20	40,97
06.5	Olives	168,11	4,67	11,56
07	WINE	27,56	0,64	2,88
08	OLIVE OIL	803,75	16,61	21,61
09	OTHER CROP PRODUCTS	56,83	5,46	28,78
10	CROP OUTPUT (1 TO 9)	7.212,44	568,84	1.412,28
11	ANIMALS	1.371,77	117,87	204,97
12	ANIMAL PRODUCTS	1.246,04	102,14	314,96
13	ANIMAL OUTPUT (11+12)	2.617,81	220,01	519,93
14	AGRICULTURAL GOODS OUTPUT (10+13)	9.830,25	788,85	1.932,21
15	AGRICULTURAL SERVICES OUTPUT	247,77	19,54	48,52
16	AGRICULTURAL OUTPUT (14+15)	10.078,02	808,39	1.980,73
17	SECONDARY ACTIVITIES (INSEPARABLE)	656,04	51,15	174,84
18	OUTPUT OF THE AGRICULTURAL 'INDUSTRY' (16+17)	10.734,06	859,55	2.155,57
19	TOTAL INTERMEDIATE CONSUMPTION	5.263,24	487,99	961,56
20	GROSS VALUE ADDED AT BASIC PRICES (18-19)	5.470,82	371,56	1.194,00
21	FIXED CAPITAL CONSUMPTION	1.212,94	99,42	306,59
22	NET VALUE ADDED AT BASIC PRICES (20-21)	4.257,87	272,13	887,41
23	COMPENSATION OF EMPLOYEES	561,72	45,08	110,41
24	OTHER TAXES ON PRODUCTION	611,39	49,04	120,16

25	OTHER SUBSIDIES ON PRODUCTION	2.309,56	240,82	442,42
26	FACTOR INCOME (22-24+25)	5.956,05	463,91	1.209,67
27	OPERATING SURPLUS/MIXED INCOME (22-23-24+25)	5.394,33	418,83	1.099,26
28	RENTS AND OTHER REAL ESTATE RENTAL CHARGES TO BE PAID	486,39	67,66	143,88
29	INTEREST PAID	155,68	6,81	59,09
30	INTEREST RECEIVED	0,00	0,00	0,00
31	ENTREPRENEURIAL INCOME (27-28-29+30)	4.752,26	344,36	896,30
	*Provisional data			

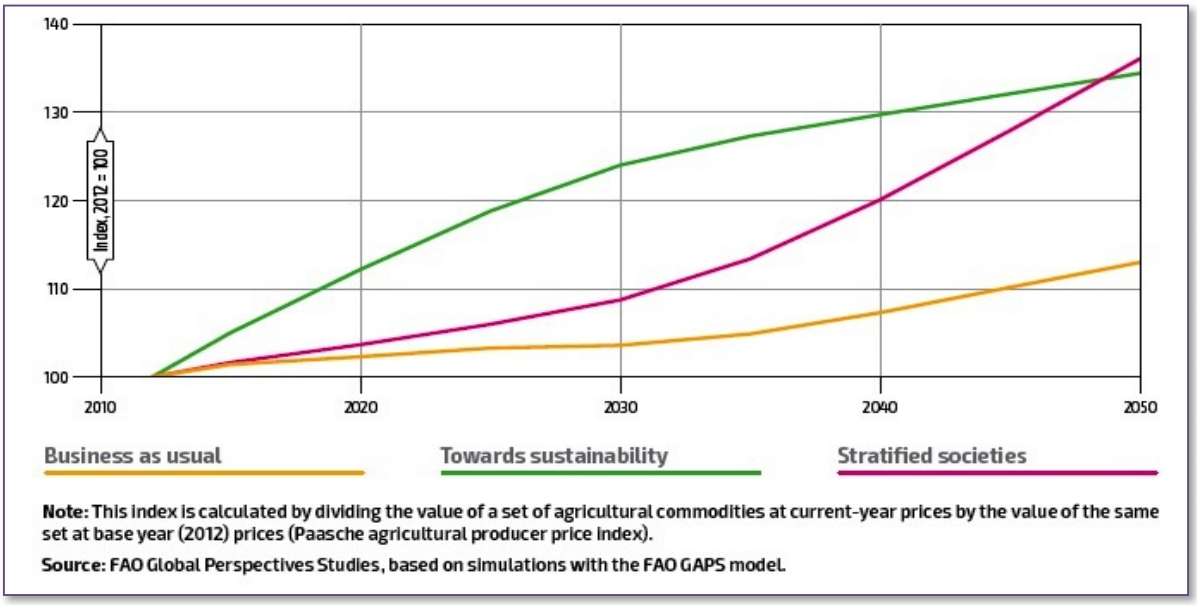
In the long term, according to FAO (2018), future agricultural prices will be increased but depend on how production systems accommodate any future changes in food and non-food consumption in an environment of tightening resources and climate change, based on the analysis of 3 long term agricultural development scenarios (BOX 1). They will also depend on how far agricultural trade will help adapt to this changing environment. Meanwhile, prices will determine consumer behaviour as demand adapts to changes in purchasing power, in turn determined by real per capita income. Higher prices are expected to restrain and reorder consumer demand. Meanwhile producers would be able to expand supply, with this then leading market prices to fall. The equilibrium prices reported in this section are the result of an interplay between adjustments in market supply and demand (**Figure 5)**. The long-term nature producers can also adjust their schedules through investment, which might take time to materialize. On the other hand, in the long run consumers adjust their preferences based on changes in taste, education, and awareness – factors that can take time to affect spending patterns.

BOX 1. LONG TERM AGRICULTURAL DEVELOPMENT SCENARIOS OF FAO (2018)

Business as usual (BAU): Global future develops according to socio-economic, technological and environmental patterns that fail to address many challenges for food access and utilization, as well as for sustainable food stability and availability, despite efforts to achieve and maintain SDG targets

Towards sustainability (TSS): Virtuous social, environmental and economic dynamics in this scenario ensure fairly generalized equity in terms of access to basic services, as well as universal and sustainable access to sufficient, safe and nutritious food mostly produced with environmentally sustainable methods.

Stratified societies (SSS): Societies are structured in separate layers. Self-protected elite classes, such as groups of people who have decisional power do not feel the urgency to conserve natural resources or mitigate climate change. At the same time, increased poverty, food insecurity and poor nutrition leads to the over-exploitation of natural resources and unmanaged agglomerations.



Note: This index is calculated by dividing the value of a set of agricultural commodities at current-year prices by the value of the same set at base year (2012) prices (Paasche agricultural producer price index).

Source: FAO Global Perspectives Studies, based on simulations with the FAO GAPS model.

Figure 5. Projected agricultural producer price index.

According to the EU agricultural outlook for markets and income, 2018-2030 (EC 2018), many drivers will be at play in shaping agricultural markets over the next decade. The consumer and citizen will become more demanding towards food and its sourcing, its impact on the environment and climate change. For producers these evolving demands mean often higher production costs but also an opportunity to differentiate their products, adding value while reducing negative climatic and environmental impacts. Alternative production systems, such as local, organic or other types of certified production will further excel. At world level, both demand and supply will grow further, creating opportunities and pressures for EU imports and exports, depending on the product and target market. Important trends that should be highlighted are the following:

- EU consumption of sugar will decline by 5 %, driven by health initiatives and consumer preferences. Sugar is expected to be only partially substituted by an increasing use of isoglucose in processed food, and total sweetener consumption will decrease by 2 %. EU sugar production is expected to be slightly above 19 million t by 2030.
- EU cereal production is expected to continue growing to 325 million t by 2030. This growth is driven by a small increase in feed demand (in particular for maize), moderate export prospects and the growing importance of industrial uses. Prices are expected to remain fairly stable.
- For oilseeds, given the opportunities and limits of biofuel policy after 2020 and only limited growth in feed demand, no further growth is expected in the rapeseed crop area.
- Driven by a favourable policy environment, protein crops have recently experienced a strong revival. Over the outlook period, strong demand both for feed purposes and for human consumption, as well as the supportive policy environment, will further drive production growth of soya beans and protein crops.
- Demand for feed (from arable crops, fodder and pasture) should grow in the outlook period despite mixed trends in animal production.

- The biofuels market, which uses certain agricultural feedstocks, continues to be driven by changes in policy. With the RED II agreement, the biofuel industry now has a clearer framework for adjusting EU production and investing in the necessary production capacity. Due to remaining uncertainties, biofuel production levels are expected to remain stable overall until 2030.
- Growing production and processing capacity in the EU olive oil sector is expected to further strengthen the EU net export position. Increasing consumption outside Spain, Italy, Greece and Portugal should offset the consumption loss in these countries over the outlook period.
- EU total wine production and domestic use are expected to stabilise after a previous decade of decrease. Over the outlook period, some slight reduction in human consumption in the EU of wines and products prepared through distillation such as brandies is expected.

Trends towards reduced meat, bread and sugar consumption compensated by increased consumption of plant based proteins exemplify this consumption shift. Pressure from climate change and environmental commitments is going to be compensated only partly by advances in management and technology, such as precision farming, resulting into increasing yields though at a slower pace compared to the past. As a result it is expected a stabilisation of agricultural income per labour unit in real terms throughout the outlook period (2018-2030). This can be explained by a significant increase of the agricultural value of production (+17 % over the period) in nominal terms outweighed by a similar increase in production costs, stemming mainly from higher energy prices and stronger depreciation. The continued labour outflow from agriculture due to structural changes at EU level is also playing a significant role.

6. Market SWOT Analysis

The agricultural sector has an important role in rural development and surely, due to extensive changes in the structure and functions of agriculture. Agri-Entrepreneurship is closely linked to rural development of the study area. Entrepreneurship can expedite the process of rural sustainable development and improve income for farmers and other relevant businesses. The key strengths, weakness, opportunities and threats of Agricultural sector in the Greek eligible area are presented through the SWOT analysis.

The main components of the SWOT analysis include:

Strengths describe in what the under study area excels at and what separates it from the competition

Weaknesses stop an entrepreneur from performing at its optimum level. They are areas where the business needs to improve to remain competitive: a weak brand, higher-than-average turnover, high levels of debt, an inadequate supply chain, or lack of capital.

Opportunities refer to favorable external factors that could give a competitive advantage. For example, for example if a country cuts tariffs, a car manufacturer can export its cars into a new market, increasing sales and market share.

Threats refer to factors that have the potential to harm an agricultural entrepreneur. For example, a drought is a threat to a wheat-producing company, as it may destroy or reduce the crop yield. Other common threats include things like rising costs for materials, increasing competition, tight labor supply and so on.

Strengths and weaknesses refer to the internal environment of the area under study—things that one can have some control over and can change.

Opportunities and threats are external—factors that are going on in the broader environment. One can take advantage of opportunities and protect against threats, but he can't change them.

The SWOT analysis was performed to facilitate a realistic, fact-based, data-driven look at the strengths and weaknesses of the sector in the Greek eligible area. Using internal and external data, the technique can guide businesses toward strategies more likely to be successful, and away from those in which they have been, or are likely to be, less successful.

SWOT ANALYSIS

INTERNAL ENVIRONMENT		EXTERNAL ENVIRONMENT	
 Strengths	 Weaknesses	 Opportunities	 Threats
Dynamic and productive manufacturing center pole of basic agricultural products.	Luck of cooperation culture between researchers and practitioners	Several traditional and local products	Non favorable economic environment for new investments and limited cash-flow due to the financial crisis
Availability and quality of soil and water resources.	Low competiveness and profitability of family farms	Consumers looking for local and authentic products	Aging farmers and decreasing rural population
Universities and Research Institutions provide growth prospects, supporting and promoting innovation.	High cost of agricultural inputs	Financial support programmes (Regional, National and EU)	Prices are affected by both national and international factors
Geopolitical position in Southeastern Europe that enables cross border transactions	Fragmented farms	Application of ICT technology in production, marketing and e-commerce of agricultural products	Competition
Well developed transportation network (roads, ports, airports etc)	Luck of coordination and guidance for new entrants into farming business	Promotion of smart specialization and innovation strategies in the ari-food sector	Social reluctance and negative perceptions for hiring disadvantaged people and people from vulnerable groups

Geothermal fields	Luck of accessible infrastructures and equipment	Increased support of social and woman entrepreneurship	Climate change
Favorable environment for the cultivation of several crops	Lack of on-the job training infrastructures and initiatives, limited access to knowledge	Bio-economy and circular economy policies	Production and yield may affected by weather and natural disasters
Local knowledge, experience and tradition to agricultural production	Reluctance to changes and limited entrepreneurial innovative farmers	Low investment cost for the establishment of small commercial units	Fragmented policies and week coordination with other sectors
	Limited short supply chain mechanisms	Social innovation and linking of agriculture with other sectors of economic and social life	
		Advances in science that can be operationally applied in practice New aspects of agriculture alternatives (urban agriculture, social agriculture etc)	

7. Challenges and opportunities

Traditionally, agriculture is seen as a low-tech industry with limited dynamics dominated by numerous small family firms which are mostly focused on doing things better rather than doing new things. Over the last decade, this situation has changed dramatically due to economic liberalization, a reduced protection of agricultural markets, and a fast changing, more critical, society. Agricultural companies increasingly have to adapt to the vagaries of the market, changing consumer habits, enhanced environmental regulations, new requirements for product quality, chain management, food safety, sustainability, and so on. These changes have cleared the way for new entrants, innovation, and portfolio entrepreneurship. It is recognized by politicians, practitioners as well as scientists that farmers and growers increasingly require entrepreneurship, besides sound management and craftsmanship, to be sustainable in the future. This is also highlighted by the Regional Smart Specialization Strategies of both Central Macedonia (2014) and Eastern Macedonia & Thrace (2015) in which the agricultural entrepreneurship is among the central priorities.

The original Entrepreneurial Orientation (EO) construct combines three key elements of entrepreneurial behavior, namely, innovativeness, risk taking, and pro-activeness, originally on the firm level. The EO elements together allow firms to identify and exploit opportunities for organizational renewal and creating more customer value. Business owners can take on different roles depending on the specific situation, context, and phase of the firm (Gartner 1989). Three roles can be assumed by the owner of firm, namely, the entrepreneurial, managerial, and technical role (Chandler and Jansen 1992). Whereas the craftsmen role highlights technical competence (i.e., green fingers, agronomy, crop protection), the entrepreneurial role emphasizes activities such as identifying customer needs, scanning the environment, identifying opportunities, formulating strategies, networking and collaboration, taking initiative and risks (Lans et al. 2011). During the last 25 years, Greek agriculture while being fully integrated in the European agricultural system is called to survive in a very competitive and volatile environment, without thus far being able to compete, except for some very big farming corporations. The farm management and the

management of farm inputs should be made in a different way in order to succeed a competitive production cost with high product quality (Papageorgiou 2015).

Traditionally, problem solving and innovation in the agricultural sector was supported by so-called extension services, which were often funded and provided by the state in line with food security and agricultural modernization policies. According to Lans et al. (2013) these extension services often had a supply-push orientation and worked within a linear paradigm of innovation (innovations developed by agricultural research were uniformly disseminated to farmers by extension services), and the one-size-fits all modernization agenda neglected the heterogeneity of farming styles and entrepreneurial styles of farmers. Because of this changing structure of agricultural markets and the agricultural sector (earlier mentioned phenomena like multifunctionality, integration in production chains driven by consumer demands, societal demands such as food safety, animal welfare, and ecological sustainability), a one-size-fits all model of innovation and entrepreneurship support has become inadequate. This realization, coupled with the privatization of applied agricultural research institutes and agricultural extension services, has induced major changes in innovation and entrepreneurship support in agriculture. Farmers are now served by a pluralistic system of advisors (both specialized and independent advisors, and those connected to agricultural input supply such as seeds and fertilizers) (Klerkx and Jansen 2010). Since addressing the heterogeneous support demands of farmers includes a shift from a mere production-technical focus toward providing services aimed at improving more generic business, management, and entrepreneurial skills (Phillipson et al. 2004), farmers need to access different kinds of advisors. Innovations will change agriculture and the food chain in the years ahead. This will provide new options for solving societal challenges as long as the innovations are supported by a good food and agricultural policy. The same applies to new technologies, which raise new (ethical) issues. All of this underpins our view that the Common Agricultural Policy needs to shift to a more integrated food and agricultural policy, one which coherently governs and optimises the entire biocycle from farm to fork, from seed to meat. Social innovation and adaptive governance must also be a part of this policy (Fresco and Poppe 2016).

Based on the characteristics of the Greek eligible area, the EU Strategic Priorities (European Commission 2017) and challenges (Fresco and Poppe 2016) as well as the National Programme of Agricultural Development 2014-2020 (Ministry of Agriculture and Food 2017) and the Regional Operational Programmes of both Central Macedonia (2014) and Eastern Macedonia & Thrace (2015) for the Programming Period 2014-2020, the employment and entrepreneurial opportunities from agricultural fields to food production systems can classified in 6 main categories (Figure 6).

Figure 6. Employment and entrepreneurial opportunities in the agricultural sector of the Greek eligible areas of the Programme INTERREG Greece-Bulgaria 2014-2020.

1. AGRICULTURAL VALUE CHAINS AND VALUE PRODUCTS

A value chain encompasses the flow of products, knowledge and information, finance, payments, and the social capital needed to organize producers and communities. Value chains may include a wide range of activities, providing employment and entrepreneurial opportunities, such as: development and dissemination of plant and animal genetic material, input supply, farmer

organization, farm production, post-harvest handling, processing, provision of technologies of production and handling, grading criteria and facilities, cooling and packing technologies, post-harvest local processing, industrial processing, storage, transport, finance, and feedback from markets. Value crops considered to have competitive returns on investment when traded in fresh form vis–a–vis alternative investment opportunities. These crops are characterized by defined regular or niche market or potential domestic and/or export markets, command high prices, with value added or are good foreign exchange earners. Such crops for the eligible area may include olives, rice, vegetables, fruits, herbs and ornamental plants, cannabis, as well as local traditional products. Special focus is given on certified quality products and production processes (eg. organic, climate friendly, reduced input) as well as in the documentation of authenticity of origin, especially for the local products of the area.

2. ICT, DIGITISATION AND BIG DATA

Information and Communication Technologies (ICT) make it possible to set up new systems for farming. A revolution comparable to the introduction of the tractor and chemical products in the 1950s is happening, with a deluge of data as a result of the use of sensors, satellites, robots and all types of machinery. This may raise productivity, make farming more climate-smart and help to solve environmental issues. It also improves food traceability (with blockchain technology or otherwise), oversees animal welfare and helps consumers opt for more healthy and sustainable personal diets, in their smart kitchen. At the same time, developments in ICT are not neutral. Depending on who owns the data and how the exchange of data is organised, the food chain can be governed in many different ways.

3. ENERGY AND BIO-BASED TRANSITIONS

There is a trend towards low-carbon industrial processes replacing petro-chemicals and fossil fuels. The demand for non-fossil biological materials will increase and

these can only be produced via agriculture, forestry, marine activities and recycling. In the process of moving to a post-fossil-fuel, carbon-neutral world, resource efficiency is essential. According to EC (2017) new rural value chains such as clean energy, the emerging bio-economy, the circular economy, and ecotourism can offer good growth and job potential for rural areas. By-products from agri-food and forestry could find new value as inputs for bioenergy and bio-based industries, while manure can turn into biogas and fertiliser thus supporting both the energy transition and the wider nutrient recycling. This also contributes to the substitution of more polluting and non-renewable resources and materials, and to a reduction of food losses and waste. Sustainable agriculture and forestry are both strategic sectors to develop this potential.

4. ECO-SYSTEM SERVICES AND BIOECONOMY

Agriculture contributes to providing eco-system services in many regions, such as preventing erosion and wildfires, maintaining the landscape and biodiversity or water management. As these services are threatened, not least by agriculture itself, there is more and more interest in valuing them and using the CAP budget or other funds to pay for them. This is an area of innovation which includes organisation, such as collaboration of farmers with new business models, or developing new label and sustainability schemes.

Partly based on a better understanding of biomaterials and manufacturing processes, cascading is becoming an important principle in the allocation of biomaterial. This means that agriculture must be linked to bio-economy chains, to supply them through smartly designed systems with minimum losses of produced biomass. This includes the problem of food waste: in the EU-28, around 20% of produced food does not arrive on a plate for human consumption due to losses and waste

5. AGRICULTURAL PRACTICES AND OPEN INNOVATION

An important source of inspiration for innovation processes are agricultural practices themselves. In the past, many innovations in agriculture originated from innovative farmers. It was never a linear top-down innovation process. Farmers are better educated than before and many challenges, especially regarding more sustainable production, have an important local aspect. It is therefore important, in this period of change, to use the innovation capacity of farmers themselves. This requires a more open innovation process, which includes new actors by using techniques such as living labs. The European Commission recognized this by setting up EIP-AGRI and adopting open science principles.

6. SOCIAL INNOVATION AND ENTREPRENEURSHIP

Changes in consumer demands or in attitudes to food or to working in farming also create opportunities. Especially in and around cities, there is a need for a peri-urban landscape where farmers offer services in areas such as leisure, care and nature management, as well as producing food. Urban farming and home delivery of food are also on the rise, making cities and regional authorities stakeholders in innovations. Citizens are becoming increasingly involved in co-creation processes, including with social media. Social innovation and opportunities also takes place in governmental policies, for example in procurement of products, school fruit schemes and local food policies (Detang et al. 2018).

8. Conclusions

The opportunity areas as described help the food and agriculture sector to innovate and meet the identified challenges. However, it is too easy to argue that challenges for society form the business opportunity of tomorrow, and that innovation areas are available to provide the solutions. Many of the sustainability challenges are at odds with the current way the food system works. The challenges exist because the current food system generates negative externalities and it is not to be expected that the system itself will be able to fully solve that problem. In this perspective, not only are there market failures in innovation that need to be addressed, in the sense that innovators cannot reap all the benefits from their innovation (leading to underinvestment), but there is also a need for systemic innovation. The food system has to be innovated in the way it works. This raises the question of the transformative capacity of the system and if it is strong enough to create a more resilient food system. Asking the question also provides the answer. As the system does not change fast enough, it creates another reason for government intervention, that of improving the transformative capacity of the food system in order to create systemic change.

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