

THE AGRI-FOOD INDUSTRY IN GREECE: REGIONAL DEVELOPMENT AND PROSPECTS

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Abstract

Benefiting from its favorable climate conditions and rich natural resources, Greece has long been fairly reliant upon the agri-food industry, traditionally agriculture and fishery, mainly for self-sufficiency purposes. More recently, efforts capitalize primarily on economic activities that could accelerate national and regional growth through external trade. The need for improvement in agricultural production has become even more urgent, given the negative impact of both the economic and pandemic crisis, highlighting that the Greek economy cannot depend solely on the monoculture of tourism. Hence, the aim of this paper is to analyze recent trends and future prospects of the Greek agri-food industry, on both national and sub-national levels, in order to determine the product categories which are most prominent for further development in different areas. Economic data, extracted from the Hellenic and European Statistical authorities, refer to national and regional production and external trade for the period 2005-2019.

Main results show that, despite an increase in exports, agricultural production as well as agri-food manufacture remain relatively stagnant, while in some cases the negative trends are consistent. In terms of production and processing, the most promising product categories are fruits, vegetables and plants, and animal products. Domestic trade and services declined, suffering the effects of the economic crisis, while a strategic shift towards exports is salient, accompanied by respective reinforcement of the framework for agri-food marketing, research and innovation, as well as regional specialization. Regional performance is variant, capitalizing mostly on natural resource endowments, history and tradition. Exploring the prospects of increasing the added value of agricultural production, substitution of some imported products with domestic production, as well as regional specialization in high-quality local products are some of the strategies that could act as a good practice for the corresponding adjustment of national economic strategies along the Balkans.

Keywords: Agri-food, Greek economy, Product category, Regional development, Spatial analysis

1. INTRODUCTION

The global agri-food industry has become more and more important in recent decades, as the population grows in accelerating rhythms and consumption patterns are constantly being redefined. Indeed, in only 25 years (1991-2014), global food production more than tripled in terms of value, reaching 3.2 trillion € [1]. Despite the international growing consumption needs and production, as well as the country's efforts to determine certain directions for the agri-food sector, Greece has yet to see radical improvements in the performance of both the production and exports of agricultural products.

In light of the recent economic crisis and consequent recession of the Greek economy, it is expected that performance of the agri-food sector has not been sufficient. However, taking into consideration the lack of heavy industry in Greece, agri-food is the main industry that can boost national production, intertwined with other significant sectors such as tourism. A detailed analysis should focus on regional development, given the nature of agriculture itself, the traditional standing of Greece in international trade of high-quality products, and the potential for economic regional growth based on local production dynamics.

Boosting the agri-food sector efficiency requires a detailed structural plan – in some cases a restructuring of the Greek economy, based on the identification of the most recent domestic production trends at the national and regional level. In this respect, the present paper's objective is the analysis of production

and export trends for the Greek agri-food sector, both at the national and regional levels. The data deployed are extracted from the Eurostat and the ELSTAT offices, covering the period 2005-2019.

The analysis is structured as follows. Section 2 looks at primary and secondary production, domestic trade and service activities, as well as exports of agri-food products at the national level, proceeding with by product analysis for the period 2005-2019, where data is available. Section 3 analyzes regional by product group production for the 13 regions, aiming at pointing out the prominent products for each region. After a discussion of the results and policy implications in Section 4, the paper concludes.

2. THE AGRI-FOOD INDUSTRY IN GREECE

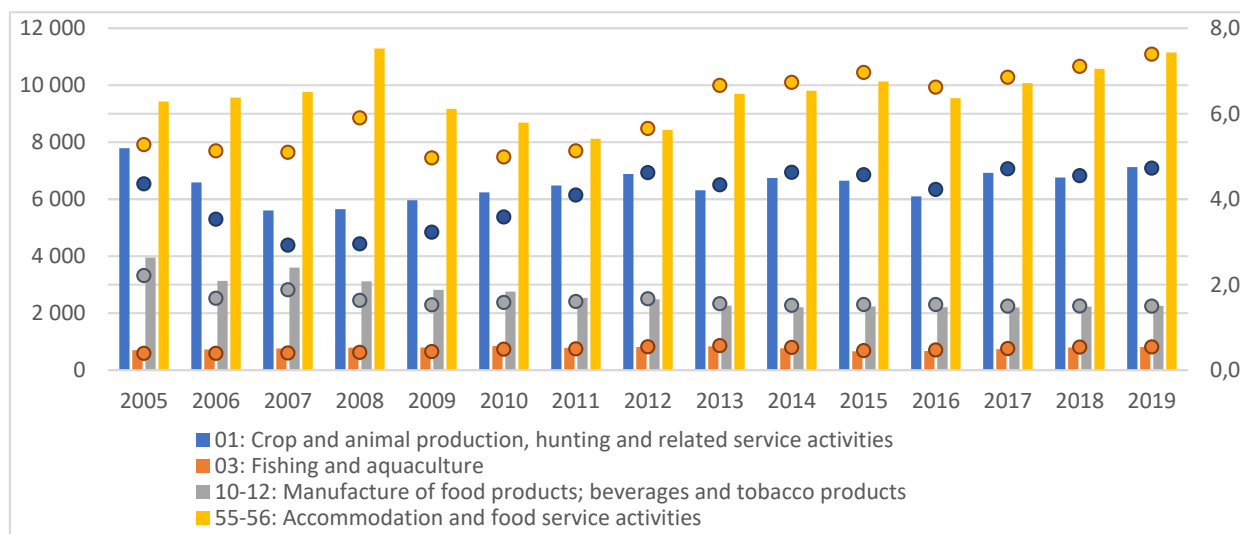
Agri-food constitutes an integral industry in Greece, in terms of economic growth, accounting for approximately one million active companies and more than two million employees in the country [2]. That is, taking into consideration the wide spectrum of economic activities that this sector connected to among the primary, secondary and tertiary sectors: agriculture and fishery, food processing and manufacturing, wholesale and retail trade, food and catering service activities. Considering the favorable environmental conditions for high quality products as well as the fact that Greece is mainly a services and consumption economy, the agri-food industry has been designated as a priority axis during the past few years, especially as a shield against the severe economic crisis in effect during the past decade.

There are several reasons to advocate in favour of the development of agri-food production in Greece. Some of its identified strengths are the Greek favorable climatic and soil conditions and the availability of the largest flora and biodiversity in Europe, the international recognition of products and regions of the country, the high degree of resilience and significant – though unrealized to some degree – potential of the industry, the diversity of agricultural products, as well as its connection of agri-food to other developed sectors, such as tourism [2, 3]. All these factors bring out the country's potential for agricultural growth and shape its export profile, rendering the country competitive in agricultural products such as olive oil, various fruits and vegetables, as well as dairy products such as cheese and yogurt. Variety and quality are the principal features that can boost agri-food production in Greece.

Despite the weight of this particular industry for the Greek economy, several structural problems have been identified, holding back its further growth. Some of these are the fragmented agricultural holdings creating cost disadvantages due to the lack of economies of scale, the high production costs related to the soil characteristics of the country, the inefficient organization and limited activity of cooperatives, the low technological and knowledge sophistication, the dominance of labor-intensive methods not only in the agricultural but also in the manufacturing sector, the weak links between agriculture and food manufacture, the strong dependence on European subsidies, the low degree of standardization of meat and agricultural products, as well as the inefficient branding and marketing of agri-food products in Greece [1, 2]. All of these factors, combined with the lack of a strategic national plan for this sector, have led to stagnancy, in contrast to the rest of Europe's path to growth, especially in agriculture, during the past decades.

The annual progress of the categories related to the agri-food industry is shown in Figure 1, depicting annual Gross Value Added (GVA) data, in terms of chain linked volumes (2005, million euro, primary axis) and as a share of the total annual GVA (% , secondary axis). During the 2005-2019 period, the industries (NACE Rev.2) related to agri-food – namely crop and animal production, hunting and related service activities (01), fishing and aquaculture (03), manufacture of food products, beverages and tobacco products (10-12), and accommodation and food service activities (55-56) – show only a slight increase – or in some cases decrease – as a share of the total annual GVA. In terms of value, a slight increase during the last years in some industries is essentially insignificant.

Figure 1: Gross Value Added by Industry [columns], % of total industries [dots], chain linked volumes [2005, million euro], 2005-2019



Source: Eurostat (2021)

More specifically during the 2005-2019 period, the value of industries 01 and 03, pertaining to primary production, are characterized by stagnation, while slightly increasing their share to the sum of the productive sectors. GVA value and share of categories 10-12 dropped significantly, a decline that started before the economic crisis and has not been reversed since. This is a significant development, as manufacture of food products, beverages and tobacco products is one of the largest manufacturing sectors in Greece, responsible for the production of beverages and wine, olive oil, fruits and vegetables, dairy, meat and pastry products, and capable of producing high added value per product. On the other hand, categories 55-56 of the tertiary sector recovered from the negative effects of the crisis, improving also in relation to the total VGA. This improvement could in part stem from the sub-accommodation category, however food service activities are indeed the largest sub-group between the two.

Some of the factors that should be taken into account with respect to national production are the productive structure of the Greek economy, the EU and national directives, the regional and local incentives towards the production base, as well as the Greek economic crisis after 2009. In terms of value, the agricultural sector was not affected as much as the rest of the productive sectors during the crisis, as the observed decline occurs before 2009, recurring ever since. Given that agricultural products are relatively inflexible, domestic demand does not show severe fluctuations. This could be related to an intensification of agricultural exports, accompanied by a respective adjustment of policies that encourage openness to international trade. Contrarily, more lasting negative effects of the recession can be observed in manufacture. This sector has probably suffered the most, making its recuperation a challenge, both for the national and the local economies. In general, taking into consideration the magnitude of the Greek recession, the food and beverage industry was characterized by relative resilience during the economic crisis and, while some enterprises closed during this period, the remaining increased their sale [4]. At the same time, the increase in exports connected to an upward trend in global food trade helped offset the impact of a declining domestic consumption.

Considering the above remarks, the agri-food industry has been subject to changes during this 15-year period, impacted by EU and national policy directives, the global and domestic economic crisis, and the actions taken on multiple levels as a response to the crises. To identify the strongest features of the agri-food industry in Greece, this paper explores the most recent dynamics developed from the side of production and external trade. Production-wise, the activities studied are agricultural production, manufacture of food products, wholesale and retail trade and food service activities. An analysis for external trade flows follows.

2.1 Production

2.1.1 Agriculture

Previous references note that, together with the manufacturing sector, the agricultural sector is a weak link for the agri-food industry, with their added value showing stagnation and decline since 2000, even during a period of general economic growth, in contrast to an average growth in the EU [2]. According to the National Strategy, the most important product categories are tree crops (fruit trees and olives). Greek olive oil production is third in the world after Spain and Italy, while the production of extra virgin olive oil is first. The production of vegetables is also important, producing higher value per unit area compared to other crops such as wheat. Regarding livestock, the high imports of meat (e.g. pork) show that there is a relative deficit, while the value of sheep and goat farming and cattle breeding for the production of high-quality dairy products (milk, yogurt, feta, etc.) is highlighted.

Based on Eurostat data, Table 1 demonstrates the annual progress of produced value (million euro) for the 11 basic product sections (NACE Rev.2 – see Appendix A) for the 2005-2019 period. The largest and most dynamic section is Fruits, showing signs of exponential growth especially from 2010 onwards. On the other hand, the second largest section in terms of production, vegetables and horticultural products, has a negative progress, decreasing by 18,3% from 2005 to 2019. The category of animals declines after 2009, whereas animal products increase overtime. Cereals, which is a significant main category in terms of production, has the worst performance especially after 2012, with a negative growth rate at -42%. Following a sharp decline pre-crisis, Industrial crops has an increasing trend after 2010. Moreover, olive oil production has also been decreasing, reaching almost half of its initial value at the end of the period. The most significant shifts, either positive or negative, appear to take place during 2009-2011, indicating the strong connection to the crises.

Table 1. Agricultural primary production in Greece by product category (constant prices [2010], million euro, 2005-2019)

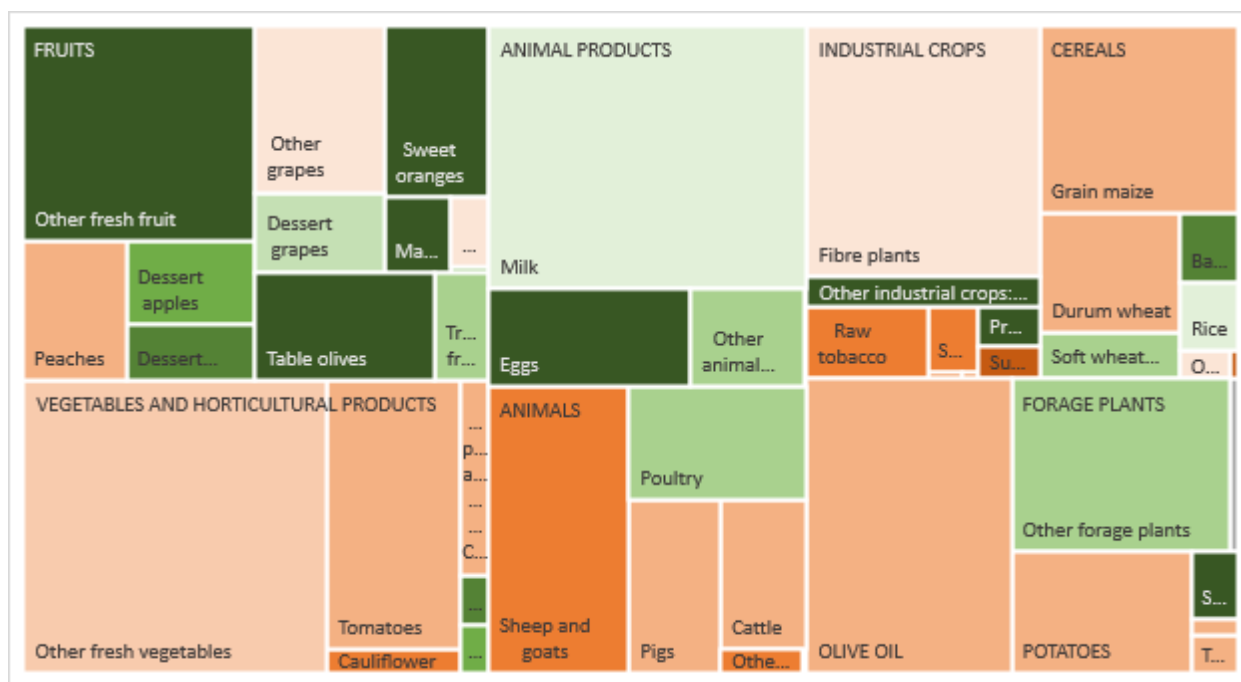
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
01.Cereals	982	891	878	1.062	1.034	959	1.000	981	1.002	916	869	848	793	721	741
02.Industrial Crops	1.419	958	830	725	733	808	1.058	1.032	1.130	1.081	983	1.008	1.102	1.218	1.431
03.Forage plants	436	440	432	483	500	502	496	504	512	480	491	532	573	576	572
04.Vegetables, horticultural products	1.946	1.897	1.876	1.875	1.864	1.738	1.719	1.692	1.675	1.730	1.697	1.631	1.571	1.575	1.591
05.Potatoes	308	311	325	315	326	312	305	300	304	272	257	217	220	203	203
06.Fruits	1.652	1.699	1.568	1.636	1.666	2.187	2.176	2.200	2.148	2.306	2.279	2.372	2.610	2.648	2.612
07.Wine	31	32	32	30	28	16	16	18	18	19	20	21	20	20	20
08.Olive oil	1.049	948	839	767	774	804	778	893	525	654	823	609	788	612	650
09.Other crop products	27	24	24	24	26	57	50	47	45	57	64	61	82	82	83
11.Animals	1.533	1.498	1.441	1.435	1.438	998	997	1.019	1.039	1.001	1.032	1.037	1.045	1.023	1.033
12.Animal products	1.364	1.378	1.380	1.347	1.372	1.546	1.481	1.478	1.514	1.528	1.513	1.498	1.532	1.547	1.632

Source: Eurostat (2021), Economic Accounts for Agriculture

The following tree-map chart (Figure 2) shows the most important product categories (sections, groups), in terms of their average value for the period 2005-2019. The value size is indicated by the size of each “box”, while orange-toned and green-toned areas signify overtime decrease and increase in production by groups, respectively. Fruits and Animal products appear as the most dynamic sections, consisting of several rapidly growing product categories (over 100% growth rate), such as other fresh fruits, sweet

oranges, mandarins, nursery plants, table olives and eggs. Other product groups with a positive growth rate are dessert apples and dessert pears, barley, plantations, milk, other animal products, poultry, other forage plants, other industrial crops (others), and soft wheat. A special note should be made on the group Seeds, which is a smaller category but increased during this period by 661%, showing promising signs.

Figure 2. Agricultural primary production in Greece by product category (constant prices [2010], million euro, average for 2005-2019)



Source: Eurostat (2021), Economic Accounts for Agriculture

Most of the product categories are characterized by negative growth rates. Sheep and goats, other animals, raw tobacco, cauliflower and sugar beet decreased by over 50%, while peaches, tomatoes, ornamental plants and flowers, fibre plants, protein crops, sunflower, grain maize, durum wheat, olive oil, potatoes and table wine show a reduction of 25-50%. These developments are indicative of a general shift towards four product sections, namely fruits, animal products and forage plants and industrial crops, and specific product groups within them. Negative performance of the olive oil category is probably the most concerning development, given Greece's competitive advantage and traditionally high degree of specialization in this product. Sheep and goat breeding is also a traditional livestock activity that appears to be losing ground to another group, poultry.

2.1.2 Manufacture

Food and beverage is one of the largest manufacturing industries, both in terms of value added and in terms of employment. Beverage production includes wineries, other alcoholic beverages, water bottling and soft drinks. Based on previous data [2], a large share of the produced Greek wine is channeled to the Greek market and only a small share is exported, but in recent years there has been an upswing in its value, indicating a shift in exports of quality-more expensive wine. In the category of vegetable and animal oils, the most important group is olive oil.

Eurostat's Economic Accounts for Agriculture also provide data regarding the transformation of agricultural products as part of primary production, referring to the minor processing of raw products before promotion. An overtime growth of 39% in this category is worth noting. On the other hand, food manufacture performance deteriorated during the same period. As mentioned above, secondary

production of agricultural products, i.e. manufacture of food products; beverages and tobacco products is a major part of manufacturing in Greece, amounting to around 25% of total manufacturing in terms of value.

Table 2. Agri-food manufacture, product categories (production value, million euro, 2008-2018)

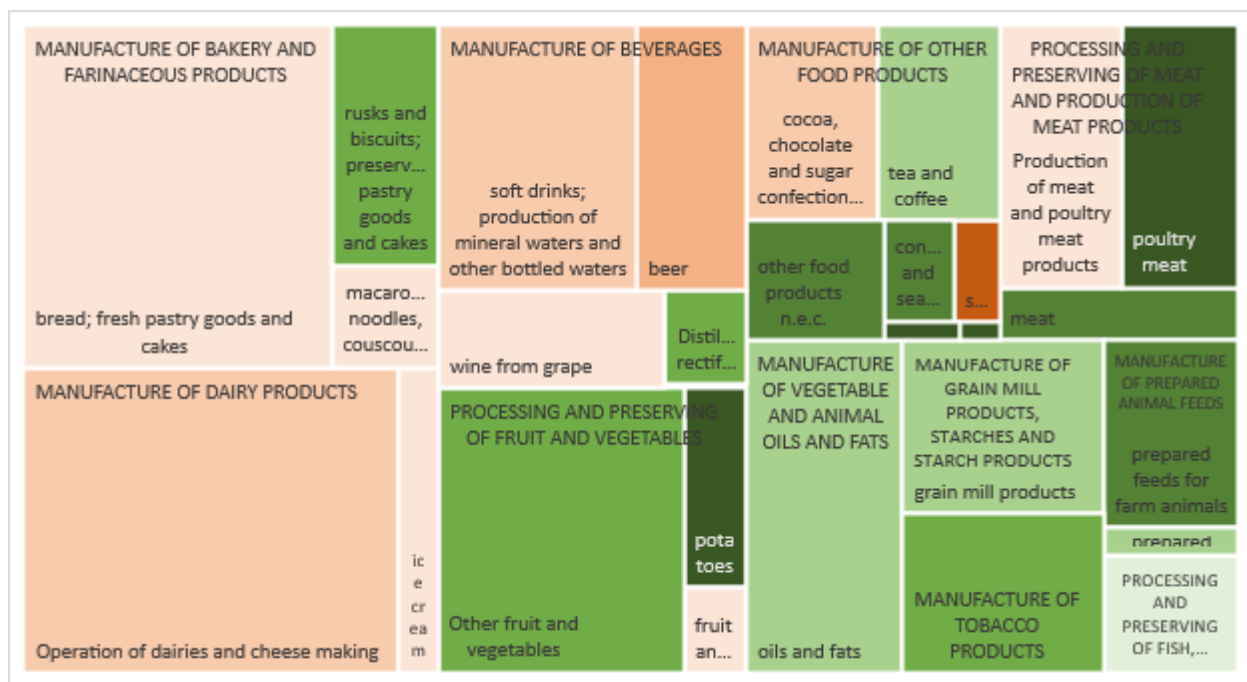
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
C10	Manufacture of food products	10.033	10.246	10.622	10.227	10.430	10.320	10.806	10.850	10.673	11.152	11.812
C101	Processing and preserving of meat and production of meat products	927	1.080	1.070	1.048	1.126	1.148	1.374	1.376	1.444	1.537	1.614
C102	Processing and preserving of fish, crustaceans and molluscs	147	133	419	432	453	430	175	189	170	164	160
C103	Processing and preserving of fruit and vegetables	1.355	1.015	1.142	1.250	1.288	1.296	1.597	1.673	1.621	1.765	1.985
C104	Manufacture of vegetable and animal oils and fats	764	904	964	878	846	847	771	825	847	920	901
C105	Manufacture of dairy products	2.517	2.140	1.981	1.851	1.861	1.844	2.197	2.167	2.095	2.184	2.230
C106	Manufacture of grain mill products, starches and starch products	543	478	484	552	649	587	612	630	574	596	613
C107	Manufacture of bakery and farinaceous products	2.094	2.846	2.926	2.573	2.546	2.398	2.089	2.100	2.042	2.068	2.123
C108	Manufacture of other food products	1.291	1.277	1.273	1.262	1.287	1.276	1.399	1.370	1.375	1.360	1.468
C109	Manufacture of prepared animal feeds	395	374	364	381	374	494	590	520	505	559	719
C11	Manufacture of beverages	2.154	2.145	2.059	1.863	1.683	1.695	1.731	1.747	1.781	1.827	1.699
C12	Manufacture of tobacco products	510	576	:	:	370	457	501	561	616	541	662

Source: Eurostat (2021), Annual detailed enterprise statistics for industry (NACE Rev. 2, B-E)

A product category breakdown for food products manufacture is presented in Table 2, based on the classification system outlined in Appendix B. Due to changes in the classification system, the data presented here concern the period 2008-2018. The highest contributing categories throughout this period are Bakery and Farinaceous products, and Dairy products. The former group grew notably during the first two years of the economic crisis, regressing and stabilizing at 2008 levels from 2014 onwards, and remaining, in any case, one of the strongest groups. The latter presents with a reverse course, declining throughout the first years of the crisis and stabilizing at higher levels from 2014 onwards. Fruit and vegetables is the most dynamic group in terms of growth, as also observed in the case of primary production, at least for the case of fruits, confirming a probably strategic focus on these product groups. Another dynamic product group is meat and meat products, following an increasing trend especially after 2014. The weakest product groups with respect to food manufacture are grain mill, starches and starch products, prepared animal feeds, and fish, crustaceans and molluscs. The former two groups show signs of growth, especially Prepared animal feeds. The third has the lowest performance among the groups, and improved amid the crisis, between 2010 and 2013, only to regress until the end of the period.

Other than food products, the agri-food industry also includes the categories of beverages and tobacco production. The beverages category decreased during 2009-2011, showing small signs of recovery in the following years. Production of tobacco in Greece has weakened during the past decades and, as shown in Figure 3 (no data for 2010-2011), remains at relatively low levels. Overall, the most important product categories and groups are Bakery products, dairy products, fruits and vegetables, meat products and beverages, while the most dynamic are fruits and vegetables, and meat products.

Figure 3. Agri-food manufacture, product groups (production value, million euro, 2008-2018)



Source: Eurostat (2021), Annual detailed enterprise statistics for industry (NACE Rev. 2, B-E)

At the lower levels, the largest groups are dairies and cheese, bread, fresh pastry goods and cakes, other fruit and vegetables, soft drinks and mineral waters, and oils and fats. With the exception of the last two groups, the rest follow a downward trend. The most dynamic groups are some of the smallest, namely poultry meat, potatoes, meat, other food products n.e.c., condiments and seasoning, and prepared feeds for farm animals.

Comparing the primary with the secondary production in the agri-food sector, the following main observations can be made:

- Production and processing of fruits and vegetables, especially fruits, is the most dynamic category, contributing also to other categories like beverages and oils and fats.
- Both the production of cereals and the processing of their derivatives show a relative decline, remaining an important category.
- Animal production is declining significantly, with the exception of poultry, which are generally rising, as well as eggs. In addition, despite a decline in animal production, animal products such as meat, milk and dairy products remain significant.
- An important product for domestic production, olive oil, has a significant decline during the study period. At the same time, the production of table olives as well as processed olive oil (oils and fats) has a significant increase. It should be noted that, generally, despite the strong production of olive oil, most of it is channeled mainly to the domestic market and a part of it is sold in bulk in Italy, where it is processed, packaged and sold. The observed growth in olive oil manufacturing could be suggestive of an upswing of domestic processing of this product, instead of channeling to Italy.
- Despite the initial decline in tobacco production, processing of tobacco products is characterized by an increase. This may be related to either a decrease in tobacco exports or an increase in tobacco imports.

2.1.3 Trade and Service activities

Domestic trade and food service activities represent the final stages from production to consumption in the agri-food industry. Table 3 displays the groups representing wholesale and retail trade, as well as service activities for the agri-food industry. The data point to a significant contraction of these sectors, the production value of which decreased significantly until 2014, and stagnated ever since. Only food services show improvement in the last year. This declining pattern until 2014 applies to all of the important groups comprising both sectors, namely wholesale of food, beverages and tobacco, retail sale of food, beverages and tobacco in specialized stores, restaurants and mobile food service activities, and beverage serving activities.

Table 3. Agri-food trade and service activities groups (production value, million euro, 2008-2018)

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
G462	Wholesale of agricultural raw materials and live animals	999	567	593	513	501	525	406	505	489	490	484
G463	Wholesale of food, beverages and tobacco	5.579	5.646	5.640	4.714	3.715	4.462	3.741	4.010	3.914	4.140	4.166
G472	Retail sale of food, beverages and tobacco in specialised stores	1.788	2.149	1.799	1.917	1.455	1.422	673	687	644	624	664
G4776	Retail sale of flowers, plants, seeds, fertilisers, pet animals and pet food in specialised stores	241	246	228	181	232	118	103	107	100	111	119
I561	Restaurants and mobile food service activities	5.063	4.760	4.468	3.719	3.038	3.101	2.144	2.119	1.715	1.879	3.585
I562	Event catering and other food service activities	299	288	253	240	222	219	219	223	239	220	281
I563	Beverage serving activities	2.357	2.271	2.138	2.064	1.734	1.830	886	874	700	766	1.584

Source: Eurostat (2021), Annual detailed enterprise statistics for services (NACE Rev. 2 H-N and S95) and for trade (NACE Rev. 2 G)

Regarding the product classes for trade as demonstrated in Figure 4 (categories in detail in Appendix C), it should firstly be noted that all but one classes are characterized by negative growth rates during the decade. Fruit and vegetables is once again the prevailing class in terms of average value, followed by other food, including fish, crustaceans and molluscs, dairy products, eggs and edible oils and fats, and meat and meat products. Beverages, and sugar and chocolate [...] are smaller classes, although characterized by lower contraction rates than the others. As for retail trade, bread, cakes [...] in specialized stores is the largest class, despite a -50% growth. A separate class, retail sale of flowers, plants [...] in specialized stores has been included in the agri-food classes and can be considered as the most promising retail trade class. The only class presenting with overtime increase is Coffee, tea, cocoa and spices. These classes can be identified as the most dynamic with respect to trade, leading to the deduction that the impact of the crisis was larger on retail, rather than wholesale trade of agri-food products.

Figure 4. Agri-food wholesale and retail trade, by division and class (production value, million euro, average for 2008-2018)



Source: Eurostat (2021), Annual detailed enterprise statistics for trade (NACE Rev. 2 G)

Overall, some consistent patterns can be identified throughout the overall process of agri-food production, processing, distribution and trade. The categories performing better than others in primary and secondary production are those characterized by the weakest decline in trade. Fruits have been the driving force for agri-food production between 2005 and 2019, followed by certain sub-groups of vegetables, animals and animal products. Respectively, a decline in cereal and raw tobacco production corresponds with negative growth in manufacture of bakery and farinaceous products and retail sale of bread, cakes, flour confectionery etc., and of wholesale of grain, unmanufactured tobacco, seeds and animal feeds. The latter does not stand with the increase of manufactured tobacco products which, as already mentioned, could relate to either a decrease in tobacco exports or an increase in tobacco imports.

Based on the above, it becomes clear that by 2018-2019 the Greek economy has not fully recovered from the preceding recession, the impact of which was largely catastrophic for both the Greek population and businesses. These effects may not have been as pronounced in agricultural production due to the inelasticity of the products, but they are becoming more apparent at the processing stage and much more so in trade and services, where the product is available to the consumer public. As social recovery occurs later than fiscal recovery any improvement should be seen later on and, given the ongoing global crisis due to the COVID-19 pandemic, it will be further delayed. For these reasons, the promotion of agri-food products abroad through external trade can be, as we will show below, a safety net for the recovery of the domestic economy as, in any case, quality food products are essential for the social well-being.

2.2 Exports

Based on the most recent data, agri-food exports account for 21% of total exports (average for 2005-2019). With regard to external trade, the focus lays mainly on the competitiveness of Greek products in the international markets. One way to measure is to determine the degree of specialization of exports on certain products, compared to the world pattern. Products registered as Protected Designation of Origin (PDO), for example, are certainly the most specialized, given the fact that they are only produced as such in certain areas. Additionally, the import levels of certain products compared to the rest of the world can be an indicator for dependency. Regarding the SITC categories, based on recent analyses [2],

agri-food products can be separated into four groups, with regard to the different levels of specialization and dependency:

- a. High specialization and low dependency. This category concerns highly exported and minimally imported products, such as olive-oil, certain fruit groups, cotton, and rice.
- b. High specialization and high dependency, concerning highly exported and imported products. Some of these are processed foods like yogurt, some types of cheese, sugar and alcohol beverages.
- c. Low specialization and low dependency, namely minimally exported and imported products, such as fresh vegetables and tomatoes.
- d. Low specialization and high dependency, concerning minimally exported but highly imported products like milk and bovine meat.

Against this background, this research mainly focuses on export growth for the CPA divisions relative to agri-food, namely 01, 03, 10, 11 and 12 (Table 4). The first two divisions represent primary products while the rest are manufactured products. The corresponding data to international trade used in this paper have been extracted by Eurostat's Classification of Products by Activity (CPA) database, so that each product heading is assignable to a single heading of the European activity classification, the NACE Rev. 2. This arrangement enables trade statistics to be considered jointly with other sets of economic statistics, in this case with production data. First it should be noted that, in contrast to agri-food production, exports of agri-food products have increased throughout the period. This suggests a dynamic change in policy directives towards the intensification of exports even before the crisis. Analyzing the export divisions it is evident that, in terms of value, food products is the prevailing division, with a consistent and significant upward trend throughout the period, same as the second largest division, namely, products of agriculture, hunting and related services.

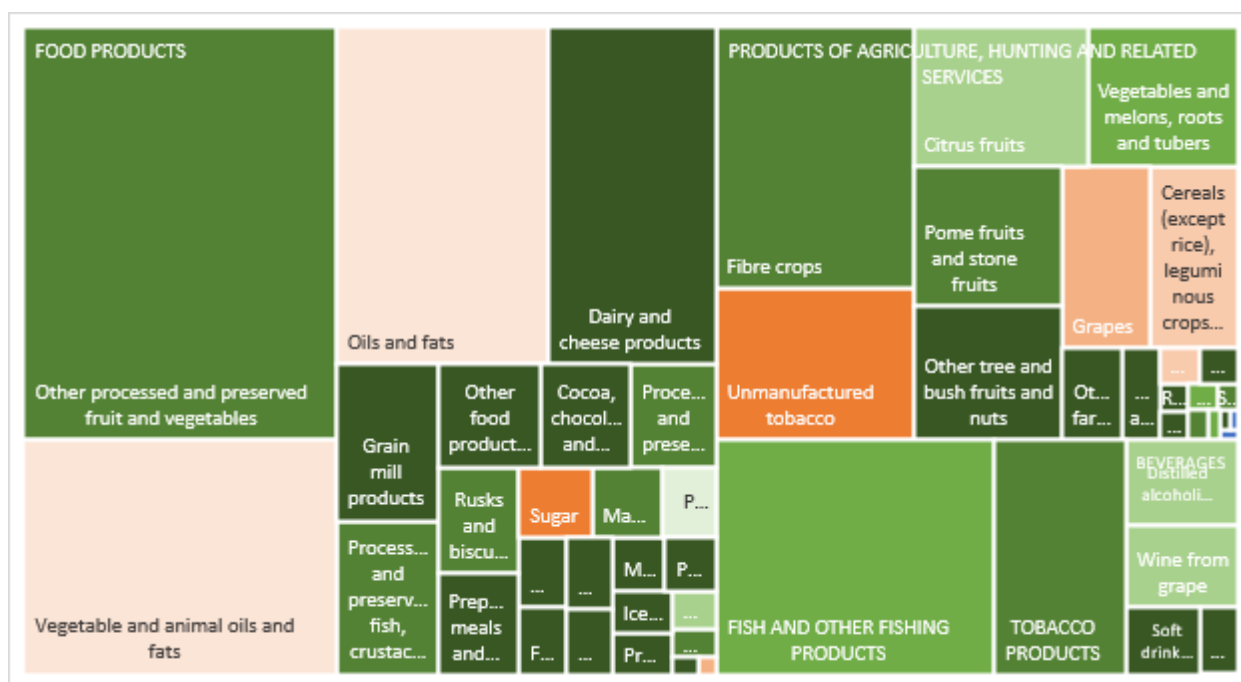
Table 4. Exports by export division (2005-2019, million euro)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
01	Products of agriculture, hunting and related services	1.308	1.300	1.152	1.450	1.457	1.552	1.396	1.708	1.641	1.601	1.519	1.769	1.659	1.705	1.889
03	Fish and other fishing products	328	372	397	406	431	463	507	487	464	479	496	546	565	541	542
10	Food products	1.817	2.043	2.136	2.177	2.070	2.288	2.483	2.625	2.849	2.629	3.231	3.312	3.380	3.724	3.581
11	Beverages	139	140	158	173	174	170	198	202	192	198	210	206	223	226	235
12	Tobacco products	138	138	148	167	158	175	188	202	206	219	282	309	297	304	366

Source: Eurostat (2021), EU trade since 1988 by CPA 2008 [DS-1060915]

At the lower levels (Figure 5) there is a significant improvement in performance for most product groups, with only a few classes showing negative change during this period. In terms of value, the most important groups are other processed and preserved fruit and vegetables, oils and fats, Fish and other fishing products, dairy and cheese products, fiber crops, tobacco products, and unmanufactured tobacco. On the other hand, the large groups with the highest rate of change (over 200%) are dairy and cheese products, grain mill products, other food products n.e.c., prepared meals and dishes, and other farmed animals and animal products. These dynamic product exports can benefit national and local production by either accelerating the positive or stemming the negative growth trends. In any case, the strategic national focus on external trade is very clear, initially prompted by low domestic trade but in the long run proving beneficial for domestic production.

Figure 5. Exports by division and class (average for 2005-2019), in terms of value (million euro)



Source: Eurostat (2021), EU trade since 1988 by CPA 2008 [DS-1060915]

Assessing the production and export of agri-food products, the key observation is that while production shows signs of declining over time for several of the categories, exports are still growing significantly. This can be explained taking into account, first, the negative effect of the recession on the domestic market, bringing about shrinkage and inciting a shift towards external markets and, second, the role of imports, as some of the raw materials used for the processing and export of agri-food products are imported. Similarly, primary production of certain products can drop while the goods produced can be used or processed in a different way or channeled to a different sector of the economy. For example, production of olive oil has decreased, while table olives have increased; production and exports of raw tobacco has decreased, while processing and export of tobacco products has increased; the – already weak – production of wine has decreased, but exports increased. At the same time, the trade of goods in the domestic market has decreased, while exports have evidently grown. All in all, the outperformance of exports over production is not an inconsistency and is largely explained by state choices following the first years of the crisis.

3. REGIONAL AGRI-FOOD PRODUCTION BY PRODUCT CATEGORY

Elaborating on the above remarks a regional analysis follows, aiming at the identification of the most prominent products per region, based not only on recent trends, but also each region's general productive profile. Due to differences in their soil and climatic conditions, historical background, traditions and local development policies, agri-food production diversifies between regions. On this basis, it should be mentioned that regional development in Greece is, in general, polarized. Attiki, the capital region not only concentrates almost half of the Greek population, but also accounts for almost half of the total annually produced value added. Apart from Kentriki Makedonia, region of the second largest city Thessaloniki, the rest of the Greek regions do not produce more than 10% of Attiki's production. As is probably expected, the sector of agriculture, forestry and fishing presents with a different distribution trend among the regions. The agricultural sector is indeed crucial, in terms of growth, to most of the Greek regions.

As illustrated in Table 5, contrary to the national level, in 10 out of 15 regions, agriculture contributes more than 5% to the total gross value added (GVA). Thessalia and Dytiki Ellada are the regions where the GVA of agriculture exceeds 10% at least for the last three years, while the respective values for Attiki, Notio Aigaio and Ionia Nisia are the lowest, below 5%. With only 0.4% contribution of agriculture, Attiki is an outstanding case, constituting the hub of the national manufacturing, wholesale and retail trade, real estate, public administration and other activities, responsible for most of its regional VGA [5]. In any case, even in terms of value, Attiki does not produce as much as most of the regions.

Table 5. Regional Gross Value Added for agriculture (% of total activities)

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
EL	Greece	4,8	3,6	3,4	3,2	3,1	3,3	3,4	3,7	3,6	3,8	4,3	4,1	4,2
EL30	Attiki	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
EL41	Voreio Aigaio	6,4	6,4	4,4	4	4,4	4,7	4,7	5,1	5,1	5	5,5	5,4	5,7
EL42	Notio Aigaio	2,8	2,7	2,5	2,3	2,4	2,4	2,6	2,8	2,7	2,6	2,7	2,6	2,7
EL43	Kriti	8,9	7,4	6,9	6,2	5,8	5,9	6	6,5	5,7	6,2	8	6,9	7,3
EL51	Anatoliki Makedonia, Thraki	9,8	6,9	7,3	6	5,9	6,2	6,7	7,1	7,5	7,4	7,6	7,9	8,1
EL52	Kentriki Makedonia	7,3	5,1	5,1	4,8	4,6	4,7	5,1	5,4	5,6	5,8	6	5,6	5,8
EL53	Dytiki Makedonia	7,2	5,7	6,1	5,9	5,5	5,2	5,6	5,4	5,9	6,1	8,4	9	9,1
EL54	Ipeiros	9,3	7,3	6,7	6,1	6,7	6,8	6,7	7,4	7,5	8,3	9,1	8,4	8,7
EL61	Thessalia	12,5	8,1	7,9	8,1	8,3	9,1	9,1	9,8	10,1	10,7	12,3	11,8	12,2
EL62	Ionia Nisia	4,7	3,4	3,4	2,7	3	3,3	3,6	3,9	3,7	3,5	4,3	4,2	4,3
EL63	Dytiki Ellada	10,9	8,2	8,2	7,6	7,8	8,2	8,1	9	9	9,5	11	10,6	11,2
EL64	Stereia Ellada	10,4	7,9	7,3	6,7	6,9	7,3	7	8	7,6	8,5	8,4	7,7	7,9
EL65	Peloponnisos	10,5	9,4	7,9	7,4	7,2	7,5	7,1	8,3	7,7	8,5	9,9	9,1	9,5

Source: Eurostat (2021); own calculations

Based on ELSTAT data (Table 6), calculating the growth rate for agricultural production for the period 2005-2018, most regions present with negative rates, meaning that, during this period, production decreased. The exceptions are Dytiki Makedonia, Peloponnisos, Thessalia and Ipeiros, some of the traditionally driving regions for agriculture. The remaining two columns concern the product categories that contribute most in terms of value, and those categories that are characterized by the highest growth rates (>50%) in each region. The highest growth rates are indicative of certain trends, although this does not necessarily mean that those categories are driving local production. Thus, to avoid misinterpretations, the smallest groups (<5% contribution) have been excluded from the highest growth rate categories per region. Other crop products is an example of this, systematically presenting with very high growth rates in several regions and at the national level.

Table 6. Regional agricultural production, growth rates and contributing categories (2005-2018)

	Region	Total growth rate	Highest % contributing categories	Highest growth rate categories per region
EL	Greece	-6,6	Fruits	Forage plants, Fruits
EL30	Attiki	-0,3	Animal products, Vegetables and plants	Fruits
EL41	Voreio Aigaio	-14,4	Animal products, Olive oil	Forage plants
EL42	Notio Aigaio	-14,7	Animal products, Forage plants, Vegetables and plants	Fruits, Vegetables and plants

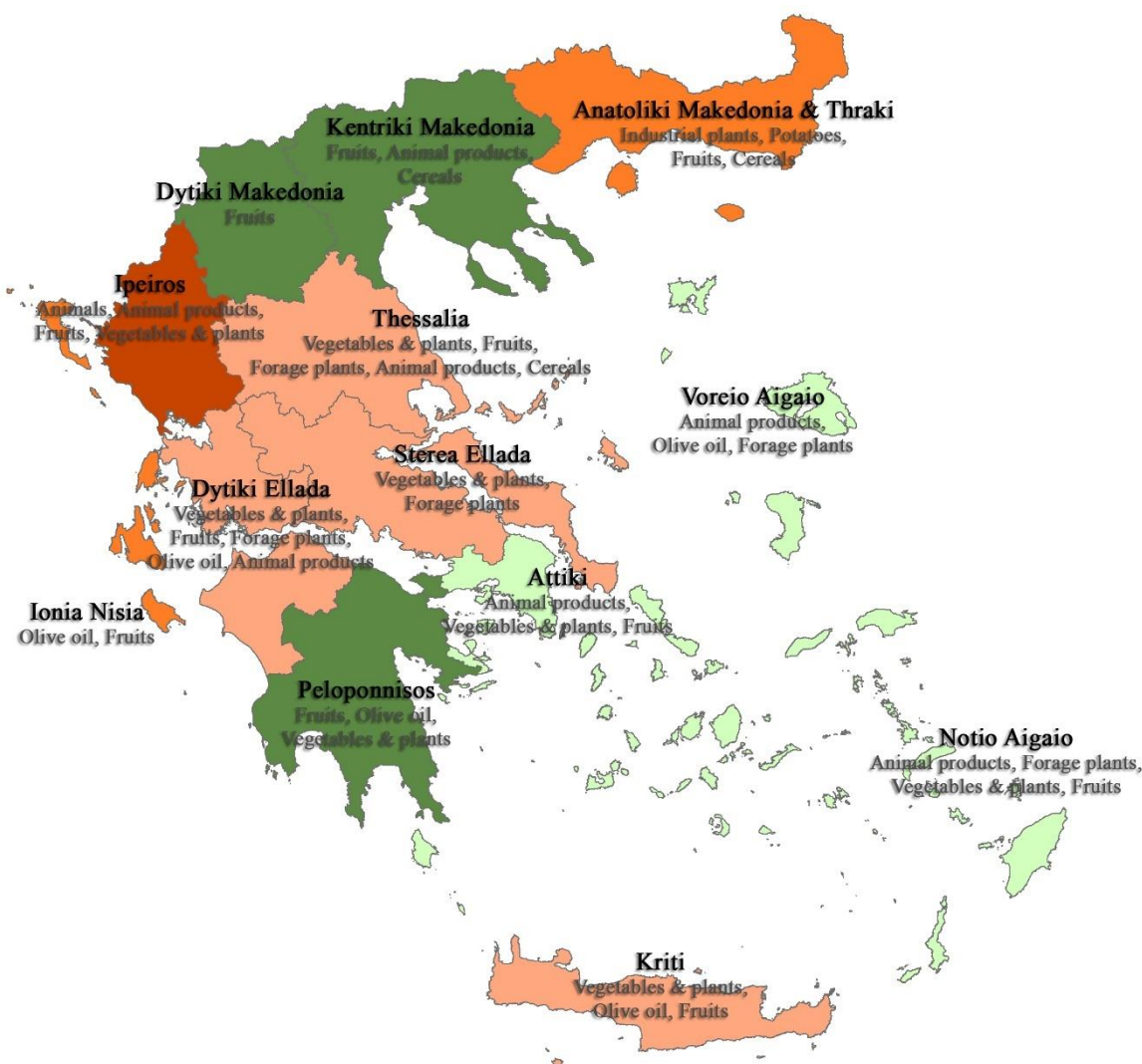
EL43	Kriti	-13	Vegetables and plants, olive oil	Vegetables and plants, Fruits
EL51	Anatoliki Makedonia, Thraki	-11,3	Industrial plants	Potatoes, Fruits
EL52	Kentriki Makedonia	-3,5	Fruits	Fruits
EL53	Dytiki Makedonia	22,4	Fruits	Fruits
EL54	Ipeiros	1,9	Animals, animal products, Fruits	Vegetables and plants
EL61	Thessalia	2,1	Vegetables and plants, Fruits	Forage plants, Fruits
EL62	Ionia Nisia	-42,3	Olive oil, Fruits	Fruits
EL63	Dytiki Ellada	-17,7	Vegetables and plants, Fruits	Forage plants, Vegetables and plants
EL64	Sterea Ellada	-29	Vegetables and plants	Forage plants
EL65	Peloponnisos	14,2	Fruits, olive oil	Vegetables and plants, Fruits

Source: ELSTAT (2021); own calculations

The most recent dynamics are not the only factor to be considered for regional production. History and tradition are also important factors for growth. One of the comparative advantages for Greek agri-food production has traditionally been olive oil production. Despite a recent decrease, efforts should focus on boosting its production specifically in the most specialized regions, namely Kriti, Peloponnisos and Dytiki Ellada. With regard to animal breeding, the only region showing upward trend is Ipeiros while other traditional producers such as Kentriki Makedonia, Dytiki Ellada, Thessalia, Crete lag behind. Moreover, Kentriki Makedonia, Thessalia and Dytiki Ellada are the driving regions for the production of certain animal products, such as meat, eggs and dairy, while Kentriki Makedonia, Thessalia and Anatoliki Makedonia and Thraki produce cereals. These facts should be taken into account when planning for agri-food production in Greece.

Based on the above remarks, the most prominent product groups per region are illustrated in Map 1, identified based on the evaluation of the largest and the most dynamic categories, as well as groups traditionally linked with certain regions. Thus, the most important groups per region are: industrial plants, potatoes, fruits and cereals for Anatoliki Makedonia and Thraki; fruits, animal products, and cereals for Kentriki Makedonia; fruits for Dytiki Makedonia; animals, animal products, fruits, and vegetables and plants for Ipeiros; vegetables and plants, fruits, forage plants, animal products, and cereals for Thessalia; vegetables and plants, and forage plants for Sterea Ellada; vegetables and plants, fruits, forage plants, olive oil, and animal products for Dytiki Ellada; animal products, vegetables and plants, and fruits for Attiki; olive oil, and fruits for Ionia Nisia; fruits, olive oil, and vegetables and plants for Peloponnisos; animal products, olive oil, and forage plants for Voreio Aigaio; animal products, forage plants, vegetables and plants, and fruits for Notio Aigaio; lastly, vegetables and plants, olive oil, and fruits for Crete.

Map 1. Regional agricultural production in Greece, prominent products per region (2005-2018)



Source: ELSTAT (2021); own elaboration

Special mention should be made of the approximately 280 (applied/registered) traditional Greek products associated with their place of origin, registered as Protected Destination of Origin (PDO), Protected Geographical Indication (PGI) or Traditional Specialities Guaranteed (TSG), as recorded in Table 7. Irrespective of the volume-size of production for each product, their added value is measurable through quality and place branding towards the domestic and international markets. One of many examples is Greek wine, which, as shown in the analysis above, contributes little – and by decreasing rates – to total production. At the same time, all of the Greek regions produce certified PDO or PGI wine, promoting local brands, contributing to quality exports and stimulating local tourism.

Table 7. Greek products registered as PDOs, GIs, PGIs by region

Region	Products registered as PDOs, GIs, PGIs
Crete	olive oil, fruits, vegetables, nuts, olives, cheeses, bakery, honey, wine
Peloponnisos	olive oil, olives, fruit and vegetables, cheeses, honey, wine
Dytiki Ellada	olive oil, fruit and vegetables, cheeses, fresh fish, molluscs, and crustaceans and products derived therefrom, wine

Voreio Aigaio	olive oil, fruit and vegetables, olives, cheeses, natural gums and resins, essential oils, wine
Notio Aigaio	bakery, olive oil, pulses, cheeses, fruit and vegetables, wine
Attiki	olive oil, fruits and nuts, cheeses, wine
Stereia Ellada	Fruits and nuts, olives, cheeses, wine
Thessaly	fruits, olives, cheeses, meat products, wine
Ipeiros	olive oil, olives, cheeses, wine
Ionia Nisia	fruits and nuts, olive oil, wine
Anatoliki Makedonia, Thraki	olive oil, olives, fruit and vegetables, pulses, cheeses, wine
Dytiki Makedonia	fruit and vegetables, pulses, other products, cheeses, wine
Kentriki Makedonia	olive oil, olives, fruits and vegetables, cheeses, wine

Source: Hellenic Republic, Ministry of Rural Development and Food; e-Ambrosia, European Commission

The significance of product variety combined with quality should be stressed. When it comes to the agri-food industry, variety of products ensures, on the one hand, the nutritional self-sufficiency of local communities and, on the other hand, the opportunity to form product/brand-place associations, beneficial both for exports and tourism. Product variety is consistent with variety in markets, expanding the potential of local production. Thus, it is not proposed here that Greek regions or regional units should capitalize on monocultures, a prior political choice that proved less than beneficial for land productivity, domestic production and economic growth in general.

4. PROSPECTS FOR THE GREEK AGRI-FOOD INDUSTRY

The agri-food industry is unequivocally a key axis of national and regional development, as clearly reflected in the Smart Specialization Strategy 2014-2020 [2]. According to the latter, the national strategy aims at utilizing, while reinforcing, research and innovation in order to address structural weaknesses and highlight the competitive advantages of the sector, emphasizing the superior quality and locality of Greek agri-food products. In addition, it is reported that the development of new cultivation and processing production methods can be used to increase productivity. Some of the opportunities identified in the sector are the development of research, linking agri-food to the fields of biodiversity, high value-added plant products and marine ecosystems, as well as the development of brand names in agri-food products and the promotion of the Mediterranean diet. The development of agri-logistics in support of agri-food marketing is also identified as a means to achieve national goals for the industry.

The Greek structure of agricultural production, namely small family-owned pieces of agri-land, family-owned enterprises or even cooperatives, can prove beneficial through the formation of local agglomerations, taking advantage of their ability to control local natural resources, the inherited expertise, the traditional specialization that comes with the close connections between the producers and the land. These elements can reinforce the potential of the manufacturing sector, largely relying on locality and tradition, responsible at least partly for local and/or regional agglomerations. At the same time, the institutional support to local producers and firms is inadequate, discouraging intensified local production and export enterprise [6].

Regions should play an important role in achieving national objectives, in relation to the development and improvement of local products, their standardization and promotion, while reducing the environmental footprint. In the framework of the Smart Specialization Strategy, the categorization of the regions and their respective actions is sought, together with complementarity with other measures promoted by the Ministry of Rural Development and Food. The aforementioned agri-food production policies should be simultaneously linked to regional demographic policies, given the heterogeneous

distribution of the population – and especially the active population – in Greece. The issue of replacing the aging human resources in the rural countryside, which is engaged in agricultural production, should be of serious concern to policy makers. It becomes necessary to ensure a smooth transition from the older to the younger generation, the latter being able to contribute with higher specialization in plant and animal production, the utilization of new technologies in production and the promotion of food products, among others.

In terms of external economic relations, the entry of Bulgaria and Romania into the European Union in 2007, along with the positive prospects for the forthcoming entry of other Balkan countries, is also a positive development for the interconnection of the distribution networks of the agricultural products along the Balkan peninsula. Joint cooperation efforts at both bilateral and EU level can also formulate a common branding strategy for specific food sectors. At the level of economic relations outside the EU, the Russian import ban on agri-food products coming from the European Union [7] had indeed negatively affected Greek fruit exports from 2014 onward [8], as a result of the EU restrictive measures the Russian Federation's destabilizing actions in Ukraine. It is evident that such a development may not be desirable for Greek export activity in this specific sector, but it was at the same time an opportunity for Greek producers to seek new markets of agri-food products. The perspective of the withdrawal of these specific trade restrictions in the future may also contribute positively to further expand the external demand.

5. CONCLUSIONS

Analyzing recent trends, it is obvious that the Greek agri-food industry is not as dynamic as it could be, based on its potential. This relates to several structural weaknesses, but also to the impact of the economic crisis and consequent recession, which led to a decline in production and domestic consumption. Even against this background, some product categories performed better than others, while certain groups can be characterized as dynamic. Fruits and vegetables, animal products and forage plants are the prevailing agricultural categories, including the product groups of sweet oranges, mandarins, table olives, dessert apples and pears, poultry, and eggs. With regard to manufacture, the largest groups related to bakery and dairy production have negative overtime growth, while smaller groups like poultry meat, potatoes, meat, other food products n.e.c., condiments and seasoning, and prepared feeds for farm animals, improve. Once more, fruits is a prevailing category.

Largely due to the crisis, domestic trade and service activities performance has deteriorated. It should be kept in mind that the social effects of the economic crisis and recession outlast its economic and fiscal effects. In this sense, domestic consumption has yet to improve despite a relative improvement in production during the last years of the study period. Partly due to this fact, one of the main goals of the Greek state has been to boost agri-food exports, accompanied by a respective reinforcement of the framework for agri-food marketing, research and innovation, as well as regional specialization. Agri-food exports have consequently improved for most of the product groups with the exception of sugar, unmanufactured tobacco and grapes.

At the regional level, it appears that some regions diverge from their traditional production profile, especially in relation to olive oil (Crete, Peloponnisos, Dytiki Ellada) and animal breeding (Kentriki Makedonia, Dytiki Ellada, Thessalia, Crete), while some regions (Kentriki Makedonia, Peloponnisos, Thessalia) focus on fruit production. Mainly after the recession, special emphasis is placed upon the variety and high quality of local products, the marketing of the Mediterranean diet's nutritional value, as well as on the connection of specific products with their place, strengthening other sectors such as research and tourism. The intensification of high value-added agri-food production should be a major strategic priority for the productive restructuring of the country. The expansion of cooperation between rural development and tourism actors can make a significant contribution in this direction.

A note should be made on the negative impact of the ongoing COVID-19 pandemic crisis, which has affected every aspect of economic growth and social well-being. The impact on the global economy and international commodity trade has clearly been significant, with recent estimates specifying reductions in economic growth rates - if not negative rates - for the largest proportion of countries in the world by

2021 [9, 10]. Focusing on Greek exports, in particular, fruit exports seem to have responded very positively amid a pandemic, based on preliminary data. At this time the magnitude of the negative aftereffects is unknown. However, an expected achievement of the pandemic management objectives will facilitate a reboot for international production and trade. A shift of consumer needs worldwide to healthier products is a modern reality, a fact which also seems to contribute to the expansion of Greek agri-food exports.

ACKNOWLEDGEMENTS

This project has received funding from the Hellenic Foundation for Research and Innovation (HFRI) and the General Secretariat for Research and Innovation (GSRI), under grant agreement No 300.

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APPENDIX A

Table: Classification of Products by Activity (CPA), 2008; products of agriculture, forestry, fishing

CODES	SECTIONS/DIVISIONS/GROUPS	CODES	SECTIONS/DIVISIONS/GROUPS
01	CEREALS	06.1	Fresh fruit
01.1	Wheat and spelt	06.11	Dessert apples
01.11	Soft wheat and spelt	06.12	Dessert pears
01.12	Durum wheat	06.13	Peaches
01.2	Rye and meslin	06.14	Other fresh fruit
01.3	Barley	06.2	Citrus fruits
01.4	Oats and summer cereal mixtures	06.21	Sweet oranges
01.5	Grain maize	06.22	Mandarins
01.6	Rice	06.23	Lemons
01.7	Other cereals	06.24	Other citrus fruits
02	INDUSTRIAL CROPS	06.3	Tropical fruit
02.1	Oil seeds and oleaginous fruits	06.4	Grapes
02.11	Rape and turnip rape seed	06.41	Dessert grapes
02.12	Sunflower	06.42	Other grapes
02.13	Soya	06.5	Olives
02.14	Other oleaginous products	06.51	Table olives
02.2	Protein crops	06.52	Other olives
02.3	Raw tobacco	07	WINE
02.4	Sugar beet	07.1	Table wine
02.5	Other industrial crops	07.2	Quality wine
02.51	Fibre plants	08	OLIVE OIL
02.52	Hops	09	OTHER CROP PRODUCTS
02.53	Other industrial crops: others	09.1	Vegetable materials [...]
03	FORAGE PLANTS	09.2	Seeds
03.1	Fodder maize	09.3	Other crop products: others
03.2	Fodder root crops	11	ANIMALS
03.3	Other forage plants	11.1	Cattle
04	VEGETABLES AND HORTICULTURAL PRODUCTS	11.2	Pigs
04.1	Fresh vegetables	11.3	Equines
04.11	Cauliflower	11.4	Sheep and goats
04.12	Tomatoes	11.5	Poultry
04.13	Other fresh vegetables	11.6	Other animals
04.2	Plants and flowers	12	ANIMAL PRODUCTS
04.21	Nursery plants	12.1	Milk
04.22	Ornamental plants and flowers	12.2	Eggs
04.23	Plantations	12.3	Other animal products
05	POTATOES	12.31	Raw wool
06	FRUITS	12.32	Silkworm cocoons
		12.33	Other animal products: others

Source: Regulation (EC) No 451/2008

APPENDIX B

Table: CPA product classification for manufacturing

C	MANUFACTURING
10	Manufacture of food products
101	Processing and preserving of meat and production of meat products
1011	Processing and preserving of meat
1012	Processing and preserving of poultry meat
1013	Production of meat and poultry meat products
102	Processing and preserving of fish, crustaceans and molluscs
103	Processing and preserving of fruit and vegetables
1031	Processing and preserving of potatoes
1032	Manufacture of fruit and vegetable juice
1039	Other processing and preserving of fruit and vegetables
104	Manufacture of vegetable and animal oils and fats
1041	Manufacture of oils and fats
1042	Manufacture of margarine and similar edible fats
105	Manufacture of dairy products
1051	Operation of dairies and cheese making
1052	Manufacture of ice cream
106	Manufacture of grain mill products, starches and starch products
1061	Manufacture of grain mill products
1062	Manufacture of starches and starch products
107	Manufacture of bakery and farinaceous products
1071	Manufacture of bread; manufacture of fresh pastry goods and cakes
1072	Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes
1073	Manufacture of macaroni, noodles, couscous and similar farinaceous products
108	Manufacture of other food products
1081	Manufacture of sugar
1082	Manufacture of cocoa, chocolate and sugar confectionery
1083	Processing of tea and coffee
1084	Manufacture of condiments and seasonings
1085	Manufacture of prepared meals and dishes
1086	Manufacture of homogenized food preparations and dietetic food
1089	Manufacture of other food products n.e.c.
109	Manufacture of prepared animal feeds
1091	Manufacture of prepared feeds for farm animals
1092	Manufacture of prepared pet foods
11	Manufacture of beverages
1101	Distilling, rectifying and blending of spirits
1102	Manufacture of wine from grape
1103	Manufacture of cider and other fruit wines
1104	Manufacture of other non-distilled fermented beverages
1105	Manufacture of beer
1106	Manufacture of malt
1107	Manufacture of soft drinks; production of mineral waters and other bottled waters
12	Manufacture of tobacco products

Source: Regulation (EC) No 451/2008

APPENDIX C

Table: CPA product classification for trade and service activities

G	WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES
462	Wholesale of agricultural raw materials and live animals
4621	Wholesale of grain, unmanufactured tobacco, seeds and animal feeds
4622	Wholesale of flowers and plants
4623	Wholesale of live animals
4624	Wholesale of hides, skins and leather
463	Wholesale of food, beverages and tobacco
4631	Wholesale of fruit and vegetables
4632	Wholesale of meat and meat products
4633	Wholesale of dairy products, eggs and edible oils and fats
4634	Wholesale of beverages
4635	Wholesale of tobacco products
4636	Wholesale of sugar and chocolate and sugar confectionery
4637	Wholesale of coffee, tea, cocoa and spices
4638	Wholesale of other food, including fish, crustaceans and molluscs
4639	Non-specialized wholesale of food, beverages and tobacco
471	Retail sale in non-specialized stores
4711	Retail sale in non-specialized stores with food, beverages or tobacco predominating
4719	Other retail sale in non-specialized stores
472	Retail sale of food, beverages and tobacco in specialized stores
4721	Retail sale of fruit and vegetables in specialized stores
4722	Retail sale of meat and meat products in specialized stores
4723	Retail sale of fish, crustaceans and molluscs in specialized stores
4724	Retail sale of bread, cakes, flour confectionery and sugar confectionery in specialized stores
4725	Retail sale of beverages in specialized stores
4726	Retail sale of tobacco products in specialized stores
4729	Other retail sale of food in specialized stores
I	ACCOMMODATION AND FOOD SERVICE ACTIVITIES
56	Food and beverage service activities
561	Restaurants and mobile food service activities
5610	Restaurants and mobile food service activities
562	Event catering and other food service activities
5621	Event catering activities
5629	Other food service activities
563	Beverage serving activities
5630	Beverage serving activities

Source: Regulation (EC) No 451/2008