

Delphi-Based Foresight of Global Olive Oil Market Trends

Samir Mili and Maria Bouhaddane

*Institute of Economics, Geography and Demography (IEGD)
Spanish National Research Council (CSIC), Madrid, Spain*

samir.mili@csic.es, maria.bouhaddane@hotmail.fr

ABSTRACT

Forecasting of supply and demand in the olive oil value chain remains a hot topic partly due to the lack of comprehensive and consensual estimates at the international level. The aim of this study is to contribute to overcome this weakness by providing a foresight of global supply and demand for olive oil for the upcoming years, using an iterative consensus-building Delphi approach. Therefore, we estimate the expected annual growth rates in the olive oil production and consumption worldwide as well as their likely impact on Spanish exports. Another key objective of the study is to elicit expert judgements on the factors that are likely to shape the predicted changes as well as the international challenges ahead. Results point to substantial future increases in production in new-producing countries, in parallel with a slower growth in the EU traditional suppliers whose focus will increasingly be placed on the quality and sustainability rather than the quantity of olive oil produced. Likewise, a significant growth in the world demand for olive oil is expected mostly in non-traditional markets, which will be spurred by greater awareness and appreciation of the product's health benefits, combined with the changes in lifestyles and the increasing purchasing power of several consumer segments. These emerging markets represent valuable opportunities for marketing and promoting olive oil as a highly valued product, and offer promising prospects for the international expansion of olive oil companies. Findings support decision-making and long-term strategic planning along the olive oil value chain. Researchers can use the results as a reference point for further study of the dynamics of world supply and demand for olive oil.

Key words: Judgmental forecasting; global trends; supply; demand; olive oil.

1. Introduction

The effectiveness of the value chain planning is heavily reliant on the accuracy and consistency of the supply and demand forecasts. In the olive oil value chain, the global supply and demand forecasting is a highly discussed topic due to the lack of comprehensive and consensual estimates at the international level. Available information reveals that uncertainties and discrepancies remain substantial in this domain. In the meantime, major changes are witnessed in the world olive oil production and consumption leading to changing market configuration and competition rules. Although there are reports on the future of the production and consumption of olive oil, dedicated academic studies that develop forecasts addressing the entire relevant countries and critical factors remain very scarce. The most reliable prospects for the olive oil market probably are those presented in the annual "EU Agricultural Outlook for the Agricultural Markets and Income". The latest EU agricultural outlook refers

to the horizon 2018-2030 (European Commission, 2018a). However, the EU prospects remain highly aggregated and are not global in nature since they are focused only on the EU Member States.

Therefore, this contribution aims at closing this gap by producing a methodologically sound study on the future of the supply and demand for olive oil in the upcoming years (horizon 2025), covering the whole spectrum of relevant countries involved in this sector ranging from traditional Mediterranean players to new international actors. Using an iterative consensus-building Delphi approach, we estimate the expected annual growth rates in the olive oil production and consumption worldwide as well as their likely impact on Spanish exports. Another key objective of the study is to elicit expert judgements on the factors that are likely to shape the predicted changes. The study also seeks to illustrate the challenges and opportunities that lie ahead and to assess whether more ambition is required to achieve further improvements in the international olive oil markets.

2. Recent trends in the global market for olive oil

Global production trends

Over the past two decades, the global production of olive oil has experienced a progressive growth in response to the increasing public and private interest in the product. An interest that materialized in the economic and technical efforts engaged in restructuring the existing plantations and the establishment of new orchards, in many olive-growing regions, along with the improvement of the cultural and harvesting practices and modernization of production processes (Mili, 2006; Rodríguez Cohard et al., 2017). These efforts reflected positively on production and resulted in substantial gains in productivity. In fact, the data provided by the International Olive Council (IOC) show that world olive oil production reached an average of 2.86 million tons in the period between 2005/06 and 2017/18, 71.1% of which was produced in the EU. Production in Spain, Italy and Greece amounted to 2 million tons approximately (96% of EU olive oil production) (Figure 1). However, production has been growing at a slower pace over the stated period, where the annual growth rate of global production fell to about 2.1%, in comparison with the 5% annual raise in production recorded between 1994/95 and 2004/05. This decline is directly linked to the slowdown in the growth of EU production, with significant output increase in Spain and Portugal largely offset by lower production in Italy and Greece.

Meanwhile, production grew rapidly during this period in non-EU Mediterranean countries such as Syria, Tunisia, Turkey and Morocco where production was spurred by domestic and foreign investment, both increasing the area planted and improving yields through irrigation and modern harvesting methods. The same trend was registered in new producing countries outside the Mediterranean region in particular Chile, Australia and Argentina, which benefit from intensive and efficient production methods and have emerged as important sources of olive oil in recent years (U.S. International Trade Commission, 2013). In fact, the IOC statistics reports indicate that production from these suppliers increased by 10.2 % annually between 2006/07 and 2017/18.

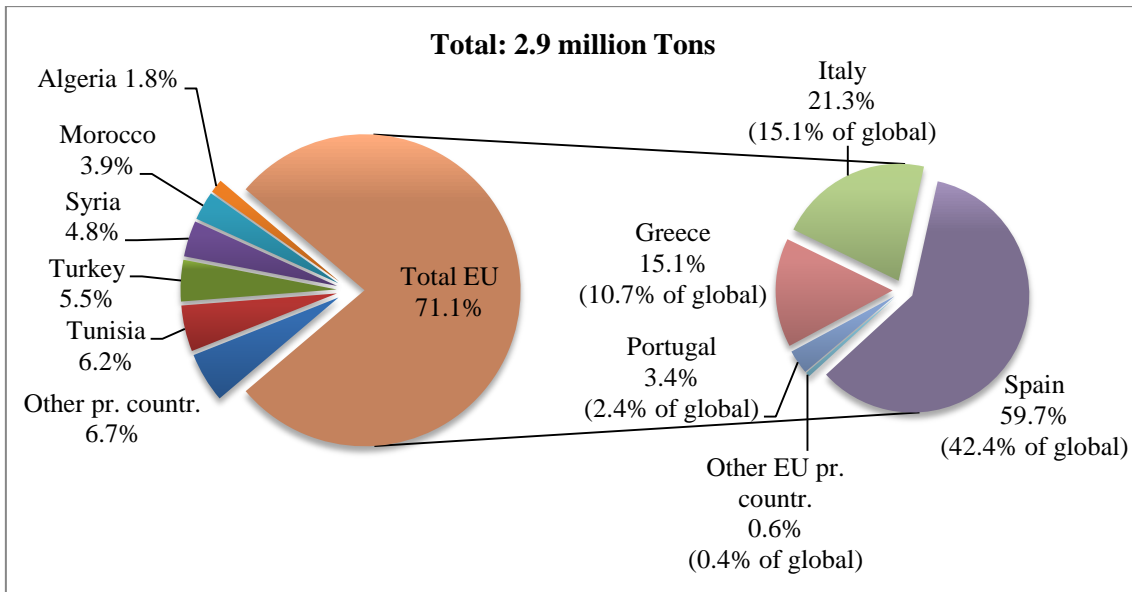


Figure 1. Breakdown of the world olive oil production (average percentage 2005/06-2017/18). Source: Own elaboration based on IOC statistic series (2018).

Global consumption trends

World consumption of olive oil has registered a substantial growth in the course of the past decades, as the product's appeal spread beyond the Mediterranean, increasing 1.6 fold in volume between 1995/96 and 2017/18 (IOC, 2018). Demand expansion has been particularly induced by the generic and commercial promotional campaigns carried out in these nontraditional markets, which contributed in stimulating interest for the olive oil and raising awareness on its health benefits (Mili, 2009).

Historically, the evolution of the global consumption of olive oil was primarily conditioned by the demand in the EU, and more specifically in the EU main producer countries, considering that between 1990/91 and 2004/05 the average olive oil consumption in the EU amounted to 1.6 million tons, representing around 72% of the world consumption. However, this share fell to 59.9% during the past decade (Figure 2), as consumption growth in the EU producer countries started slowing down since 2000/01 then decreasing after 2005/06, in parallel with the gradual decline in the consumption in both Italy and Greece that coincided with the years of the economic crisis. Meanwhile, the reverse trend emerged in the EU non-producing countries where consumption has been in excess of 200,000 tons since 2010/11, owing to the demand increase for olive oil observed in markets such as the UK and Germany. Broadly speaking, this phenomenon has been taking place mainly in non IOC-member countries whose share of the global olive oil consumption has more than doubled, rising from 11% in 1995/96 to 24% in 2015/16. Among these countries, the United States has seen the most remarkable growth as the quantity of olive oil consumed by the US consumers has tripled over the course of the past 20 years, reaching 315,000 tons in 2017/18, thereby taking over Greece's position as the world's third-largest olive oil-consuming country, in volume terms, behind Italy and Spain.

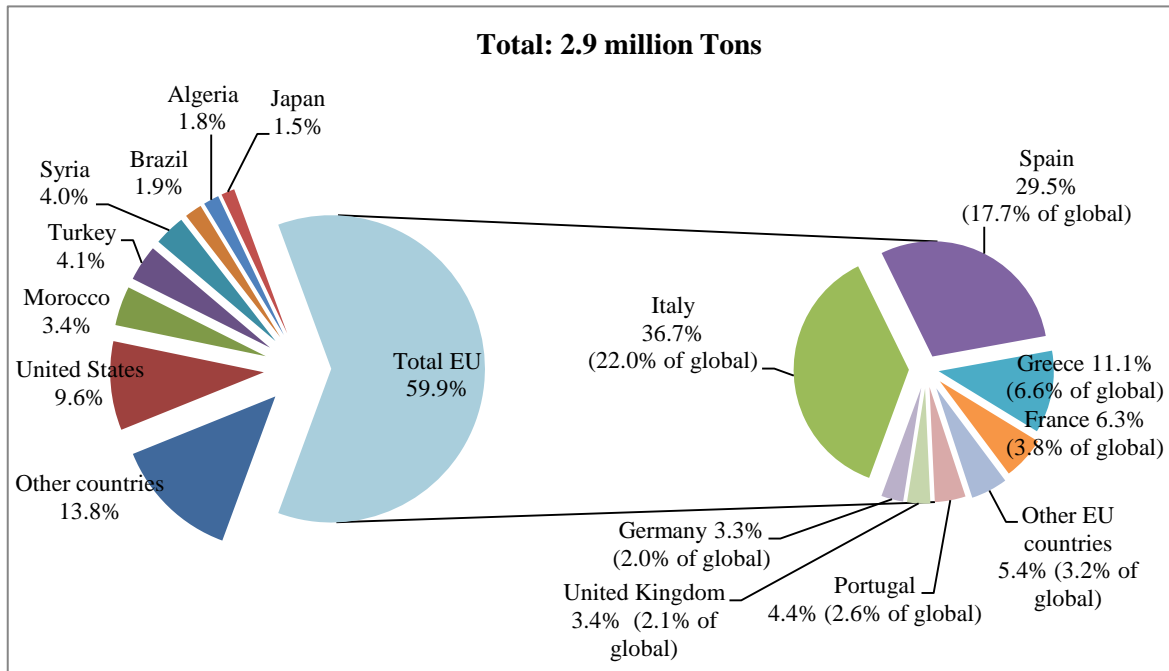


Figure 2. Breakdown of the world olive oil consumption (average percentage 2005/06-2017/18). Source: Own elaboration based on IOC statistic series (2018).

On a per capita basis, Greece maintains its world-leading position, although it has seen its annual per capita consumption reduced almost by half from 24 kg in 2005/06 to 12.08 kg in 2017/18. Spain is second with a consumption of 10.2 kg per person per year, followed by Italy (9.35 kg) and Portugal (7.29 kg), where per capita consumption also declined in comparison with its level from a decade ago. In comparison, U.S. per capita consumption is only 0.97 kg annually. However, an important qualitative parameter to be taken into account is the U.S. household penetration for olive oil, which in 2011 was estimated to be about 40 percent. This indicates that there is still room for demand growth and given the size of the U.S. market, even a small increase in this share would have a significant impact on total U.S. consumption (U.S. International Trade Commission, 2013). Likewise, per capita consumption in other importing countries, such as Japan (0.44 kg), Brazil (0.37 kg), and China (0.03 kg) is low, which suggests significant potential for future consumption growth (Figure 3).

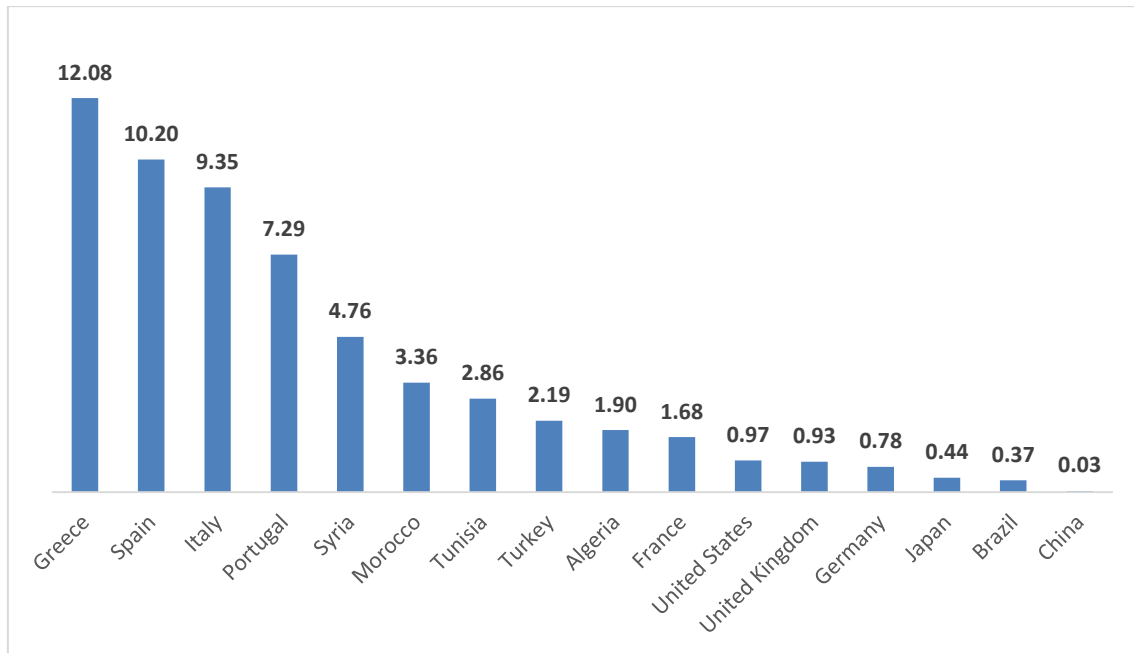


Figure 3. Olive oil annual per capita consumption for selected countries, 2017/18 (kg). Source: Own elaboration based on consumption data from the IOC statistic series (2018) and population data sourced from the World Bank database (2018).

Trends in global trade and prices

Olive oil trade mostly takes place between the Mediterranean countries, and is led by the EU. In fact, more than half of the global olive oil exchanges occurred in the EU during 2011/12-2017/18, as intra-EU exports amounted to 960,586 tons on average while its exports to the rest of the world reached an average of 550,071 tons over the stated period (Figure 4). Spain is by far the world's leading olive oil-exporting country, with a volume of approximately 885,000 tons (including intra-EU) exported on average during 2011/12-2017/18, thereby accounting for about half of global exports, of which 70% were destined for the EU market. Italy ranks second, accounting for about 20% of global exports over the same period, of which close to one-third were sent to the United States. Other EU countries, mainly Greece and Portugal, together accounted for about 14 percent of global exports over the same period. Major markets for Greece are within the EU, while about one-half of Portuguese olive oil is sent to Brazil.

Tunisia is the third largest exporter, and has accounted on average for as much as 8% percent of world exports since 2011, with an exceptional record of 304,000 tons of olive oil exported during the 2014/15 campaign, as a consequence of the heavy drop in production in Spain and Italy.

Among the other producing countries, historical data statistics show that Turkey is also an important actor on the global olive oil market but with strong fluctuations in relation to production volumes (Niklis et al., 2014). Syria and Morocco are important producers however; their presence in the export market of olive oil is limited since their production regime is very similar to their domestic demand. In addition to that, the recent political unrest in Syria has caused its olive oil exports to decline. Australia and Chile have emerged in the past decade, as new export-oriented producer countries, but their export volume is still low.

Likewise, imports are dominated by the EU, with most trade occurring among EU countries. During 2011/12-2017/18, about 88% of the olive oil imported by EU countries was sourced from other EU countries and the rest mainly came from Tunisia and Morocco. In addition to proximity to the EU market, several of these countries receive preferential access to the EU market and are given duty-free tariff quotas on the olive oil imported by the EU. Tunisia, for example, has been granted an additional quota of 35,000 tons annually for the years of 2016 and 2017, once the already established 56,700 tons quota is used up (European Commission, 2016).

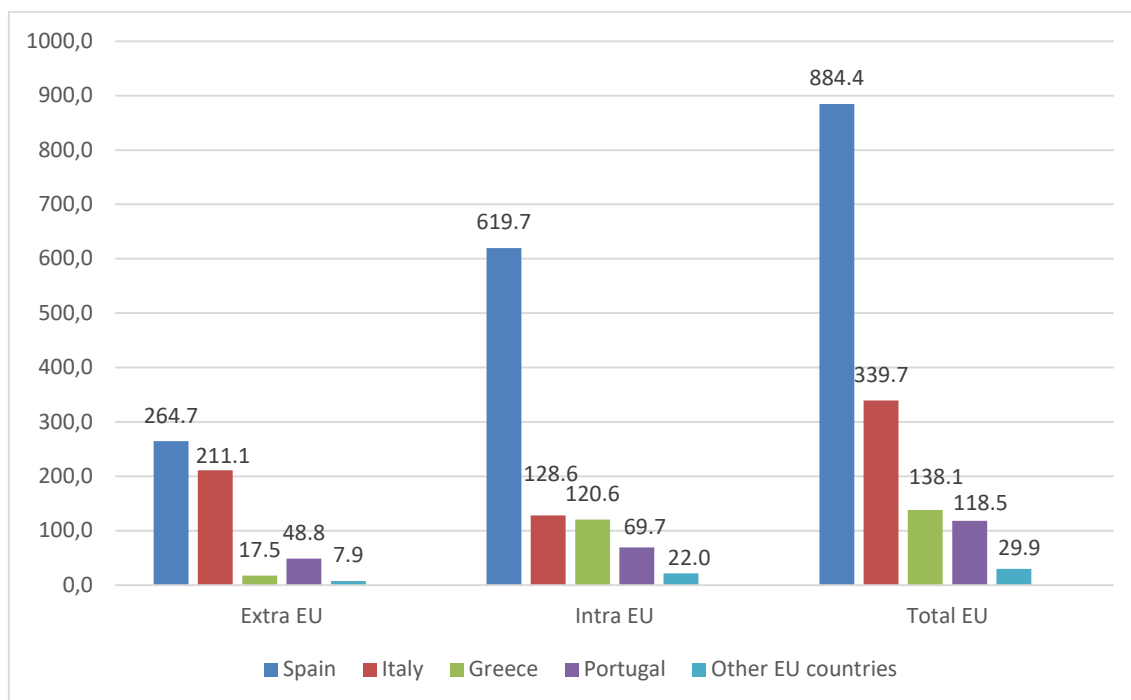


Figure 4. EU olive oil exports in 1000t (average 2011/12-2017/18). Source: Own elaboration based on data from the European commission (2018b).

Italy is the world's leading importing country, supplied mostly by Spain, Greece and Tunisia. It accounts for 29% and 47% of global and EU olive oil imports respectively with an average of 521,000 tons of olive oil imported during the 2011-2017 period, consisting largely of bulk product. Within the EU, the second largest importer is France with an average of 115,000 tons imported during the reported period (Figure 5).

The United States is the second largest importer, with an average of 305,000 tons imported during the last 5 years. U.S. olive oil imports grew significantly since the early 1990s, and tripled in volume over the past 20 years. It is also worth mentioning that since 2000/01 there has been a change in the preferences of U.S. consumers in favor of higher quality olive oil, reflecting their increased awareness of the product attributes. This is evidenced by the fact that in 1993/94 virgin olive oil represented 32% of total imports, a share that expanded to 67% in 2014/15 (IOC, 2016). Italy and Spain have been traditionally the major suppliers of the U.S. Market. However, their share of U.S. imports has fallen over the last decade, mostly because of the emergence of Tunisia, Morocco, Argentina, and Chile as suppliers to the U.S. market at the expense of Italy (U.S. International Trade Commission, 2013).

Other major olive oil-importing countries are Brazil, Japan, Canada, China, and Australia. Japanese imports grew about 6.6% annually over the past decade, while imports from Brazil and Canada recorded an annual increase by 6.7% and 4.8% respectively during the same period. The highest growth was seen in China, since its imports grew by 14% annually between 2008/09 and 2017/18.

Most representative markets determining olive oil prices are in Bari (Italy), Chania (Greece), and Jaén (Spain), where almost 70% of the world's olive oil is produced. Therefore, international prices are largely determined by their market performance, which not only has an impact on prices in other regions of the EU but also influences export prices in non-EU producing countries. Usually, while prices in Jaén and Chania track each other quite closely, the Bari price is more volatile and tends to diverge from the others. This divergence is mainly due to the fact that prices in Bari reflect local supply and demand conditions and production costs.

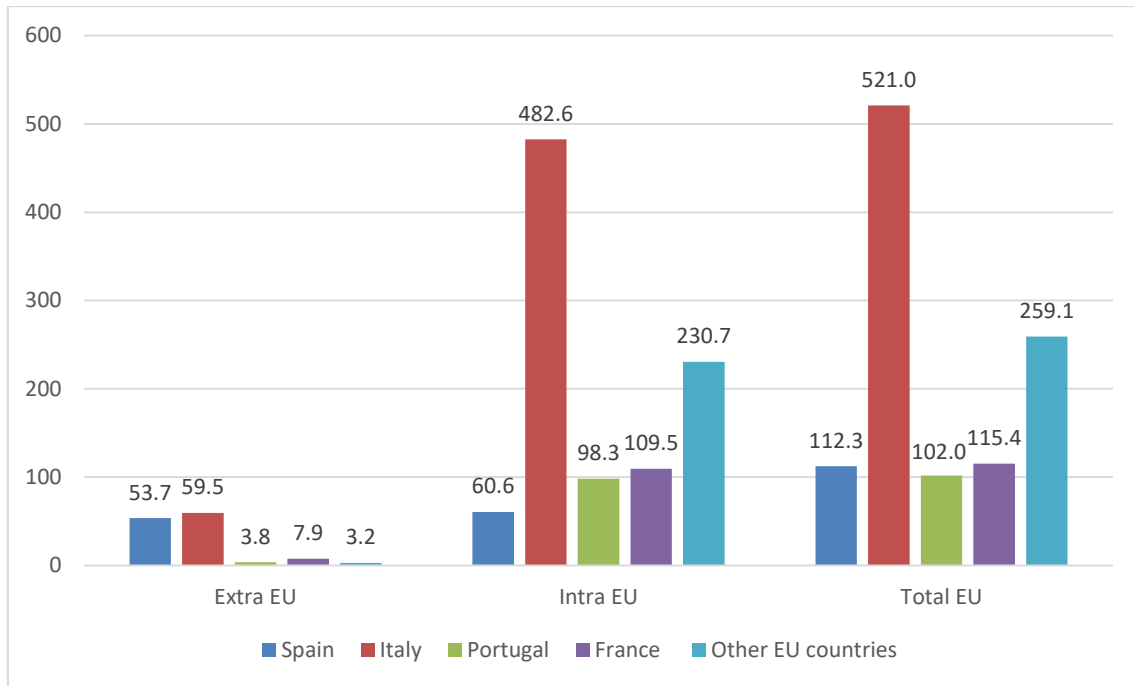


Figure 5. EU olive oil imports in 1000t (average 2011/12-2017/18). Source: Own elaboration based on data from the European commission (2018b).

Since producer prices vary according to supply, demand and stock levels, they tend to be higher in deficit markets (Italy) than in surplus markets (Spain and Greece). Prices also reflect the quality of olive oil and are different for each category (extra virgin, virgin and lampante) (European Commission, 2012). Table 1 shows the prices in these markets for the month of October 2018 and their evolution since last year. Prices dropped significantly in all three markets in comparison with the previous year. Of note is that price variations among the different olive oil categories are particularly high on the Italian and Greek markets while in Spain they are fairly similar.

Table 1. Olive oil prices by category in October 2018.

	Extra virgin		Virgin		Lampante	
	Price (€/100kg)	Evolution since last year	Price (€/100kg)	Evolution since last year	Price (€/100kg)	Evolution since last year
Spain - Jaén	268.9	-28%	245.9	-32%	235.7	-34%
Italy - Bari	528.3	-7%	298.5	-20%	209.5	-31%
Greece - Chania	528.3	-31%	246.3	-33%	202.5	-35%

Source: European Commission (2018b).

3. Research methodology: Delphi survey

The Delphi method is one of the best-known and widely used forecasting techniques that are based on the collective cognition of a panel of experts (Linstone and Turoff, 1975; Parente and Anderson-Parente, 2011; Toppinena et al., 2017; Finley and Parente, 2019). This method has proved to be a more accurate prognostication than other forecasting techniques such as group meetings, opinion polls, focus groups, or prediction markets (Rowe and Wright, 1999; Finley and Parente, 2019). Delphi also can significantly improve the chances of obtaining unbiased forecasts that will likely improve decision making (Green et al., 2007). It should be noted that Delphi projections are not baseline projection - under which policies remain unchanged (i.e. status-quo policies), since experts account for changes in settings.

In this study we applied the Delphi method in four steps. First, the research objectives were formulated. Then a rigorous selection of the participating experts was performed. Subsequently, the Delphi survey was implemented in two rounds in 2017. Finally, results were analyzed and conclusions were drawn.

Figure 6 summarizes the main components covered in the study. The issues tackled base on the previous literature on market dynamics and structural changes within the olive oil industry. In order to gain explanatory and predictive power, the internal consistency of the suggested framework is strengthened by attempting to have the maximum of theoretically and empirically grounded relationships among the variables in the model.

The panelists were carefully selected on the basis their solid expertise, knowledge and experience of the subject matter. They represent the following three expert groups: (1) olive oil industry and associations, (2) national and international public administration, and (3) academia and research. Our aim was to form a panel of top-experts in the field that approach the olive oil industry from different perspectives in order to give a comprehensive view of the topic under scrutiny.

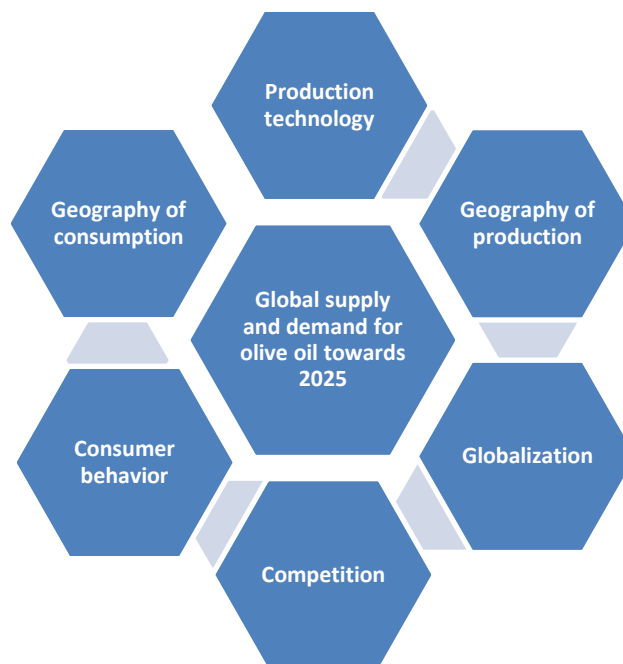


Figure 6. Main foresight factors covered in the study. Source: The Authors.

A special attention was paid to drafting the questionnaire since this is a central piece of the Delphi study. The questionnaire was carefully elaborated to cover the different aspects compiled in the analytical model presented in Figure 6. The content of the questionnaire was structured in two sections including semi-open questions.¹ The questions in section 1 related to the current and future situation of the olive oil industry in terms of supply and demand. The panelists were also asked to evaluate future business opportunities and challenges. A five-point Likert scale was used to assess the degree of importance or impact that the experts assign to each item.

Table 2 depicts the response rates in the two Delphi rounds. The number of responses is considered fair since it exceeds the minimum of seven experts established in literature, knowing that the forecast error decreases for each expert added until reaching a certain number of participants (Landeta, 1999). In any event, it should be noted that there is no established optimal number of experts in Delphi studies, and the representativeness of the panel is based on the quality of judgements rather than the number of participants (Powell, 2003; Okoli and Pawlowski, 2004).

¹ In this paper we focus on the issues surveyed in section 1 of the questionnaire. Section 2 addresses prospective strategies for the internationalization of olive oil (see Bouhaddane and Mili (2018)).

Table 2. Response rates of expert groups.

Expert group	Round 1		Round 2	
	<i>n</i>	%	<i>n</i>	%
(1) Industry and business association experts	1 of 3	33.33	6 of 21	28.57
(2) Public administration experts	2 of 3	66.66	4 of 4	100
(3) Academia experts	6 of 7	85.71	7 of 7	100
Total	9 of 13	69.23	17 of 32	53.13

The analysis of the results features a quantitative analysis of the distribution of the responses as well as a qualitative analysis integrating the comments provided by the experts. The quantitative analysis consists of the use of descriptive statistics to determine the position of the answers and to quantify the consensus degree. In line with other Delphi studies such as those conducted by Mili and Rodríguez-Zuñiga (2001), Karray and Kanoun (2013) and Toppinen et al. (2017), we opted for using the mean as a measure of the central tendency of responses.

Moreover, we used the coefficient of variation (CV) in order to test the level of agreement of the participants. Consensus is reached if the CV is less than a predetermined value and the statements that do not reach consensus are included in the next round for re-evaluation. In Delphi literature, it is conventionally accepted that a CV below 0.5 is a reasonable indicator of internal agreement (Mili and Rodríguez-Zuñiga, 2001; Zinn et al., 2001). In the present study we qualify the degree of consensus according to the following scale: $CV \leq 0.3$ = very high degree of consensus; $0.3 < CV \leq 0.5$ = high degree of consensus; $0.5 < CV \leq 0.7$ = low degree of consensus; $0.7 < CV \leq 1$ = very low degree of consensus.

The cut-off point for the first round was set at or below 0.3 in order to build a stronger consensus, and in the second round at or below 0.5. Moreover, in order to test the stability of responses we checked for changes in the relative CV between successive rounds, as suggested by Dajani et al. (1979).

The responses obtained in the second Delphi round can be considered satisfactory given that, when examined individually, they showed a fair degree of internal consistency. Moreover, a robust consensus was achieved, as the degree of dispersion expressed in terms of the CV was below 0.5 for all the items in the questionnaire, of which the majority was less than 0.3. In addition, no substantial differences were observed in the CV between the first and the second round with the majority of items displaying a change in CV lower than 15%, which complies with the stability criterion suggested by Dajani et al. (1979) and Scheibe et al. (1975) and thus allows the ending of the iterative process. Also, the differences across the three participating groups were verified by comparing their respective means. No significant discrepancies were noted in the average opinions expressed by the different expert groups.

4. Results and discussion

This section presents a summary of the main findings of the second Delphi round referring to the expected trends in the global supply and demand for olive oil and their impact on the Spanish exports, as well as the challenges related to the international trade of olive oil in the coming years.

Expected trends in the global supply for olive oil

Figure 7 summarizes the magnitude of increase and degree of impact assigned by the experts to each of the countries where olive oil production is expected to continue growing in the next years. The results are presented in terms of the overall means and their corresponding coefficients of variation (the means for each group of participants are depicted in Appendix 1).

According to the experts, substantial increases in production are likely to be recorded in the countries that have traditionally been non-producers in the upcoming years. The highest rate of growth was attributed to China, whose production is expected to experience a sharp increase by growing at a rate

greater than 5% annually. Moreover, moderate to strong annual increase rates will likely be registered in the United States, Australia, Argentina, and Chile and to a lesser extent in South Africa.

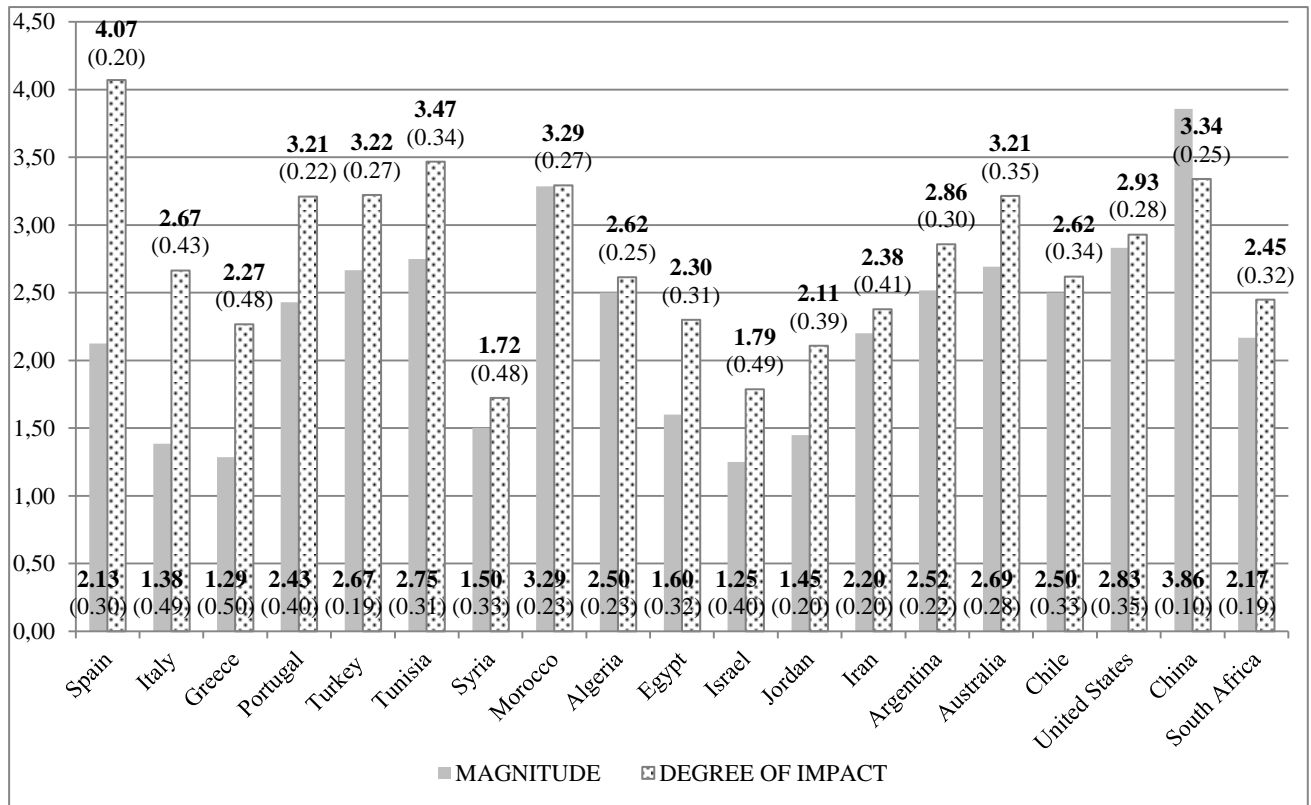


Figure 7. Magnitude of the annual increase in the supply of olive oil and its degree of impact on Spanish exports (overall mean and coefficient of variation).

Production is expected to grow at a slower rate in the EU than in the non-EU Mediterranean producer countries. In fact, it is likely that Morocco, Tunisia and Turkey will register the highest increases in production in the Mediterranean region, followed by Portugal and Spain, whereas Italy and Greece are expected to show the lowest growth rates in the coming years.

Differences across countries are not limited to the magnitude of the future increases, but extend to their potential impact on the Spanish olive oil exports. The experts estimate that the greatest impact will come from the production growth in Spain, Tunisia, China and Morocco whereas Italy and Greece have been assigned a lower degree of impact. In the case of China, the domestic output is still very low which means that the olive oil available for sale on the Chinese market is imported (mainly from the Mediterranean countries with 40% of the imports being sourced from Spain) and therefore very expensive (10 times the price of other vegetable oils) (Lazzeri, 2011). This implies that substantial increases in the domestic supply would significantly reduce the volume being imported from Spain, especially since the locally-produced olive oil would be more affordable for the Chinese consumers.

As for the conditioning factors of the above mentioned increases, there is a widespread consensus that the potential growth in supply can especially be attributed to lower production costs and increased productivity. The results in Table 3 suggest that it will be mainly determined by the improvement of production conditions (cultivation techniques, modern systems of irrigation, intensive production methods...) and a greater efficiency in the use of means of production. Also, new plantations in traditionally non-producing countries are expected to play an important role in the future growth of the olive oil supply, especially since a growing interest, awakened by the favorable commercialization perspectives in nontraditional markets, is being manifested for olive cultivation.

Other contributing factors are the stimulation of production with domestic and foreign investment in non-EU Mediterranean countries, the incorporation of technology and innovations of products and processes in the mill industry and to a lesser extent, the improvement of farmers' income. In many producer countries, the implementation of structural and technological improvements as well as the introduction of product and process innovations at the olive oil processing stage, proved to have a positive impact on production, by improving both the yield and the quality of the olive oil, while also helping with the reduction of the environmental contamination resulting from oil milling (Mili, 2006; Rodríguez Cohard et al., 2017).

Table 3. Conditioning factors of the future increase in the global olive oil supply.

	Industry experts and representatives of business associations (1)	Representatives of public administration (2)	Representatives of academia (3)	Overall mean and coefficient of variation
Improvement of production conditions (cultivation techniques, modern systems of irrigation, intensive production methods)	4.20	4.75	4.29	$\bar{z} = 4.38$ cv = 0.14
Greater efficiency in the use of means of production	4.00	4.00	3.71	$\bar{z} = 3.88$ cv = 0.16
New plantations in traditionally non-producing countries	4.17	4.25	4.57	$\bar{z} = 4.35$ cv = 0.16
Adoption of technology and innovations of products and processes in the mill industry	3.84	3.61	3.13	$\bar{z} = 3.47$ cv = 0.16
Improvement of farmers' income	3.85	3.03	3.03	$\bar{z} = 3.32$ cv = 0.27
Stimulation of production with domestic and foreign investment in non-EU Mediterranean countries	3.60	4.25	3.57	$\bar{z} = 3.75$ cv = 0.23

Expected trends in the global demand for olive oil

The growth in the global demand for olive oil witnessed in the past years is projected to persist and in some cases intensify in the upcoming years, with annual growth rates varying across countries and ranging between 2% and 10%. Figure 8 shows the results obtained in regards to the magnitude of demand increase as well as its degree of impact on Spanish exports, in each of the countries where olive oil consumption growth is expected. The overall means and coefficients of variation are mentioned on the graph, whereas the means by groups are presented in Appendix 2.

Overall, most of the growth will be seen in countries that have not been traditionally consumers, as the product's appeal is spreading and its health and culinary properties are being shared by increasing numbers of consumers and countries. Hence, the historical pattern in which the Mediterranean basin was the predominant area of olive oil consumption has been altered (Krystallis and Ness, 2005).

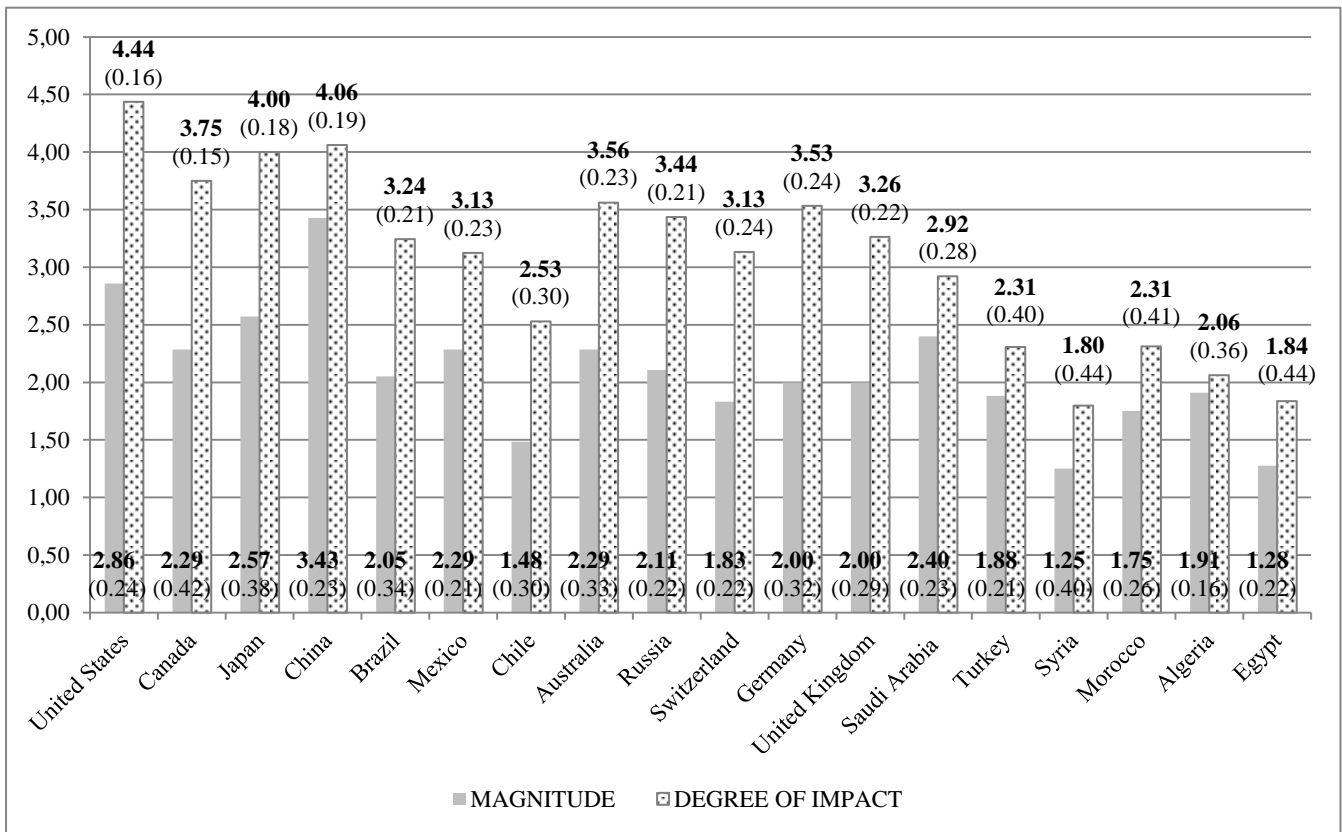


Figure 8. Magnitude of the annual increase in the demand for olive oil and its degree of impact on Spanish exports (overall mean and coefficient of variation).

The experts estimate that the highest increase in olive oil consumption in the coming years will likely be recorded in China, where consumers have recently developed a taste for olive oil and are manifesting a growing interest for the product. In fact, the data provided by the IOC indicate that the country's purchases of olive oil have increased 2.83-fold in volume between 2008/09 and 2015/16. Thus, a special attention should be paid to the Chinese market that apparently holds a huge growth potential, mainly justified by the size of the country's population, the changes in consumption habits resulting from rising living standards and the opening of its economy to international trade. Maeva, which according to data from the Spanish Embassy in Beijing is the first Spanish exporter of olive oil to China, is clearly determined to take advantage of that potential. For that, it is planning to build a bottling plant in Shanghai in order to increase its sales of packaged olive oil in China (Alimarket, 2016). The Chinese consumers, especially the more affluent, base their purchase decision on quality and brand; therefore it will be necessary to promote the olive oil as a quality product in order to pique their interest. However, Spanish olive oil companies will need more than a quality product to be able to conquer the Chinese mass market, especially with Australia as a serious competitor in the top-quality segment. For that matter, Lazzeri (2011) considers that substantial public relations will be necessary to attract the attention of importers and to raise awareness on the benefits of Mediterranean olive oil in China.

Unsurprisingly, the US is also expected to further expand its demand and will therefore continue to be a key destination for the Spanish olive oil exports in the upcoming years. Being the world's third largest olive oil consumer, after Italy and Spain, with a consumption of 315,000 tons in 2017/18, the country is already perceived as a safe bet for the national sector. This explains why important Spanish olive oil exporting groups have placed the US market at the heart of their internationalization strategies (Alimarket, 2016).

Japan, Canada, Australia, Brazil and Russia are other potentially attracting markets to the Spanish olive oil marketers. These countries have been taking an increasing share in the world consumption of olive

oil in the recent years and might hold a strong potential for consumption growth in the future. Within the group of Mediterranean consumers, consumption growth in Algeria, Turkey and Morocco will likely experience a slowdown, if compared with the annual growth rate recorded in the previous years. Whereas, the demand for olive oil in Germany and in the UK is likely to continue increasing at approximatively the same rate as it did in the past years.

Regarding the degree of impact of the aforementioned increases in demand on the Spanish exports, the experts estimate that a significant impact is to be expected from the consumption growth in the US, China and Japan. Taking into consideration the population size and the strong magnitude of increase predicted in these countries, on the one hand, and the fact that Spain is an important supplier to these markets, on the other, it is safe to assume that such demand expansion will spur the Spanish exports. Meanwhile, the moderate growth in demand expected in countries such as Canada, Australia, Russia, and Germany, will probably have a limited impact on the Spanish exports.

According to the experts, the future increases in the global demand will be likely induced by the growing interest of the consumers for the olive oil and their increasing awareness of its nutritional and dietary properties. It will also be prompted by the shift in their consumption habits towards healthier and natural products and to a lesser degree, by their inclination towards more differentiated products, such as organic olive oil and oils with indications or appellations of origin (Table 4). Besides, there is broad agreement that further promotional campaigns in non-traditional markets can play a major role in attracting new consumers, just like the ones conducted by the IOC, from the mid-80s to the early 2000, proved to be efficient in expanding the olive oil consumption to new markets. In addition to that, the increasing availability of olive oil in non-traditional consumer markets is expected to boost the olive oil consumption, given the fact that product availability has long been considered by marketers as a central feature in triggering purchase (Steinhart et al., 2013).

Table 4. Conditioning factors of the future increase in the global demand for olive oil.

	Industry experts and representatives of business associations (1)	Representatives of public administration (2)	Representatives of academia (3)	Overall mean and coefficient of variation
Increase in per capita income in emerging consumer countries	3.83	4.25	4.00	$\bar{z} = 4.00$ cv = 0.18
Increasing availability of olive oil in non-traditional markets	4.17	4.00	3.57	$\bar{z} = 3.88$ cv = 0.18
Promotional campaigns to consumers in non-traditional markets	4.33	4.75	4.29	$\bar{z} = 4.41$ cv = 0.14
Trend towards more differentiated products, such as organic olive oil and oils with geographical indications and denominations of origin	3.50	3.08	3.62	$\bar{z} = 3.45$ cv = 0.13
Increased consumer awareness of the nutritional and dietary properties of olive oil	4.00	4.50	5.00	$\bar{z} = 4.53$ cv = 0.18
Shift in consumption habits towards healthier and natural products	4.50	4.25	4.14	$\bar{z} = 4.29$ cv = 0.14
Decreasing impact of the economic crisis	3.50	4.00	4.00	$\bar{z} = 3.82$ cv = 0.19
Reduction in the volatility of international prices	3.83	3.00	3.14	$\bar{z} = 3.35$ cv = 0.23

Moreover, economic factors such as the increase in per capita income in emerging consumer countries and the decreasing impact of the economic crisis, on the one hand, will be key determinants of the future evolution of the olive oil consumption, as the rise in disposable incomes encourages the consumers to try new products and allows for greater expenditures on high-value food products. On the other hand, the reduction in the volatility of international prices is likely to have a lower impact on the evolution of the demand, when compared with the other factors.

Major future challenges in the international trade of olive oil

Among the challenges that will be facing the international trade of olive oil in the upcoming years, the experts granted the highest degree of importance to the demand increase in non-traditional consumer countries (Table 5). This can be explained by the additional effort needed to promote the olive oil in countries where its consumption is not deeply rooted in the culture, and to adapt the offer according to the characteristics of the targeted market and the preferences of the potential consumers. On the contrary, increasing consumption in traditional producer countries is deemed less challenging, although these markets are considered as mature and relatively saturated.

The panel of experts also highlighted the importance of the harmonization of international quality standards along with the clarification of the denominations of the different olive oils for their better understanding by the consumer. In fact, non-traditional consumers, such as the Chinese, are often times unable to distinguish the different olive oil grades and varieties meaning that the quality and specificity of each product is not being appreciated. This situation calls for clear labelling that indicates the quality, country, terroir and designation of origin and highlights the need for educating the consumers on the differences between the olive oil categories.

On the trade side, the principal challenges that will be posed to the sector refer to trade facilitation measures (more transparent, predictable and simplified cross-border procedures), tariff liberalization of trade and the facilitation of investments in foreign countries. In the case of Russia, for instance, a simplification of import processes and procedures could help promote more actively olive oil from the EU into the Russian market (Niklis et al., 2014).

Future challenges will also include the stability and reliability of the offer, the transparency in the international value chain as well as the poor product positioning and low level of differentiation. The latter depicts the need for stronger marketing strategies especially since the olive oil market is expected to be more and more segmented on the basis of product quality differentiation in the future. Besides, the fluctuations in currency exchange markets and the volatility of international prices are both considered as potential hindering factors for the internationalization of the sector. In that sense, DCOOP, along with other cooperatives, highlighted the need for establishing market management mechanisms at the sector level in order to prevent price fluctuations. Such measure would allow strengthening consumers' loyalty and mitigating the impact of the price swings on demand in foreign markets.

On the other hand, it seems like the Spanish olive oil marketers will not be particularly worried about the competitive pressure from substitute oils in the international market, in the upcoming years. This is probably due to the increasing awareness among consumers of the fact that oils are different in terms of characteristics, nutritional values and types of use, which makes the substitution relatively limited. However, the price differential in favor of other oils is often an impediment at the time of purchase, especially in the case of extremely price sensitive consumers. Likewise, the opening of new quotas for southern Mediterranean countries is unlikely to be a major concern for the Spanish exporters. In fact, the larger quotas of olive oil imports being granted to Tunisia and Morocco are not seen as a threat to Spain but rather a positive option in times of reduced production. According to the president of the Spanish inter-branch organization, it is less worrisome that Spain imports olive oil from these countries than if it is being imported by other countries (Alimarket, 2016). The lack of an official and universal price reference in the international market is also perceived as a challenge of less relevance to the sector.

Table 5. Major challenges in the international trade of olive oil.

	Industry experts and representatives of business associations (1)	Representatives of public administration (2)	Representatives of academia (3)	Overall mean and coefficient of variation
Trade liberalization	4.00	4.00	3.43	$\bar{z} = 3.76$ cv = 0.22
Opening of new quotas for southern Mediterranean countries	3.50	3.25	3.43	$\bar{z} = 3.41$ cv = 0.21
Implementing trade facilitation measures	4.17	4.00	4.00	$\bar{z} = 4.06$ cv = 0.20
Facilitation of investments in foreign countries	3.33	4.00	4.00	$\bar{z} = 3.75$ cv = 0.25
Fluctuations in currency exchange markets	3.67	3.30	3.49	$\bar{z} = 3.51$ cv = 0.16
Unsatisfactory harmonization of international quality standards	4.83	4.50	4.43	$\bar{z} = 4.59$ cv = 0.13
Private standards established by distributors in the country of destination	3.33	4.00	4.00	$\bar{z} = 3.73$ cv = 0.29
Demand increase in non-traditional consumer countries	4.50	4.33	4.86	$\bar{z} = 4.63$ cv = 0.13
Demand increase in traditional producer countries	3.50	3.50	4.20	$\bar{z} = 3.73$ cv = 0.21
Clarification of the different olive oils denominations for their better understanding by the consumer	4.33	3.50	4.43	$\bar{z} = 4.18$ cv = 0.21
Poor product positioning and low level of differentiation	3.83	3.67	4.17	$\bar{z} = 3.93$ cv = 0.18
Competitive pressure from substitute oils	4.00	3.04	3.20	$\bar{z} = 3.44$ cv = 0.23
Stability and reliability of supplies	4.33	3.67	4.00	$\bar{z} = 4.06$ cv = 0.19
Transparency in the international value chain	4.17	3.00	4.29	$\bar{z} = 4.00$ cv = 0.22
Volatility of international prices	4.00	3.25	3.67	$\bar{z} = 3.69$ cv = 0.19
Lack of an official and universal price reference in the international market	3.17	2.50	3.14	$\bar{z} = 3.00$ cv = 0.20

5. Conclusions and perspectives

The present study attempted to provide a prospective view of the expected trends and developments in the global supply and demand for olive oil markets that will likely affect the olive oil value chain in the years to come. This also allowed the identification of the future challenges that will be posed to the actors involved as well as the main factors that will shape the environment in which they will be operating. The Delphi survey carried out reflect the structured opinions of a representative group of highly qualified experts belonging to some of the most important olive oil companies and organizations, public administrations and academia. Hence, the information gathered can be considered representative and relevant to the object of study, yet it should be regarded as explorative rather than conclusive. The elicited estimates and constructs add accuracy and consistency to available market

information and therefore help managers when drafting new strategies or challenging those already in place.

There appears to be a broad consensus on the fact that the recent developments in the global olive oil market will likely be maintained in the upcoming years. On the supply side, substantial increases in production will be observed in the countries that have traditionally been non-producers, whereas a slower growth is expected in the EU producer countries, whose focus is being placed on the quality and sustainability rather than the quantity of olive oil produced. This shift in the EU producers' mindset can be associated with the introduction of the decoupled income support under the last Common Agricultural Policy reforms (European Commission, 2013; Mili et al., 2017). The foreseen growth in supply will probably be the result of lower unit production costs, especially in the modern plantations developed in traditionally non-producing countries, along with the increased adoption of technology and innovations in products and processes in the mill industry. Likewise, the global demand for olive oil is expected to continue increasing, with most of the growth happening in non-traditional markets, mainly in China, the U.S., Japan and Russia, and whose impact on the Spanish exports might be the greatest. The low per capita consumption together with a low household penetration rate in these countries suggest that there is room for expanding the demand, both by reaching a larger number of households and by increasing the quality and frequency of purchases performed by the existing consumers. Given the size of these markets, even a slight increase in these two parameters can significantly impact their total consumption levels. A demand boost that can be achieved by targeting the ever-expanding group of consumers interested in adopting healthier diets, through promotional campaigns in non-traditional markets that emphasize the nutritional and dietary properties of the olive oil.

These trends point to a future scenario marked by a heightened competition between Spain and the rest of the producer countries, but also within the Spanish business sector to take advantage of the favorable market prospects of olive oil. This competitive pressure should be viewed from the positive side, as it will prompt the parties involved to improve the quality of the product and the service offered to the consumers.

The international trade of olive oil will likely be facing a series of challenges among which stand out the demand increase in countries where the olive oil is not traditionally consumed, and the insufficient harmonization of international quality standards. The latter generates tensions in the trade between countries, since the standards provided by the IOC are often criticized for being unenforced and too broad by non-IOC countries such as Australia and the United States. Another relevant barrier to trade will be of a procedural nature, namely the time and administrative procedures necessary to conduct the export transactions. Besides, the fluctuations in currency exchange markets and the volatility of international prices will potentially hamper the internationalization of the sector, given the fact that price elasticity of demand for the olive oil is relatively higher in the non-traditional markets where the olive oil consumption is not deeply-rooted in tradition, which means that price swings can instantly impact the demand in these countries.

Appendix 1. Magnitude of the annual increase in the olive oil supply and its degree of impact on Spanish exports.

Country	Industry experts and representatives of business associations (1)		Representatives of public administration (2)		Representatives of academia (3)		Overall mean and coefficient of variation	
	Magnitude	Degree of impact	Magnitude	Degree of impact	Magnitude	Degree of impact	Magnitude	Degree of impact
Spain	2.00	4.00	2.00	3.67	2.25	4.40	$\bar{z}=2.13$ cv=0.30	$\bar{z}=4.07$ cv=0.20
Italy	0.83	3.30	1.33	1.74	1.64	2.74	$\bar{z}=1.38$ cv=0.49	$\bar{z}=2.67$ cv=0.43
Greece	1.00	2.75	1.00	1.63	1.67	2.36	$\bar{z}=1.29$ cv=0.50	$\bar{z}=2.27$ cv=0.48
Portugal	1.50	3.33	2.50	3.07	3.00	3.19	$\bar{z}=2.43$ cv=0.40	$\bar{z}=3.21$ cv=0.22
Turkey	2.50	3.20	2.50	2.93	3.00	3.44	$\bar{z}=2.67$ cv=0.19	$\bar{z}=3.22$ cv=0.27
Tunisia	2.67	3.40	2.33	3.50	3.00	3.44	$\bar{z}=2.75$ cv=0.31	$\bar{z}=3.47$ cv=0.34
Syria	2.00	2.00	1.25	1.54	1.50	1.67	$\bar{z}=1.50$ cv=0.33	$\bar{z}=1.72$ cv=0.48
Morocco	3.00	3.28	3.00	3.44	3.67	3.22	$\bar{z}=3.29$ cv=0.23	$\bar{z}=3.29$ cv=0.27
Algeria	2.50	2.50	2.50	2.50	2.50	2.80	$\bar{z}=2.50$ cv=0.23	$\bar{z}=2.62$ cv=0.25
Egypt	1.50	2.38	1.33	1.97	1.75	2.48	$\bar{z}=1.60$ cv=0.32	$\bar{z}=2.30$ cv=0.31
Israel	1.25	1.63	1.00	1.75	1.50	1.92	$\bar{z}=1.25$ cv=0.40	$\bar{z}=1.79$ cv=0.49
Jordan	1.50	1.63	1.33	1.90	1.50	2.58	$\bar{z}=1.45$ cv=0.20	$\bar{z}=2.11$ cv=0.39
Iran	3.00	2.50	2.00	1.97	2.00	2.55	$\bar{z}=2.20$ cv=0.20	$\bar{z}=2.38$ cv=0.41
Argentina	2.35	3.00	2.13	2.75	2.73	2.83	$\bar{z}=2.52$ cv=0.22	$\bar{z}=2.86$ cv=0.30
Australia	2.33	3.60	2.33	2.67	3.00	3.17	$\bar{z}=2.69$ cv=0.28	$\bar{z}=3.21$ cv=0.35
Chile	1.00	2.25	2.50	2.44	3.00	2.93	$\bar{z}=2.50$ cv=0.33	$\bar{z}=2.62$ cv=0.34
United States	3.00	3.20	2.00	2.75	3.50	2.80	$\bar{z}=2.83$ cv=0.35	$\bar{z}=2.93$ cv=0.28
China	4.00	3.40	3.50	2.94	4.00	3.52	$\bar{z}=3.86$ cv=0.10	$\bar{z}=3.34$ cv=0.25
South Africa	2.00	2.88	2.00	1.94	2.33	2.43	$\bar{z}=2.17$ cv=0.19	$\bar{z}=2.45$ cv=0.32

Appendix 2. Magnitude of the annual increase in the demand for olive oil and its degree of impact on Spanish exports.

Country	Industry experts and representatives of business associations (1)		Representatives of the public administration (2)		Representatives of academia (3)		Overall mean and coefficient of variation	
	Magnitude	Degree of impact	Magnitude	Degree of impact	Magnitude	Degree of impact	Magnitude	Degree of impact
United States	2.50	4.67	2.50	4.00	3.33	4.50	$\bar{z}=2.86$ cv=0.24	$\bar{z}=4.44$ cv=0.16
Canada	2.00	3.50	1.50	4.00	3.00	3.83	$\bar{z}=2.29$ cv=0.42	$\bar{z}=3.75$ cv=0.15
Japan	2.00	3.67	2.50	4.00	3.00	4.33	$\bar{z}=2.57$ cv=0.38	$\bar{z}=4.00$ cv=0.18
China	4.00	3.83	2.50	4.00	3.67	4.33	$\bar{z}=3.43$ cv=0.23	$\bar{z}=4.06$ cv=0.19
Brazil	2.22	3.19	1.78	3.07	2.10	3.39	$\bar{z}=2.05$ cv=0.34	$\bar{z}=3.24$ cv=0.21
Mexico	2.50	3.33	2.00	2.75	2.33	3.17	$\bar{z}=2.29$ cv=0.21	$\bar{z}=3.13$ cv=0.23
Chile	1.17	2.75	1.22	2.38	1.69	2.46	$\bar{z}=1.48$ cv=0.30	$\bar{z}=2.53$ cv=0.30
Australia	2.00	3.50	1.50	3.00	3.00	4.00	$\bar{z}=2.29$ cv=0.33	$\bar{z}=3.56$ cv=0.23
Russia	2.10	3.50	2.00	3.00	2.17	3.67	$\bar{z}=2.11$ cv=0.22	$\bar{z}=3.44$ cv=0.21
Switzerland	2.00	3.00	1.50	2.75	2.00	3.50	$\bar{z}=1.83$ cv=0.22	$\bar{z}=3.13$ cv=0.24
Germany	2.00	3.60	1.50	3.00	2.33	3.83	$\bar{z}=2.00$ cv=0.32	$\bar{z}=3.53$ cv=0.24
United Kingdom	2.00	3.42	1.50	2.63	2.33	3.50	$\bar{z}=2.00$ cv=0.29	$\bar{z}=3.26$ cv=0.22
Saudi Arabia	2.00	3.35	2.00	2.63	3.00	2.79	$\bar{z}=2.40$ cv=0.23	$\bar{z}=2.92$ cv=0.28
Turkey	1.84	2.63	1.78	1.82	1.95	2.36	$\bar{z}=1.88$ cv=0.21	$\bar{z}=2.31$ cv=0.40
Syria	1.00	2.00	1.00	1.67	1.50	1.71	$\bar{z}=1.25$ cv=0.40	$\bar{z}=1.80$ cv=0.44
Morocco	1.34	2.60	1.78	2.00	1.86	2.29	$\bar{z}=1.75$ cv=0.26	$\bar{z}=2.31$ cv=0.41
Algeria	1.50	2.37	2.00	1.68	2.00	2.06	$\bar{z}=1.91$ cv=0.16	$\bar{z}=2.06$ cv=0.36
Egypt	1.00	2.00	1.22	1.69	1.38	1.81	$\bar{z}=1.28$ cv=0.22	$\bar{z}=1.84$ cv=0.44

References

Alimarket (2016). Informe 2016 del sector de aceites. Madrid, Publicaciones Alimarket.

Ascher, W. (1978). Forecasting: An Appraisal for Policy-makers and Planners. Baltimore, Johns Hopkins University Press.

Bouhaddane, M., Mili S. (2018). A forecast of internationalization strategies for the Spanish olive oil value chain. In Deiters, J., Rickert, U., Schiefer, G. (Eds.), *System Dynamics and Innovation in Food Networks 2018*. Kiel: CentMa Press, pp 1-27.

Dajani, S.L., Sincoff, M.Z., Talley, W.K. (1979). Stability and agreement criteria for the termination of Delphi Studies. *Technological Forecasting and Social Change* 13, pp 83-90.

European Commission (2012). *Economic analysis of the olive sector*. Brussels, European Commission, Directorate-General for Agriculture and Rural Development.

European Commission (2013). *Overview of CAP Reform 2014-2020*. Brussels, European Commission, Directorate-General for Agriculture and Rural Development, *Agricultural Policy Perspectives Brief n° 5*, December 2013.

European Commission (2016). *Official Journal of the European Union*, L 104, 20 April 2016, pp 11-13.

European Commission (2018a). *EU Agricultural Outlook for Markets and Income, 2018-2030*. Brussels, European Commission, DG Agriculture and Rural Development.

European Commission (2018b). *Olive oil production, prices, balance sheets and trade data*. Available at https://ec.europa.eu/agriculture/olive-oil/prices_en

Finley, J-C., Parente, F. (2019). A 30-year retrospective case analysis in the Delphi of cognitive rehabilitation therapy. *Technological Forecasting and Social Change* 138, pp 254-260.

Green, K., Armstrong, J.S., Graefe, A. (2007). Methods to Elicit Forecasts from Groups. Delphi and Prediction Markets Compared. *Foresight: The International Journal of Applied Forecasting* 8 Fall 2007, pp 17-20.

IOC (various years). *World Olive Oil Figures*. www.internationaloliveoil.org/estaticos/view/131-world-olive-oil-figures.

Karray, B., Kanoun, F. (2013). Forces, faiblesses, opportunités et menaces de la filière oléicole en Tunisie. *New Medit* 12 (4), pp 35-45.

Krystallis, A., Ness, M. (2005). Consumer preferences for quality foods from a South European perspective: A conjoint analysis implementation on Greek olive oil. *International Food and Agribusiness Management Review*, 8 (2), pp 62-91.

Landeta, J. (1999). *El método Delphi: Una técnica de previsión para la incertidumbre*. Barcelona, Ariel.

Lazzeri, Y. (2011). China: An Emerging Market with High Potential. *CIHEAM Watch Letter* 16, pp 8-10.

Linstone, H.A., Turoff, M. (1975). Introduction. In Linstone, H.A., Turoff, M. (Eds), *The Delphi method - techniques and application*, Reading, Addison-Wesley.

Mili, S. (2006). Olive Oil Marketing on Non-traditional Markets: Prospects and Strategies. *New Medit* 5 (1), pp 27-37.

Mili, S. (2009). Market Dynamics and Policy Reforms in the Olive Oil Sector: A European Perspective. In Noronha, T., Nijkamp, P., Rastoin, J.L. (Eds), *Traditional Food Production and Rural Sustainable Development. A European Challenge*. Surrey (UK), Ashgate Publishing, pp 215-238.

Mili, S., Rodríguez-Zuñiga, M. (2001). Exploring future developments in international olive oil trade and marketing: A Spanish perspective. *Agribusiness: An International Journal* 17 (3), pp 397-415.

Mili, S., Judez, L., de Andres, R. (2017). Investigating the impacts of EU CAP reform 2014-20 and developments in sustainable olive farming systems. *New Medit* 16 (3), pp 2-10.

Niklis, D., Baourakis, G., Thabet, B., Manthoulis, G. (2014). Trade and Logistics: The Case of the Olive Oil Sector. In *MEDITERRA 2014: Logistics and Agro-food Trade. A Challenge for the Mediterranean*. Paris, Presses de Sciences Po, pp 203-226.

Okoli, C.H., Pawlowski, S.D. (2004). The Delphi method as a research tool: an example, design considerations and applications. *Information et Management*, 42, pp. 15-29.

Parente, R., Anderson-Parente, J. (2011). A case study of long-term Delphi accuracy. *Technological Forecasting and Social Change* 78 (9), pp 1705–1711.

Powell, C. (2003). The Delphi technique: myths and realities. *Journal of Advanced Nursing* 41 (4), pp 376-382.

Rodríguez Cohard, J.C., Sánchez Martínez, J.D., Gallego Simón, V.J. (2017). The upgrading strategy of olive oil producers in Southern Spain: origin, development and constraints. *Rural Society* 26 (1), pp 30-47.

Rowe, G., Wright, G. (1999). The Delphi technique as a forecasting tool: issues and analysis. *International Journal of Forecasting* 15 (4), pp 353–375.

Scheibe, M., Skutsch, M., Schofer, J. (1975). Experiments in Delphi methodology. In Linstone, H.A., Turoff, M. (Eds.), *The Delphi Method - Techniques and Applications*. Reading, Addison-Wesley, pp 262 - 287.

Steinhart, Y., Mazursky, D., Kamins, M.A. (2013). The process by which product availability triggers purchase. *Marketing Letters* 24, pp 217–228.

Toppinen, A., Pätäri, S., Tuppurä, A., Jantunen, A. (2017). The European pulp and paper industry in transition to a bio-economy: A Delphi study. *Futures* 88, pp 1–14.

United States International Trade Commission (2013). *Olive Oil: Conditions of Competition between U.S. and Major Foreign Supplier Industries*. USITC Publication 4419, August 2013. Washington DC, United States International Trade Commission.

World Bank (2018). *World Development Indicators*. Washington DC, World Bank. <http://wdi.worldbank.org/table/2.1>

Zinn, J., Zalokowski, A., Hunter, L. (2001). Identifying indicators of laboratory management performance: a multiple constituency approach. *Health Care Management Rev.* 26, pp 40-53.