

# The territorial dimension of transactions in the Canary Islands' grape market

La dimensión territorial de las transacciones  
en el mercado de la uva de Canarias

Dirk Godenau 

[dgodenau@ull.edu.es](mailto:dgodenau@ull.edu.es)

Gloria Martín-Rodríguez 

[gmartinr@ull.edu.es](mailto:gmartinr@ull.edu.es)

José Ignacio González-Gómez 

[jggomez@ull.edu.es](mailto:jggomez@ull.edu.es)

José Juan Cáceres-Hernández 

[jcaceres@ull.edu.es](mailto:jcaceres@ull.edu.es)

*Departamento de Economía Aplicada y Métodos Cuantitativos  
Universidad de La Laguna (España)*

## Abstract

The territorial dimension of transactions between grape growers and wine producers in the Canary Islands' grape market is examined. This is a market fragmented into different wine-grape zones and institutionally organised through protected designations of origin (PDOs) which, except in the case of one that is regional in scope, restrict the spatial mobility of grapes. We use information from the harvest declarations submitted by grape growers, which indicate the location of the vineyard plots, and production declarations submitted by the wine producers, which

indicate the grape grower who supplies grapes to their winery, as well as from harvest reports, which contain a record that facilitates the traceability of the grape's journey from the plot of origin to the winery of destination. The results obtained show that there are hardly any inter-island movements of grapes and that inter-zone transactions were selectively intensified between the wine-grape zones of the island of Tenerife following the creation of a regional PDO.

**Key words:** wine; territory; Protected Designation of Origin.

## **Resumen**

Se examina la dimensión territorial de las transacciones entre productores de uva y productores de vino en el mercado de uva de Canarias. Se trata de un mercado fragmentado en diferentes comarcas vitícolas y ordenado institucionalmente mediante denominaciones de origen protegidas (DOP) que, salvo en el caso de una que posee ámbito regional, restringen la movilidad espacial de la uva. Se recurre a la información derivada de las declaraciones de cosecha presentadas por los viticultores, en la que se indica la ubicación de las parcelas de viñedo, de las declaraciones de producción presentadas por los productores de vino, en la que se indica el viticultor que provee de uva a la bodega, así como de los partes de vendimia, que contienen un registro que facilita la trazabilidad del recorrido de la uva desde la parcela de origen hasta la bodega de destino. Los resultados obtenidos reflejan que apenas existen movimientos de uva entre islas y que las transacciones entre comarcas se intensificaron selectivamente entre las comarcas de la isla de Tenerife a raíz de la creación de una DOP de ámbito regional.

**Palabras clave:** vino; territorio; Denominación de Origen Protegida.

## **1 Introduction**

The analysis of transactions in the wine-grape market requires certain conceptual clarifications. Firstly, relationships between grape growers and wine producers can take place in internal markets, with vertical integration of grape growers and wineries, or in external markets, with sales by grape growers to wineries of which they are not members. The main strategic alternative is backward vertical integration (wineries producing their own grapes) or forward vertical integration (grape growers making wine). And, unlike other perishable products (fruit, vegetables, flowers, etc.), the organisation of market transactions through auctions is rare. The main reason for this lies in the value for wineries of actively monitoring grape production conditions (quality optimisation) during the months prior to the harvest. As there are limits to

standardise quality with a view to making the desired wine, wineries seek loyalty from suppliers through stable links, whether formal or informal.

Fernández-Olmos et al. (2009) and Fernández-Olmos et al. (2016) point out that wineries devoted to the production of quality wines may be more likely to adopt vertical integration formulas, although, as highlighted by Fernández-Olmos (2010a) and Cadot (2015), it does not seem that vertical integration is always a guarantee of greater process efficiency. On the other hand, according to Pomarici et al. (2021), both the external grape market and the bulk wine market provide the supply chain with flexibility to adapt to years of shortage or excess grape production.

If there is no vertical integration, and as Fernández-Olmos (2008) comments, contracts can be used as a guarantee of grape supply in quantity and quality for the wineries and as a guarantee of sales and income for grape growers, but often these relationships are based on trust and experience of previous exchanges rather than on the existence of formal contracts. Moreover, whether formal contracts exist or not, wineries wishing to produce quality wines tend to monitor to a greater extent the grape production of their suppliers.<sup>1</sup> In any case, wineries have greater bargaining power and determine to a large extent the conditions they demand from grape growers.<sup>2</sup> If the grapes are only destined for winemaking, at harvest time the grape grower's only potential customers are wine producers, there is no other alternative, other than one's own winemaking. However, if growers have their own winemaking infrastructure, this opens up a strategically important alternative that increases the growers' bargaining power.

Moreover, wine grapes have several features that condition their processing. They are a perishable product, whose processing takes place immediately after harvesting (grape harvest), with a low economic value per unit weight (high water content) and high unit transport costs. Furthermore, the perishable nature of grapes and the volatility in their volumes and qualities condition the evolution of the grape market for each vintage during the months prior to the harvest, as more information is obtained on the likely characteristics of the grape supply for the agricultural year in question. This creates particular conditions for the establishment of inter-annual

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1 Some studies on different grape growing areas analysing the use and terms of contracts in grape grower-winery relationships include Fraser (2003, 2005), Fernández-Olmos (2008, 2010b), Fernández-Olmos et al. (2008), Jano (2017) and Wilson et al. (2018). And, despite the difficulty in measuring grape quality, several authors find a direct link between the intention to produce quality wines and the increased formality and stringency of contracts (Goodhue et al., 2003; Fraser, 2005; Zylberztajn & Miele, 2005).

2 This has also been found by Fraser (2005), Traversac et al. (2011) and Altschuler (2012).

contractual links. On the one hand, uncertainty can lead to negotiations on transactions in the short term (once the supply is known). On the other hand, uncertainty can also be seen as an incentive to guarantee a certain stability of supply (supplier loyalty) and to place a strategic value on own grape production.

Grapes are also a heterogeneous product in terms of variety and quality. Their contribution to the differentiation of wines (typicity, *terroir*) is related to the interaction between territorial constraints, plant material and growing practices. As it is an open-air crop, climatic conditions during the growing cycle condition both quantity (yields) and quality, with inter-annual fluctuations that can cause volatility in the grape and wine markets. The unpredictability of production conditions and the limited possibility of buffering their effects affect the functioning of the wine grape market (high levels of uncertainty).

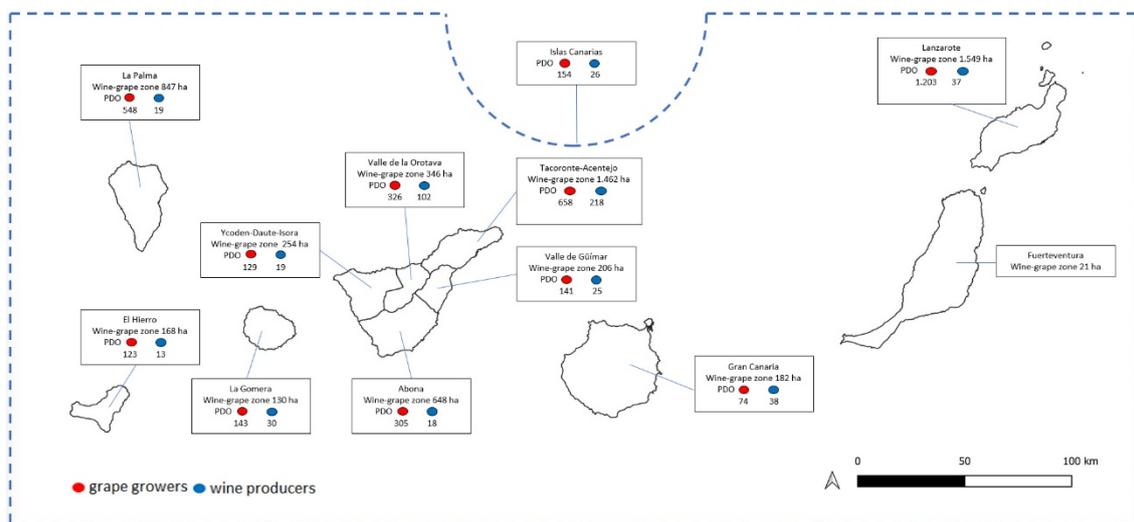
These characteristics are applicable to the case of the Canary Islands, which also has some unique features. Viticulture has a long tradition in the Canary Islands (Macías-Hernández, 2005; García-Rodríguez, 2019). During the 16th and 17th centuries, wines were exported to Europe and America, but the interruption of exports at the end of the 17th century brought about a sharp reduction in vine cultivation in coastal areas, although it was maintained to a greater extent in areas of medium altitude to produce wines for the local market. Since the end of the 20th century, this decline has been cushioned by the creation of protection formulas involving the gradual establishment of eleven Protected Designations of Origin (PDOs) (see Figure 1). This institutional division of the territory can be explained by the great heterogeneity of wine-growing areas, which are small compared to the geographical scope of other PDOs in Spain.<sup>3</sup> This spatial fragmentation is generated by altitudinal differences and microclimates that lead to the production of a wide range of wines of different typicity and linked to the territory. The great diversity of natural conditions implies that the harvest is one of the first to begin in the northern hemisphere in some areas and ends among the last in others.

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3 According to the information published by the Spanish Ministry of Agriculture, Fisheries and Food (see Data on Protected Designations of Origin for Wines, 2021) for the 2019/20 campaign, the PDO with the largest registered surface area in the Canary Islands is Lanzarote, with less than 2,000 ha. And the five PDOs on the island of Tenerife, not including PDO Islas Canarias, which is regional in scope, have just over 2,000 ha. On the other hand, for the same campaign, the surface area registered in the PDO Ribera del Duero and the PDO Rioja exceeded 23,000 and 66,000 ha, respectively. According to the same source, the eleven existing PDOs in the Canary Islands represent more than 10% of the existing PDOs in Spain, but less than half a percent of the total wine these PDOs produce.

The PDOs certify that the raw material used comes from the territory in question and, therefore, have an important role to play in the territorial segmentation of the grape market, because they limit grape transactions between areas to wines that are not produced under any PDO. This situation changed in 2011 with the creation of the PDO Islas Canarias, whose territorial scope covers the whole of the Canary Islands and whose members can buy grapes from any area. Therefore, the current territorial structure of the grape market has two levels. One level with restrictions on the movement of grapes for wines produced under one of the ten PDOs and another level with freedom of movement of grapes between zones, either for wines that do not have PDOs or for wines produced under the PDO Islas Canarias.

Figure 1. The wine-grape zones and Protected Designations of Origin of the Canary Islands in 2020



Source: For each wine-grape zone, the areas of vine cultivation for wine production in 2020 are indicated according to the municipal areas published by the Canary Islands Statistics Institute (ISTAC) based on data from the Department of Agriculture, Livestock, Fisheries and Water of the Government of the Canary Islands. For each of the Protected Designations of Origin (PDO), the number of grape growers who have submitted harvest declarations is indicated, as well as the number of registered wine producers that have submitted production declarations in their respective PDO in 2020, according to the information provided by the Canary Islands Institute of Agri-food Quality (ICCA)

Although there are many PDOs, some wine grapes are used to make wines without PDO certification. While producers covered by one of the PDOs are registered, and therefore more information is generated about them and their transactions, there are others who operate outside

the PDO circuit and for whom the same information is not available (unregistered production and transactions). Moreover, the link with formal and informal circuits can vary over time and be used as a strategic option for negotiating transactions in the grape market, which affects the stability and formalisation of contractual relations between grape growers and wineries (formal or informal contracts, maintenance of contractual relations over time).

Apart from the territorial divisions through the institutional framework, this fragmentation in supply and demand is also relevant for the structure and functioning of the grape market. The supply of wine grapes is in the hands of heterogeneous producers in terms of farm size and plot fragmentation (a consequence of the structure of agricultural land ownership and the division of this property into productive units), with wide differences in the capitalisation and professionalization of farms (full or part-time family work; levels of training; technological endowment). In turn, the demand for wine grapes is in the hands of wine producers, who are not characterised by homogeneity either. They may be registered wineries that buy grapes or grape growers who simply make wine from their own grapes. The specific situation of the winemaker seems to be related to factors such as size (volume of grapes or wine produced), capitalisation (infrastructure and technology in wineries) and both oenological and commercial training (market orientation of bottled and certified wines). The degree of concentration of demand in the hands of the wineries is higher than in the supply of grape growers. It should be added that the internal concentration within supply and demand conditions the transactions between the two. In this sense, it is expected that the segmentation according to size of suppliers and purchasers will be reflected in their market strategies.

The location of grape suppliers and wine producers determines the relevance of the territorial dimension of transactions. The perishable nature of grapes and their territorial aspect promote physical proximity between the places where grapes are produced and the places where they are processed. In this sense, it is common for wineries to be located "in the middle" of the vineyards that supply them, with a corresponding reduction in transport costs and an increase in quality control (reduction of uncertainty).

In summary, some of the characteristics of grapes and of the relations between grape growers and wineries help to explain the importance of the territorial dimension in the case of the wine grape market in the Canary Islands. Firstly, the perishable nature of the product and its low unit value justify the attempt to minimise distances, especially if looking for grapes far from the place of vinification does not guarantee finding a better product or a lower-priced grape for the type of

wine to be made. Secondly, wineries are often located in the vineyard, which implies proximity between grower and winery,<sup>4</sup> and favours the spatial-temporal encapsulation resulting from the zonal adjustment between the harvest and subsequent vinification periods. Moreover, wineries seek the typicity of the wines (*terroir*), often protected by the regulatory framework defined by the PDOs, which oblige member wineries to vinify grapes produced in a specific geographical area and with certain varieties. Finally, in the Canary Islands, there are geographical barriers arising from the fragmentation into islands that also contribute to the territorial segmentation of the grape market.

The relevance of the territorial dimension for precision viticulture or as an element for zoning by productive aptitudes has been reflected in the specialised literature<sup>5</sup> and the spatial dimension of the international wine trade<sup>6</sup> has also been analysed. However, the introduction of this dimension in the analysis of the relationships between the agents participating in the grape market has not received the same attention.<sup>7</sup> For this reason, the object of this paper is precisely the analysis of the territorial dimension of the buying and selling operations of wine grapes registered in the Canary Islands during the last decade. Firstly, the territorial distribution of the supply and demand for grapes is examined, i.e., the location of the plots of land on which grape growers produce grapes and of the wineries responsible for their vinification. Moreover, based on the analysis of the locations corresponding to each transaction between a grape grower and a wine producer, the territorial patterns of these transactions are identified. Specifically, the extent to which the areas (municipalities or wine-grape zones) of origin and destination of the grapes coincide is studied and, therefore, the degree of territorial segmentation, which translates into the presence of local grape markets, and the relative importance of the transactions between these agents is assessed. Finally, the wineries' sourcing strategies are analysed through selected cases. The rest of the text will be structured as follows. First, the sources of information and the methodology

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4 The concept of proximity is widely used in regional and urban economics. Its spatial, relational, institutional and cognitive dimensions are analysed with respect to the positive (reduction of uncertainty and coordination costs, collective learning) and negative (risk of lock-in effects) externalities they generate (Capello, 2016, pp. 241 & 249).

5 Examples are Smith & Wigham (1999), Ramos et al. (2015), Karlik et al. (2018), Anastasiou et al. (2019) or Saavedra et al. (2019).

6 The spatial dimension of international wine trade has been analysed through the use of gravity models, as in Castillo et al. (2016) or Gouveia et al. (2018), in which the intensity of transactions between origin and destination depends, among other factors, on the geographical distance between the two.

7 This absence does not imply that there are no references to the spatial analysis of transactions by regional and urban economics. These analyses highlight the importance of spatial-relational proximity as a relevant factor of endogenous development in the generation of agglomeration economies (Capello, 2016) and as part of what Camagni (2008) understands as territorial capital.

used will be presented. Then, the results obtained will be summarised, and finally, their interpretation and conclusions will be discussed.

## **2 Materials and method**

An analysis of the grape market in the Canary Islands is carried out from a territorial point of view, analysing the places of origin and destination of the grapes at various levels: plots, municipalities and vineyard areas. In addition, and whenever the available information allows, a dual perspective is adopted, in that an aggregate study is carried out and an examination of the individual transactions in which certain economic agents are involved. Specifically, we study the grape supply strategies of wineries that illustrate different purchasing behaviours.

### **2.1 Information sources**

To obtain answers to the above questions, the first step is to identify supply locations. There are official statistical sources that make it possible to estimate the grape growing areas in the municipalities of the different zones. Specifically, based on the data provided by the Department of Agriculture, Livestock, Fisheries and Water of the Government of the Canary Islands, the Canary Islands Institute of Statistics publishes annual information on these zones in its Canary Islands Agricultural Statistics, and the information corresponding to wine grape cultivation for the period 2009-2020 has been used.

However, there are no statistics published by official entities that record grape production by municipality. Canary Islands Agricultural Statistics includes data on grape production by island. In addition, the information corresponding to the harvest declarations (HD) of the grape growers who have submitted them in any of the Canary Islands' PDOs for the period 2009-2020 is available, as well as the production declarations (PD) of grapes used by wine producers in the same period.<sup>8</sup> The aggregation of the areas and production derived from these declarations for all the plots located in the municipalities of the region should approximate the municipal figures published by official statistical sources. However, not all grape growers and wine producers

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8 According to Royal Decree 739/2015, of 31 July, on compulsory declarations in the wine sector (BOE 183, of 1 August 2015), grape growers who cultivate at least 0.1 ha (or in any case, if they market part of their grapes or deliver them to a winery) must submit a declaration of the harvest obtained on their plots, while wine producers who obtain at least 1,000 litres of wine on their premises are obliged to submit a declaration of the production of wine grapes, unless they were exempted from submitting a harvest declaration as wine producers. The information corresponding to the anonymised registers has been provided by the ICCA. An identification code of the grape grower and wine producer is available.

submit their corresponding declarations and, therefore, it will be necessary to estimate the undeclared part of the grape production.

However, to correctly approximate the aggregate production levels, it has been necessary to check the original records as described below. Regarding the HDs, duplicate records were detected when part of the grape production was declared as having been delivered to produce wine qualified with the PDO Islas Canarias. In these cases, the plots and production from which the grapes delivered to the PDO wineries were obtained were also included as being destined to produce wine marketed under the specific PDO of the area where the plot was located. Therefore, the destinations (wine producers) declared for the grapes produced were checked and, if the aforementioned duplication was confirmed, it was decided to assign the duplicated production to the specific PDO according to the location of the plot.<sup>9</sup> As for the PDs, wine producers who declared that they used part of the grape production to make wine marketed under the PDO Islas Canarias also occasionally incurred in duplications of production and in these cases, once the duplication was verified from the records of grape purchases from the grape growers acting as suppliers, it was decided to assign the production to the PDO of the specific wine-grape zone in which the plots of the grape grower in question were located.<sup>10</sup>

In each HD, it is possible to identify the location of the plots from which the grower obtained the grapes, as well as the distribution of the total grapes produced by the grower among the different wine producers. However, it is not possible to know precisely the geographical origin of the grapes involved in each transaction. In the PDs, on the other hand, the wine producer identifies the quantity of wine grapes purchased from each grower, but the plot from which the grapes originate is not known either. Therefore, from the point of view of territorial identification of the origin and destination of the grapes in transactions between grape growers and wine producers, it is useful to consider the so-called harvest reports (HRs), which make it possible to determine the geographical origin of the grapes used in the winemaking process and in this sense are completed by wineries that declare production (PD) and wish their wine to be certified

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9 Each grape grower should only submit one HD per year in the same PDO. Therefore, in all those cases in which duplicate records were found, it was decided to eliminate one of them based on the completeness of the record and the most recent date. Finally, in those cases in which the sum of areas and productions for the plots included in a PDO did not coincide with the totals declared also included in the register, it was decided to correct these totals according to the data disaggregated by plot.

10 In the PDs, the existence of duplications in the registers made by the same wine producer in the same year and PDO was also checked, and the duplications were eliminated, again taking into account the completeness of the registers and their dates of creation. Finally, some of the total production data recorded in the PDs were adjusted by considering the sums resulting from the purchases made from the grape growers listed in the register.

as a PDO wine. Records are available from 2013 to 2020, although, especially in the early years of this period, the information is not available for all wineries. In these HRs, each winery records the plots from which the grapes originate. However, in some cases there is a duplication of records in that the production corresponding to the same producer may have been assigned to the PDO Islas Canarias and at the same time to a specific PDO of a particular zone. Once these duplicities have been corrected, the harvest reports provide useful information for understanding the market flows of grapes used for PDO wine making from the perspective of wine producers.

## **2.2 Methodology**

Despite the above limitations, the sources of information used constitute an extensive and detailed picture of thousands of individual transactions between points in the territory in which the grape growers and wine producers are located in each of the years analysed. Taking advantage of this analytical wealth, this section describes the specific procedure used to obtain estimates of the aggregate supply and demand of grapes, as well as the origin-destination flows between different territories and the flows that define the self-supply strategies of specific wineries.

The production of grapes obtained in a specific wine-grape zone or municipality is not always recorded in the corresponding PDOs. In fact, part of the grape production obtained remains hidden in informal channels. In order to approximate the undeclared grape production, the following procedure has been used.

According to the information collected in the HD, the surface area of each plot is known, as well as the declared grape production obtained and the municipality where it is located. Therefore, it is possible to obtain the total surface area and declared grape production in each municipality and, by extension, in the wine-grape zone to which the municipality belongs. However, the total area declared is considerably lower than that recorded in the official statistics on vineyard cultivation area by municipality. Therefore, in order to deduct the amount of undeclared production, it is necessary to formulate a hypothesis that allows a yield to be attributed to this cultivated area not included in the corresponding declarations. Specifically, and adopting a conservative assumption, a yield calculated as the minimum of the following two amounts has been applied to the undeclared area in each municipality: a) the yield corresponding to the plots in the municipality included in the HD and b) the yield obtained for the vineyard area of the island to which the zone not included in the HD belongs, once the production recorded in the corresponding HD is eliminated from the annual island production of grapes. Applying this assumption, the estimated productions were still lower than those indicated in the official sources.

The estimated yields for the municipalities of a given island were finally adjusted by applying a correction factor so that the total per island coincided with the island production reflected in the official sources.

However, if a relevant part of the production in the PD was not included in those declared by the grape growers, it would be necessary to correct the registered grape production. Given that it is not possible to know the cultivation area of grape growers who do not submit HD or the location of their plots, only the production of grape growers who appear as suppliers in the wineries' PDs is known. In fact, in a significant percentage of cases, these grape growers do not present HD in any year, which means that it is not possible with the available information to approximate these cultivation areas. In this sense, a new definition of registered grape production has been taken into consideration, which includes all the production included in the HD, as well as that corresponding to those grape growers who appear as suppliers in the PD of the wineries and who have not submitted HD.

The problem that persists is that, since there is not enough information available on the cultivation areas of the grape growers who have not submitted HD, it is not possible to distribute the production registered according to the new definition among the areas where the grapes are obtained. However, the production registered in HDs can be distributed by zones and municipalities according to the location of the grape growers' plots. Moreover, according to the municipality where the wineries that present PD are located, a territorial distribution of the demand for grapes can be obtained by municipalities and wine-grape zones.<sup>11</sup>

In any case, and although the location of the wineries is more relevant than the PDO to which they belong from the point of view of the territorial dimension of the transactions, the appearance of the PDO Islas Canarias has influenced these transactions. From this point of view, it is interesting to approximate the relative weight of this PDO in the PD of wine producers as a whole. Of course, the criterion adopted to avoid duplication in the approximation of aggregate production tends to underestimate this relative weight, which must in fact be considered as a minimum. It was therefore decided to define an alternative criterion that would provide a maximum for the production that is finally labelled with this PDO. To do so, this production was

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11 In these PDs, the wine producer must indicate the nature of the grapes included in each transaction, distinguishing between own grapes and purchased grapes. However, it should be noted that grapes recorded as purchased grapes by a winery may in some cases correspond to grapes produced by the partners or owners of the winery in their capacity as growers. In other cases, these grapes are registered as the winery's own grapes.

estimated on the assumption that the wineries that had submitted PDs within the scope of a PDO would end up qualifying all their production under this PDO.

On the other hand, taking into account the municipality where the plots included by a grape grower in the HD are located, as well as the identification of the wine producers to whom that grower sells the grapes, and assuming that the grapes obtained by the wine producer are vinified in the municipality in which the winery is located, the movement of grapes between the municipalities of origin of the production and the municipalities of destination of the same can be approximated. However, the information available does not identify from which specific plots the grapes sold to a winery come from, unless there is only one buyer of the grower's grapes. Thus, to estimate the grape flows from the grower to the winery, it has been assumed that all the buyers of a grower's grapes, including the growers themselves, receive grapes from the plots located in the different municipalities in the same proportions as the total production of the grower in question. This assumption may not be entirely realistic, but in most cases where grape growers declare to sell grapes, they do so to a single winery. On the other hand, when the grower does not sell grapes, it is assumed that the grapes are used to produce wine in the same municipality where they are obtained.

The origin-destination matrices make it possible to identify municipalities that are net receivers of the grapes produced in a zone, as well as those with a greater capacity to produce grapes. But they also offer relevant information at more spatially aggregated levels. Once the inter-municipal matrices have been obtained, the matrix of inter-wine grape zones or even inter-insular origin-destination flows can be deduced by aggregation. The reference period chosen (2009-2020) is sufficient to reflect the effect of the creation of the PDO Islas Canarias on the inter-wine grape zone matrices.

Finally, although the origin-destination matrices mentioned above are constructed from the information contained in the grape growers' HDs, an interesting complement to this supply-side view can be obtained by considering the HRs, which, with greater precision on the origin of the transactions recorded, provide useful information on the flows in the market of grapes used for PDO winemaking from the perspective of wine producers. From this perspective, municipal and zone origin-destination matrices have also been derived for each of the years 2013–2020.

Both the origin-destination matrices drawn up from the point of view of grape growers (supply) and those deduced from the information provided by wine producers (demand) illustrate different spatial supply strategies of the wineries. In this sense, wineries have been selected that

are representative of these different strategies in terms of the distribution by geographical origin (own municipality, rest of the zone, or other zones) of the grapes vinified and type of transaction (own or purchased grapes) according to the information contained in the HRs. Moreover, the evolution of these distributions over time reveals the effect of the creation of the PDO *Islas Canarias*. And taking into account that the HRs contain sufficient information on the plots of origin of the grapes to geo-reference them, we have used geographical information systems for agricultural plots (SIGPAC)<sup>12</sup> to illustrate the spatial distribution of the supply points (plots) of some of these wineries.

### 3 Results

#### 3.1 Volume and structure of the Canary Islands' grape market

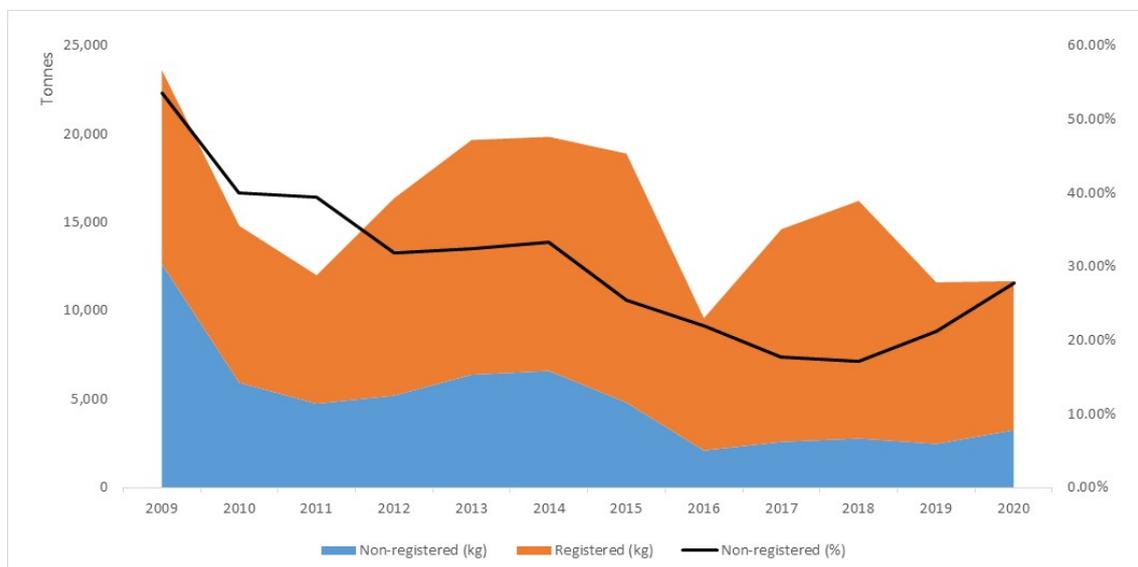
Annual wine grape production averaged 15 million kg during the years 2009–2020, with significant annual fluctuations between just under 10 million kg and almost 24 million kg (Figure 2). In addition, the Canary Islands' grape market has a significant weight of unregistered grape supply. In 2020, 27.8% of the total grape production was unregistered, clearly lower than the 53.6% in 2009. Even so, the considerable proportion of unregistered grapes indicates the existence of a large informal segment of the grape market and there is likely to be a continuous interaction between the workings of both segments through the annual decision making of grape growers and wine producers on the destination/origin of grapes. This market attribute is also relevant to recognise the scope and limitations of statistical information on supply-demand transactions. In particular, a grape grower who does not present a HD may appear as the origin of the grapes in the PD of the winery to which he/she sells. This circumstance may lead to the demand for grapes declared by the winery exceeding the supply of grapes channelled to that winery according to the destinations declared by the grape growers. In addition, some grape growers often decide to submit or not to submit HD discontinuously over time. Moreover, it is noted that none of the wine producers not registered as wineries declare buying grapes, which would imply assuming that their production is limited exclusively to the processing of their own (not purchased) grapes, a circumstance that does not seem reasonable to occur in all cases and

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12 The geographic information system for agricultural plots of the Ministry of Agriculture, Fisheries and Food of the Spanish Government allows the geographic identification of plots declared by farmers and livestock farmers in any aid scheme related to the area cultivated or used by livestock. On the specific features of the Canary Islands' case, see García-Cruz et al. (2017).

years. Therefore, through the information available, it is not possible to know details of possible informal transactions of purchase and sale of unregistered grapes.

**Figure 2. Evolution of registered and non-registered grape production in the Canary Islands (2009-2020)**



Source: Prepared by authors based on municipal crop areas and island productions published by the ISTAC and records of harvest and production declarations provided by the ICCA

Grape production by grape growers has a dispersed territorial distribution among the different grape-growing islands and zones. Although total production is estimated at the municipal level, it is not possible, however, to accurately estimate the territorial distribution of the part of registered grape production not included in HD. However, in the formal segment, grape growers' HDs indicate the location of the plots from which production is obtained and, therefore, it is possible to distribute this production over the territory. Similarly, considering the municipality where the wineries with PDs are located, it is possible to obtain a territorial distribution of the demand for grapes. The distribution by grape-growing zones of the supply and demand of grapes thus defined for the year 2020 is shown in Table 1. The corresponding 7.7 million kg included in the HD in 2020 show a distribution in which Tenerife stands out (68.1%), followed by Lanzarote (19.1%) and La Palma (5.4%). Although the temporal evolution is not shown for reasons of space, it should be added that it is characterised by relative stability and is mainly altered by the unequal impact of the climatic conditions of each year on the different islands. The estimated territorial distribution of grape demand (Table 1) reveals a similar pattern. The 8.0 million kg in PDs, higher than in HDs, are also concentrated in Tenerife (70.2%), Lanzarote (17.5%) and La Palma (5.4%).

The similarity between the two distributions reflects the high degree of self-containment of the grape-growing zones: a large part of the grapes produced in a zone are processed by wineries located in the same zone. This pattern is also influenced by the fact that almost all the Designations of Origin, with the exception of the PDO Islas Canarias, have territorial boundaries that coincide with the wine-growing zones and that the wines produced under one of these PDOs have the origin of the grapes restricted to the zone where the winery is located.

**Table 1. Territorial distribution of registered grape production according to place of production (supply) or processing (demand) in 2020**

Grape growing zones	Supply (place where grown)		Demand (place of transformation)	
	Tn	%	Tn	%
Tacoronte-Acentejo	2,109	27.6	2,279	28.4
Ycoden-Daute-Isora	603	7.9	688	8.6
Valle de la Orotava	1,365	17.8	1,361	17.0
Valle de Güímar	307	4.0	338	4.2
Abona	828	10.8	970	12.1
La Palma	417	5.4	432	5.4
El Hierro	138	1.8	126	1.6
La Gomera	119	1.6	76	0.9
Gran Canaria	296	3.9	346	4.3
Fuerteventura	6	0.1	6	0.1
Lanzarote	1,464	19.1	1,405	17.5
Canary Islands	7,652	100.0	8,026	100.0

Source: prepared by authors based on HD (supply) and PD (demand) records provided by the ICCA

In addition to territorial disaggregation, the supply of grapes in the Canary Islands is split into small producers who process and sell small quantities obtained mainly on small family-owned estates. With a few exceptions, there are no horizontal integration formulas (cooperatives) and transactions are organised by direct contact between grape grower and winery. Of the 3,804 grape growers who submitted HDs in 2020, 28.9% do not sell their grapes and 65.1% sell to a single winery. Of the remaining 6% of growers, almost all sell their grapes to two wineries.

In the group of grape users (Table 2), registered wineries can be distinguished from other wine producers. Of the 545 wine producers that submitted PDs in 2020, 40.6% are registered wineries that process 84.5% of the grapes; on the other hand, the remaining wine producers are large in number, but handle smaller volumes of grapes and, according to the PDs, are

exclusively dedicated to processing their own grapes. With regard to the evolution over time, the share of registered wineries in the demand for grapes is increasing.

Table 2. Wine producers by origin of grapes in 2020

Type of wine producer	Grape origin	Number	Total kg of grapes	Average kg of grapes	% average of own grapes
Registered wineries	100% own grape	77	377,855	4,907	100.00
	Own and purchased grapes	106	4,798,017	45,264	27.77
	0% own grapes	38	1,606,622	42,280	0.00
Other wine producers	100% own	324	1,243,400	3,838	100.00
Total wine producers	100% own grapes	401	1,621,254	4,043	100.00
	Own and purchased grapes	106	4,798,017	45,264	27.77
	0% own grapes	38	1,606,622	42,280	0.00

Source: prepared by authors based on PD records provided by the ICCA

Among the registered wineries are the so-called *bodegas comarcales* created with public support during the period of economic growth between 1994 and 2007. These wineries produce mainly with grapes from their local area, in accordance with the reason for their creation. Management is carried out under different organisational forms; some are companies that include the grape growers among their shareholders and others are cooperatives.

Another relevant feature of the Canary Islands' grape market is that transactions are conditioned by the existence of PDOs. In particular, the creation of the PDO Islas Canarias in 2011 has made it easier for member wineries to buy grapes in other wine-grape zones without having to renounce the quality label of a PDO. However, it is not easy to assess the volumes of grapes that give rise to wine qualified under this PDO. At the time of making their production declarations (PDs), winemakers may not be certain of the PDO under which they are going to qualify their vinified production and, therefore, there may be duplications in the registers. To avoid them, it was decided in such cases to allocate all the production subject to duplication to the specific PDO of the wine-grape zone, thus minimising the size of the PDO Islas Canarias. However, this

relative weight would be substantially higher if it is assumed, on the other hand, that the wineries that declare part of their production under the PDO Islas Canarias end up qualifying all their production under this PDO. In fact, in the minimum estimate, the PDO Islas Canarias accounts for 8.0% of the PD grapes in 2020, a weight clearly lower than the 22.6% in the maximum estimate. If these estimates are compared with the volumes of qualified wine according to the campaign reports of the protected designations of origin of Spanish wines published by the Spanish Ministry of Agriculture, Livestock, Fisheries and Food, it can be seen that in 2017/2018 to 2019/2020 campaigns the average weight of the PDO Islas Canarias accounted for 11.7% of the total qualified wine of the Canary Islands, a share closer to the minimum estimate (between 4 and 8% in the 2018-2020 triennium) than to the maximum estimate (over 20% in the latter three-year period). Whatever the actual volume of grapes processed by the PDO Islas Canarias, there is no doubt that its appearance is a potentially significant change in the territorial mobility of grapes. It is, therefore, appropriate to analyse its relative importance in the territorial dimension of transactions between supply and demand for grapes in the Canary Islands' market.

### **3.2 Territorial dimension of transactions**

Buying and selling transactions connect the places where grapes are produced with the places where they are processed. This territorial perspective of transactions is influenced by the geographical dimension (the fragmentation of the territory into zones (or islands), with the corresponding difference between inter-zone and intra-zone transactions), but also by the institutional dimension (the existence of PDOs). The zone and institutional dimensions may coincide in their territorial demarcation, but the assignment of supply and demand to a PDO introduces an additional element: the restriction on the mobility of grapes, as the PDO certifies the exclusive origin of processed grapes by its territorial area. If there are territorial overlaps between PDOs, as in the case of the PDO Islas Canarias, there may be inter-zone flows of grapes that are endorsed by this PDO with a higher territorial scope.

As mentioned above, in the HDs, grape growers indicate the location of the plots where grape production was obtained and, assuming all deliveries from a given grower to any destination have the same origin of plots, these HDs allow approximations of transactions to be obtained for the period 2009–2020. However, in the HRs available since 2013, the wineries also indicate the plot of origin of the grapes purchased from each grower and, therefore, a more accurate picture of these transactions can be obtained for these years. However, whether considering the HD or the HR, it turns out that transactions between zones on different islands are very limited in

amount. Considering the HRs for 2020, they accounted for only 0.5% of the total market volume (33,000 kg). These flows are concentrated in shipments from Tenerife to Gran Canaria and others from La Palma, El Hierro and La Gomera to Tenerife (Table 3), with Lanzarote and Fuerteventura showing complete self-containment. The same conclusion can be drawn taking into account the data corresponding to the HDs, which are useful to note the evolution of these flows before and after the creation of the PDO Islas Canarias. A comparison of the 2009 and 2020 matrices shows that inter-island flows, which remain marginal, have increased. According to the HDs, inter-island flows represented barely 0.02% of total production in 2009, whereas in 2020 they accounted for around 0.5%, both if the HDs and the HRs are considered.

**Table 3. Matrix of inter-zone transactions in the year 2020 (tn)**

Wine-grape zone of origin	TA	YDI	VO	VG	AB	LP	EH	LG	GC	FV	LZ	TOTAL
TA	1,403.6	2.9	22.8						5.5			1,434.9
YDI	32.0	564.8	48.1		15.3							660.2
VO	53.7	2.4	895.7	7.3	29.2				1.4			989.8
VG	7.8			298.6	15.9							322.3
AB	27.1	7.9	25.8	25.9	900.0				9.1			995.8
LP		1.1			0.4	432.0						433.5
EH	10.8						125.6					136.4
LG	3.8		1.0					54.0				58.9
GC									324.8			324.8
FV										6.0		6.0
LZ											1,370.0	1,370.0
<b>TOTAL</b>	<b>1,539.0</b>	<b>579.1</b>	<b>993.5</b>	<b>331.7</b>	<b>960.8</b>	<b>432.0</b>	<b>125.6</b>	<b>54.0</b>	<b>340.8</b>	<b>6.0</b>	<b>1,370.0</b>	<b>6,732.5</b>

Note: TA (Tacoronte-Acentejo), YDI (Ycoden-Deute-Isora), VO (Valle de la Orotava), VG (Valle de Güímar), AB (Abona), LP (La Palma), EH (El Hierro), LG (La Gomera), GC (Gran Canaria), FV (Fuerteventura), LZ (Lanzarote).

Source: prepared by authors based on the records of HRs provided by the ICCA

On the other hand, transactions between zones within the same island are more frequent and have grown in volume over time. As Tenerife is the only island subdivided into several grape-growing zones, it is on this island that the intensification of flows between zones can be

observed. In 2009, with data based on HDs, only small transactions were observed (0.2% of the insular volume of grapes produced and vinified on the island itself) between the Valle de Güímar and Tacoronte-Acentejo; in 2020, these flows between Tenerife zones have diversified and expanded, reaching 6.5% or 7.4% of the vinified production on the island according to data from HDs or the HRs, respectively. According to the HRs, the main destination of these flows in 2020 is the Tacoronte-Acentejo zone (37.2%), followed at a great distance by Valle de la Orotava (29.8%) and Abona (18.7%). The most relevant zones as grape issuers are Ycoden-Daute-Isora (29.4%), Valle de la Orotava (28.6%) and Abona (26.7%).

Considering again the whole of the Canary Islands' grape production in 2020, the opening rates, calculated as the quotient between the sum of entries plus exits and the total volume of grapes produced in the zone, show wide differences. As already indicated, these rates are zero in the zones on the islands of Fuerteventura and Lanzarote. They are also very low in La Palma but somewhat more relevant in Gran Canaria, which receives grapes from Tenerife and does not send them to any other island. And, as expected, the highest opening rates correspond to the five zones of the island of Tenerife, ranging from 11.61% in Tacoronte-Acentejo to 19.38% in Valle de la Orotava.

The origin-destination matrices between municipalities (see Appendix I), which are not shown for reasons of space, make it possible to identify the municipalities with the greatest weight as senders or receivers of grapes. In this sense, considering the HRs in 2020, it can be concluded that the most relevant producing municipality is La Orotava, whose production represents slightly less than 10% of the total grapes produced in the Canary Islands, and other municipalities in Tenerife such as Santa Úrsula, La Victoria, Icod de los Vinos, Los Realejos or Vilaflor are also relevant, with relative weights close to 5%, as well as the municipalities of Tías and Tinajo in Lanzarote, with weights also close to 5%. If, instead of the production obtained, the quantity of grapes purchased for winemaking is taken into account, the most important municipalities are the Tenerife municipalities of Tacoronte and La Orotava, which each buy more than 12% of the Canary Islands' total, followed by the municipalities of San Bartolomé and Tías in Lanzarote, with relative shares of less than 10%.

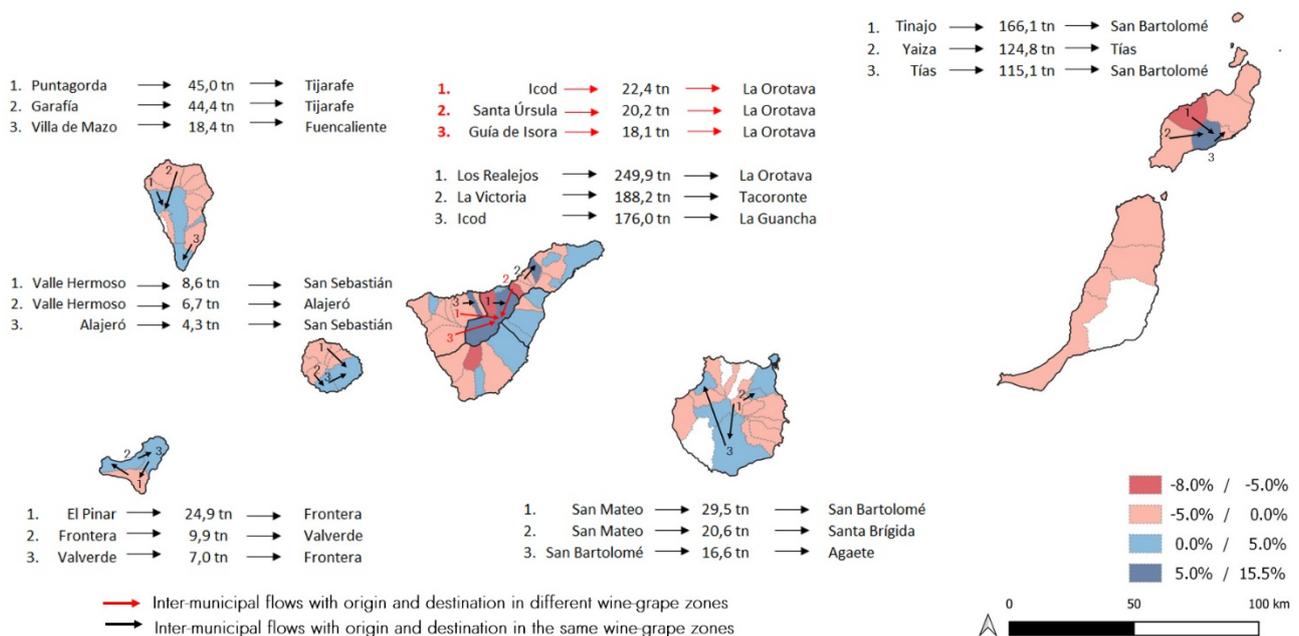
But, above all, these matrices facilitate the identification of the municipalities with the greatest participation in inter-municipal flows, either as receivers or emitters of grapes. Figure 3 shows the net reception shares of the municipalities in 2020, which are obtained by dividing the balance of inflows minus outflows of grapes from the municipality by the total inter-municipal grape flows.

Among the net receiving municipalities with the greatest weight in inter-municipal flows are Tacoronte (Tacoronte-Acentejo zone), La Guancha (Ycoden-Daute-Isora), La Orotava (Valle de la Orotava), Arico (Abona) and Tías (Lanzarote). In turn, the most relevant net emitting municipalities in these flows are Santa Úrsula (Tacoronte-Acentejo), Los Realejos (Valle de la Orotava), Vilaflor (Abona) and Tinajo (Lanzarote). Figure 3 also includes the links between the main net emitters (origins) and net receivers (destinations) in the inter-municipal flows of grapes.

A large part of these inter-municipal transactions take place within the wine-grape zones. According to the HRs for the year 2020, some of these transactions of more than 100,000 kg are, for example, those involving grapes from Los Realejos that are vinified in the wineries of La Orotava. Other transactions involve those between the municipality of Tacoronte, as the recipient and the municipalities of La Victoria and Santa Úrsula as the senders. There are also those involving the municipality of La Victoria and Santa Úrsula as the sender and the grapes from the municipality of La Victoria and Santa Úrsula as the recipient and the municipalities of La Guancha and Icod de los Vinos as the senders, as well as those from the municipality of Arico and Granadilla.

On the other hand, of more than 357,000 kg of grapes that were moved in 2020 between zones according to the HRs, it is worth noting that 95% originated in the municipalities of Tenerife. Moreover, of these transactions between zones in Tenerife, 95% were also destined for another zone in Tenerife. La Orotava, Vilaflor, Los Realejos, Arona, Guía de Isora and Icod de los Vinos stand out among the municipalities of Tenerife that are most important as senders in the flows between the wine grape zones of Tenerife. In turn, the receiving municipalities with the greatest weight in the flows between the Tenerife's zones are La Orotava, El Sauzal, Arico, San Miguel and Tacoronte. Within the limited volumes of grape trade between zones, the links between those on the northern slopes of Tenerife (Tacoronte-Acentejo/Valle de la Orotava/Ycoden-Daute-Isora) and, in turn, between municipalities in relatively close geographical proximity, as in the case of grapes leaving Icod de los Vinos and Santa Úrsula for La Orotava, are of greater relative intensity (see Figure 3).

Figure 3. Relative weight of the municipal balance of inflows and outflows in total inter-municipal flows (year 2020; %), main flows by origin and destination

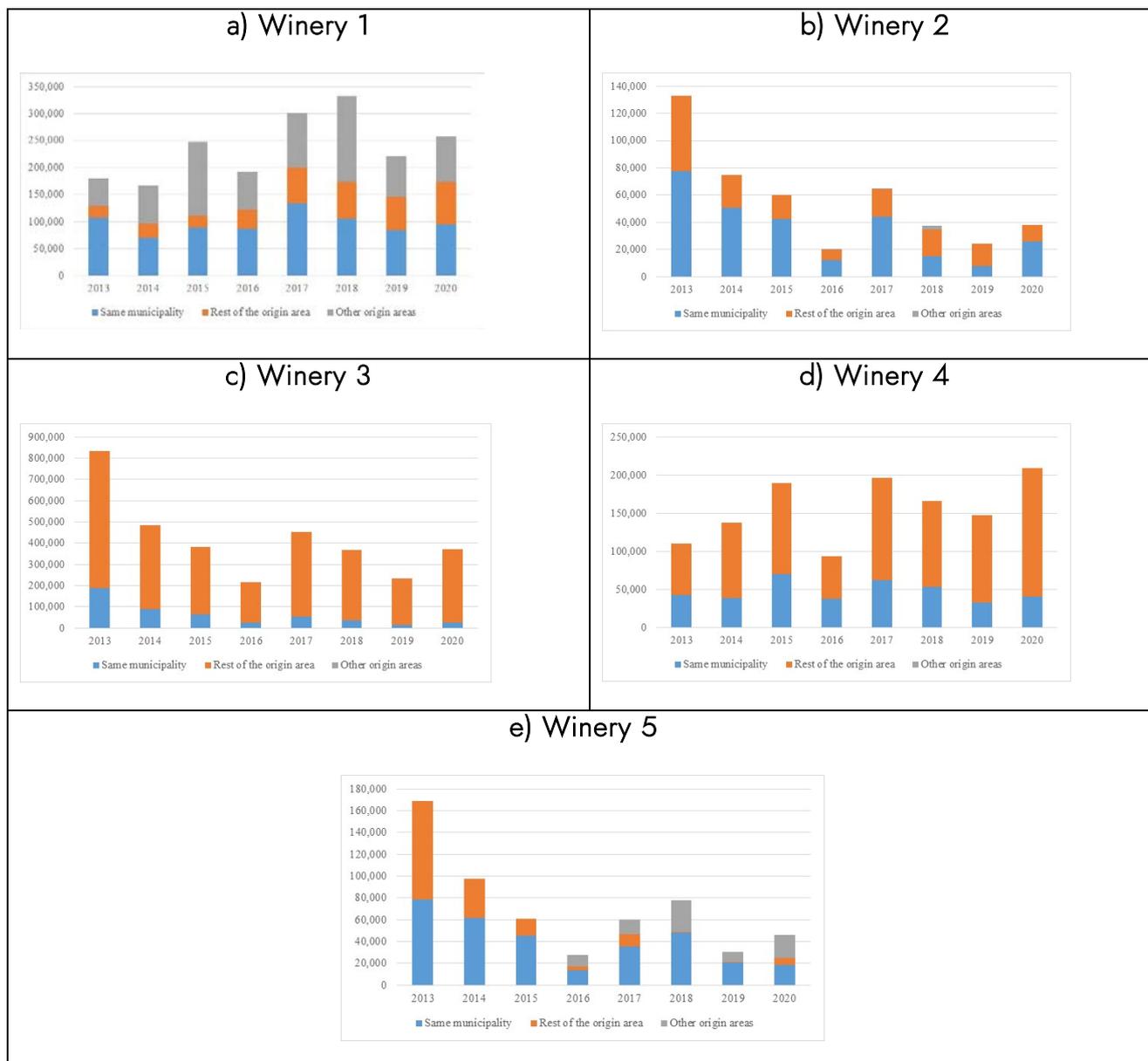


Source: prepared by authors based on the records of HRs provided by the ICCA

### 3.3 The territorial dimension in wineries' sourcing strategies

The results relating to the territorial dimension of transactions and, in particular, the recent diversification of flows between wine zones, reflect wineries' grape supply strategies. To illustrate these strategies, some representative wineries have been chosen, both in terms of their size and the different territorial strategies they follow. The first (Winery 1) is located in Valle de la Orotava and the second (Winery 2) in the Tacoronte-Acentejo zone. Both wineries were already operating before the creation of the PDO Islas Canarias and both joined it in the first years after its creation, but they have followed different patterns in their territorial supply strategies. The third winery (Winery 3), also located in Tacoronte-Acentejo, is a case of a larger winery focused exclusively on acquiring grapes in the area of its Designation of Origin. The fourth winery (Winery 4) is in the same zone as Winery 3, and its supply strategy is also limited to that zone, but its size is smaller. The fifth winery (Winery 5) is similar in these attributes to Winery 4, but it joined the PDO Islas Canarias late, with a different strategy to that employed by Winery 2. Other large-volume wineries located in different wine-grape zones have not been analysed individually in this section because they have not undergone any modification in their PDO membership or substantial changes in the territorial dimension of their grape sourcing strategies.

Figure 4. Origin of grapes (kg) in the selected wineries

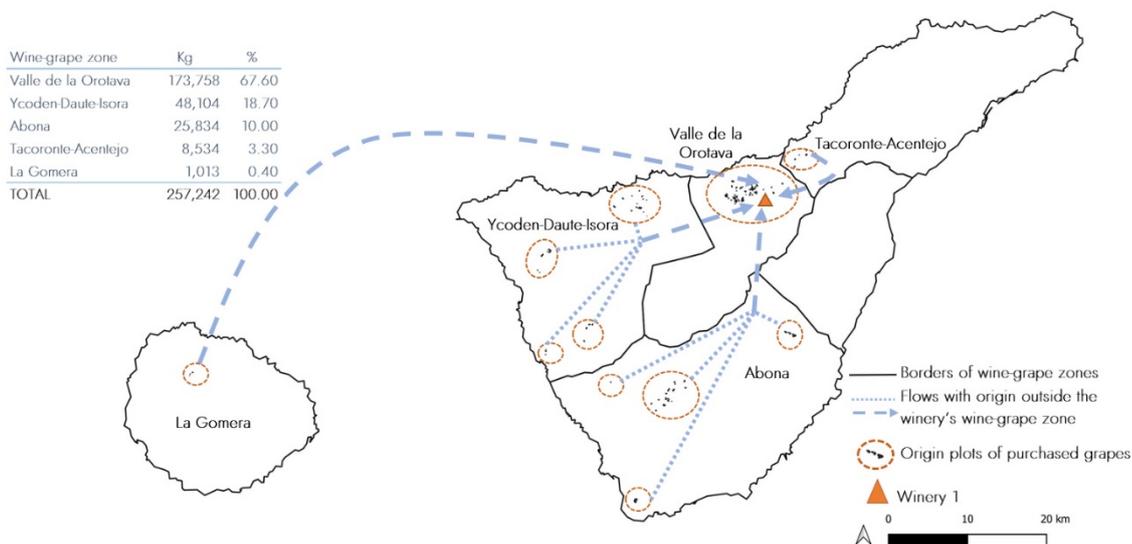


Source: prepared by the authors on the basis of the records of HRs provided by the ICCA

Winery 1 handles an annual volume of between 200,000 and 300,000 kg of grapes and from the date of creation of the PDO Islas Canarias, it began a path of growth that led it to double the volume it vinifies, including both its own grapes and purchased grapes (Figure 4-a). The additional volume is mainly grapes purchased in other zones, although it has also opted to increase purchases in the zone in which it is located. Grapes purchased outside its wine-grape zone in 2020 come mainly from the rest of the island of Tenerife, particularly from Abona (municipalities of Arico, Arona, Vilaflor) and Ycoden-Deute-Isora (municipalities of Santiago del Teide, Icod de los Vinos, Guía de Isora) (Figure 5). It also buys from other islands, although in

limited quantities (La Gomera). The strategy followed by Winery 1 can be labelled as growth based on territorial diversification of the supply strategy.

Figure 5. Winery 1: territorial distribution of grape origin in 2020



Source: Prepared by the authors on the basis of the records of harvest reports provided by the ICCA

By contrast, Winery 2 processes grape volumes ranging widely from a low of 10-20 thousand kg to a high of 120-130 thousand kg (Figure 4-b). There is no clear trend, but over the last few years volumes have decreased considerably. Unlike Winery 1, joining the PDO Islas Canarias is not associated with an expansionary path. This is also reflected in the low contribution of grape purchases from other wine-grape zones (originating in La Palma and Valle de la Orotava), so the reason for joining the PDO may have been different (commercial reasons, reasons for leaving the PDO in which it previously operated). This strategy can be described as localist and not expansive.

Apart from these two examples of wineries belonging to the new PDO Islas Canarias, different patterns in the supply strategies can also be detected in the wineries that still belong to one of the previously existing PDOs. Also in this group, two examples have been selected. Winery 3 handles highly variable volumes between two hundred thousand and one million kg of grapes, with no clear pattern of expansion or contraction (Figure 4-c). Its grape supply is centred on the purchase of grapes from its own wine zone, with the municipality where it is located being of relatively limited weight and the relevance of its own grapes being almost nil. Grape purchases

are made in all the municipalities of the wine zone. Its supply strategy can be labelled as non-expansive but diversified within its own zone.

Unlike Winery 3, Winery 4 is smaller in size. It is located in the same wine zone as Winery 3 and has experienced strong growth in the volume it handles to almost 200 thousand kg of grapes (Figure 4-d). This expansion is based on the purchase of larger volumes of grapes from the rest of the zone and, in recent years, on the expansion of its own grape production in municipalities other than the winery's location. Its strategy is, therefore, expansive and focuses on local origin through a combination of higher levels of own production and the expansion of purchases in an increasing number of locations. The municipalities of Tegueste, La Laguna and El Sauzal are the main base for this selective diversification.

Winery 5, located in the Tacoronte-Acentejo zone, like wineries 3 and 4, currently handles a volume of grapes of less than 50,000 kg and has been on a downward trajectory between 2013 and 2016 (Figure 4-e). From that year onwards, it managed to halt the decline by purchasing grapes from other wine zones, purchases that have been replacing other sources within the zone in which it is located. In this sense, Winery 5 employs a strategy that is not expansive and at the same time substitutes local grapes with grapes from other zones. It is possible that the grape price differential is an important criterion in this strategy.

None of these wineries have resorted to the acquisition or leasing of plots of land located in zones other than the winery's own location. On the contrary, those that have opted for territorial diversification have done so through the purchase of grapes.<sup>13</sup>

#### **4 Discussion of results**

The distribution of grape production among the geographical zones needs to be estimated considering the information about registered production for these territories and the estimates of the undeclared part of production. In this sense, and despite the trend towards increasing formalisation through registration, it has not been observed that short harvest years imply a greater propensity not to declare grapes, as might occur if the grape growers gave preference to making their own wine in the informal circuit over the possibility of declaring their sale to another winery. Neither has it been detected whether the size of the informal sector increases, in relative

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13 Although they are not included in the text for reasons of space, the analysis of the HRs for all the wineries that made them reveals that the volume of own grapes coming from zones other than the one where the winery is located has a very marginal weight in all the transactions carried out in the grape market in any of the years of the period analyzed.

terms, when better harvests are obtained, which could reveal the function of the informal circuit as a secondary market for adjusting production surpluses.<sup>14</sup> On the other hand, and even though the informal circuit encompasses both grape production and processing, registered wineries have been found to absorb an increasing proportion of the grapes vinified in the formal segment. These two trends suggest a growing professionalization of the wine business and its transactions. And these changes cannot be seen as unrelated to the shift in demand for wine, more oriented towards PDO bottled product.

Another relevant feature of the grape market in the Canary Islands is that it is geographically isolated i.e., grape imports for wine production are marginal and wine exports are insignificant and segmented into islands, which entails additional transport costs that limit inter-island trade. Moreover, segmentation is intensified by an institutional element that identifies the geographical area of grape-growing zones with the area covered by the specific PDOs of these zones. This institutional element, which particularly restricts transactions between wine-grape zones on the island of Tenerife (divided into five wine-grape zones with their corresponding PDOs), has been weakened to some extent by the recent appearance of the PDO Islas Canarias.

Transactions between grape growers and wine producers have a territorial dimension conditioned by the aforementioned segmentation and, obviously, also by the location of suppliers and customers. The geographical distribution of grape growers is largely due to the tradition maintained by small farmers in medium altitude areas unsuitable for export crops such as bananas or avocados, although there are some crops integrated into farms of a certain size linked to registered wineries and located in both coastal and highland areas. In terms of zones, history also plays a role in identifying the most productive islands (Tenerife, Lanzarote and La Palma) as opposed to others with marginal crops (Fuerteventura). Indeed, this history explains why many wineries arose from vineyards and, consequently, the geographical distribution of grape demand is remarkably similar to that of supply in terms of islands and wine zones, within which it is possible to identify net emitting and net receiving municipalities. The former tend to concentrate a large number of small grape growers, while the latter are home to the wineries that vinify larger volumes of grapes.

These characteristics of the Canary Islands' productive structure are, to a greater or lesser extent, shared by part of the wine sector in the south of the European continent. The structural

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14 This role has been highlighted by Pomarici et al. (2021) in the Italian market.

differences between the so-called *Old World* and the *New World* are reflected in the ownership structure, the historical path that has shaped transactional relationships, and the way in which quality parameters are anchored in certain attributes, such as the emphasis on geographical origin in the case of Europe (Anderson et al., 2003).<sup>15</sup>

Although the importance of the undeclared market share seems to be decreasing, behind many of the transactions currently recorded there is an informal and stable relationship between grape growers and wineries that is the result of geographical proximity. North (1990), in the field of institutionalist economics, underlines the importance of path-dependency and embeddedness in the organisation of transactions. The limited use of formal contractual relations in the case of proximity grape growing is related to informal institutions (creation of inter-annual bonds of trust), the greater ease with which the winery can control the work of grape growers (information), the presence of shared specific knowledge about grape and wine production in the area, and the possibility of achieving the implementation of what has been agreed (enforcement) through proximity relations. In this sense, geographical proximity, highlighted in the introduction as spatial-temporal encapsulation, has a specific link with transactional aspects in the grape market.

The above segmentation elements are the main factors behind transactions that rarely go beyond the borders of the grapes' zones of origin. This is also due to the strategy of those wineries, the majority, which do not seek to purchase grape varieties that are especially adapted to certain geographical areas, and which are not available in nearby locations. If there is a certain homogeneity in quality and price, the distance between vineyard and winery works against the chances of the transaction taking place. However, since the creation of the PDO Islas Canarias has allowed the mobility of grapes between zones, there have been transactions of this type that seem to be more the result of the initiative of wineries contacting growers in other areas than of the sales strategies of the growers themselves. One of the possible explanations could be related to commercial strategies that favour the sale of wine to consumers who identify the Canary Islands better than a specific wine zone, although exports are quite limited, and some of the main export protagonists have maintained their affiliation to the specific PDO of their wine zone. Another explanatory factor could be the price differential for grapes of the same variety and similar quality. What the available information reveals is that some of the wineries that have opted to join the PDO Islas Canarias have grown in parallel with the territorial diversification of their self-supply

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15 For a critical view of the Old and New World distinction, see Banks & Overton (2010). On the link between origin and quality in the European case, see Gangjee (2017), and its growing relevance in other countries, such as Japan, is highlighted in Kodama (2019).

strategy (producing grapes instead of buying grapes). It seems, therefore, that they have sought, above all, to supply themselves with enough grapes to increase their wine production and these decisions are not guided by price differentials. Simultaneously, some wineries have based their growth strategies on their own grape production or buying grapes from the zone where they are located.

In short, although the creation of the PDO Islas Canarias has contributed to an increase in inter-wine zone transactions,<sup>16</sup> the grape market is still largely focused on intra-wine zone transactions and, within each of the zones, a small number of wineries often act as magnets for grapes from the different municipalities in the zone in question. The future of inter-wine zone transactions, driven by the PDO Islas Canarias, depends crucially on the ability of its wineries to increase wine sales and thus create a greater demand for grapes. Moreover, competition for grapes will intensify if the abandonment of vineyards continues the trend of recent decades. Other forthcoming institutional changes may also have an impact as the creation of an additional PDO, the PDO Tenerife, is being promoted. With much of the movement of grapes between zones being located on this island, competition for grapes in Tenerife would increase even more.

As of 2009, the surface area of vineyards in the Canary Islands has decreased by a third to 5,946 ha in 2020. This process of progressive abandonment reveals the difficulties in maintaining the crop in a context of high production and opportunity costs, even with POSEI subsidies<sup>17</sup>. In this context of decline, the positioning of the final product (wine) through marketing efforts based on differentiation (quality and origin certified by PDO) is the main asset to stop and reverse the downward trend. This strategy also includes wine tourism initiatives, in which the territory plays a crucial role in the creation of an experience economy (Pine and Gilmore, 1998; Godenau, 2008) and its contribution to the future viability of the sector. The rich

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16 The creation of a supraterritorial PDO has also been used in other contexts. An example in Spain is the PDO Cataluña, created in 2005 after the other PDOs covering parts of the Catalan territory had already been established. PDO Cataluña has 40,660 ha and 6,349 grape growers registered in the 2019/2020 campaign, according to the report about the Spanish Protected Designations of Origin for Wines. These values are similar to the sum of the hectares and grape growers of the remaining ten PDOs in Cataluña –if PDO Cava (sparkling wine) is excluded–, indicating a wide coverage of the double adscription of actors at both territorial levels. The wine production of PDO Cataluña reached 347,288 hectolitres, 49% of the total production of PDOs in Cataluña (PDO Cava excluded). About half of the PDO Cataluña production is sold on foreign markets, a fact that reveals that the positioning on foreign markets may have been at the origin of its creation.

17 The EU programme of options specific to the remote and insular nature of certain Community regions is known as POSEI and integrates the so-called “outermost regions” in the European Union, including the Canary Islands. As part of the POSEI, the Community Programme to Support Agricultural Productions in the Canary Islands provides subsidies to local agriculture. Action I.3 focuses on the maintenance of vineyards (aid per hectare), Action I.6 on support for winemaking (cellars) and Action I.7 promotes exports.

diversity in local products and landscapes linked to wine production generates inputs for other activities, such as tourism. A productive fabric fragmented into small businesses on a local scale also increases this diversity. Nevertheless, fragmentation into smallholding structures entails certain drawbacks regarding economies of scale, which is why defenders of the unification and merger of the multiple PDOs in the Canary Islands underline the need to reduce production costs through the territorial mobility of grapes supplied to wineries growing in size. However, to date this "market logic", already applicable through potentially free grape mobility under the protection of the Canary Islands PDO, does not seem to have triggered a clear process of concentration in larger production units.

## 5 Conclusions

An examination of transactions between grape growers and wine producers in the Canary Islands in recent years leads to the conclusion that the market is highly fragmented, with island borders only rarely crossed. This segmentation of regional territory is linked to geographical reasons arising from fragmentation into islands with additional transport costs between them as well as to institutional territorial divisions through local PDOs that restrict the spatial mobility of grapes used for quality wines. Moreover, wine producers vinify grapes that have been grown mostly on plots located in the same wine-grape zone where the winery that processes them is located, even after the creation of the PDO Islas Canarias in 2011 allowed transactions between zones and islands without losing the quality label associated with a PDO. However, only on the island of Tenerife have these transactions between zones acquired some weight.

And although the creation of the PDO Islas Canarias favours transactions between different wine zones, only a low number of wineries have developed growth strategies based on the purchase of grapes outside the zone where they are located. It does not seem, therefore, that the possibility of capturing grapes in larger markets is the reason for the registration of wineries in this PDO. In the growth strategies detected among the bigger wineries the purchase of geographically distant inputs due to price differentials does not seem to be relevant. Most of the grape mobility is linked to other reasons, like access to land for expanding the wineries' own grape production or the purchase of varieties contributing to the oenological differentiation that are scarce in the zone where the winery is located.

Most transactions take place within wine-grape zones that are institutionally reinforced by specific PDOs. Within these zones, the internal territorial pattern of the grape market is strongly conditioned by the location of the wineries that concentrate larger shares of grape demand in the

municipalities of their location. Thus, it is possible to identify municipalities that are clearly net receivers, while others are net senders of grapes. The location of wineries that turn these areas into net receivers is related to several reasons, such as centrality for minimizing transport costs in the surrounding crop cultivation area, access to public infrastructures (road network, water supply and sewer system, electricity), availability of land with permits for construction and industrial activities, and historical patterns of land ownership and crop processing facilities. In any case, the results obtained are conditioned by the scope and limitations of the sources of information used. The statistical information used in this study offers some advantages. As it is a register and not a survey, it has a wide coverage of transactions between grape growers and wineries. Also, as it is linked to the specific plots where production is obtained, it allows a detailed territorial disaggregation of transactions, even at infra-municipal level. It is also annual in nature, which facilitates the monitoring of the evolution of the patterns observed over time.

Of course, some of the potential explanatory factors for the territorial dimension of transactions in the Canary Islands' market could not be addressed due to the limited information on prices and contractual links. Systematised statistical data on grape varieties and qualities are also lacking. These limitations imply that the analysis will not be able to delve into the study of the business strategies expressed by the market agents themselves, and it will not be possible to obtain an insight into the vertical segmentation of the market in terms of prices and product qualities.

However, in addition to the territorial dimension of transactions in the grape market in the Canary Islands, the information available helps identifying the structural patterns of the purchase and sale of grapes from a broader analytical perspective. Specifically, we can focus on aggregate aspects such as the degree of concentration of supply and demand, and their evolution over time by geographical area. On the other hand, it is valuable to analyse individual strategies of the agents who do or do not participate in the market and who do or do not maintain stable relationships with grape growers or wine producers.

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original draft preparation, writing-reviewing and editing. José Ignacio González-Gómez: data curation, writing—original draft preparation, writing-reviewing and editing. Jose Juan Cáceres-Hernández: formal analysis, methodology, writing—original draft preparation, writing-reviewing and editing.

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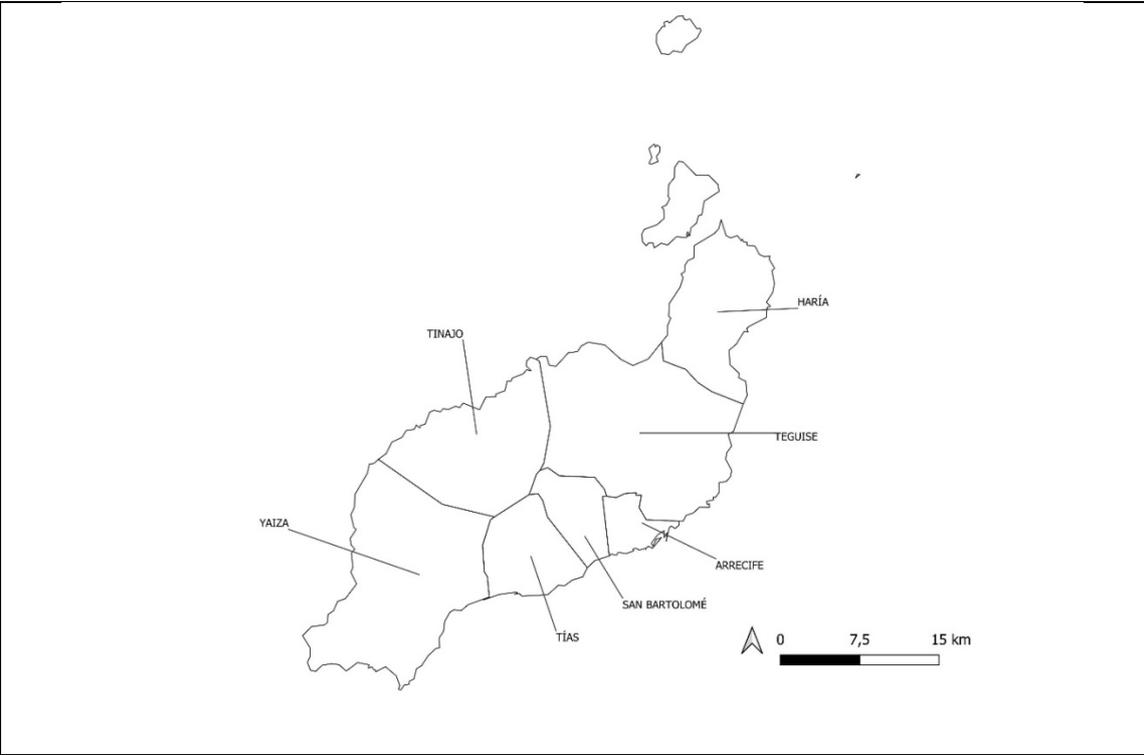
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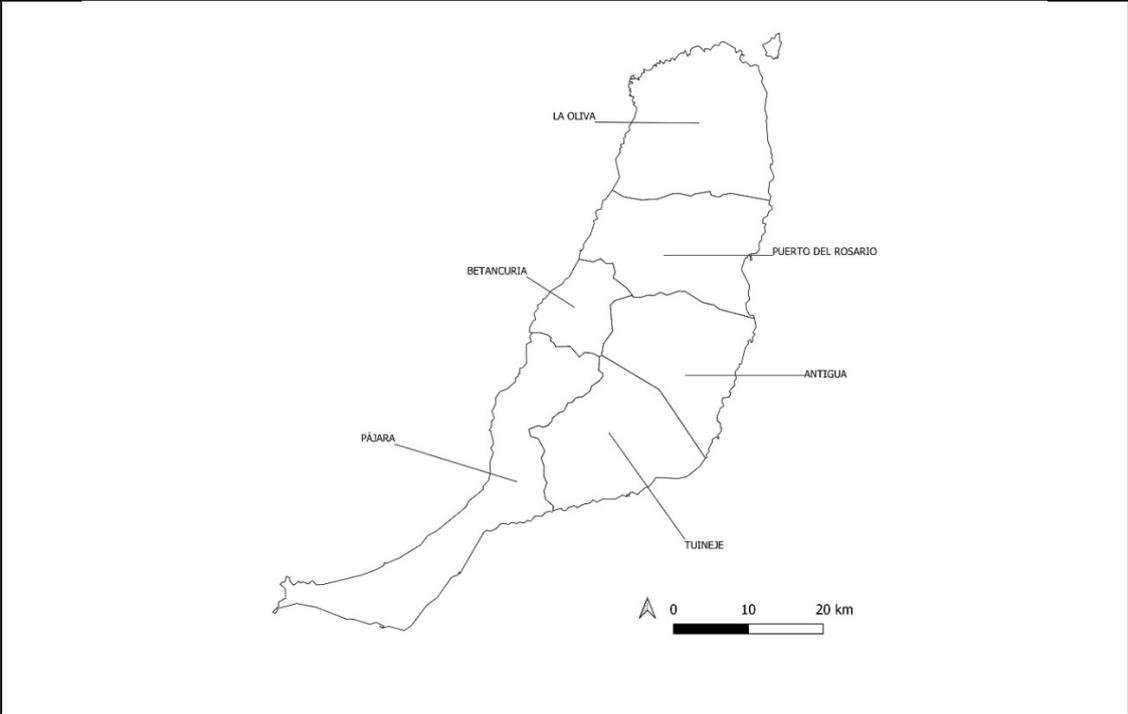
# Appendix I. Map of municipalities in the Canary Islands

Figure 1. Municipalities in Lanzarote



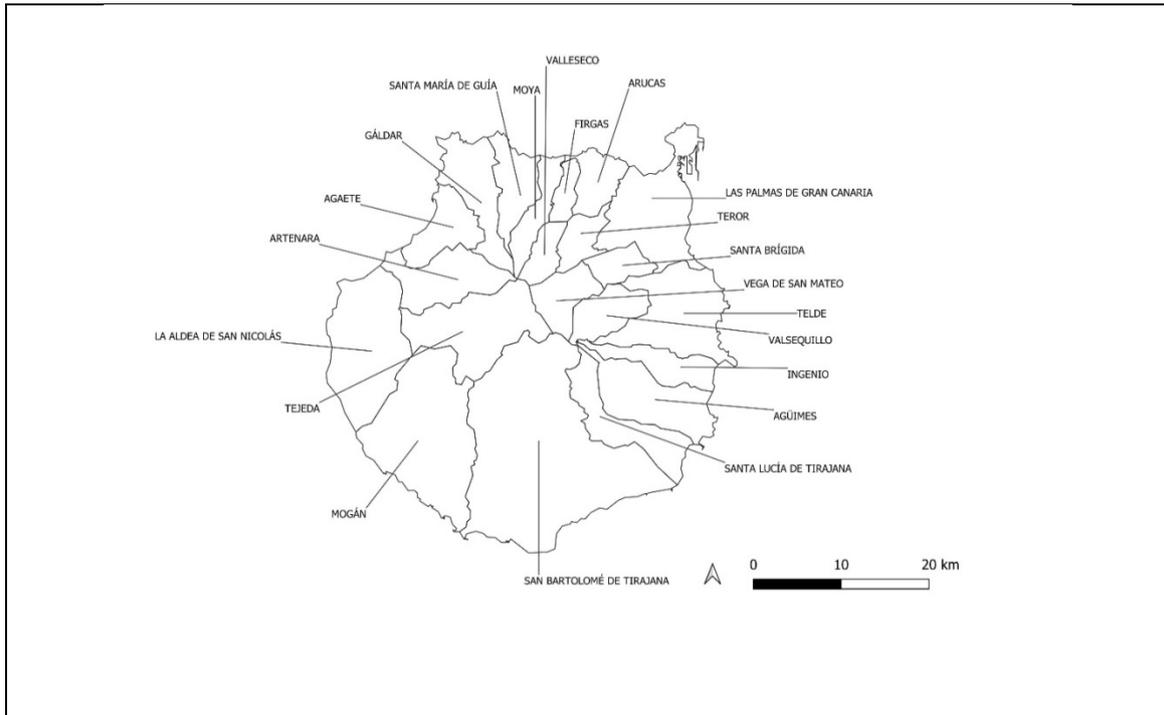
Source: GRAFCAN

Figure 2. Municipalities in Fuerteventura



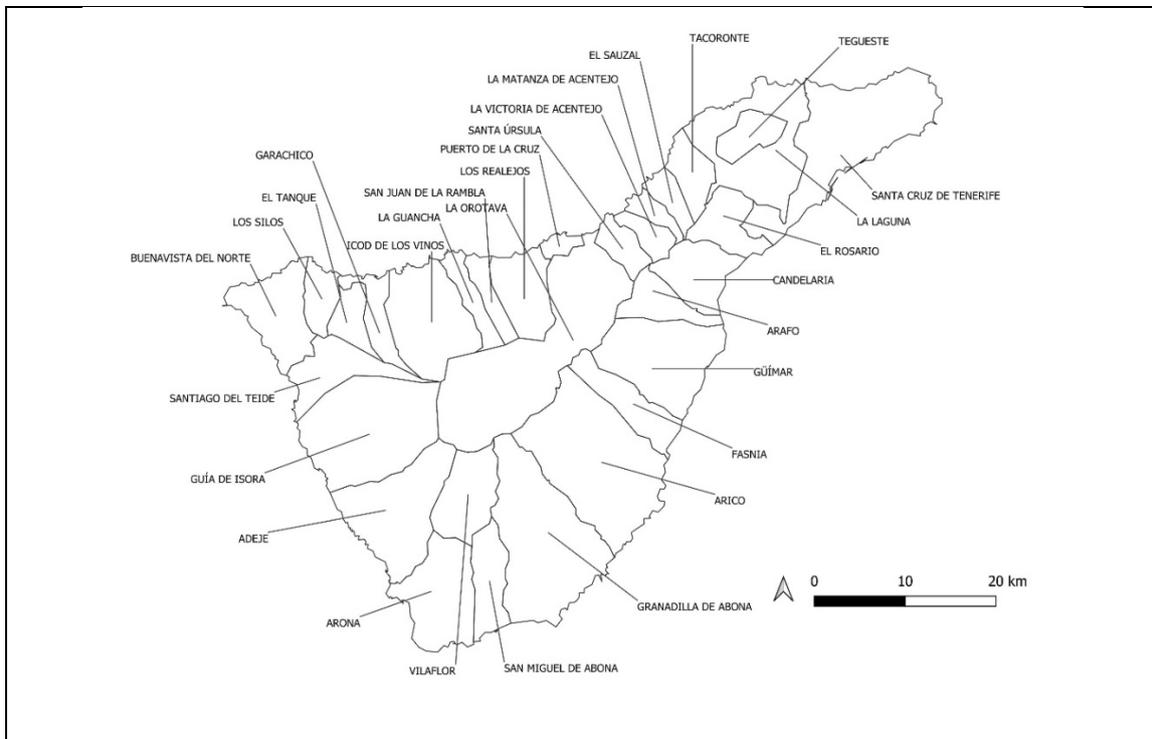
Source: GRAFCAN

Figure 3. Municipalities in Gran Canaria



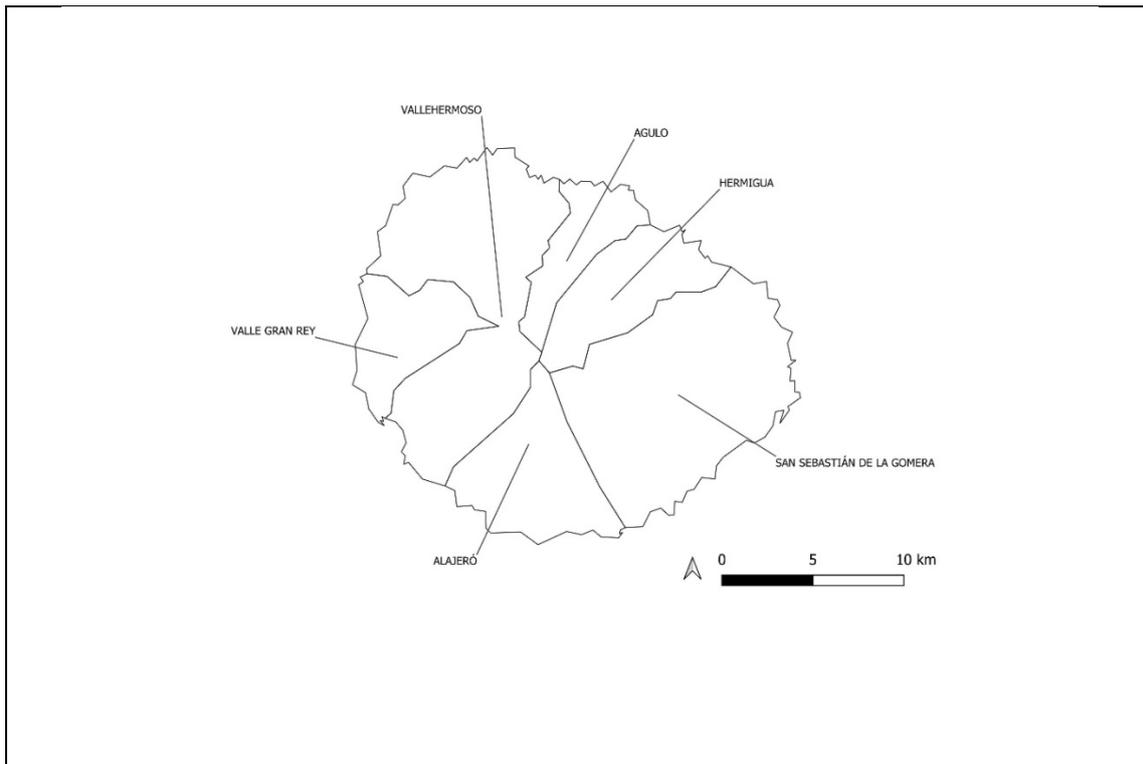
Source: GRAFCAN

Figure 4. Municipalities in Tenerife



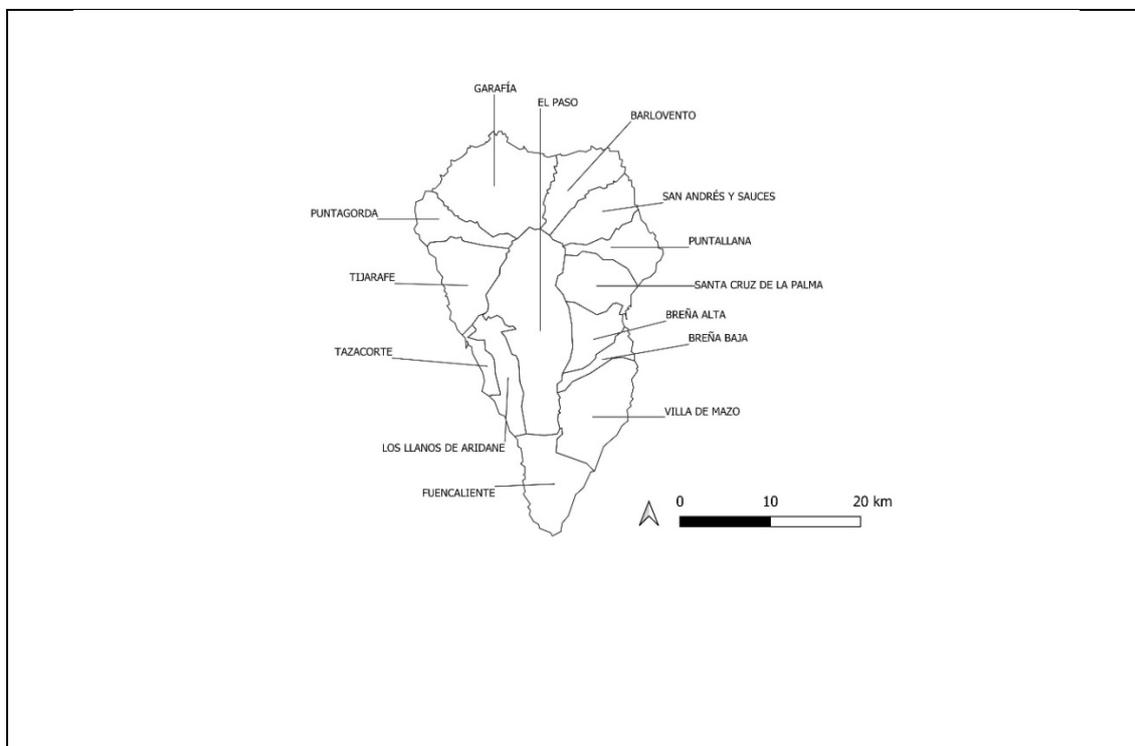
Source: GRAFCAN

Figure 5. Municipalities in La Gomera



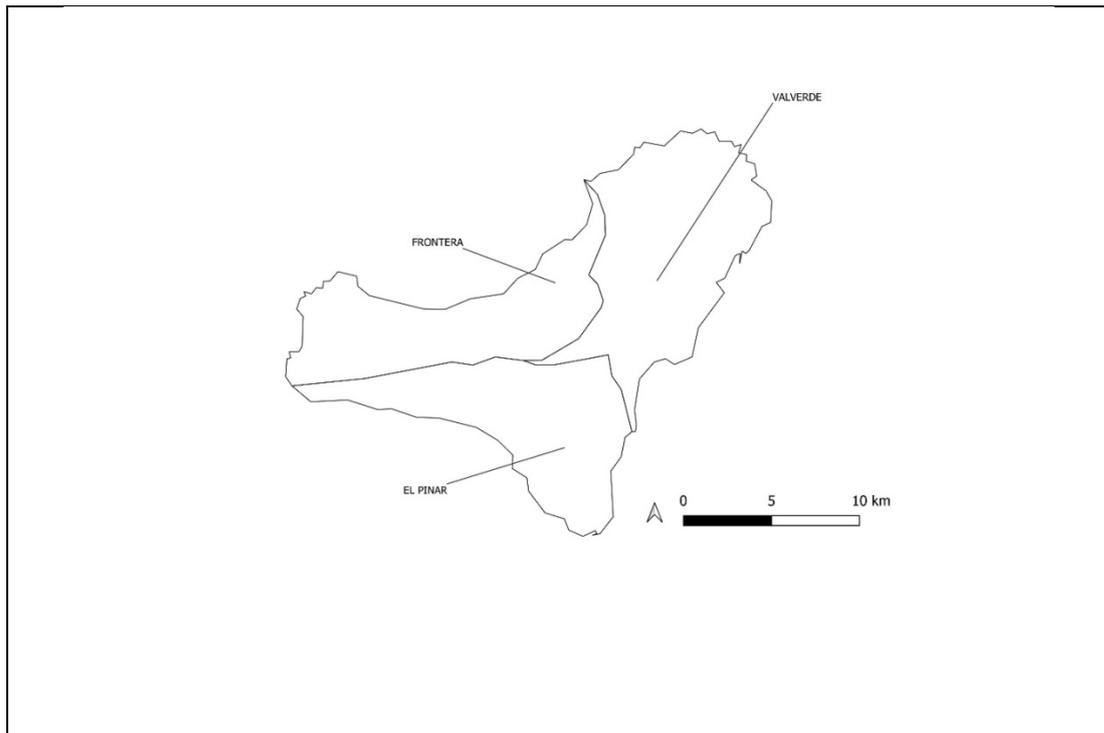
Source: GRAFCAN

Figure 6. Municipalities in La Palma



Source: GRAFCAN

Figure 7. Municipalities in El Hierro



Source: GRAFCAN