

# The Growth of an Agribusiness Cluster in Catalonia: Evidence from the Olive Oil Industry

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TSEG 13 (4): 41–66

DOI: 10.5117/TSEG2016.4.MUNO

## Abstract<sup>1</sup>

This article aims to contribute to an understanding of the evolution of agribusiness clusters. It focuses on Catalonia, one of Europe's leading regions in the agro-food industry; and it takes as a case-study olive oil, a typical Mediterranean commodity. After identifying the cluster and the main stages of its evolution, the article shows that the three decades following the years around 1890 were the most dynamic period for the cluster. Whereas several factors contributed to the final outcome, this article suggests that the existence of previous processes of accumulation of skills, techniques, market and product knowledge and the capabilities of firms had a remarkable influence on the successful response of agents to developments and shocks from outside the cluster.

<sup>1</sup> Earlier and longer drafts of this article were presented at the 16th World Economic History Congress (Stellenbosch) and the International Conference of the European Rural History Organisation (Girona). I am very grateful to the participants at these conferences for their useful comments, particularly to Marcel Boldorf, Jordi Catalan, Fernando Collantes and José Antonio Miranda. I also thank the editors of this special issue for their encouragement and accurate suggestions on a previous draft of this article, the anonymous referees for their observations as well as the Spanish Ministry of Economy and Competitiveness (MINECO) for funding support through the project MINECO/FEDER, UE HAR2015-64769-P. The usual disclaimer applies.

# 1 Introduction

Clusters and industrial districts evolve over time.<sup>2</sup> This fact has led scholars to investigate the dynamic nature of geographically concentrated industry by applying the concept of life-cycle.<sup>3</sup> Thus, it has been observed that most clusters have generally passed through several stages of evolution, including formation, rise, maturation, decline and, sometimes, death, but also recovery. A number of factors determine cluster dynamics.<sup>4</sup> Factors internal to the cluster are sometimes crucial. This is, for example, the case when agglomeration advantages turn into disadvantages. In order to benefit from external economies, the cluster initially attracts new entrants, but as agglomeration diseconomies emerge, firms prefer other locations and the cluster begins to decline. Exogenous factors such as the impact of economic policy, demand-side shocks or technological discontinuities can also play a pivotal role in the evolution of the cluster.

The concept of life-cycle, however, is not free from criticism. Recently, some scholars have emphasised that life-cycle approaches are deterministic as they assume that clusters follow a predetermined sequence of stages. As an alternative to the life-cycle, Ron Martin and Peter Sunley, for example, have argued that cluster evolution should be viewed 'as an adaptive process with different possible outcomes based on episodic interactions of nested systems'.<sup>5</sup> Although applying the concept of life-cycle, other scholars have stressed that 'a cluster consists of many diverse protagonists that

2 The concept of industrial district and the notion of cluster are not synonyms. Nevertheless, and despite the controversies, we take them as close concepts. See, for example, Michael Porter and Christian Ketels, 'Clusters and industrial districts: Common roots, different perspectives', in: Giacomo Becattini, Marco Bellandi and Lisa De Propis (eds.), *A handbook of industrial districts*, (Cheltenham 2009) 172-183; and Fabio Sforzi, 'Rethinking the industrial district: 35 years later', *Investigaciones Regionales—Journal of Regional Research* 32 (2015) 11-29.

3 See, among others, the articles on life-cycle reviewed in María Teresa Martínez-Fernández, Josep Capó-Vicedo and Teresa Vallet-Bellmunt, 'The present state of research into industrial clusters and districts. Content analysis of material published in 1997-2006', *European Planning Studies* 20:2 (2012) 281-304; and, particularly in Michaela Tripll c.s., 'Perspectives on cluster evolution: Critical review and future research issues', *European Planning Studies* 23:10 (2015) 1-17.

4 See, for example, K. Press, *A life-cycle for clusters? The dynamics of agglomeration, change and adaptation* (Heidelberg 2006) 9-13; and Ron Martin and Peter Sunley, 'Conceptualizing cluster evolution: beyond the life cycle model?', *Regional Studies* 45:10 (2011) 1299-1318, 1301-1302.

5 Martin and Sunley, 'Conceptualizing cluster evolution', 1299-1318. See also Tripll c.s., 'Perspectives on cluster evolution', 6-10.

develop differently' which 'means that the cluster does not develop evenly and as a whole'.<sup>6</sup>

The aim of this study is to contribute to the growing literature on cluster evolution and its determinants. It deals with an agribusiness cluster – a comparatively less researched field despite the importance of food processing activities<sup>7</sup> – and it focuses on Catalonia, one of Europe's leading regions in the agro-food industry.<sup>8</sup> In particular, it takes as a case study olive oil – a typical and relevant Mediterranean commodity. One of the interesting contributions of this article is to identify the evolution of the cluster over the long run. A second important contribution refers to the response of agents to developments and shocks from outside the cluster. In response to globalisation forces, the international markets for olive oil experienced a deep transformation in the final decades of the nineteenth century. Agents rapidly adapted to the new market conditions and firms gradually entered this geographically concentrated activity. As a result, the cluster experienced a period of rapid growth between the 1890s and the 1910s. Whereas several factors contributed to the final outcome, this article suggests that the existence of previous processes of accumulation of skills, techniques, market and product knowledge and the capabilities of firms had a remarkable influence on the successful response of agents to developments and shocks from outside the cluster.

The article is organised as follows. The next two sections are devoted to identifying the boundaries of the olive oil cluster in Catalonia and its main stages of evolution. This is followed by an overview of the impact of globalisation on international olive oil markets. Then, the responses of agents to the impact of globalisation are analysed. The subsequent section aims at explaining the factors that determined this response. The last section sets out conclusions.

6 Max-Peter Menzel and Dirk Fornahl, 'Cluster life cycles—dimensions and rationales of cluster evolution', *Industrial and Corporate Change* 19:1 (2009) 205-238, 224.

7 For example, in 2014, the food industry was the largest European manufacturing sector by turnover, value added and employment. FoodDrinkEurope, *European food and drink industry: Data and trends, 2014-2015* (Brussels 2015) 3.

8 J. Peix, 'Catalunya, primer clúster regional Agroalimentari d'Europa', *Documents de Treball, Departament d'Agricultura, Ramaderia i Acció Rural, Generalitat de Catalunya* 5 (2007) 1-46, 11.

## 2 Identifying clusters in the Catalan olive oil industry

Olive oil was (and still is) a typical Mediterranean product. But while olive trees and olive oil mills were (and still are) widely present in the Catalan geography, they were not (and still are not) equally distributed across the territory. From the official data, less than a quarter of Catalonia's counties accounted for roughly three-quarters of the area devoted to olive growing and for a similar proportion of total olive oil production by the late 1880s.<sup>9</sup> The situation did not substantially change over the first third of the twentieth century. In the years around World War I, a relatively small number of counties and municipalities continued to stand out from the rest.<sup>10</sup> This pattern of geographical concentration has persisted to the present day and has, in general, remained rather stable: it can be estimated that throughout the twentieth century the four largest olive-growing counties have accounted for between 40 and 50 per cent of total olive oil mills and factories: both in the first half of the century, when the number of firms in the industry was high (between nearly 1,880 in 1913 and roughly 1,540 in 1951-52), and also later on, when the number of firms had fallen to 309 in 1978 and to 202 in 2012, due in part to the acceleration of technical change and the increase in the average productive capacity of mills.<sup>11</sup>

The fact that olive oil mills and factories have tended to concentrate in specific areas might suggest that the Catalan olive oil industry has been organised in the form of clusters or industrial districts.<sup>12</sup> Whether this is

9 Dirección General de Agricultura, Industria y Comercio, *Avance estadístico sobre cultivo y producción del olivo en España formado por la Junta Consultiva Agronómica 1888* (Madrid 1891).

10 E. Giralt, 'L'agricultura', in: Jordi Nadal et. al. (eds.), *Història econòmica de la Catalunya contemporània*, vol. 2 (Barcelona 1990) 121-305.

11 The sources used in this estimation are *Anuario General de España* (Barcelona 1913); Jordi Nadal, Josep Maria Benaul and Carles Sudrià, 'La formació d'una societat industrial, 1833-1935', in: Jordi Nadal, Josep Maria Benaul and Carles Sudrià (eds.), *Atles de la industrialització de Catalunya* (Barcelona 2012) 55-178; *Guía Industrial y Comercial de España* (Barcelona 1951-1952); Instituto Nacional de Estadística, *Censo Industrial de España. Establecimientos Industriales. Serie(s) Provincial(es)* (Madrid 1980); and Agencia para el Aceite de Oliva (MAGRAMA.AAO), *Almazaras* (Madrid 2012). Available at <http://www.magrama.gob.es/ca/> (19 January 2012).

12 In recent years, several studies have analysed the olive oil industry by making use of concepts such as a local agro-food system, agro-industrial district and cluster. See, among others, Javier Sanz Cañada and Alfredo Macías Vázquez, 'Quality certification, institutions and innovation in local agro-food systems: Protected designations of origin of olive oil in Spain', *Journal of Rural Studies* 21 (2005) 475-486; Juan Carlos Rodríguez-Cohard and Manuel Parras, 'The olive growing agri-industrial district of Jaén and the international olive oils cluster', *The open geography journal* 4 (2011) 55-72; Ilan Bijaoui, Suhail Sultan and Shlomo Yedidia Tarba, 'The progressive model, an economic reconciliation process for regions in conflict', *Cross cultural management: an international journal* 18:3 (2011) 293-312.

the case or not, however, needs to be verified. There are several methodologies to identify clusters or industrial districts, the Sforzi-ISTAT method being the most widely accepted approach. First applied in Italy by Fabio Sforzi and the Istituto Centrale di Statistica (ISTAT), this methodology relies on employment data and, more specifically, on the identification of local labour markets. Unfortunately, this information is not always easy to obtain for certain periods of time. In addition, the Sforzi-ISTAT method imposes several restrictions during the identification process and, as a result, it does not offer a precise account of the existing industrial districts.<sup>13</sup>

For this reason, and also because of data availability, the present article follows a different strategy. Firstly, it identifies concentrations of mills and factories by taking the county as the unit of analysis. Secondly, it only considers as potential clusters those counties that reach a minimum size in absolute terms and also relative to the industry as a whole. Thus, it establishes that a county has the potential to fall within the category of a cluster when it has more than 12 olive oil establishments and concentrates a minimum of 5 per cent of the total olive oil mills or factories operating in Catalonia in the considered year. Finally, it concludes that a county (or group of counties) forms a cluster when the available evidence confirms the existence of what is known as Marshallian external economies, namely specific but non-codified knowledge, specialised labour and subsidiary industries.<sup>14</sup>

The previous method of identification has been applied to two different periods of time: the early twentieth and the early twenty-first centuries.<sup>15</sup> Unfortunately, no homogenous data for the whole Catalan territory were found for the middle decades of the nineteenth century, which would have enabled a longer period of time to be covered. For the early twentieth century, data for 1913 show that 7 counties were home to more than 12 olive oil establishments and accounted for a minimum of 5 per cent of the total mills and factories operating in the sector (Figure 1A). Of these 7 counties, 6 were located in southern and western Catalonia, the country's main area of olive oil production.<sup>16</sup> These counties were also home to most

13 See, for example, Jordi Catalan and Ramon Ramon-Muñoz, 'Marshall in Iberia. Industrial Districts and Leading Firms in the Creation of Competitive Advantage in Fashion Products', *Enterprise and Society*, 14:2 (2013) 327-359.

14 A. Marshall, *Principles of Economics* (London 1961) [1st ed. 1890]; M.E. Porter, *The competitive advantage of nations* (London 1990).

15 The sources are *Anuario* and MAGRAMA.AAO, *Almazaras*.

16 This area accounted for more than four-fifths of total output in Catalonia by the eve of World War I. J.F. Zambrana, *Crisis y modernización del olivar español* (Madrid 1987) 422-425.

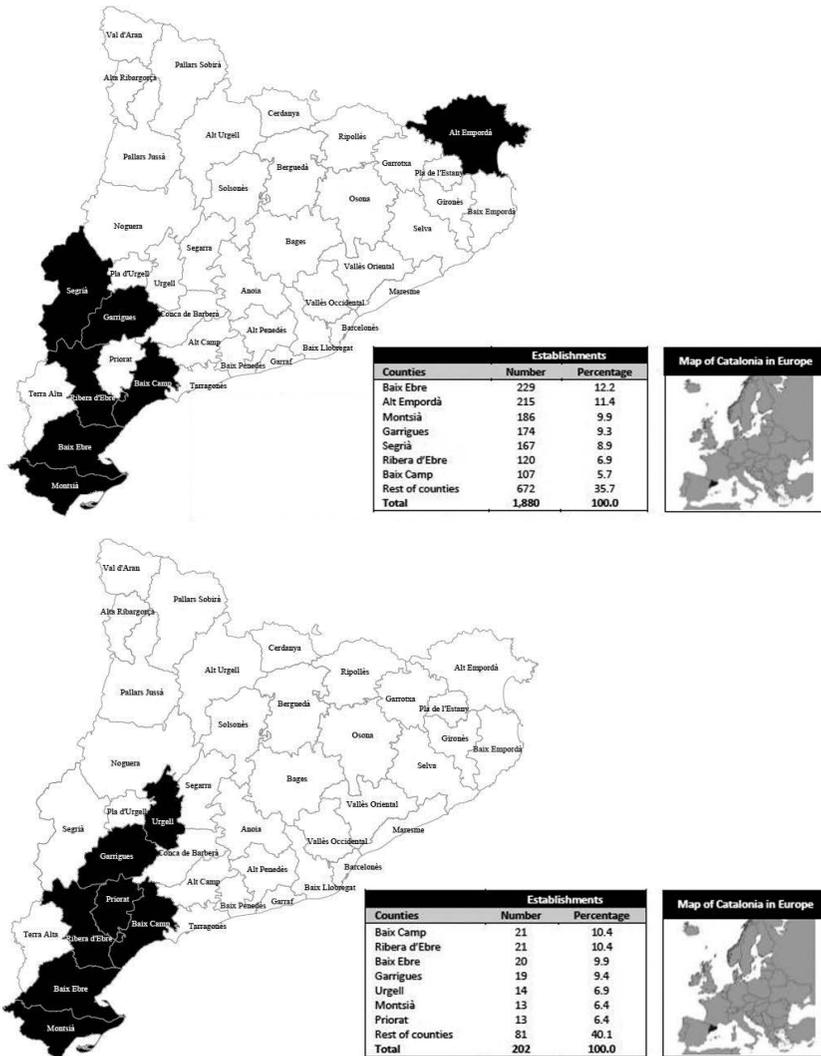


Figure 1. A. The largest geographical concentrations of olive oil establishments in Catalonia, 1913-2012.

B. Counties with the largest concentrations of establishments in 1913

of the mills and factories operating in the Catalan olive oil industry. And perhaps most interestingly, as the following sections will show, they took advantage of the Marshallian external economies that emerged during the nineteenth century.

Interconnected through personal, commercial and institutional links,

these six southern and western counties might also be considered to have formed a single cluster or industrial district. There are several pieces of evidence that suggest this could have been the case. Entrepreneurs from southern counties invested in the western ones. Commercial agents connected producing localities in the west to distribution areas in the south. Auxiliary industries were shared by firms from different olive oil counties. And associations of olive growers, olive oil producers and olive oil traders from different localities in the south and the west could cooperate and defend common interests through general meetings and the associations they joined.<sup>17</sup>

A second area where there was a large concentration of olive oil establishments was the north-eastern part of Catalonia. Populated by small mills located in a single county, this was a modest production area compared to southern and western Catalonia. It was a declining area as well. The available figures for north-eastern Catalonia show that olive oil production more than halved between the 1890s and the 1930s and halved again between this latter period and the early 2010s.<sup>18</sup> By then, no county in the north-east had more than 12 olive oil mills and factories, and none of them accounted for a minimum of 5 percent of the total olive oil establishments. This contrasts with the southern and western parts of Catalonia where a significant agglomeration of olive oil mills and factories persisted over time (Figure 1B). In 2012, seven counties in southern and western Catalonia fit our definition of cluster.

It is acknowledged that the method used in this paper to identify clusters is somewhat arbitrary. Nevertheless, the results are consistent with those obtained by other scholars. For example, in 2005 Hernández, Fontrodona and Pezzi mapped Catalonia's traded local industrial production systems in the early twenty-first century.<sup>19</sup> In the identification process,

17 R. Ramon-Muñoz, 'La industria catalana del aceite de oliva: exportaciones, localización y empresas (1861-1921)', in: Jordi Catalan, José Antonio Miranda and Ramon Ramon-Muñoz (eds.), *Distrítos y clusters en la Europa del Sur* (Madrid 2011) 57-80, 67-77.

18 Zambrana, *Crisis y modernización*, 388-389; and Departament d'Agricultura, Ramaderia, Pesca, Alimentació i Medi Natural, *Superfícies, rendiments i produccions comarcals dels conreus agrícoles*, various issues (Barcelona 2011-2015).

19 These scholars defined a traded local industrial production system as 'an agglomeration of companies from a certain strategic industry or segment in a limited geographical space that create links of cooperation and competition with each other and where specialised suppliers, service providers or associated institutions are also present. A local industrial production system is considered traded if the companies that make it up compete with companies from other countries'. Joan Miquel Hernández Gascón, Jordi Fontrodona Francolí and Alberto Pezzi, *Map of Local Industrial Production Systems in Catalonia* (Barcelona 2005) 24.

they firstly identified concentrations of companies by industries and geographical areas, generally counties. Then, they filtered the information by eliminating ‘the groups of companies that did not have a significant level of geographically specific business specialisation and whose market did not reach a minimum size requirement’. Finally, they eliminated the concentrations of companies when cooperation among the companies (or externalities that increased competitive efficiency) was not detected. By following this methodology, the authors identified 42 traded local industrial production systems in Catalonia. Olive oil was one of these production systems and it included 7 counties – precisely the same seven counties identified in the present article for the early 2010s. Interestingly, by interviewing experts in the olive oil industry, Hernández, Fontrodona and Pezzi concluded that these 7 counties formed a single local industrial production system rather than seven different ones. They designated it ‘olive oil in southern and western Catalonia’.

### 3 The evolution of the southern and western Catalan olive oil cluster over the long run

How did it evolve over time? The literature considers several variables to measure the evolution of clusters. Scholars generally rely on data on the number of workers and the number of firms, but sometimes they also make use of output information and a variety of other metrics.<sup>20</sup> In Catalonia, neither employment data nor information on firms by sectors and counties is easy to obtain on a regular basis, at least not before the final decades of the twentieth century. Therefore, we opted to use output as the

20 See, among many others, the case studies by Arjen Van Klink and Peter De Langen, ‘Cycles in industrial clusters: the case of the shipbuilding industry in the Northern Netherlands’, *Tijdschrift voor economische en sociale geografie* 92:4 (2001) 449-463; and Lisa De Propris, and Luciana Lazaretti, (2008) ‘Measuring the decline of a Marshallian industrial district: the Birmingham jewellery quarter’, *Regional Studies* 43:9 (2008) 1135-1154.

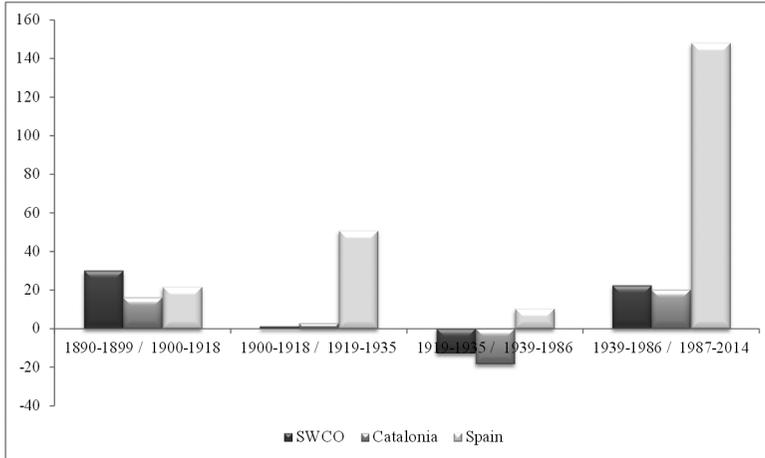
main variable to estimate the evolution of the southern and western Catalan olive oil (hereafter SWCO) cluster.<sup>21</sup>

According to data on olive oil production, the SWCO cluster, once formed, passed through four different stages of development (Figure 2). Between the late nineteenth century and the end of World War I, it experienced a phase of growth or take-off. Then, during the interwar years, the cluster reached its peak or maturation stage and, to some extent, stagnated. The growth of olive oil production decelerated and, in fact, the average production for the period 1919-1935 was similar to the period 1900-1918. After the Spanish Civil War (1936-1939), the SWCO cluster entered into a stage of decline, with average olive oil production falling by more than 10 per cent relative to the years prior to 1936. However, this downward trend was reversed from the 1980s onwards as olive oil output resumed its upward growth trend. The cluster recovered and, in fact, in the period 1986-2014 reached an output level higher than in the peak period of 1919-1935. Nonetheless, the number of firms in the cluster did not recover; by the early 2010s only some 175 remained compared with nearly 1,480 in the mid-1930s, although the average production per firm had risen roughly tenfold in the intervening period.

Put in a broader perspective, and perhaps contrary to what recent models of cluster evolution might lead us to expect, the SWCO cluster seems to have followed the typical stages suggested by most approaches on cluster life-cycle.<sup>22</sup> In addition, it mirrored the cycles of the Catalan olive oil industry. This is a non-surprising finding. The SWCO cluster accounted for between 80 and 95 per cent of total Catalan olive oil production over the course of the twentieth century. By contrast, when the SWCO cluster is compared to the Spanish olive oil industry, significant differences emerge. Finally, the available evidence on output data shows that the three decades

21 Output data are available on a regular basis from the 1890s onwards for each of the four provinces in which Catalonia was administratively divided, namely Barcelona, Girona, Lleida and Tarragona. By contrast, such data are non-existent at local and county levels for most of the period under consideration. As a result, the production data we use here are not specific to the exact area covered by the SWCO cluster but to the provinces where the cluster was located, namely the provinces of Tarragona and Lleida. However, this does not seem to be a major shortcoming: the SWCO has traditionally accounted for the bulk of olive oil production in these latter two provinces and, therefore, provincial production figures are highly representative of the olive oil produced in the cluster. The data used in this article come from: Zambrana, *Crisis y Modernización*, 384-391; *Anuario de Estadística Agraria*, various issues (Madrid); Departament d'Agricultura, Ramaderia, Pesca, Alimentació i Medi Natural, *Superfícies, rendiments i produccions*, various issues (Barcelona).

22 For references, see the introductory section.



*Figure 2. The production of olive oil in the southern and western Catalan olive oil cluster, Catalonia and Spain, 1890-1899 / 1987-2014 (annual averages, percentage changes by periods)*

*Notes and sources: SWCO=Southern and Western Catalan Olive Oil cluster. For Catalonia, there are no data for 1892-1893, 1896-1897 and 1941-42. For Spain, there are no data for 1941-42. See also text and footnotes.*

following the years around 1890 were the most dynamic period for the cluster. Interestingly, this was a period of deep transformation in the olive oil market due to the impact of nineteenth-century globalisation and one might argue that external shocks played a pivotal role in the evolution of the SWCO cluster. As a first step towards a better understanding of the determinants of the evolution of the SWCO cluster, the following sections investigate the reasons why this Catalan cluster experienced a phase of relatively rapid growth between the 1890s and the 1910s.

#### 4 The international olive oil market and the impact of globalisation<sup>23</sup>

On the eve of World War I, the olive oil sector, like many others, produced a relatively wide set of products, which differed from one another in final uses, quality, and methods of production. International demand for olive

<sup>23</sup> This section relies heavily on R. Ramon-Muñoz, 'Specialization in the international market for olive oil before World War II', in: Sevket Pamuk and Jeffrey G. Williamson (eds.), *The Mediterranean response to globalization before 1950* (New York 2000) 159-198, 162-167.

oil was also characterised by the existence of relatively well-differentiated import markets for the product: olive oil was imported for industrial purposes; it was sold in bulk as an edible olive oil, either to be consumed by the population or to be used as a raw material by the food industry; and, lastly, it was traded in small packages as a salad oil and for other cooking purposes.

Between the final decades of the nineteenth century and the outbreak of World War I, international markets for olive oil experienced two key changes. Firstly, demand for industrial olive oil fell dramatically, whereas import markets for edible olive oil, either in bulk or under brand names, increased rapidly, becoming predominant on the eve of World War I. Secondly, geographical patterns of trade were totally modified, due mainly to the collapse of northern European markets as well as the expansion of demand in the Americas. Like many other changes in the late nineteenth century, the transformation of international olive oil markets was determined by globalisation forces, namely the fall in transport costs, the integration of new areas into the international economy and, finally, the mass migration from southern Europe.<sup>24</sup>

Industrial markets for olive oil, which were mainly in the United Kingdom and continental Europe, were enormous by the 1870s, accounting for almost 80 per cent of total world olive oil imports. Olive oil was in demand as a lubricant for machinery, to oil wool after scouring in the textile industry, as a raw material for soap making, and, finally, as a fuel for lighting. From the 1870s onwards, however, cheaper and more efficient seed oils, animal fats and mineral oils coming from the Americas, India and Western Africa started to replace olive oil in its industrial applications.

On the other hand, international markets for edible olive oil in bulk became extremely important. France and Italy became the main import markets for bulk olive oil, which prior to World War I consisted of edible olive oil of high and medium grades. At least from the central decades of the nineteenth century, in response to the continuous decline in domestic production, traders from the French cities of Marseilles and Nice began to import olive oil for refining or to mix with some of their own olive oils. They also adjusted the product to the requirements of final consumption markets, many of which were situated abroad. By the turn of the twentieth century, the north-western Italian exporters of Porto Maurizio, Oneglia

24 See, among others, Kevin O'Rourke and Jeffrey G. Williamson, *Globalization and history. The evolution of a nineteenth-century Atlantic economy* (Cambridge 1999).

and Genoa followed the pattern initiated by the neighbouring cities of Marseilles and Nice.

Aside from the expansion of international demand for bulk olive oil, import markets also developed rapidly for edible olive oil in small packages. Between 1890/1894 and 1909/1913, the annual rate of growth was greater than 4 per cent. Southern European mass migration to the Americas was partly responsible for this expansion. The use of olive oil as a food is, among other factors, highly dependent on consumption patterns and cultural experience. While butter, fats or other edible vegetable oils were preferred in other regions, olive oil was an essential product among the population living in the Mediterranean basin. Therefore, it is not surprising that import markets for edible olive oil expanded as thousands of Southern European citizens left their home countries for the Americas. In the Americas, however, olive oil was generally imported in small packages and ready for final consumption. By 1909-1913, Argentina, followed by the United States, had become the main importers of packaged olive oil.

## 5 Response of agents to external shocks and the rise of the cluster

The challenge of globalisation posed difficulties for a large number of farmers, producers and traders in the Mediterranean olive oil sector. This was also the case in the SWCO cluster. The growth of the area devoted to olive trees decelerated, from 0.7 to 0.2 per cent per year between the periods 1858-1888 and 1888-1898.<sup>25</sup> Export trade also felt the impact of globalisation, and between the mid-1880s and mid-1890s olive oil exports declined by around 10 per cent in volume and rather more in value.<sup>26</sup> The same percentage decline was recorded in the number of olive oil producers between 1878-1891 and 1895-1900, as proxied by the number of manufacturers paying the *contribución industrial y de comercio*, the main industrial tax in Spain.<sup>27</sup>

25 Zambrana, 'Crisis y modernización', 397-398.

26 Ramon-Muñoz, 'La industria catalana', 79-80.

27 Dirección General de Contribuciones, *Estadística Administrativa de la Contribución Industrial y de Comercio* (Madrid 1878, 1890-1891, 1895-1896 and 1900). According to this source, in the area that roughly corresponded to the SWCO cluster, the number of taxpayers fell from 749 to 651 between 1878-1891 and 1895-1900.

In fact, in southern and western Catalonia the prices of olive oil experienced a continued downward trend throughout the 1880s and early 1890s.<sup>28</sup> Nevertheless, the process of recovery was relatively rapid in the SWCO cluster as farmers, producers and traders were prone to adjust olive oil production and trade to the new market conditions. They soon began to avoid the production of inedible and low-grade olive oil and focused instead on higher grades of the product, thereby entering the emerging markets for edible olive oil in both Europe and the Americas.

A key factor to improve the quality of olive oil was (and still is) the reduction of the time elapsed between the harvesting of olives and their pressing to make olive oil. The olive is a perishable fruit that easily ferments when it is stored for long periods or in poor conditions before being crushed and pressed,<sup>29</sup> something that in the nineteenth century occurred generally in the largest areas of production. Moreover, olive oil from a fermented fruit yields a rancid taste, as well as an objectionable odour and flavour. Thus, the long storage of olives was a serious problem for the industry as it hindered the production of a higher quality product. The collapse of traditional markets for non-edible olive oil accelerated the modernisation of the olive oil industry. This was clearly the case in pressing operations. The replacement of old wooden presses by iron and modern hydraulic presses intensified from the last decades of the nineteenth century onwards. Relative to older presses, these new presses were more cost effective and much more powerful.<sup>30</sup> They also worked faster, especially when driven by mechanical power, which led to a rapid reduction in the time that olives had to remain stored, thus increasing the potential supply of edible olive oils.

28 Nicolás Sánchez Albornoz and Teresa Carnero Arbat, *Los precios agrícolas durante la segunda mitad del siglo XIX. Volumen II: vino y aceite* (Madrid 1981) 182-183; Grupo de Estudios de Historia Rural, *Los precios del aceite de oliva en España, 1891-1916* (Madrid 1981) 116-117.

29 The process of making (bulk) olive oil consisted mainly of crushing the olives, which were reduced to a uniform pasty mass by means of millstones, then pressing this pasty mass and, finally, collecting the resulting olive oil in deposits or tanks.

30 See, for example, Zambrana, *Crisis y modernización*, 141-151; J. Simpson, *Spanish agriculture: the long siesta, 1765-1965* (Cambridge 1996) 167-171; Ramon Ramon-Muñoz, 'Modernizing the Mediterranean olive-oil industry, 1850s-1930', in: Derek J. Oddy and Alain Drouard (eds.), *The food industries of Europe in the nineteenth and twentieth centuries* (Farnham 2013) 71-88, 71-76.

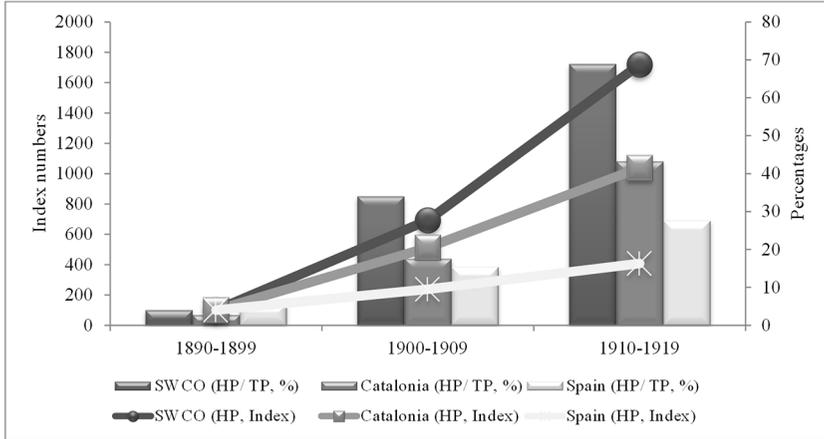


Figure 3. The adoption of hydraulic presses in the southern and western Catalan olive oil cluster, Catalonia and Spain, 1890-1919 (Ten-year annual averages)

Notes and sources: SWCO=Southern and Western Catalan Olive Oil cluster. HP=Hydraulic Presses. TP=Total presses. Index Numbers, 1890-1899=100. The period 1890-1899 only includes data for 1890 and 1895. See also text and footnotes.

The southern and western Catalan manufacturers were not slow to adopt the new pressing machinery. Figure 3 presents Spanish data on the use of hydraulic presses in olive oil making. These data make it clear that between the 1890s and the 1910s the adoption of more modern crushing machinery was very intense in the SWCO cluster: the number of hydraulic presses multiplied by a factor of more than 15 in southern and western Catalonia, it increased by a factor of 10 in Catalonia as a whole and it multiplied only by 4 in Spain. By the 1910s, more than two-thirds of the olive oil presses operating in the SWCO cluster were hydraulic presses, compared to a little more than 40 per cent in Catalonia as a whole, and less than 30 per cent in Spain. These data rely on tax records, the so-called *Estadística Administrativa de la Contribución Industrial y de Comercio*, and, therefore, must be taken with caution. Nevertheless, the qualitative information points in the same direction. In 1913, E. W. Thompson, a commercial agent for the US Department of Commerce, stated, for example, that ‘...in the north of Spain there have been many improvements made in the manufacture of olive oil and very little of the low grades is manufactured

(...).<sup>31</sup> According to this American consul, the same could not be said of other areas of Spain.

The rising supply of high-grade olive oil, which also increased due to the expanding acreage planted in olive trees, served to meet the new demands for edible olive oil. To give some examples, in the period 1912-1914 more than 12,000 metric tonnes (or 60 per cent of total olive oil exports from Catalonia) were traded to northern Italy and, to less extent, southern France for blending and re-exporting purposes. Additionally, around 8,000 metric tonnes (more than one-third of total olive oil exports from Catalonia) went to Argentina and other South American markets in small packages for final consumption.

This latter point deserves emphasis. Packaged olive oil was a totally finished product which had to be adjusted to the different tastes of final consumers through the use of refining methods, blending techniques and packaging operations. This means that it was necessary to properly blend several varieties of olive oils to meet consumer preferences. Similarly, the use of modern marketing practices, namely packaging, branding and advertising, became an essential factor in penetrating foreign markets for olive oil, which were mainly located in the Americas. Therefore, possessing specific skills and knowing the characteristics of the final markets were both crucial issues in exporting packaged olive oil. In these areas, the creation and accumulation of a firm's capabilities through investments in manufacturing and marketing was an important source of successful performance. There is evidence showing that these investments had been made in the late nineteenth century, as will be shown in the next section.

The fact is that the olive oil traded to foreign markets through Catalan ports skyrocketed between the early 1890s and the early 1910s. Interestingly, Catalonia's export trade grew not only in absolute terms, but also relative to both Spain and the world average. By the eve of World War I, the olive oil exported through Catalan ports accounted for almost 50 per cent of total Spanish olive oil exports and for more than 10 per cent of total world olive oil exports. Exports continued growing during World War I as a consequence both of Spanish neutrality in the conflict and of the collapse of competitors' exports. Partly fostered by this export dynamism, olive growing and olive oil production both experienced an upward trend, particularly in the western part of the cluster. In fact, it can be estimated that in the period 1905-1914, exports accounted for a minimum of 40 per cent of

31 E. W. Thompson, 'Edible oils in the Mediterranean district', United States of America. Department of Commerce and Labor, *Special Agents Series* 75 (Washington 1913) 9.

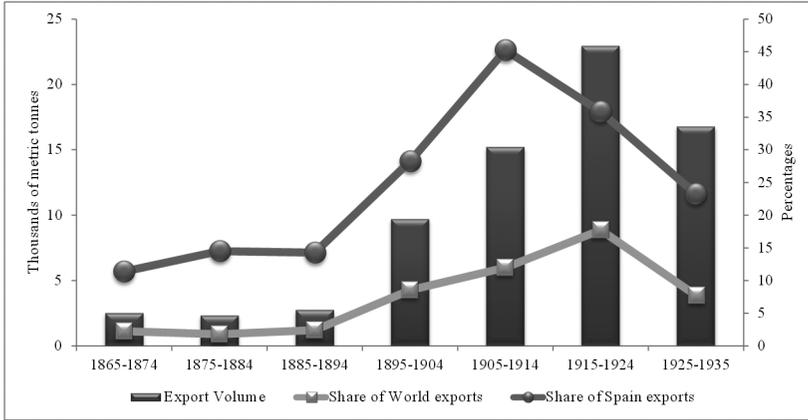


Figure 4. Olive oil exports in Catalonia, 1865-1935 (Ten-year annual averages)

Notes and sources: *Estadística(s) del Comercio Exterior de España, 1865-1935* (Madrid); and R. Ramon-Muñoz, 'La industria catalana', 79-80.

the total output of the SWCO cluster, and probably even more. This percentage grew even higher during World War I. While the role of domestic demand cannot be neglected, the stage of rapid growth experienced by the SWCO cluster was clearly influenced by exports. In other words, the rapid adaptation of farmers, manufacturers and traders to the new conditions of the international olive oil markets formed the basis for the growth of the cluster.



Illustration 1. Olive harvesting in western Catalonia in the early 1930s. Source: Camins (January 1934) 8. Author of the picture: E. Gausí.

## 6 Explaining agents' successful response: evidence and hypotheses

The obvious question is this: why did agents in the cluster succeed in this process of adaptation? A number of factors have to be considered. There is no doubt that Marshallian external economies, as well as some of the factors included in Michael Porter's famous diamond of national competitive advantage, enhanced cluster competitiveness.<sup>32</sup> And they will be considered in a systematic manner later on in this section. First, however, an important and preliminary factor needs to be stressed. In considering the rapid and successful adaptation of agents to the new conditions, the available qualitative evidence suggests that the existence of previous processes of accumulation of skills, techniques, market and product knowledge and the capabilities of firms had a remarkable influence on the successful response of agents to developments and shocks from outside the cluster. It also suggests that most of these elements gradually spread across the different actors in the cluster through their geographical proximity and perhaps through the existence of business networks.

At the epicentre of these accumulation processes, we find the medium-sized city of Tortosa, in the southern Catalan county of Baix Ebre (Figure 1), where a dynamic group of producers and traders emerged over the course of the nineteenth century. Before the boom in Catalan olive oil exports, they had already adopted up-to-date practices in olive oil making such as crushing and pressing soon after harvesting as well as avoiding the addition of hot water to olive paste during pressing operations.<sup>33</sup> These improvements appear to have been the result of technological transfer by a group of French olive oil businessmen who had set up in Tortosa – in the third quarter of the nineteenth century olive oil manufacturers from southern France made use of better techniques than in Catalonia. Nevertheless, external economies also played a role. The manufacturers in Tortosa rapidly realised that the grades obtained by their French colleagues garnered

32 A. Marshall, *Principles*; M.E. Porter, *The competitive advantage of nations* (London 1990). It is worth noting that Porter's diamond also includes some of the factors already mentioned by A. Marshall. This is the case with related and supporting industries. The other three factors in Porter's diamond are demand conditions, factor conditions and, finally, firm strategy, structure and rivalry. For a comparative description of the two approaches, see Jordi Catalan, José Antonio Miranda and Ramon Ramon-Muñoz, 'Distritos, clústers y ventaja competitiva: interpretaciones y debates', in: Catalan, Miranda and Ramon-Muñoz (eds.), *Distritos y clusters*, 9-36, 21-24.

33 D. Mangrané, *El problema del aceite virgen de oliva* (Barcelona 1967) 22; Giral, 'L'agricultura', 253.

higher prices in the markets; and as result they soon improved their olive oil making.<sup>34</sup> The high concentration of mills and factories in the city and surrounding area made the transmission of new techniques and practices more rapid.<sup>35</sup>

Commercial progress ran in parallel to industrial improvements and new markets opened up. In fact, by the 1870s traders from this southern Catalan city were already exporting packaged olive oil to the Americas. They also blended olive oil from different origins to adjust the product to the requirements of final consumers.<sup>36</sup> This evidence suggests that blending skills, together with foreign market knowledge, had developed among the different actors of the city. Whether or not these skills also developed (or were at least reinforced) through technological transfer is more difficult to ascertain. There is, nevertheless, some evidence to suggest that one of the early leaders of the group of manufacturers and traders emerging in Tortosa, namely Manuel Porcar i Tió, had started his industrial and commercial activity with 'previous knowledge acquired personally in the counties of Tuscany and Provence',<sup>37</sup> the most advanced Mediterranean areas in terms of pressing, clarifying, blending and packaging. As export trade progressed, it also improved the reputation of Tortosa as an olive oil centre and, of course, the standing of those agents most directly involved in making and trading olive oil.

Unsurprisingly, these agents participated in various networks of relationships, sometimes occupying central positions. For example, among the promoters and shareholders of the Bank of Tortosa (1881) it is possible to find some of the most well-known producers and traders of olive oil in this southern Catalan city. Later on, they can be found participating not only in local institutions, such as the Chamber of Commerce and Industry of Tortosa (1908),<sup>38</sup> but also in non-local associations such as the 'Gremio de Almacenistas de Aceites de Barcelona' (Association of Olive Oil Wholesalers of Barcelona). Set up in Barcelona during the last decade of the

34 Mangrané, *El problema*, 22; Simpson, *Spanish agriculture*, 214.

35 For example, in 1861, approximately 120 olive oil manufacturers paid the industrial tax in Tortosa, and roughly 200 in the county of Baix Ebre (of which Tortosa is the capital). F. Giménez Guited, *Guía fabril e industrial de España* (Barcelona 1862).

36 R. de Manjarrés, *Memoria sobre el mejoramiento de nuestros aceites y necesidad de presentarlos bien elaborados y clarificados* (Barcelona 1872) 160.

37 I. Aguiló, *Notas de actualidad sobre la elaboración del aceite de oliva* (Barcelona 1918) 65.

38 On the above-mentioned institutions, see E. Llorente, 'La fundació del Banc de Tortosa', *Recerca* 9 (2005) 255-294, 271-273; and E. Llorente, 'La fundació de la Cambra del Comerç de Tortosa', *Quaderns de l'Ebre* 1 (2010) 9-16, 11-14, respectively.

nineteenth century, the Association of Olive Oil Wholesalers of Barcelona gradually brought together a large number of Catalan olive oil exporters, including those manufacturers and traders from Tortosa that also operated in Barcelona, such as the above-mentioned Manuel Porcar i Tió but also Fernando Pallarés.

These two manufacturers and traders deserve comment. Born in Tortosa in 1841 and later on established in Barcelona, Manuel Porcar i Tió was already exporting olive oil to the Antilles and Rio de Janeiro (Brazil) by the 1870s; in the 1880s he led a small group of north-eastern Iberian exporters to Argentina; and in the 1890s he registered his own brand.<sup>39</sup> With production and storage establishments in Tortosa and warehouses in Barcelona, Porcar i Tió also set up an olive oil factory in the early 1880s in Lleida, a medium-sized city in the olive-growing western county of Segrià (Figure 1). Judging by the standards of the time, the size and modernity of Porcar's factory were impressive. According to data for the late 1890s, his factory was equipped with 12 hydraulic presses powered by steam energy; it had a network of rails to transport both raw materials and finished products within the building; and, attached to the olive oil factory, it also had an establishment for the production of sulphur oil, a by-product of olive oil production used in soap making. Porcar i Tió's factory could employ 80 workers during peak production periods, an astounding figure if we consider the small size of most of the olive oil mills in the area. Soon, the firm of Manuel Porcar i Tió began to operate as a vertically integrated company: it owned olive tree orchards in western Catalonia, which served to feed the olive oil factory he owned in Lleida; it produced bulk olive oil, which was probably sent to the establishments the company had in Barcelona; it manufactured packaged olive oil, which was sold either to the domestic market or abroad; and last but not least, it took advantage of the by-products the company obtained.

Following in the steps of Manuel Porcar i Tió, Fernando Pallarés Besora had also set up a new and modern olive oil factory in western Catalonia by

39 On this company, see, among others, J. Nadal, 'La industria fabril española en 1900. Una aproximación', in: Jordi Nadal, Albert Carreras and Carles Sudrià (eds.), *La economía española en el siglo XX. Una perspectiva histórica* (Barcelona 1989) 23-61, 31; R. Ramon-Muñoz, 'Estructura empresarial, empreses i canvi tècnic en la indústria de l'oli d'oliva de les comarques de Lleida, 1890-1936', in: Enric Vicedo (ed.), *Empreses i Institucions Econòmiques Contemporànies a les terres de Lleida* (Lleida 1999) 141-187, 156-164; E. Lorente, 'Manuel Porcar i Tió', in: Núria Gil Duran (ed.), *Ebrencs del segle XIX* (Tarragona 2009) 79-100; R. Ramon-Muñoz, 'Porcar y Tió', in: Conxita Mir c.s., *Diccionari biogràfic de les terres de Lleida. Política, economia, cultura i societat. Segle XX* (Lleida 2010) 306.

the end of the nineteenth century.<sup>40</sup> In this case, the factory was erected in Les Borges Blanques, a small-sized town in the olive-growing county of Garrigues (Figure 1). Born in 1849 in a commercial and industrial city in southern Catalonia (Reus), Fernando Pallarés had moved to Tortosa in his youth and was first married there in 1873. In Tortosa, he stood out as a businessman. Apart from trading in olive oil, he actively participated in the foundation of the Bank of Tortosa in 1881; a year later he promoted the creation of a newspaper, the *El Correo de Tortosa*; and in 1884, in partnership with another important manufacturer, he set up a new olive oil factory using steam power.<sup>41</sup> In Les Borges Blanques, the factory erected by Pallarés was also characterised by the use of modern and accurate methods of production. With 7 screw presses mechanically moved by steam power, his factory became the largest and most modern establishment in the county of Garrigues, where more than 70 olive oil mills were operating in the late 1890s.

There is no doubt that in the context of the western Catalan olive oil industry both Manuel Porcar i Tió and Fernando Pallarés Besora became leading firms. In addition, it might well be that both leading firms contributed to the transmission of new technology and modern techniques of production. They had set up their factories in areas populated by a large number of olive oil mills, which were, nevertheless, technologically backward.<sup>42</sup> In this context, it cannot be ruled out that the establishments owned by these two leading manufacturers and traders provided a model to be followed. And, in turn, clustering might have eased the adoption of up-to-date production methods. Although direct causality cannot be established, the fact is that between the late 1890s and the mid-1910s the number of hydraulic presses multiplied by almost nine in the counties where Man-

40 On this company, see R. Ramon-Muñoz, 'Estructura empresarial', 156-164; R. Ramon-Muñoz 'Fernando Pallarés e hijos', in: Conxita Mir et. al., *Diccionari biogràfic*, 166-167; L. Pérez Moral, *La Casa Pallarés. Familia y negocio oleícola* (Cabra 2010); L. Pérez Moral, 'Pallarés en la industria y comercio oleícolas', *Recerca*, 14 (2012) 69-90.

41 *La Verdad. Diario de noticias e intereses generales*, 248 (Tortosa, 11 November 1884) 1-2.

42 By the late 1890s, if we leave aside the factories of Porcar i Tió and Pallarés, only 5 per cent of the more than 190 mills located in the counties where these two firms had set up made use of modern olive oil presses, including hydraulic presses and screw presses. Dirección General de Agricultura, *Memoria sobre la fabricación de aceites de la provincia de Lérida escrita por el ingeniero agrónomo D. José Gabriel Téllez y Arauz* (Madrid 1901).

uel Porcar i Tió and Fernando Pallarés Besora had set up their factories; in Catalonia as a whole, it had multiplied by a factor of 7.<sup>43</sup>

The adoption of new and better machinery is, certainly, a complex process. A detailed analysis of technological change in the SWCO cluster should take into account a number of factors, including, among others, the following: a) demand and market conditions and the evolution of olive oil prices; b) the existence or lack of a subsidiary industry; c) the size of firms and the structure of the olive oil sector; d) trends in relative factor prices, namely labour and capital. This detailed analysis is, however, beyond the aim of this article. At present, the only thing that can be said is that only the first two of the potential determinants of technological change mentioned above appear to have had a more important influence in western Catalonia.<sup>44</sup> Indeed, when new market opportunities opened up for edible olive oil and prices began to recover, new firms in western Catalonia entered the industry by adopting up-to-date technology. Similarly, the pioneering firms that remained in the sector gradually replaced old crushers

43 R. Ramon-Muñoz, 'Estructura empresarial', 169. Interestingly, Porcar i Tió and Pallarés were not alone in promoting the diffusion of new techniques and up-to-date technology. In the inter-war period, Pau Vila, an outstanding Catalan geographer, noted that western Catalonia had transformed into a modern centre of production thanks to the influence of olive oil manufacturers and traders from the southern Catalan city of Tortosa. Vila stated that this process of modernisation had started in the years around 1890. He argued that, relative to other areas, the Tortosa producers and dealers were more skilled and had a deeper knowledge of export markets. In fact, and with the aim of meeting the foreign demand for edible oils, Vila explains that they began to buy fresh olives in the western Catalan town of Les Borges Blanques and hired local millers to crush and press them *in situ*. For Vila, these practices had an enormous impact on the olive oil industry of both Les Borges Blanques and Western Catalonia as a whole, and they probably reflect a process of knowledge and technology transfer. Firms from Tortosa set up mills equipped with modern presses in this area, as did local millers. In Vila's words, 'the action of producers and traders from Tortosa and the improvement of olive-oil making had more than doubled the value of the product', which might be considered another factor in explaining technical change. P. Vila, *Resum de Geografia de Catalunya* (Barcelona 2003, originally published between 1928 and 1936) 179-180.

44 By the years around 1900, western Catalonia did not have an industrial structure that differed significantly from other olive-oil producing areas in Spain, as measured by average pressing capacity per firm. In addition, between 1890 and 1913, the ratio between the daily wage of a male agricultural worker in western Catalonia and the price of machinery in Spain followed a downward trend from 1895 to 1904, but neither before nor after. Taking the period 1890-1913 as a whole, the annual rate of growth was, in fact, rather modest, -0.6 per cent per year. My own estimates based on data provided by Ramon Garrabou and Enric Tello (2002), 'Salario como coste, salario como ingreso: el precio de los jornales agrícolas en la Cataluña contemporánea', in: José Miguel Martínez Carrión (ed.), *El nivel de vida en la España rural, siglos XVIII-XX* (Alicante 2002), 174-176, and Leandro Prados de la Escosura and Joan R. Rosés, *El capital en España*. Unpublished (Universidad Carlos III Madrid 2003).

and presses with new ones. This was not all. By the end of the nineteenth century, several firms devoted to the construction of olive oil machinery had already emerged in the cluster and in the early years of the twentieth century some workers had already specialised in the use of hydraulic olive oil presses. These are important issues, not only because they provide further evidence of how external economies operated in the SWCO cluster. In the 1890s, the expert Ramon de Manjarrés argued that one of the factors that slowed the diffusion of hydraulic presses in Spain was the continuous breakdown of the new presses, which could not be repaired by local craftsmen but needed skilled machinists resident in industrial cities far away from the olive oil mills.<sup>45</sup> With a subsidiary industry operating in the cluster, agents could respond more easily to changes on the demand side.

Marshallian external economies contributed to the success of the cluster. The same holds true for some of the factors that form Michael Porter's diamond of national competitive advantage. A first factor is to do with what might be attributed to favourable natural endowments and, therefore, to factor conditions in Porter's diamond. When accurately cultivated and manufactured, the varieties of olives mostly grown in the cluster yielded an olive oil of smooth taste, light colour and high quality, which made it particularly suited to supply the growing demand for edible olive oil in foreign markets.<sup>46</sup>

Price competitiveness, which is also connected to factor conditions, is the second factor to be mentioned. Certainly, comparing olive oil prices is a difficult matter due to the existing differences across olive oil varieties. Nevertheless, detailed price data from the marketplace of Genoa for the period 1909-1911 suggest that the olive oils produced in the SWCO cluster could be between 7 and 15 per cent cheaper compared to similar varieties of olive oil produced in Italy.<sup>47</sup> That the Catalan olive oils were becoming more price-competitive than the Italian and the French ones is also suggested by contemporary observers in France and Norway.<sup>48</sup> These price differences

45 R. de Manjarrés, *El aceite de oliva. Su extracción, clarificación y refinación. Medios de presentar nuestros aceites de los mercados extranjeros en competencia con los de Francia e Italia* (Madrid 1896) 158, Antonio Parejo and Juan F. Zambrana (1994), 'La modernización de la industria del aceite en España en los siglos XIX y XX', in: Jordi Nadal and Jordi Catalan (eds.), *La cara oculta de la industrialización española* (Madrid 1994) 13-42, 34.

46 Ministerio de Fomento, *El aceite de oliva. Resumen hecho por la Junta Consultiva Agronómica de las Memorias de 1921 remitidas por los ingenieros del Servicio Agronómico provincial* (Madrid 1923) 371 and following; Zambrana, *Crisis y modernización*, 114-115.

47 *Bolletino della Camera di Commercio e Industria di Genova* (Genoa 1909-1911), various issues.

48 *Bolletino de la Società Nazionale degli Olivicoltori*, 4 (Rome 1909) 52; and Ministero di Agricoltura, Industria e Commercio, *Il commercio dell'olio d'oliva all'estero*, vol. 1 (Rome 1912) 76.

can mainly be attributed to cross-country differences in production costs which, in turn, were closely related to labour costs and yields.<sup>49</sup>

The third factor to be considered, again in the area of factor conditions, concerns the existence of a relatively adequate level of infrastructure endowment and trading services. This allowed the main centres of the cluster (Lleida and Les Borges Blanques in the west and Tortosa and Reus in the south) to be connected with the country's leading seaports (i. e., Tarragona and especially Barcelona), and, from them, to export, for example, to Marseilles and Genoa, where a growing demand for edible olive oil for blending purposes had emerged.<sup>50</sup> Access to the markets on the other side of the Atlantic was also eased by the high volume of traffic and the abundance of shipping services that characterised the port of Barcelona. In fact, according to information for the year 1911, the ocean freights to Buenos Aires (Argentina) were slightly lower in Barcelona than in Genoa (north-western Italy) and Marseilles; in Seville (southern Spain) these freights fluctuated around the Genoese levels, depending on the shipping company; and in Malaga (southern Spain) they were slightly higher than in Genoa but never higher than in Marseilles.<sup>51</sup>

Finally, a combination of cooperation and competition has also been found among the firms that populated the SWCO cluster. In the context of Porter's diamond, this concerns firm strategy and rivalry. Cooperation generally took place through institutions that gradually emerged in the cluster, which included, among others, chambers of commerce and industry as well as agrarian societies.<sup>52</sup> Competition seems to have provided dyna-

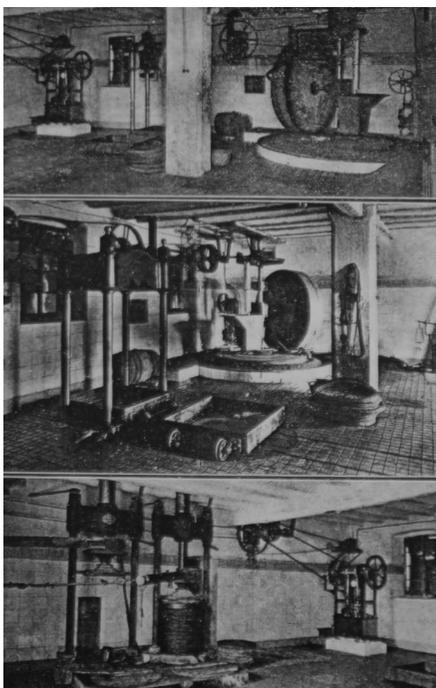
49 Certainly between 1891 and 1904, the strong depreciation of the peseta strengthened the competitiveness of Catalan firms against the rest of their foreign rivals. Pablo Martín Aceña and María Ángeles Pons, 'Sistema monetario y financiero', in: Albert Carreras and Xavier Tafunell (eds.), *Estadísticas Históricas de España, siglos XIX-XX*, vol. 2 (Bilbao 2005) 645-706; and R. Ramon-Muñoz, 'El comercio exterior del aceite de oliva en Italia y España, 1850-1936', in: Carlos Biela and Antonio di Vittorio (eds.), *Las industrias agroalimentarias en Italia y España durante los siglos XIX y XX* (Alicante 2005) 497-555, 520-527.

50 P. Pascual, 'La modernització dels mitjans de transport a la Catalunya del segle XIX', in: Jordi Nadal et. al. (eds.), *Història econòmica de la Catalunya contemporània*, vol. 3 (Barcelona 1991), 233-335, and for the particular case of railways P. Pascual, *El ferrocarril a Catalunya (1848-1935). Una història de la seva explotació* (Vic 2016).

51 A. E. Fernández, *Un 'mercado étnico' en el Plata. Emigración y exportaciones españolas a la Argentina, 1880-1935* (Madrid 2004) appendix 6.

52 In addition, in 1911 the establishment of an olive oil station in Tortosa was authorised, in order to promote technical and technological improvements in olive growing and olive oil making. *Gaceta de Madrid*, 185 (Madrid, 4 July 1911), 52; G. Erill i Pinyot and J. Casanovas i Prat, *L'Escola Superior d'Agricultura de Barcelona: cent anys d'ensenyament universitari, 1912-2012* (Barcelona 2012) 65-66.

mism to the cluster. As a result of the action of new entrants, competition also contributed to modifying the existing hierarchies. The case of Porcar i Tió provides a good example. As noted earlier, Porcar i Tió was one of the pioneers in penetrating South American markets for olive oil. Nevertheless, he faced strong competition from other southern and western Catalan exporters, especially from José Bau. Also established in the city of Tortosa, Bau began to export olive oil to Argentina around 1900, and by 1913, the firm had already become the largest Spanish olive oil exporter, as well as one of the most important Mediterranean firms in terms of olive oil exports, to Argentina. Interestingly, in explaining the success of Bau in Argentina prior to World War I, many contemporaries considered it to be a crucial fact that the firm regularly (and intensively) advertised its products in journals and newspapers.<sup>53</sup>



*Illustration 2. An olive oil mill in southern Catalonia in the late 1910s. Source:*

*I. Aguiló, Notas de actualidad sobre la elaboración del aceite de oliva (Barcelona 1918), figure 18.*

53 R. Ramon-Muñoz, 'Product differentiation and entry barriers: Mediterranean export firms in the American markets for olive oil prior to World War II', *Business History* 52:3 (2010) 390-416, 393-394 and 402.

## 7 Conclusions and research agenda

This article has analysed the evolution of the southern and western Catalan olive oil cluster since the second half of the nineteenth century. Using quantitative and qualitative evidence, it has identified the cluster's territorial boundaries as well as its performance over the long run. It has found that the concept of life-cycle, as well as the sequential stages it suggests, fits rather well with the evolution of the southern and western Catalan olive oil cluster.<sup>54</sup> Once formed, this cluster passed through the stages of growth, maturation, decline and, finally, recovery. Unfortunately, no evidence has been provided on whether or not the diverse actors of the cluster developed differently over the long run, an issue that will require further research.

A detailed analysis of the reasons why the cluster moved from one phase to another will also form part of the future research agenda. Nevertheless, as an approach to the determinants of cluster evolution, this article has focused on analysing the period between the 1890s and the 1910s. For the SWCO cluster, this was a phase of intense growth, compared to subsequent periods and relative to both the Catalan and the Spanish olive oil industries, and it took place during a period of deep transformation in the international market for olive oil. The response of agents to these changing circumstances was clearly successful. Technical change accelerated. Modern marketing was adopted. And exports, which accounted for a large share of the output, boomed. Rather than only considering that external shocks explain the growth stage of the cluster life-cycle, this article advocates for a more integrative approach. It recognises the contribution of Marshallian external economies to the success of the cluster. It explains how factors such as price, natural and infrastructure endowments, and a combination of cooperation and competition among firms enhanced the competitive advantage of the cluster. Perhaps most importantly, it suggests the importance of previous processes of accumulation of skills, techniques, market and product knowledge and the capabilities of firms in the successful response of agents to developments and shocks from outside the cluster.

54 This paper has mostly focused on the three decades following 1890 and refers to later periods only in passing. A preliminary but fuller description of the evolution of the SWCO cluster from the years around 1920 onwards can be found in R. Ramon-Muñoz, 'The life-cycle of the agribusiness clusters: the case of the olive oil sector in Catalonia since the second half of the 19th century', a paper presented at *Rural History 2015 – Conference of the European Rural History Organisation* (Girona, 7-10 September 2015).

An obvious implication of the evidence presented in this study is that cluster evolution depends on how agents adapt to changes. Whereas several factors contributed to the final outcome, this article has stressed the importance of past developments in explaining the response of agents to external shocks. The question that comes next is, of course, the extent to which agents' performance during the growth stage of the cluster influenced subsequent phases of the cluster.

### About the author

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