# The economic impact of the Tajo-Segura aqueduct on Alicante, Almería and Murcia

June 2020

Report prepared for:

SCRATS
SINDICATO CENTRAL DE REGANTES DEL ACUEDUCTO TAJO-SEGURA

# About this report

This report has been prepared exclusively for the 'Sindicato Central de Regantes del Acueducto Tajo-Segura'. The report presents the findings of the work performed by PricewaterhouseCoopers Asesores de Negocios, S.L. regarding the economic impact of the Tajo-Segura aqueduct. It has been prepared in accordance with our engagement letter, dated 20 March 2020, and its accompanying terms and conditions.

PwC does not accept any liability whatsoever with respect to third parties regarding any use that might be made of this report.

# *List of abbreviations*

CNAE: National Classification of Economic Activities (*Clasificación Nacional de Actividades Económicas*).

DIRCE: Central Directory of Companies, compiled by Spain's National Institute of Statistics (*Directorio Central de Empresas del INE*).

EBITDA: Earnings Before Interest, Taxes, Depreciation and Amortisation.

FEPEX: Spanish Federation of Associations of Producers and Exporters of Fruits, Vegetables, Flowers and Live Plants (*Federación Española de Asociaciones de Productores Exportadores de Frutas, Hortalizas, Flores y Plantas Vivas*).

FTE: Full-Time Equivalent.

INE: Spain's National Institute of Statistics.

MAPA: Ministry of Agriculture, Fisheries and Food.

OECD: Organisation for Economic Cooperation and Development.

GDP: Gross Domestic Product.

SABI: Iberian Balance Sheet Analysis System (*Sistema de Análisis de Balances Ibéricos*).

SAT: Agrarian processing company (*Sociedad Agraria de Transformación*).

UASA: Useful Agricultural Surface Area.

SCRATS: Central Syndicate of Farmers with Irrigation Rights of the Tajo-Segura Aqueduct (*Sindicato Central de Regantes del Acueducto Tajo-Segura*).

EU: European Union.

ADU: Agricultural Demand Unit.

UWA: Units of Work per Year.

GVA: Gross Value Added.

# Content

# Executive Summary

# *Executive Summary*

This report has been prepared by PricewaterhouseCoopers Asesores de Negocios, S.L. (hereinafter PwC) for the 'Sindicato Central de Regantes del Acueducto Tajo-Segura' (SCRATS). It contains the findings of a study performed by PwC to evaluate the socio-economic impact of the Tajo-Segura aqueduct on the regions that receive water.

Water carried by the Tajo-Segura aqueduct has two main uses: irrigation-based agriculture, which is the main purpose of the aqueduct water, and the supply of domestic and industrial water to support tourism. This study focuses on the **economic impact** of the first use, **irrigation-based agriculture and the main related activities**: marketing and processing of fruit and vegetable products, which are in the same value chain.

In order to measure the impact, we have taken into account not only the direct effects of the activities described above, but also the indirect and induced effects of the activities that form part of the value chain of the sectors that are directly affected by and/or that benefit from the increase in wealth in the region, and the associated increase in household consumption.

The study is based on qualitative and quantitative data from different databases and publications (MAPA, Regional Departments of Agriculture in the regions affected by the aqueduct, amongst others, INE, Datacomex, SABI, etc.), as well as from SCRATS. The estimation of the indirect and induced impact has been performed using an Input-Output model based on data from Spain's National Accounts.

## Agriculture is a strategic sector generating wealth in Spain

Agriculture, which is the main beneficiary of the water transported by the aqueduct, is a strategic sector and creates employment in Spain. Spain has an important competitive advantage that is difficult to replicate in other countries, thanks to the privileged climatic conditions, particularly in terms of hours of sunlight and temperature, which facilitate production even during the winter months. Spain is the European Union country in which the relative significance of the primary sector to the economy is the highest, well above the EU average and above countries such as Italy, Netherlands, France, Germany and the United Kingdom.

**Spain produces 13% of the European Union's farming produce**, a figure well in excess of its overall weight in the EU economy, which was nearly 9% of GDP in 2019, seven out of every 10 euros relating to the production of fruit and vegetables.

The farming industry is also **highly competitive internationally** and makes a positive contribution to the balance of trade surplus. In 2019, agricultural exports accounted for 6.4% of total Spanish exports and helped to bring down Spain's structural trade deficit by more than 17%.

The **agricultural sector's ability to balance the economy in times of recession is also noteworthy**. Although the sector is not immune to economic circumstances, it is less tied to the economic cycle than the majority of industrial or service activities and is generally more stable and resilient. For example, during the crisis period from 2008 to 2013, while the overall GDP fell by 9%, farming GVA rose by 1%.

Moreover, the **relevance of the function of farming as a provider of food** is increasingly critical. Certain circumstances such as international conflicts, pandemics, natural disasters or plagues may cause falls in production, price increases and even a shortage of certain products. In the face of these risks, the capacity to produce food without depending on imports will become increasingly necessary.

Agriculture also stimulates the development of a number of associated industries, including activities such as marketing and processing, as well as those that supply the agri-food sector with goods and services such as machinery, pesticides, transport or packaging. Overall, by boosting the economy, agriculture generates employment and helps preserve the rural population.

Our study findings show that farming is a strategic industry in Spain, so it is in the public interest to promote and preserve it.

## The irrigable areas affected by the aqueduct are key to this strategic sector

Although agriculture is hugely important to Spain's economy, it is even more relevant in the provinces irrigated by the Tajo-Segura aqueduct: Alicante, Almería and Murcia. In these provinces, **the relative significance of farming in terms of both GVA and employment is well above the national total**.

This activity is highly competitive at the national and international levels, as reflected by exports of agricultural produce, mainly fruit and vegetables. Taken as a whole, the three provinces affected by the aqueduct **account for 71% of Spain's vegetable exports** and 25% of fruit exports.

Farming also **creates jobs and helps to stop the local population from leaving rural areas**. The aqueduct and the resulting agricultural development in the area have helped to preserve and increase the number of inhabitants, the population of these three provinces having growth well above the rest of Spain in the past decades. For example, Alicante's population has doubled since 1970, while the Spanish average has risen by just 38%. This population increase has been even higher in the towns directly affected by the aqueduct.

The relevance of agriculture means that the availability of the aqueduct water is essential for irrigation purposes. At present, the Segura River Basin, where most of the surface area irrigated by the aqueduct is found, has a structural water deficit, since water resources are insufficient to meet total demand from crops. From the outset, this triggered a process of infrastructure modernisation and the increased use of technology in the search for greater efficiency and sustainability in water distribution.

But this was not enough and farmers are increasingly forced to turn to other complementary resources such as recycled or desalinated water.

As regards desalinated water, desalination plant (IDAM) infrastructures have developed significantly in recent years. There is one important advantage in the use of desalinated water, this being the inexhaustible nature of seawater. However, there are major disadvantages, such as low mineralisation and excessive boron, meaning that desalinated water cannot be used to irrigate crops directly; or high power consumption during the desalination process, entailing greater greenhouse gas emissions and significantly higher prices than the other conventional sources. These factors make desalination a necessary alternative but only on a complementary basis with respect to the other resources and, specifically, to the aqueduct.

# On aggregate, activities relating to agriculture in the aqueduct area contribute €3,000 million to GDP and support more than 106,000 jobs

## Agriculture

The opening of the Tajo-Segura aqueduct in 1979 allowed a considerable increase in water resources in the southeast of Spain, boosting irrigation-based agriculture in the areas benefited, which are now among the country's main agricultural areas in terms of production. The growth in farming has been accompanied by the development of numerous businesses engaged in providing services of different kinds to farmers, such as suppliers of very-high-tech, remote-controlled irrigation systems or engineering companies engaged in innovative projects to automate farming processes.

Agricultural output in the aqueduct area contributes nearly **€1,548 million to GDP**, which is equivalent to 2.4% of the aggregate GDP in Alicante and Murcia provinces. Of this amount, more than €646 million relates to direct impacts within the activity itself, which represents 28.3% of the total GDP contributed by the farming industry in the two provinces. Indirect and induced impacts exceed €901 million.

In terms of employment, the aqueduct contributes to the creation of 55,941 direct Full-Time Equivalent (FTE) jobs in the agricultural sector and 13,200 indirect and induced jobs, which particularly benefit sectors such as retailing, farming, accommodation and food and beverages. So the total impact amounts to 69,141 FTE jobs or 4.2% of the total active population in the provinces of Alicante and Murcia in 2019.[1]

## Marketing and processing

The development of agriculture in the aqueduct area has driven the creation and growth of companies and enterprises engaged in the marketing, distribution and processing of fruit and vegetable products.

**Marketing** encompasses product reception, quality control, wrapping, labelling, packaging and transport to the destination. This business activity adds nearly **€1,146 million to the GDP**, of which approximately €582 million reflects direct impacts. Indirect and induced impacts amount to almost €564 million, benefiting sectors such as land transport, real estate services (mainly the induced impact on household consumption), and rubber and plastics for wrapping and packaging. As regards employment, marketing contributes 22,233 FTE jobs, of which 13,617 (61.2%) are direct and 8,616 are indirect and induced, particularly favouring sectors such as land transport, rubber, plastics and retailing.

**Processing** is carried out by companies engaged in producing canned food, fruit and vegetable juices and nectars, jams and compotes, pickles and olives, and sauces, among other products. There are 138 processing companies in the aqueduct provinces, which contribute close to **€320 million to the GDP** thanks to aqueduct-related agricultural output, nearly €69 million being generated directly. Food products, agriculture and real estate services are among the sectors that most benefit from indirect and induced contributions. In terms of work, the aqueduct supports nearly 1,500 direct FTE jobs through the processing activity and a total of 5,856 FTE jobs, particularly benefiting the food, agriculture, security and research sectors, which include activities such as security services and systems.

[1] In terms of employed workers, the impacts of agriculture are as follows: direct impact of 61.733, indirect impact of 7,441 and induced impact of 6,965, making a total impact of 76,139.

## Total impact

Overall, **activities related to farming in the aqueduct area contribute more than €3,013 million to the GDP**, over 50% of which relates to agriculture. The aqueduct is also a powerful driver of employment, giving rise to an **absolute 106,566 jobs** in the provinces of Alicante, Almería and Murcia or 97,230 FTE jobs.

# 1

# Introduction: Purpose and scope

# *1. Introduction: purpose and scope of the study*

The Tajo-Segura aqueduct is one of the largest hydraulic engineering projects to have ever been completed in Spain. It opened in 1979 and facilitates the diversion of water from the Tagus River to the Segura River through a 292-kilometre-long channel, which is open for the most part.

The channel starts alongside the Bolarque Reservoir, between the provinces of Cuenca and Guadalajara. From Bolarque, water travels down to the Bujeda Dam (Cuenca), and then on to the Alarcón Reservoir (Cuenca), which sits at the head of the Júcar River. From there it continues through a 31.9 kilometre long tunnel that leads to the Talave Reservoir (Albacete). This reservoir is located on the Mundo River, in the Segura River Basin. After leaving the Talave Reservoir, the water enters the post-aqueduct infrastructures, through which it is distributed to all the irrigable zones. The main work of construction in the post-aqueduct infrastructure is the Azud de Ojós Reservoir, in the province of Murcia, from where the water is redistributed to Alicante, Murcia and Almería, for use in Zones I and II of the “Vegas Medias y Alta” area, on the Segura River, upstream from the reservoir. This redistribution is accomplished through two main routes:

- Main Channel on the Left Bank (Canal Principal de la Margen Izquierda) (82 kilometres). This takes water from the aqueduct to Zones III and IV of the “Vegas Medias y Alta” area, the province of Alicante and the Campo de Cartagena.

- Main Channel on the Right Bank (Canal Principal de la Margen Derecha). There are two sections to this channel, one of which is an 85-kilometre stretch that transports water from the aqueduct to Zone V of the “Vegas Alta y Media del Segura” area, the Mula River area and the Guadalentín Valley. The other is the Almería Channel (42 kilometres), which carries water from Lorca to the Almanzora Valley.

**Figure 1. Map of the Tajo-Segura aqueduct**


*Source: Prepared in-house using information furnished by SCRATS.*

The aqueduct water has two main uses: irrigation-based agriculture and the supply of domestic and industrial water.

As regards agriculture, this infrastructure was the driver of irrigation in the southeast of Spain, preventing desertification by allowing crops and trees to be grown. Thanks to the aqueduct water, an area with a structural water deficit has been able to develop modern, productive agriculture and become one of Europe's largest fruit and vegetable producers, to the point of becoming known as Europe's vegetable garden.

So agriculture is hugely important in the aqueduct area, both for wealth generation and employment, while the socio-economic relevance is not limited to the activity itself. Businesses associated with farming have been developed to create a large fabric of innovative industries engaged in farm technology, greenhouses, wrapping and packaging, and processing, among others. The agri-food sector is currently an essential socio-economic activity and one of the main economic drivers in the southeast of Spain, on which a considerable number of jobs depend direct and indirectly.

In all, the farming sector relies heavily on the water from the Tajo-Segura aqueduct. In a context of growing water scarcity and faced with the worsening of the situation in the future as a result of climate change, other complementary water resources have been promoted such as seawater desalination. Although desalination is a strategic resource able to complement the transport of water through the aqueduct and the Segura River Basin's own resources during the

driest years, it is not currently a competitive source, particularly due to the high price, which is unsustainable for most operations.

In this context, the **purpose of this study is to provide a measurement of the relevance of the economic activities related to the aqueduct water**. In order to obtain a measurement, we have taken into account not only the **direct effects** on agriculture, for which water consumption is essential to the production process, but also the **indirect and induced effects of the activities that form part of the value chain** of the sectors that benefit from the increase in wealth in the area, and the associated increase in household consumption.

In order to prepare the study, qualitative and quantitative data has been obtained from the main databases and publications, mostly related to agriculture (MAPA, Regional Departments of Agriculture in the regions affected by the aqueduct, INE, Datacomex, SABI, etc.), as well as from SCRATS. This report details the information sources used in the different analyses, as well as the related processing and analysis procedure, if applicable.

As indicated, the study focuses solely on assessing the economic impact on the areas that receive water, which is one of the relevant aspects of the aqueduct debate. So the study has not been performed from the perspective of a cost-benefit analysis and does not take into account or quantify other possible impacts (such as environmental effects or others) on the rest of Spain.

The report is divided into three additional sections:

- **Section 2** contextualises the study, providing a description of the significance of agriculture for both the national and regional economy, and of the irrigation water situation faced in the area.
- **Section 3** focuses on measuring the economic activities undertaken in the agricultural and related sectors (marketing and processing) in the region affected by the aqueduct.
- Finally, **section 4** sets out the main findings and conclusions.

# 2

# The aqueduct and agriculture in the context of the regional and national economy

# 2. The aqueduct and agriculture in the context of the regional and national economy

This section contains a reference framework for the impact analysis addressed later in this report. Firstly, the Tajo-Segura aqueduct is described as an irrigation water resource for farming in the southeast of Spain. There follows an analysis of the role played by agriculture as a strategic sector of the economy and society both nationally and regionally (in the three aqueduct provinces). This analysis will allow estimates of the economic importance of the impact of the Tajo-Segura aqueduct presented in section 3 to be put into context. Finally, we focus on the significance of the aqueduct water as an essential resource for irrigation-based agriculture in the southeast of Spain and the role of desalinated water as a complementary resource.

## 2.1. The Tajo-Segura aqueduct as a water resource for agricultural irrigation

Since it opened in 1979, the Tajo-Segura aqueduct allows surplus water to be moved from the head of the Tagus River to the Segura River Basin, an area that is highly productive from a farming viewpoint but has a structural water deficit.

As indicated, the water carried by the aqueduct is used for two main purposes: irrigation-based farming and domestic and industrial supply. In accordance with Law 52/1980,[2] the volume of water to be carried is determined on the basis of the regulated surplus flows from the Tagus River Basin, up to a maximum of 600 $hm^3$ per annum, distributed in 400 $hm^3$ for irrigation and 110 $hm^3$ for supply (initially allocating the remaining 90 $hm^3$ to losses during transportation and distribution).

As regards agricultural use, the aqueduct water is carried to the irrigation associations of Murcia, Alicante and Almería based on a certain allocation per irrigable area, as shown in Figure 2.

**Figure 2. Distribution of aqueduct water allocated to irrigable areas**

| Irrigable areas | Allocation ($hm^3$/year) |
|---|---|
| Vega Alta and Media del Segura (Murcia) | 65 |
| Regadíos de Mula and local area (Murcia) | 8 |
| Lorca and Guadalentín Valley (Murcia) | 65 |
| Levante left bank and right bank, Vegas Bajas del Segura and salt marshes (Alicante) | 125 |
| Campos de Cartagena (Murcia) | 122 |
| Almanzora Valley (Almería) | 15 |
| **Total** | **400** |

*Source: Law 52/1980 of 16 October on the Economic Scheme for the Tajo-Segura Aqueduct.*

[2] Law 52/1980 of 16 October on the Economic Scheme for the Tajo-Segura Aqueduct.

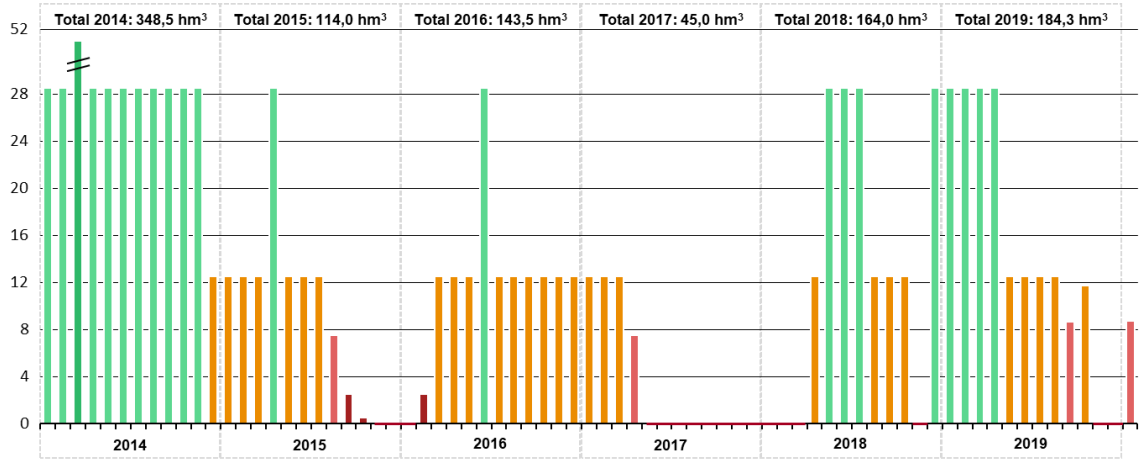
These areas have an associated net farmland of 126,086 ha. Most of this farmland is in Murcia (78,144 ha), followed by Alicante (44,111 ha) and Almería (3.831 ha).[3]

The figures in Figure 2 are maximum allocations. Effective allocations are decided at the beginning of each month (or quarterly or six-monthly, if conditions allow it) based on the overall volumes at the head of the Entrepeñas and Buendía reservoirs which, in turn, are measured based on four levels numbered 1 to 4, in order to arrange transportation of the potential allocations. Level 1 relates to a situation in which the volume of water at the head of the reservoir is equal to or above 1,300 $hm^3$, in which case water may be released in a volume of 60 $hm^3$/month, without ever exceeding 600 $hm^3$ per annum. Conversely, level 4 refers to a situation in which the volume of water at the head is below 400 $hm^3$, in which case no water may be released.[4]

In the past, the maximum annual volume of water transported only reached the annual maximum authorised amount on one occasion (in water year 2000-2001). In practice, in view of the low contributions and levels at the head of the Tagus River, the volumes actually carried have been significantly lower, particularly in recent years.

Figure 3 shows the monthly volumes authorised for transportation from the source of the aqueduct for irrigation uses in the last six years (2014 to 2019) and the total for each year.

**Figure 3. Volumes authorised for irrigation ($hm^3$)**




*Source: SCRATS and data prepared in-house.*

Effective water volumes at destination received at the irrigation association connection points are below those shown in Figure 3 due to losses during transportation and distribution, estimated at 10% in a specific study by the CEDEX (Public Works Studies and Experimentation Centre), this being a reference volume for comparison with the maximum of 400 $hm^3$/year laid down in Law 52/1980 for these users. Figure 4 shows these volumes and monthly breakdowns for the last six years.

[3] Source: SCRATS (Proposal for the award of concessions for the exclusive use of water transported by the Tajo-Segura aqueduct).

[4] Additional Provision Five of Law 21/2015 of 20 July amending Law 43/2003 of 21 November on Mountain Areas and Article 1 of Royal Decree 773/2014 of 12 September containing regulations on transportation by the Tajo-Segura aqueduct.

**Figure 4. Irrigation volume of the Tajo-Segura aqueduct at user connection points (hm³)**

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2014 | 25.7 | 25.7 | 45.9 | 25.7 | 25.7 | 25.7 | 25.7 | 25.7 | 25.7 | 25.7 | 25.7 | 11.3 | **313.7** |
| 2015 | 11.3 | 11.3 | 11.3 | 25.7 | 11.3 | 11.3 | 11.3 | 6.8 | 2.3 | 0.5 | 0.0 | 0.0 | **102.6** |
| 2016 | 0.0 | 2.25 | 11.25 | 11.25 | 11.25 | 25.7 | 11.25 | 11.25 | 11.25 | 11.25 | 11.25 | 11.25 | **129.2** |
| 2017 | 11.3 | 11.3 | 11.3 | 6.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **40.5** |
| 2018 | 0.0 | 0.0 | 0.0 | 11.3 | 25.7 | 25.7 | 25.7 | 11.3 | 11.3 | 11.3 | 0.0 | 25.7 | **147.6** |
| 2019 | 25.7 | 25.7 | 25.7 | 25.7 | 11.3 | 11.3 | 11.3 | 11.3 | 7.7 | 10.5 | 0.0 | 0.0 | **165.9** |

*Source: SCRATS and prepared in-house.*

Volumes available for irrigation at destination recorded in the last six years are highly irregular. With the exception of 2014, when the aqueduct's irrigation water users received 313.7 hm³ of water from the Alto Tajo, during the remainder of the period available volumes from this source were always below 200 hm³/year. In 2017, only 40.50 hm³ was available at destination and no water was carried for irrigation for 11 consecutive months, from May 2017 to March 2018. Both before and after that period, there were other times when no irrigation water was granted. Overall, in the past six years, the average volume transported for irrigation uses at destination was 149.9 hm³/year or 38% of the annual maximum volume authorised.

## 2.2. Agriculture as a strategic sector generating wealth in Spain

The role of farming is absolutely essential as a source of food production that is indispensable for the population's life and health. Besides its relevance as a supplier of food, agriculture makes a significant contribution to the economy and society, both directly through farming itself and indirectly through associated activities.

In Spain's case, agriculture has traditionally been highly important to the economy. Although it has lost relative economic significance in modern times due to the growth of industry and services, the main macroeconomic variables have risen steadily in absolute terms.

According to statistics from the Ministry of Agriculture, Fisheries and Food (MAPA), Spain's agricultural output increased from €19,293 million in 2000 to €25,411 million in 2019, entailing 32% growth in less than 20 years.[5] These are highly relevant figures, as shown by a comparison with our neighbouring countries. **Spain produces 13% of the European Union's farming produce**, a figure well in excess of its overall weight in the economy, which was nearly 9% of GDP in 2019.

**Figure 5. Trend in Spain's agricultural output (million euro)**

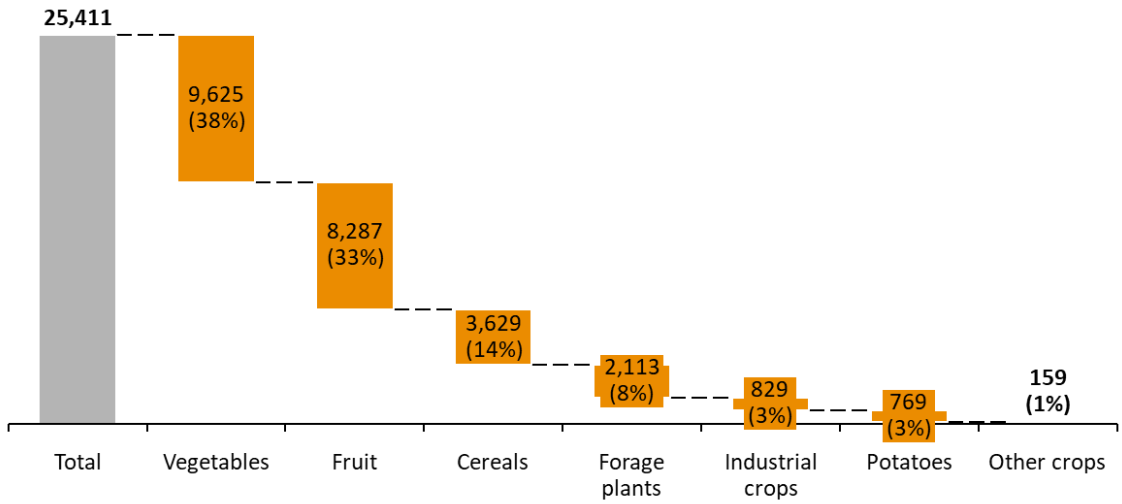
| 2000 | 2005 | 2010 | 2019 |
|---|---|---|---|
| 19,293 | 20,402 | 22,313 | 25,411 |

*Notes: Includes vegetables, fruit, cereals, forage plants, industrial crops, potatoes and other crops. Not including the production of oil, wine and grape juice due to being classed as processed products, not primary products.*
*Source: MAPA.*

[5] In this period, the Compound Annual Growth Rate (CAGR) was 1.5%.

Figure 6 Shows the distribution of Spain's agricultural output by crop type. In order of importance, **vegetables (38%) and fruit (33%) are ahead of the other crops and generate an aggregate 7 out of 10 euros of Spain's total agricultural output**, followed by cereals (14%), forage plants (8%), industrial crops (3%), potatoes (3%) and other crops (1%).

**Figure 6. Distribution of Spain's agricultural output by crop type (€ million, 2019)**




*Source: MAPA (Sub-Directorate General for Analysis, Coordination and Statistics).*

The industry's contribution to GDP is also particularly relevant, measured in terms of Gross Value Added (GVA)[6], the industry equivalent of GDP. Figure 7 shows the contribution by farming GVA to Spain's economy as a whole and compares it with some of the main neighbouring countries and the European Union average. The statistics relate to the farming industry which, beside agriculture, includes livestock, silviculture and fishing, due to the lack of data relating only to agriculture. It may be observed that **Spain is the country in which the farming industry has the highest relative importance at 2.9%**, well above Italy, Netherlands, France, Germany and the United Kingdom, and **1.3% above the EU-28 average**.

**Figure 7. Direct contribution by farming GVA to the economy's total GDP (2000-2019)**

| Country | 2000 | 2005 | 2010 | 2019 |
|---|---|---|---|---|
| Spain | 4.1% | 3.1% | 2.6% | 2.9% |
| Italy | 2.9% | 2.3% | 2.0% | 2.2% |
| Netherlands | 2.6% | 2.1% | 2.0% | 1.9% |
| France | 2.3% | 1.9% | 1.8% | 1.8% |
| Germany | 1.1% | 0.8% | 0.9% | 0.9% |
| United Kingdom | 1.0% | 0.6% | 0.7% | 0.7% |
| EU-28 | 2.2% | 1.7% | 1.7% | 1.6% |

*Note: Calculated based on farming GVA data, which also includes plant output, animal output, silviculture and fishing output.*
*Source: Aggregate data from Spain's National Accounts by business line, Eurostat.*

[6] GVA is the difference between the value of output and the intermediate consumption necessary to reach that output. The measurement of the industry's contribution in GVA terms avoids the dual accounting that arises when it is measured in terms of output, since a certain sector's output always includes consumption by other activities upstream in the supply chain that does not reflect any value contributed by the sector in question.

**As regards employment**, Figure 8 shows the trend in agricultural jobs. It may be observed that the number of industry workers fell from 882,400 in 2000 to 729,800 in 2019. Although this is a significant decrease, the industry still accounted for **3.7% of total jobs in Spain in 2019**.

**Figure 8. Trend in agricultural jobs (people employed)**

| 2000 | 2005 | 2010 | 2019 |
|---|---|---|---|
| 882,400 | 831,100 | 716,600 | 729,800 |

*Note: Agricultural jobs include vegetable output and animal output.*
*Source: Economically Active Population Survey (EPA), National Institute of Statistics (INE).*

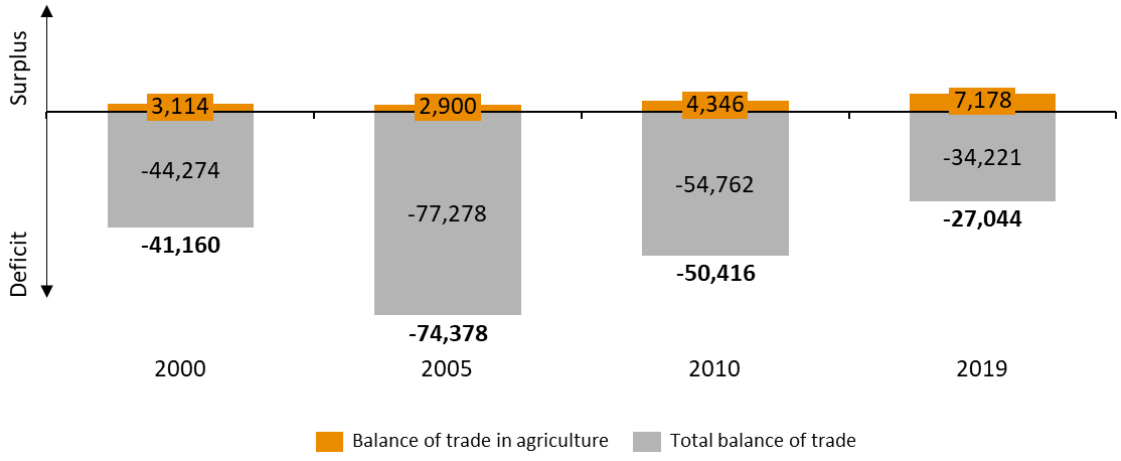
The relevance of agriculture is also reflected in the proportion of surface area used. In Spain, approximately **17 million hectares are devoted to agricultural produce (3.8 million irrigated)**, representing around one third of the country's total area. This places Spain second in the European Union in terms of farmland, which accounts for 13% of the Useful Agricultural Surface Area (UASA).

From an international perspective, Spain has a considerable competitive advantage in agriculture compared with other countries thanks to the privileged climatic conditions, particularly in terms of hours of sunlight and temperature, which favours production all year round, including the winter.

Spain is therefore one of the main exporters of agricultural produce. In 2019, the industry's exports reached €18,926 million or **6.4% of Spain's total exports.** This figure is also well above imports, so the balance of trade is clearly positive in the industry.

Figure 9 reflects the industry's **trade surplus** of €7,178 million in 2019. This surplus contrasts with the structural trade deficit that characterises the Spanish economy and amounted to 3% of GDP in 2019.[7] Agriculture has therefore traditionally helped to reduce the country's trade deficit, a reduction that exceeded 17% in 2019.

**Figure 9. Trend in the balance of trade in agriculture and in Spain's economy as a whole (million euro)**




*Note: Provisional figures for 2019.*
*Source: DataComex, Eurostat data.*

[7] Source: Datacomex.

The economic relevance of agriculture goes far beyond the activity itself. The industry is related to others such as the agri-food industry in the areas of processing, transportation, distribution and marketing. Agriculture has a greater economic importance than is strictly reflected in the National Accounts, which do not take into account the added value generated in other associated sectors or activities.

**As a core link in the agri-food chain, agriculture helps to create wealth and employment both directly and indirectly, through close relationships with other industries**. If we add the associated activities into the mix, the productive, industrial, transportation and distribution businesses forming part of the agri-food system complete one of the country's main industries, at a level very close to tourism, contributing 10.6% to GDP and 14.2% to employment.[8]

The agricultural sector's ability to **balance the economy in times of recession** is also noteworthy. Although the sector is not immune to economic circumstances, it is less tied to the economic cycle than the majority of industrial or service activities and is generally more stable and resilient. For example, during the crisis period from 2008 to 2013, while the overall GDP fell 9%, farming GVA rose 1%.

Finally, the relevance of the function of farming as a provider of food will become increasingly critical. Certain circumstances such as international conflicts, pandemics, natural disasters or plagues may cause falls in production, price increases and even a shortage of certain products. In the face of these risks, the capacity to produce food without depending on imports will become increasingly essential. Agriculture is an absolutely strategic sector to secure the food supply.

## 2.3. Agriculture in the regions affected by the aqueduct

Although farming is particularly relevant to Spain's economy as compared with our neighbouring countries, reliance is even greater in the aqueduct area.

Figure 10 shows the relative significance of agriculture, livestock farming, silviculture and fishing to GVA and total employment in the aqueduct provinces and in Spain as a whole. Two of the aqueduct provinces are well above the national average in terms of both GVA and employment. Specifically, the sector accounts for 15% of GVA and 23.9% of jobs in Almería. Almería is also the Spanish province in which both figures show the greatest relative significance in the farming industry. In Murcia, the sector accounts for 5.3% of GVA and 12.2% of jobs. Finally, in Alicante the sector contributes 1.8% of GVA and 3.7% of employment. The aggregate figures for all three provinces show that the relative importance of farming is twice the national average in the case of GVA and even higher in the case of employment.

**Figure 10. Relative importance of farming in the economy as a whole (GVA in 2016 and employment n 2019): Spain and provinces affected by the aqueduct**

| GVA (million euro) | Alicante | Almería | Murcia | Aqueduct provinces | Domestic market total |
|---|---|---|---|---|---|
| Farming* | 657 | 1,995 | 1,531 | 4,183 | 30,096 |
| Sector total | 35,578 | 13,330 | 29,116 | 78,024 | 1,117,964 |
| **Farming as % of total** | **1.8%** | **15.0%** | **5.3%** | **5.4%** | **2.7%** |

[8] Statistics prepared by the Ministry of Agriculture, Fisheries and Food's Sub-Directorate General for Analysis, Coordination and Statistics; published in the AgroInfo report no. 29 (2018). "The agri-food system's contribution to the Spanish economy."

| Employment (thousand people) | Alicante | Almería | Murcia | Aqueduct provinces | National total |
|---|---|---|---|---|---|
| Farming* | 29 | 67 | 75 | 171 | 797 |
| Sector total | 777 | 281 | 614 | 1,672 | 19,779 |
| **Farming as % of total** | **3.7%** | **23.9%** | **12.2%** | **10.2%** | **4.0%** |

* Includes agriculture, livestock farming, silviculture and fishing. ** Sum of the three aqueduct provinces.
*Source: INE (Regional Accounts and Economically Active Population Survey).*

The main crops grown are vegetables, both outdoors and in greenhouses, followed by citrus and orchard fruits plus, to a lesser extent, olives and grapes. Agriculture in the area is one of the most competitive in Spain and in Europe, as reflected by exports, mainly of fruit and vegetables.

Figure 11 shows the relative importance of the provinces affected by the aqueduct in relation to Spain's total fruit and vegetable exports. As regards vegetables, Almería itself accounts for 43% of national exports, Murcia 23% and Alicante 5%. Overall, **the three provinces generate 71% of Spain's total fruit and vegetable exports**. With respect to fruit, the relative significance of the three aqueduct provinces is somewhat lower, though highly relevant, accounting for 25% of national exports. In the aggregate, Alicante, Almería and Murcia account for 44% of Spain's fruit and vegetable exports.

**Figure 11. Relative importance of the aqueduct provinces in relation to Spain's total exports of fruit and vegetables (2019)**

| Exports (M€) | Alicante | Almería | Murcia | Aqueduct provinces | National total |
|---|---|---|---|---|---|
| Vegetables | 267 | 2,476 | 1,331 | 4,074 | 5,753 |
| *% of national total* | *5%* | *43%* | *23%* | *71%* | |
| Fruit | 352 | 343 | 1,233 | 1,928 | 7,790 |
| *% of national total* | *5%* | *4%* | *16%* | *25%* | |
| **Total fruit and vegetables** | **618** | **2,819** | **2,564** | **6,002** | **13,543** |
| ***% of national total*** | ***5%*** | ***21%*** | ***19%*** | ***44%*** | |

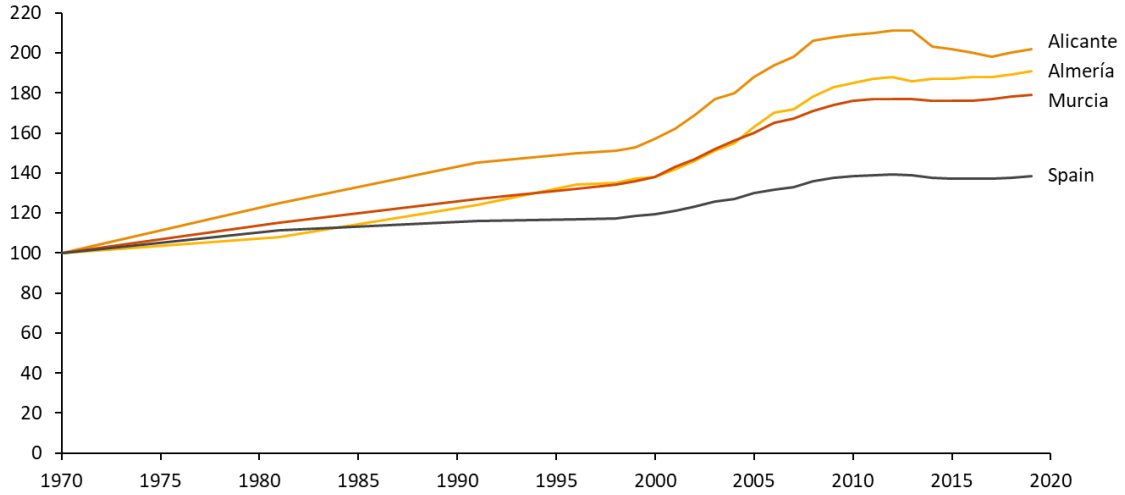
*Source: Fepex*

The preponderance of the farming industry in these regions is particularly noteworthy in certain products. For example, the three provinces account for 91% of Spanish exports of artichokes, 89% in the case of spinach, 88% of lettuce, 87% of courgettes and 86% of peppers and aubergines, to mention only a few. **Appendix A** contains a list of the main produce exported by the three provinces taken as a whole, as well as the relative significance of these exports in relation to the national total.

Agriculture is also a means to create jobs and keep the rural population from leaving, thus combating the depopulation of rural areas. In this regard, the OECD noted in a study on Spain in 2009 that the reduction of the rural population is one of the greatest challenges and that agriculture continues to be the main driver for maintaining the population and employment in this area. *"Putting a stop to rural depopulation is the main challenge facing Spain. A large part of the country suffers from problems of depopulation owing to the poor living conditions associated with the topography, the climate and the scarcity of water, amongst other factors. The primary sector (agriculture, hunting and forestry) continues to be the main driver for maintaining population and employment in rural areas."*[9]

The aqueduct and the resulting agricultural development in the area have **helped to maintain and increase the local population**. This phenomenon is clearly reflected in Figure 12, which shows population trends in the three aqueduct provinces, Alicante, Almería and Murcia, between 1970 and 2019, and a comparison with the trend in Spain's average population in the same period. For nearly five decades, the population of the three provinces has grown above the Spanish average. Alicante shows the most growth (102%), followed by Almería (91%) and Murcia (79%) which, though having grown less, more than doubles the average for Spain (38%).

**Figure 12. Population trends in the aqueduct provinces in relation to the average for Spain (1970 – 2019)**

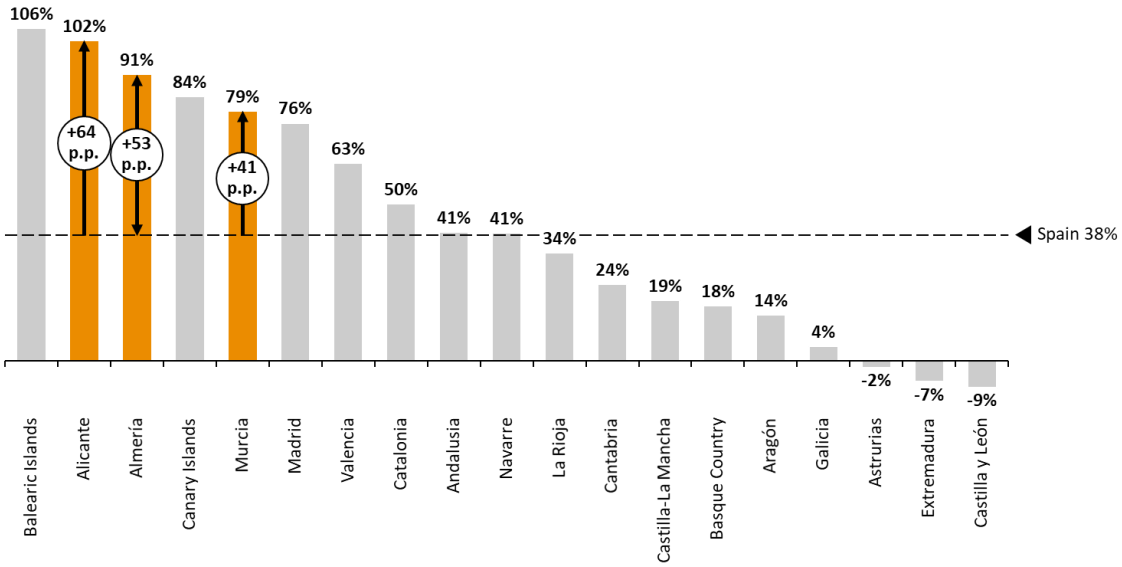



*Source: INE*

It is also interesting to compare the growth in these three provinces with the averages for the Autonomous Regions, as set out in Figure 13. It may be observed that only one Autonomous Region grew more than Alicante and Almería (Balearic Islands, at 106%) and only one more grew more than Murcia (Canary Islands, at 84%), due in both case to dynamic tourism.

[9] OECD Rural Policy Reviews: Spain 2009.

**Figure 13. Population trends in the aqueduct provinces in relation to the Autonomous Regions and the average for Spain (1970 – 2019)**




*Source: INE*

Population growth in the towns located in the irrigable areas affected by the aqueduct (see Appendix E) was even higher than in the provinces as a whole in the case of Alicante (118% as compared with 102%) and Almería (99% v. 91%), and virtually identical in the case of Murcia (78% v. 79%).

This population increase has essentially impacted the rural towns in the aqueduct area. Specifically, the rural population (approximate figures based on towns with fewer than 5,000 inhabitants[10]) in the aqueduct area increased by 113%, well above the 38% rise in Spain's population in the same period.

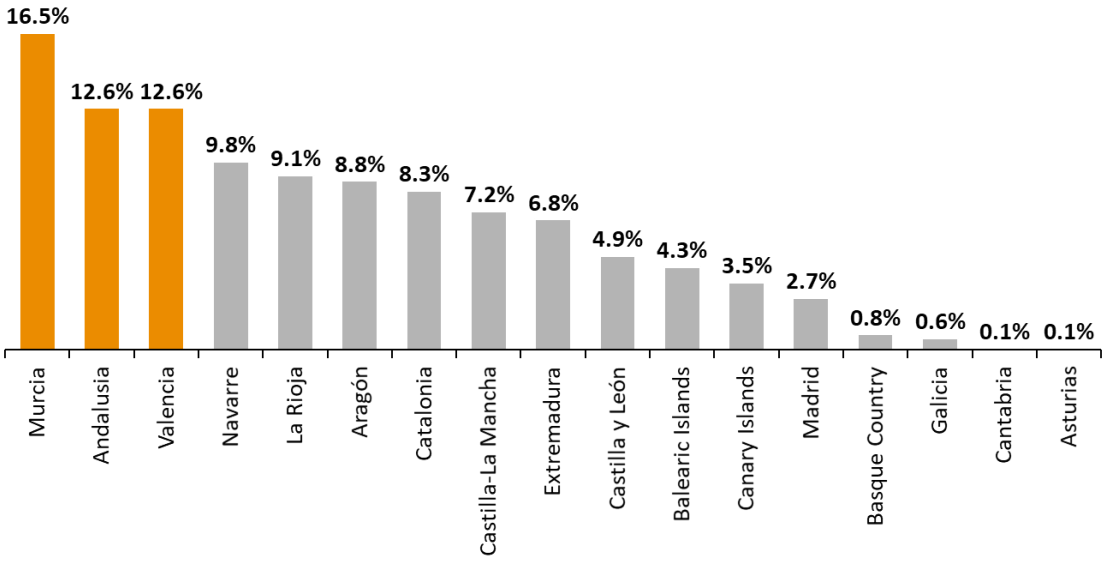
[10] Towns with fewer than 5,000 inhabitants in 1970.

# 2.4. Water as an essential resource in the aqueduct area

## 2.4.1 Imbalance between demand for water and the authorised aqueduct allocations

The availability of water is a strategic aspect of irrigation-based agriculture, above all in the southeast of Spain, where irrigated fruit and vegetables grow particularly well.

**Figure 14. Proportion of irrigable land with respect to the total surface area (2019)**




*Source: MAPA (2019): ESYRCE. Survey of Surface Areas and Crop Yields. Report on irrigation in Spain.*

At present, the Segura River Basin, in which most of the land supplied by the aqueduct can be found, has a structural water deficit because available water resources are insufficient to meet the demand from crops, largely due to the lack of guarantees that water will be obtained from the Alto Tajo.

As shown in Figure 15, according to the Hydrological Plan for the Segura Basin for the period 2015-2021, gross annual demand for water in the aqueduct area is significantly higher than the authorised allocations and, what is more, as indicated previously, these are maximum allocations, while actual amounts are a lot lower (149.9 $hm^3$/year on average in the past six years, considerably below the 400 $hm^3$/year allocated).

**Figure 15. Estimated demand and allocation of water in the Tajo-Segura aqueduct area for the period 2015/2021**

| | Gross area (ha) | Gross demand ($hm^3$/year) | Maximum allocation ($hm^3$/year) | Average allocation 2014-2019 |
|---|---|---|---|---|
| **Alicante** | 51,556 | 224 | 125 | 47 |
| **Almería** | 7,264 | 27 | 15 | 6 |
| **Murcia** | 91,501 | 365 | 260 | 97 |
| **Total** | **150,321** | **616** | **400** | **150** |

*Note: Estimated gross demand for the period 2015/2021.*
*Source: Hydrological Plan for the Segura Basin 2015-2021. Ministry for the Ecological Transition and the Demographic Challenge and prepared in-house using SCRATS data.*

Since the infrastructure was opened, the aqueduct area has undergone an **intense process of modernisation and technical development** to become one of the most outstanding of its kind in Europe. With the aim of distributing the irrigation water effectively, intelligently and sustainably, the users have developed innovative infrastructures to transport and distribute the water, as well as more efficient irrigation systems to make the most of the water resources. For example, according to MAPA 2019 data, 86% of irrigation in the Murcia region consists of localised (or drip) irrigation systems, which make better use of the water compared with other methods such as gravity, sprinkler or automotive systems. In Andalusia, this figure is 78% and 72% in the Valencia region. In other areas of Spain, however, the use of localised systems is a lot less common, at 53%, on average.[11]

In a situation in which coverage of demand for water is not assured and despite the efficiency of the irrigation systems, farmers in the aqueduct area are increasingly turning to other complementary resources to meet their water needs. The irrigable aqueduct zones have their own resources (in the Segura River Basin, reuse[12], desalination, etc.), which provide an additional theoretical volume of 230 $hm^3$/year, although this figure is not reached in reality, since these resources are also subject to losses and environmental restrictions.[13]

## 2.4.1 The role of desalinated water in the aqueduct area

In recent years, the scarcity of water resources has driven progress in desalination, leading to the development of specific infrastructures known as IDAMs (seawater desalination plants), which usually supply water both to agriculture and to people.

There are three main seawater desalination plants serving the aqueduct area, all managed by the Spanish state-owned enterprise Aguas de las Cuencas Mediterráneas, Acuamed: Torrevieja (located in Alicante, with a capacity of 80 $hm^3$/year, production being distributed in equal parts between irrigation and supply), Valdelentisco (in Murcia, with a capacity of 48 $hm^3$/year, pending grant of irrigation concessions totalling 37 $hm^3$/year) and Águilas (also in Murcia, with a capacity of 60 $hm^3$/year and an irrigation concession granted in 2019 for 11 $hm^3$/year).[14]

Desalinated water has a big advantage, which is the inexhaustible nature of the water resource (seawater), as well as stability in the face of weather conditions. Conversely, desalinated water has a number of features that limit its use and condition the availability of continental waters. The most significant are described below:

- **Composition of desalinated water**

  Desalinated water has a low mineralisation and a high concentration of boron. The high quantity of this element in water is harmful to crops, particularly citrus fruits, one of the main crops in the areas irrigated by the aqueduct. For this reason, the quantity of boron in irrigation water is regulated and must not exceed 0.5 mg/litre of water. Desalinated water is not ideal for direct use in irrigation and must be mixed with continental waters to correct the imbalances and obtain water with a composition suitable for agricultural uses.

  The need to mix desalinated water with continental water for irrigation means that the desalinated water is not an irrigation solution for farmers separately from the other resources, but is merely useful in combination with continental and aqueduct waters.

[11] MAPA (2019): Survey of Surface Areas and Crop Yields. Report on irrigation in Spain – ESYRCE 2019.

[12] Reuse is essential to guarantee the sustainability of irrigation and environmental protection, as well as to avoid wasting a limited resource.

[13] Provisional summary of important matters in the Segura River Basin.

[14] Acuamed.

Consequently, when continental waters are scarce, the use of desalinated water is also limited.

- **Price of desalinated water**

  The cost of this water may represent between 5% and 25% of agricultural output costs (depending on the crop and the water price),[15] so it is particularly relevant to farmers and can condition their production decisions and financial results to a large degree.

  Desalinated water production requires high power consumption, resulting in a high production cost that relies heavily on the price of electricity (besides generating greenhouse gases).

  In particular, the water produced in the Segura Basin desalination plants has an average cost of between 0.60 and 0.69 €/$m^3$.[16] This cost is significantly higher than the amount paid by farmers for water from alternative sources. For example, the average price paid for aqueduct water in 2019 was 0.16 €/$m^3$,[17] so desalinated water was about four times more expensive than aqueduct water.

  So, the price of desalinated water usually exceeds the users' payment capacity and they are only willing to bear this cost when there is sufficient continental water for mixing, resources are very scarce or products are highly profitable. The use of desalinated water also has an adverse impact on farmers' profit margins and competitiveness in international markets.

  Spain's institutions are aware that the high price of desalinated water limits its use, so Law 1/2018 of 6 March brought in urgent measures to alleviate the effects of drought in certain hydrographic basins, including measures to combat this situation. In particular, Additional Provision Four provides an emergency plan to optimise desalination whereby the "*Government will urgently approve an emergency plan to optimise desalination for a thirsty Mediterranean that will promote the use of unconventional desalinated water resources, prioritising the use of desalination facilities already installed by executing works and actions pending and not yet concluded."* It also states that the "*Government will provide the necessary subsidy mechanisms so that the price of desalinated water does not exceed 0.30 €/$m^3$.*" However, this law has yet to be developed in enabling regulations.

  According to the Hydrological Plan for the Segura Basin for the period 2015-2021, with respect to desalinated water for agricultural uses, even if the production capacity of desalinated water increases, the final output will be below that capacity due to the price:

  "*Actual output is unlikely to reach values close to the existing production capacity, since the high price of desalinated water exceeds the payment capacity of a large part of agricultural water users.* (…) *For agricultural use, it is not possible to allocate the entire production capacity, since the current prices of desalinated water exceed costs affordable for users."*[18]

  So desalinated water production is currently insufficient to meet demand for irrigation water and the water must be used on a complementary basis with other sources in order to guarantee crop irrigation.

[15] Domingo Zarzo Martínez (2019): Desalination for agriculture. National Water Congress 2019: Innovation and Sustainability. Subject: purification, reuse and desalination.

[16] Martínez Álvarez, V. and Martín Górriz, B. (2014): Background and problems of using desalinated seawater for agricultural irrigation.

[17] SCRATS.

[18] Report on the Hydrological Plan for the Segura Basin 2015-2021.

- **Location of the desalination plants**

  In addition, the desalination plants that supply the aqueduct area with desalinated water are located on the coast, near to the seawater, essentially in Alicante and Murcia. In order for this water to be used in a generalised way in the aqueduct area, it must be carried from the plants to the farms, so a distribution network is needed.

  However, connectivity between desalination plants and irrigation water users in the southeast of Spain is currently very poor and the desalinated water only reaches a small number of farms, basically in the Campo de Cartagena area.

  Infrastructures would have to be developed to foster the use of this resource, transporting the water to the irrigation zones not currently served. This could be very costly, however, and if the cost were passed on to the users, it could push up the already high price of desalinated water even further.

# 3

# Economic impact of activities linked to agriculture in the region affected by the aqueduct

# 3. Economic impact of activities linked to agriculture in the aqueduct area

The Tajo-Segura aqueduct has a positive impact on the economy and society in the aqueduct area both directly through the farming activities that use the aqueduct water as a resource and indirectly thanks to the economic activities undertaken throughout the agri-food industry's value chain.

This section analyses and quantifies the Tajo-Segura aqueduct's contribution to economic activities in Alicante, Almería and Murcia, distinguishing the effects generated in each stage of the value chain:

- Impact related to the farms that use water from the Tajo-Segura aqueduct
- Impact related to the marketing of farm produce by agricultural enterprises and cooperatives.
- Impact related to the transformation of agricultural products, including the processing and canning of fruit and vegetables, and the preparation of processed fruit and vegetable products (juices, soups, etc.).

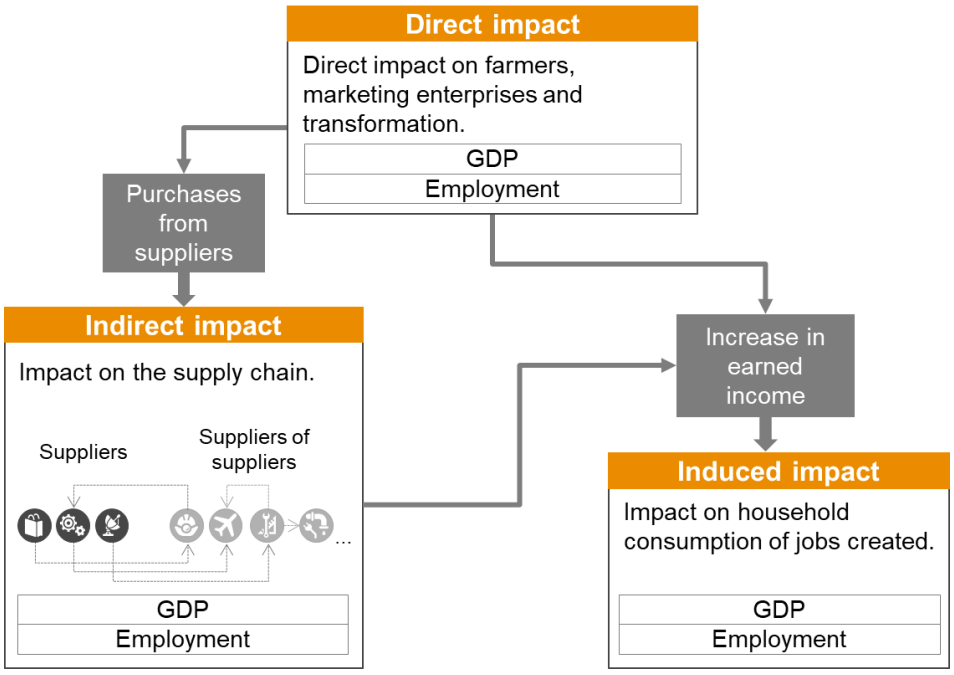
**Figure 16. Agri-food industry value chain**


*Source: Prepared in-house.*

The measurement is made in terms of gross value added (as an indication of the contribution to GDP) and employment (approximate based on FTE or Full-Time Equivalent input), including the direct impacts on the activities indicated (agriculture, marketing and processing), as well as the indirect and induced impacts on associated economic activities.

**Direct contribution** relates to the economic activity and jobs generated within agriculture itself. In the case of GDP, the direct impact has been estimated using the "income method", whereby the impact on GDP is approximated through the activity's GVA as the sum of the wages of salaried workers and the gross operating surplus. In turn, the indirect impact on employment has been estimated based on the number of jobs created in each activity, employing national and regional statistics from public sources, as well as data of agri-food industry enterprises.

**Figure 17. Method for estimating direct, indirect and induced impacts**




*Source: Prepared in-house.*

In addition, the **indirect impact** relates to the economic activity and employment generated through the acquisition of goods and services by farmers and enterprises (e.g. machinery or chemical products) and extends along the supply chain through the goods and services in turn demanded by the suppliers, and so on. The measurement of the indirect impact presented here reflects the gross value added and the jobs created by the farming activities related to the aqueduct thanks to the drag-along effect triggered in the supply chain.

The **induced impact** refers to economic activities generated thanks to consumption by the households that obtain income directly or indirectly from activities related to the Tajo-Segura aqueduct. In a region in which the main economic activity is agriculture, we would expect a significant part of household consumption to be funded by income (salaries or profits) from that activity and, as a result, stores and private and public services will ultimately depend on agriculture to a large extent. Our impact analysis includes, through the induced impact, the part of gross value added and employment of those sectors that supply goods and services to households and also rely on agriculture made possible by the aqueduct.

The indirect and induced impacts have been estimated using the Input-Output tables of Spain's National Accounts provided by the National Institute of Statistics,[19] so the findings relate to the national total. Nonetheless, given the industry's characteristics, it appears reasonable to assume that a large part of the impacts are concentrated in the aqueduct area.

The following sections present the findings of our analysis in terms of GDP and employment for each of the three activities analysed separately: agriculture, marketing and processing. The aggregate findings for all three activities are presented at the end of the section.

[19] Appendix F provides further details of the estimation model based on the Input-Output tables.

# 3.1. Agriculture

The opening of the Tajo-Segura aqueduct and the resulting increase in water resources led to significant growth in agriculture, particularly in the irrigated areas benefited, allowing modernisation so as to reach the forefront of productivity and efficiency, especially for certain types of crops such as vegetables, fruit and citrus fruits.

Nowadays, the aqueduct zones are among Spain's main areas of farming output, particularly in economic terms. In turn, progress in farming has fostered economic activity in the sectors that serve farmers. For example, the considerable implementation of high-tech irrigation systems in the aqueduct area has facilitated the creation and growth of local enterprises which market their technology and components globally, such as manufacturers of very-high-tech, remote-controlled irrigation systems or engineering companies engaged in innovative projects to automate farming processes.

This section analyses and quantifies all these effects and makes an estimate of the economic activity and employment linked to the very-high-tech, remote-controlled irrigation systems or engineering companies engaged in innovative projects related to agriculture in the aqueduct area. The estimates, method and assumptions employed in the calculation are presented below.

## 3.1.1 Contribution to GDP

The contribution to farming GDP made by the aqueduct has been estimated prior to the economic value of agricultural output in the aqueduct area, which in turn requires the estimation of three figures: the surface area affected, the yield (tonnes of produce per hectare) and the economic value of the produce, all disaggregated by crop type and province.

In this study, the net area linked to the aqueduct has been assumed to total 126,086 hectares, distributed across Alicante, Almería and Murcia, also estimating the area occupied by each type of crop.[20] For this purpose, the Hydrological Plan for the Segura Basin 2015-2021 has been consulted. Among other aspects, as it analyses water uses and demands in the Segura River Basin, where most of the land benefited by the aqueduct is located. Specifically, the plan divides the Segura Basin into Agricultural Demand Units (ADUs), in each case stating the number of hectares used for agricultural production by type of crop. Based on this information, we obtained the percentage of hectares devoted to each crop in terms of aqueduct ADUs and aggregated the percentages at the provincial level.

The average yield per hectare associated with each crop category in each of the three provinces analysed has been calculated using the output and surface area data provided in the regional statistics portals.[21]

Finally, the economic value of this agricultural output has been estimated by applying the average price estimated to be received by the farmer to the tonnes of produce of each category of crop. These prices have been calculated using average price data per crop furnished by MAPA for 2018.[22] The following table shows the economic value of output by province for the main types of crop.

**Figure 18. Economic value of agricultural output in the aqueduct area by province and crop type in 2019 (million euro)**

| | Alicante | Almería | Murcia | Total | Total (%) |
|---|---|---|---|---|---|
| Vegetables | 51.7 | 86.5 | 540.3 | **678.5** | 47.9% |
| Citrus fruits | 288.8 | 6.2 | 211.6 | **506.5** | 35.8% |
| Orchard fruits | 25.0 | 0.2 | 177.5 | **202.7** | 14.3% |
| Almonds | 1.8 | 0.1 | 0.5 | **2.3** | 0.2% |
| Olives | 1.5 | 0.0 | 4.9 | **6.4** | 0.5% |
| Grapes | 8.5 | 0.0 | 11.3 | **19.8** | 1.4% |
| **Total** | **377.3** | **93.0** | **946.0** | **1,416.3** | 100.0% |
| Total (%) | 26.6% | 6.6% | 66.8% | 100.0% | |

*Source: Prepared in-house using data from MAPA, regional statistics portals and SCRATS.*

As reflected in Figure 18, the economic value of agricultural output in the aqueduct area totals over €1,416 million, of which Murcia accounts for over 66%, as the province with the largest number of irrigable hectares in the aqueduct area. By crop type, vegetables and citrus fruits together account for over 80% of the economic value of output, which is explained by the fact that they occupy the largest surface area and have the highest yield per hectare.

[20] This study assumes that all the hectares are productive. Appendix B provides details of the surface area, output and yield by province and crop category.

[21] Statistics Portal of the Valencia Regional Government, Institute of Statistics and Cartography of Andalusia and Statistics Portal of the Region of Murcia.

[22] Appendix C provides a breakdown of the prices of each crop and the estimated weighted averages for each category.

After estimating the economic value of agricultural output, we estimated the contribution to GDP using the "income method" described previously. This entailed estimating the proportion of wages and salaries and of gross operating surplus (approximate figures based on the equivalent business data for EBITDA[23]), using MAPA data, which include technical and economic results for farms by crop type.[24] As a result, we found that, on average, these figures represent around 40% of the economic value of the output.[25]

So the direct contribution to GDP made by farming in the aqueduct area amounts to €646.3 million, which is equivalent to 28.3% of the GDP of the entire farming industry in the provinces of Alicante and Murcia.[26]

In addition, the indirect and induced impacts on GDP have been estimated using a breakdown of intermediate consumption for farming,[27] using Spain's Input-Output tables, as explained previously. These impacts amount to an overall figure of €901.2 million. So the total contribution to GDP made by farming in the aqueduct area amounts to over €1,547.5 million, which is equivalent to 2.4% of the aggregate GDP of the provinces of Alicante and Murcia.[28]

**Figure 19. Contribution to GDP in the Tajo-Segura aqueduct area in 2019**

| Contribution to GDP | Million euro |
|---|---|
| Direct effect | 646.3 |
| Indirect effect | 488.2 |
| Induced effect | 413.0 |
| **TOTAL** | **1,547.5** |

*Source: Prepared in-house using data from MAPA, INE and regional statistics portals.*

Figure 20 shows the breakdown of the indirect and induced impacts for each sector benefited. The real estate sector benefits the most, basically from induced impacts, i.e. household consumption by people whose jobs depend in some way on farming. Other sectors considerably benefited are water treatment and distribution, due to the expenditure incurred by farms on irrigation water, and the accommodation, food and beverages sector, through induced effects.

[23] Earnings before interest, taxes, depreciation and amortisation.

[24] Specifically, the average proportion represented by wages and salaries and EBITDA with respect to the economic value of output for each crop category was calculated, obtaining a weighted average of these variables for each group based on the national output of each crop. Source: MAPA (2018): Technical and economic results for Vegetable Crops 2015", Sub-Directorate General for Analysis, Prospective and Coordination, Under Secretary's Office. Ministry of Agriculture, Fisheries and Food. MAPA (2019): Technical and economic results for Orchard Fruits 2017". Sub-Directorate General for Analysis, Coordination and Statistics. Under Secretary's Office. Ministry of Agriculture, Fisheries and Food. MAPA (2019) Technical and economic results for Olives and Wine 2017". Sub-Directorate General for Analysis, Coordination and Statistics. Under Secretary's Office. Ministry of Agriculture, Fisheries and Food.

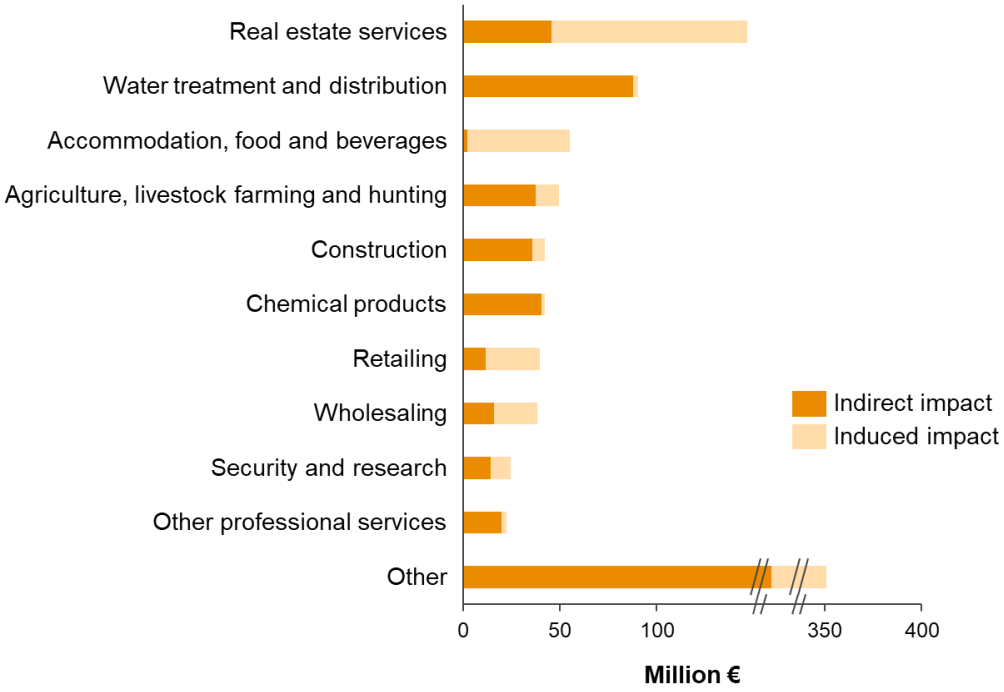
[25] The proportion by crop type is as follows: vegetables 41.6%, citrus fruits 53.6%, orchard fruits 39.6%, almonds 17.7%, olives 37.8% and grapes 45.7%.

[26] Excluding Almería, given the lower relative importance of the areas affected by the aqueduct in this province. The figure relates to the GDP of the agriculture, livestock farming, silviculture and fishing industry. Latest available data for 2017. Source: INE (Spanish Statistical Office).

[27] Appendix D contains a breakdown of farming costs.

[28] Latest available data for 2017. Source: INE.

**Figure 20. Indirect and induced impacts on GDP by sector benefited**




*Source: Prepared in-house using data from MAPA, INE and regional statistics portals.*

## 3.1.2 Contribution to employment

As indicated in section 2, farming is a highly relevant activity in the aqueduct provinces, also in terms of employment. This is reflected in the number of people registered with the Social Security authorities in the farming industry, which reached 159,604 in the provinces of Alicante, Almería and Murcia in 2019.[29]

Farming's direct contribution to employment has been estimated using data on the number of people registered with the Social Security authorities in the farming industry in the aqueduct area towns[30], including salaried and self-employed workers. The figure for salaried workers has been directly extracted from the information provided by the Social Security authorities, broken down to the municipal level. In view of the lack of disaggregated data at the municipal level in this case, the figure for self-employed workers has been approximated based on provincial averages. The Social Security data include both agriculture and livestock farming. In order to strip out workers in the livestock segment, we have applied an adjustment coefficient equivalent to the relative importance of agriculture over the total UWAs (Units of Work per Year) for agriculture and livestock farming in the region affected by the aqueduct.[31]

Overall, 61,733 people are estimated to be employed in farming in the towns affected by the aqueduct, representing 38.7% of the total number of people registered with the Social Security authorities in the farming industry in the three provinces.

[29] The farming industry includes agriculture, livestock farming and fishing. No disaggregated data are provided at the sub-sector level.

[30] Appendix E provides the list of towns in the Tajo-Segura aqueduct area.

[31] Figures obtained from the 2009 Agricultural Census compiled by Spain's National Institute of Statistics (latest data available). The AWU data are broken down by municipality and therefore we can identify the figures for the aqueduct area.

**Figure 21. Social-security-registered workers in the farming industry in the Tajo-Segura aqueduct area in 2019**

| Province | Province total | Aqueduct towns | % of province total |
|---|---|---|---|
| Alicante | 18,944 | 8,397 | 44.3% |
| Almería | 65,711 | 4,662 | 7.1% |
| Murcia | 74,948 | 48,674 | 64.9% |
| **Total** | **159,604** | **61,733** | **38.7%** |

*Source: Prepared in-house using Social Security and INE data.*

This figure was then converted to FTE jobs to facilitate comparison with the other impacts. To this end, we calculated FTE jobs as a proportion of the total number of workers using farming industry data from the National Accounts[32]. Specifically, we estimated that each farming job corresponds to 0.91 FTE jobs. So the direct impact of the aqueduct in FTE terms amounts to 55,941 jobs.

If we add to the above figure indirect and induced employment generated by the aqueduct, we arrive at a total of 69,141 FTE jobs, which is equivalent to 4.2% of the total active population in the provinces of Alicante and Murcia in 2019. [33]

**Figure 22. Contribution by farming to employment in the Tajo-Segura aqueduct area in 2019[34]**

| Contribution to employment | FTE Jobs |
|---|---|
| Direct effect | 55,941 |
| Indirect effect | 6,960 |
| Induced effect | 6,240 |
| **TOTAL** | **69,141** |

*Source: Prepared in-house using Social Security and INE data.*

Figure 23 shows the breakdown of the indirect and induced impacts on employment for each sector benefited. As may be observed, there is a certain correspondence between the sectors most benefited in terms of GDP and employment, although there are certain noteworthy differences due, among other factors, to the productivity of labour. The most labour intensive sectors, such as retailing or agriculture, livestock farming and hunting have a proportionally higher impact on employment than on GDP.

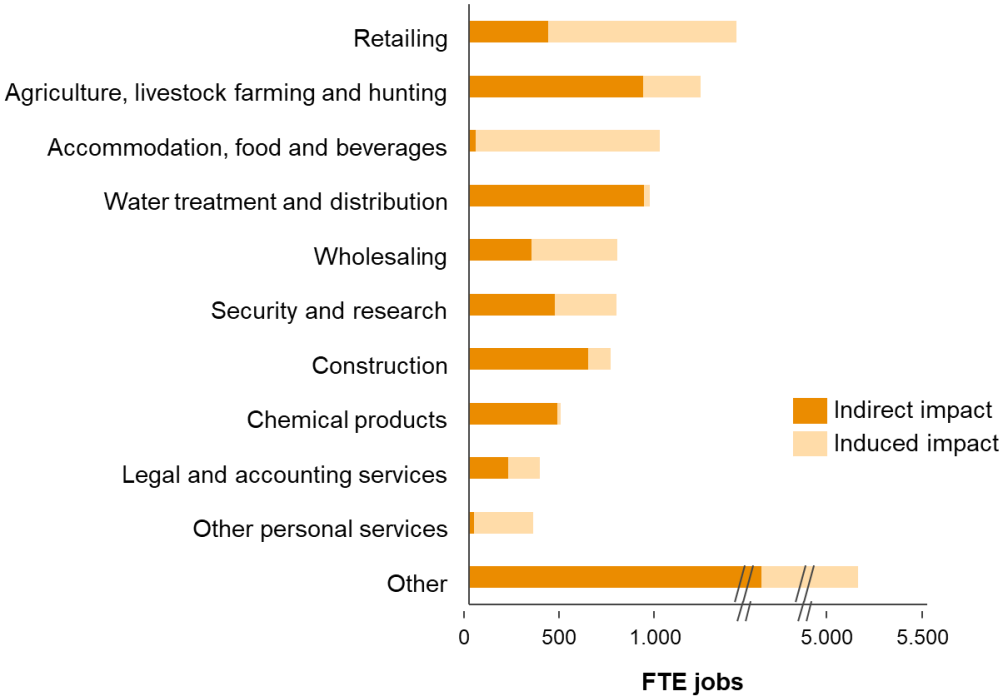
The sector most benefited in terms of employment is retailing, thanks mainly to the induced impact of household consumption, which is similar to the impact on the accommodation, food and beverages sector, which is in third place. The farming sector is particularly benefited in an indirect way, since farmers purchase seeds and plants, among other products, thus generating indirect employment in the sector.

[32] Includes agriculture, livestock farming, hunting and related services. Latest available data for 2017. Source: INE

[33] Figures for 2019. Source: INE.

[34] In absolute terms, farming has the following impacts: direct impact of 61.733 jobs, indirect impact of 7,441 jobs and induced impact of 6,965 jobs, making a total impact of 76,139 jobs.

**Figure 23: Indirect and induced impacts on employment by sector benefited**




*Source: Prepared in-house using Social Security and INE data.*

## 3.2. Marketing and distribution

The next link in the value chain is the wholesale marketing and distribution of agricultural products, including the following activities:

- Product reception, unloading, weighing and initial quality control
- Product storage, sorting, preparation, wrapping, packaging and labelling
- Quality control: products are checked to ensure compliance with the specifications set by the fruit and vegetable centre and by the customer
- Palletising and cold storage of the goods until shipment
- Order management and delivery to wholesalers, including, where appropriate, transport to the end destination.

This activity is carried out by fruit and vegetable centres which have widely differing structures, although most are organised as companies, cooperatives or agrarian processing companies (SAT). These entities vary in size, in terms of both turnover and the number of members.

### 3.2.1. Contribution to GDP

To estimate the impact of marketing in GDP terms, a calculation of the unit cost amount and the value added over the price paid by the farmer at this stage of the chain has been used.

Firstly, the unit amount, which includes all of the costs incurred during the marketing stage, including personnel expenses and the margins earned by traders, has been calculate. It is calculated as the difference between the sales price recorded by the fruit and vegetable centres, and the price paid to farmers. [35] To this end, information provided by the MAPA Food Price Observatory, which performs studies of the value chain and pricing of various food products, has been used.[36]

The Food Price Observatory studies were drawn up on varying dates between 2009 and 2013 and therefore contain prices that in some cases are considerably out of date. To address this issue, the prices contained in these reports have been updated to 2019 based on the Consumer Price Index (CPI) for fruit and vegetables.[37] Figure 24 presents the estimated unit amounts for marketing in relation to the main crop groups.

**Figure 24. Marketing unit amount by crop group (€/kg) in 2019**

| Vegetables | Citrus fruit | Orchard fruits |
|---|---|---|
| 0.58 | 0.41 | 0.55 |

[35] In the case of citrus fruit, the price received by the farmer includes the price received by the storage broker, which often picks up and transports the fruit to the packer or centre.

[36] MAPA (2012): "Study on the value chain and price setting in the onion sector". MAPA (2012): "Study on the value chain and price setting in the chard sector". MAPA (2012): "Study on the value chain and price setting in the courgette sector. Season 09-10». MAPA (2012): "Study on the value chain and price setting in the green bean sector". MAPA (2012): "Study on the value chain and price setting in the lettuce sector". MAPA (2012): "Study on the value chain and price setting in the carrot sector. Season 2010". MAPA (2012): "Study on the value chain and price setting in the apple sector. Season 2009-2010". MAPA (2012): "Study on the value chain and price setting in the pair sector. Season 2009-2010". MAPA (2012): "Study on the value chain and price setting in the banana sector. Season 2010". MAPA (2013): "Study on the value chain and price setting in the green pepper sector. Season 09-10". MAPA (2013): "Study on the value chain and price setting in the citrus fruit sector. Season 2010-2011". MAPA (2013): "Study on the value chain and price setting in the tomato sector. Season 2010-2011". The potato study has not been included in the analysis as it is a tuber and this category has not been analysed since it is not one of the main crops, nor is there sufficient information for a study.

[37] The CPI for two categories - fruit and vegetables - has been used in this calculation.

*Source: In-house using MAP data: Food Price Observatory (Studies on the Value Chain and Price Setting for Agrifood Products) and INE.*

Subsequently, the economic value of the marketing activity related to the aqueduct has been estimated by applying the above unit amounts to the volume of agricultural output derived from the aqueduct (estimated in the previous section), discounting losses and wastage.[38] This figure amounts to €1,181.7 million.

The impact on GDP has been calculated by applying to the above figure the average weight of wages and salaries and gross operating surplus over the total. This weight, also obtained through data from the MAPA Food Price Observatory, has been estimated at around 43% for all crops.[39]

The indirect and induced impacts have been estimated using the national Input-Output tables, for which it has been necessary to previously obtain a breakdown of the costs incurred in this stage. According to MAPA data, the marketing activity involves the intensive consumption of manufactured products (mainly wrapping and packaging) and transport.[40]

In total, taking into account the three types of impact, the contribution of agricultural product marketing in the aqueduct area to GDP was €1,145.9 million in 2019, of which nearly 51% (€582.1 million) pertains to the direct impact, i.e. the impact generated within the marketing activity itself.

[38] Losses in this phase include two different items: (i) the volume of production delivered by the farmer that goes to the processing industry, which is normally lower quality and therefore sold at a lower price; and (ii) the volume of production delivered by the farmer that is thrown away due to lack of quality. The average wastage percentages assumed for each crop group are: vegetables, 20%; citrus fruits, 22.5%; orchard fruits, 22.5%. These figures have been extracted from the report prepared by Ernst & Young and Capgemini in 2004 “Analysis of the value chain and price setting for fresh produce”.

[39] The proportion represented by marketing GVA for each crop group is: vegetables 54.6%; citrus fruits 47.2%; and orchard fruits 27.5%.

[40] Appendix D includes a breakdown of marketing activity costs.

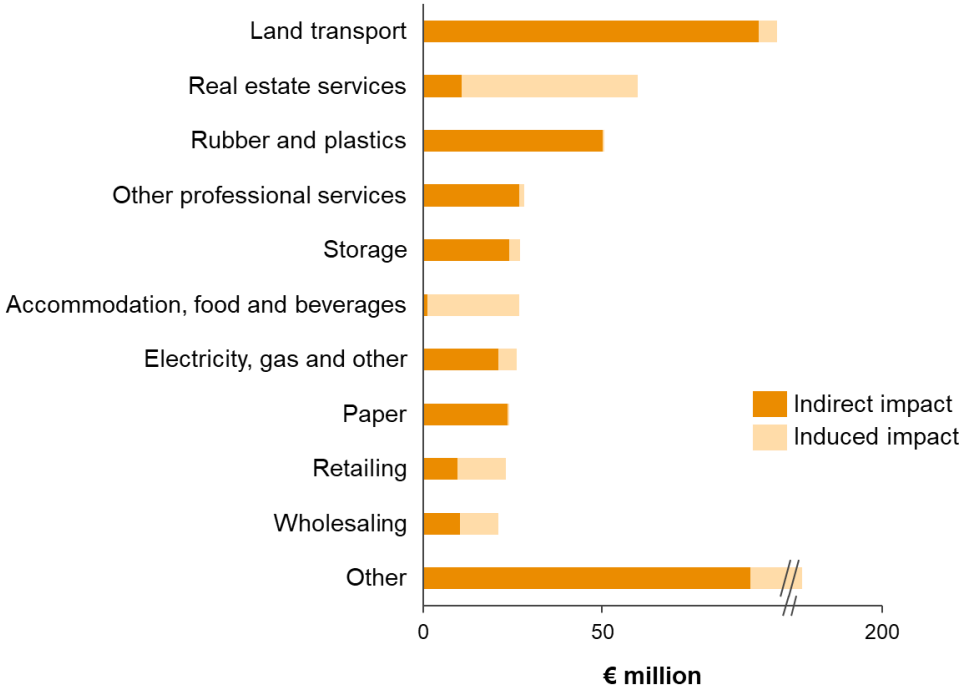
**Figure 25. Contribution of the marketing activity in the Tajo-Segura aqueduct area to GDP in 2019**

| Contribution to GDP | Million euro |
|---|---|
| Direct impact | 582.1 |
| Indirect impact | 362.6 |
| Induced impact | 201.3 |
| **TOTAL** | **1,145.9** |

*Source: In-house using data from MAPA, INE and regional statistics portals.*

Figure 26 includes a breakdown of indirect and induced marketing impacts by sector of activity. The sector that benefits most is land transport, used mainly to distribute products from the fruit and vegetable centre to the end destination. Another sector that benefits from this activity is real estate services due to the induced impact derived from household consumption. Finally, the rubber and plastics sector also benefits as these products are used essentially in packaging.

**Figure 26. Indirect and induced impacts of the marketing stage on GDP by beneficiary sector**




*Source: In-house using data from MAPA, INE and regional statistics portals.*

## 3.2.2. Contribution to employment

The marketing activity also generates a very relevant impact in terms of employment, both directly, involving professionals working in packaging, labelling, transport, etc., and on an indirect and induced basis, due to employment created in the related economic activities (e.g. manufacture of the products needed for packaging, labelling, etc.).

The direct employment contribution has been estimated on the basis of the production value explained in the previous section and the employment coefficients specific to the marketing activity. For this purpose, INE data on production and FTE jobs in the wholesale trade sector have been used and it has been found that in 2017, the latest year for which data are available, the employment coefficient for this sector was 9.1 FTE employees per million euros of

production. Applying this figure to the economic value of the marketing activity before deducting losses and wastage, the direct impact on jobs generated by this economic activity may be calculated.

Additionally, the indirect and induced impacts on employment have been estimated using the Input-Output tables. Figure 27 reflects our estimates of direct, indirect and induced employment generated by marketing activity in the aqueduct area. In aggregate, the total impact amounts to 22,234 FTE jobs, of which 13,617 are direct jobs.

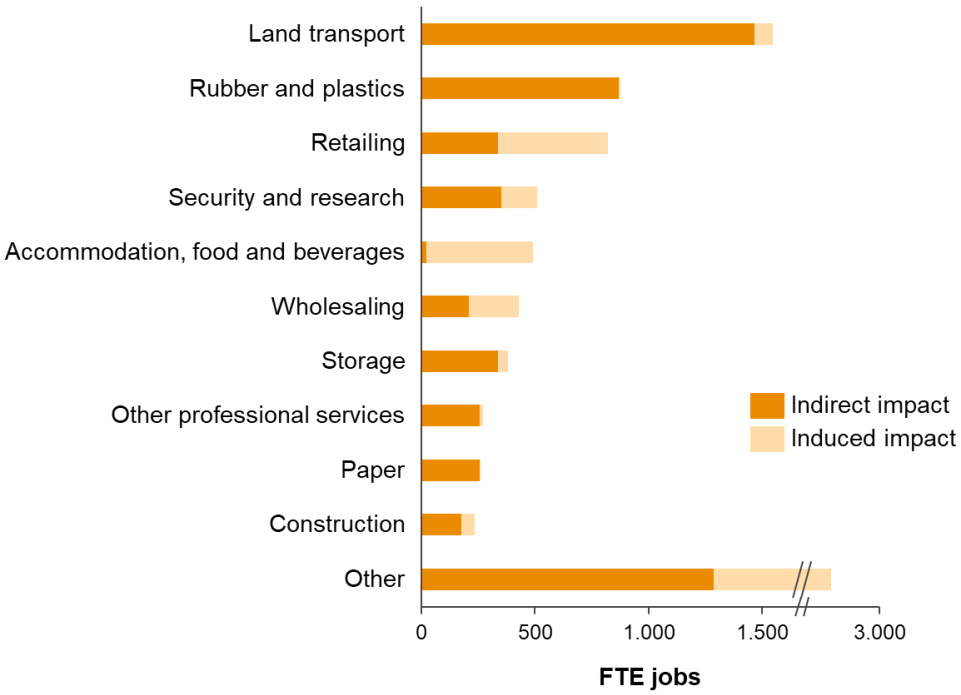
**Figure 27. Contribution of the marketing activity in the Tajo-Segura aqueduct area to employment in 2019[41]**

| Contribution to employment | FTE jobs |
|---|---|
| Direct impact | 13,617 |
| Indirect impact | 5,575 |
| Induced impact | 3,041 |
| **TOTAL** | **22,233** |

*Source: In-house using data from MAPA, INE and regional statistics portals.*

Figure 28 contains a breakdown of indirect and induced impacts by sector. The land transport and rubber and plastics sectors are the ones that benefit the most from the marketing of agricultural products, as was the case with the impact on GDP. The retail sector is also particularly favoured by this economic activity, largely due to the induced impact generated by household consumption.

**Figure 28. Indirect and induced impacts of the marketing activity on employment by beneficiary sector**




*Source: In-house using data from MAPA, INE and regional statistics portals.*

[41] In terms of absolute jobs, the marketing impacts would be: Direct impact 14,745, indirect impact 5,911, and induced impact 3,394, giving a total impact of 24,050 jobs.

## 3.3. Processing

After the marketing phase, the next link in the value chain is the processing of agricultural products. The Tajo-Segura aqueduct area includes some of the largest fruit and vegetable processing companies in Spain, mainly producing tinned food, fruit and vegetable juices and nectars, jams and compotes, pickles and olives, and sauces.

According to the latest statistical data available at the Central Directory of Companies (DIRECE) compiled by the INE, in 2019 the three Autonomous Regions with the greatest number of companies in the fruit and vegetable processing and canning sector are Andalusia and the Valencia and Murcia regions, with 360, 148 and 140 companies, respectively.

Appendix G contains a list of the main fruit and vegetable processing companies that have their head offices in the provinces affected by the aqueduct. AMC, Hero and Juver should be noted, which are also among the leaders in their sector at national level. Two of these companies, AMC and Juver, also have their head offices in municipalities in the aqueduct area. Other companies that are well placed in the ranking of Spanish processing companies located in the aqueduct area are Quirantes Fruits S.L., Ultracongelados Azarbe S.A., Fruveco S.A. and Paprimur S.L.

### 3.3.1. Contribution to GDP

The contribution of processing activities involving agricultural products in the aqueduct area to GDP has been estimated on the basis of the economic information of companies in this sector located in that area. Specifically, the accounts of the companies located in the provinces of Alicante, Almería and Murcia registered under the following CNAE codes[42] have been obtained from SABI:[43]

- Manufacture of spices, sauces and condiments
- Manufacture of fruit and vegetable juices
- Other processing and canning of fruit and vegetables

Companies that no longer exist or are undergoing liquidation have been excluded from the total number of companies in the sample, as have companies for which no information on the annual accounts for 2017 or later was available, either because they have not filed them or because they are not registered with SABI. In addition, companies classified under one of the codes

[42] National Classification of Economic Activities (CNAE 2009).

[43] Iberian Balance Sheets Analysis System.

mentioned above but which carry out activities differing from those covered by this study have not been taken into account.[44]

As reflected in Figure 29, a total of 138 companies that process agricultural products have been identified in the three provinces.[45] It should be noted that those companies engaging in other fruit and vegetable processing and conserving accounted for 66.7% of the total. By geographical distribution, Murcia is the province with the highest concentration of companies (73.2%).

**Figure 29. Number of companies engaged in agricultural product processing in the aqueduct provinces in 2018**

| Number of companies | Alicante | Almería | Murcia | Total | Total (%) |
|---|---|---|---|---|---|
| Manufacture of spices, sauces and condiments | 4 | 0 | 22 | **26** | 18.8% |
| Manufacture of fruit and vegetable juices | 4 | 2 | 14 | **20** | 14.5% |
| Other processing and canning of fruit and vegetables | 20 | 7 | 65 | **92** | 66.7% |
| **Total** | **28** | **9** | **101** | **138** | 100% |
| Total (%) | 20.3% | 6.5% | 73.2% | 100% | - |

*Source: In-house using SABI data.*

Prior to estimating the contribution to GDP, the approximate processing production value has been estimated by means of the aggregate operating income of the companies engaging in this activity in the provinces in the aqueduct area in 2018.[46]

However, it must be taken into account that not all these companies' production is related to the agricultural products grown in the Tajo-Segura aqueduct area, as the processing companies also utilise other goods in their production processes (including livestock products, agricultural products from other regions, etc.). Therefore, although considering their geographical location and their main business activities it is reasonable to assume that these companies use agricultural products from the aqueduct area to a major extent, it would be inaccurate to claim that their entire income is linked to these products. An adjustment has therefore been made to estimate the portion of their income that derives from farming in this area. To this end, a ratio has been applied which measures the relative importance of the aqueduct area in relation to the total agricultural area of each province.[47] The adjusted revenue of the processing companies related to the aqueduct for 2018 has thus been estimated at €445.6 million.

After estimating the production value of the processing activity, the direct contribution of this economic activity to GDP has been measured using the "income method", as in the cases of agriculture and marketing. The proportion represented by wages and salaries and gross operating surplus over the production value in this stage has thus been estimated at 15.4%.[48]

[44] The objects of the companies identified have been analysed individually to determine the extent of their relationship with the agricultural products grown in the aqueduct area.

[45] It should be mentioned that there are also numerous small associations or cooperatives that engage in processing activities but which have not been analysed in this study due to restrictions on the availability of information. Our approach is conservative, therefore, and the impact of this economic activity could be even greater.

[46] When the latest available information on companies relates to 2017, an adjustment has been made based on the average growth in revenue among the other companies in each province to estimate the amount for 2018.

[47] This allocation has been made in terms of hectares of surface area rather than output and the approach is therefore conservative, given the high productivity levels of crops in the aqueduct area. Specifically, the ratio has been calculated considering the hectares that correspond to the following crop groups: vegetables, citrus fruits, orchard fruits, almonds, olives and grapes. The resulting ratios are: Alicante 30.4%, Almería 2.6% and Murcia 24.9%

[48] This ratio has been calculated using only the companies for which the three sets of data are known (operating income, personnel expenses and EBITDA).

The direct contribution of the processing activity to GDP is therefore in the region of €68.6 million. When estimating indirect and induced impacts, it has been assumed that these companies' cost structure is similar to that of the "food products" sector in the Input-Output tables. As shown in Figure 30, the total contribution by processing to GDP has been estimated at around €320 million.

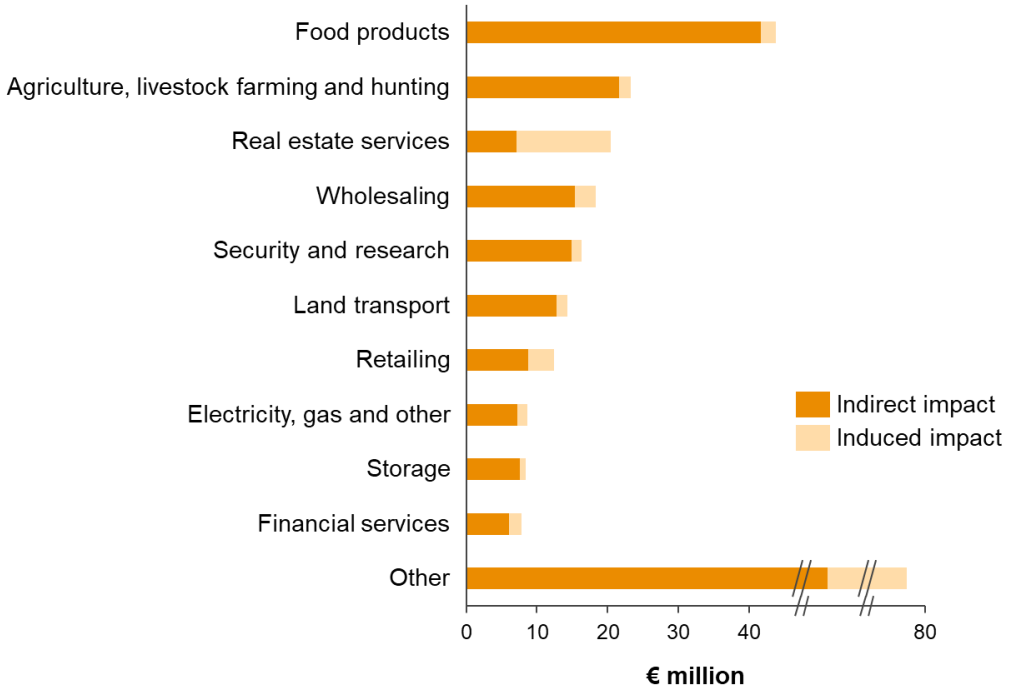
**Figure 30. Contribution of the processing of agricultural products in the Tajo-Segura aqueduct area to GDP in 2019**

| Contribution to GDP | Million euro |
|---|---|
| Direct impact | 68.6 |
| Indirect impact | 196.3 |
| Induced impact | 54.8 |
| **TOTAL** | **319.7** |

*Source: In-house using data from MAPA, INE and regional statistics portals.*

Figure 31 includes a breakdown of indirect and induced impacts by sector of activity. The food products sector, which encompasses different branches of the food industry, benefits more than any other, followed by the agricultural sector. Both sectors provide the processing sector with the inputs required by its business activities. In addition, the real estate services sector is largely favoured by the induced effect generated by the consumption of persons whose wages depend, to a certain extent, on processing activities.

**Figure 31. Indirect and induced impacts of the processing stage on GDP by beneficiary sector**




*Source: In-house using data from MAPA and regional statistics portals.*

## 3.3.2. Contribution to employment

The same reasoning as for the GDP estimate has been followed to estimate the direct contribution of the processing activity to employment. That is, the total number of persons employed by these companies has been estimated and this figure has been weighted by the relative surface area affected by the aqueduct in each province.

In addition, the number of employees has been converted into FTE jobs, applying a ratio calculated on the basis of data from the Spanish Annual National Accounts for companies engaging in the manufacture of food products of 0.93 FTE jobs per absolute job.

Figure 32 reflects the estimated impact of processing on employment. In total, it has been estimated that this activity contributes to the creation of 5,856 jobs, of which 1,466 (25%) are direct jobs generated within the sector itself.

**Figure 32. Contribution of the processing of agricultural products in the Tajo-Segura aqueduct area to employment in 2019[49]**

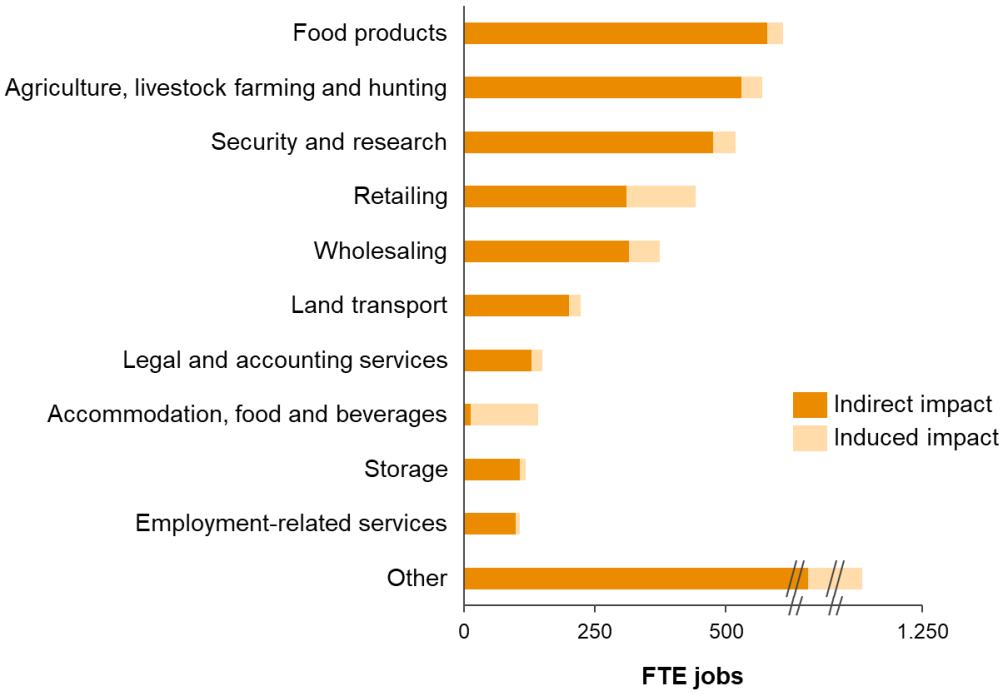
| Contribution to employment | FTE jobs |
|---|---|
| Direct impact | 1,466 |
| Indirect impact | 3,563 |
| Induced impact | 827 |
| **TOTAL** | **5,856** |

*Source: In-house using data from MAPA, INE and regional statistics portals.*

As shown in Figure 33, the food and agriculture sectors again benefit the most, as does GDP. The security and research sector, which includes activities such as surveillance services and security systems, also benefits.

[49] In terms of absolute jobs, the processing impacts would be: Direct impact 1,574, indirect impact 3,880, and induced impact 923, giving a total impact of 6,377 jobs.

**Figure 33. Indirect and induced impacts of the processing stage on employment by sector**




*Source: In-house using data from MAPA and regional statistics portals.*

# 3.4. Total contribution

As we have seen, the Tajo-Segura aqueduct has become a strategic economic and social factor in the provinces of Alicante, Almería and Murcia. The agricultural sector is the main beneficiary since it depends directly on the water transferred, although it acts as a catalyst for business throughout the region's agri-food industry.

The aqueduct also produces a transversal impact on the rest of the economy since the agri-food industry is a driver for the supply chain and consumption due to wage income related directly or indirectly to the aqueduct.

In overall terms, it has been estimated that the aqueduct generates a total impact of more than **€3,013 million, equivalent to 4.6% of GDP in the Alicante and Murcia provinces**.[50]

The total impact is greater than the contribution to the national economy in GVA terms of sectors such as air transport or the extractive industries. In addition, the impact of the Tajo-Segura aqueduct is almost double the contribution made by the fishing and aquaculture sector in Spain, and is equivalent to over three times the contribution of forestry and logging in the country as a whole.[51]

**Figure 34. Total contribution to GDP of agriculture-related activities in the Tajo-Segura aqueduct area in 2019, by type of impact**

| Contribution to GDP | Million euro |
|---|---|
| Direct impact | 1,296.9 |
| Indirect impact | 1,047.2 |
| Induced impact | 669.1 |
| **TOTAL** | **3,013.1** |

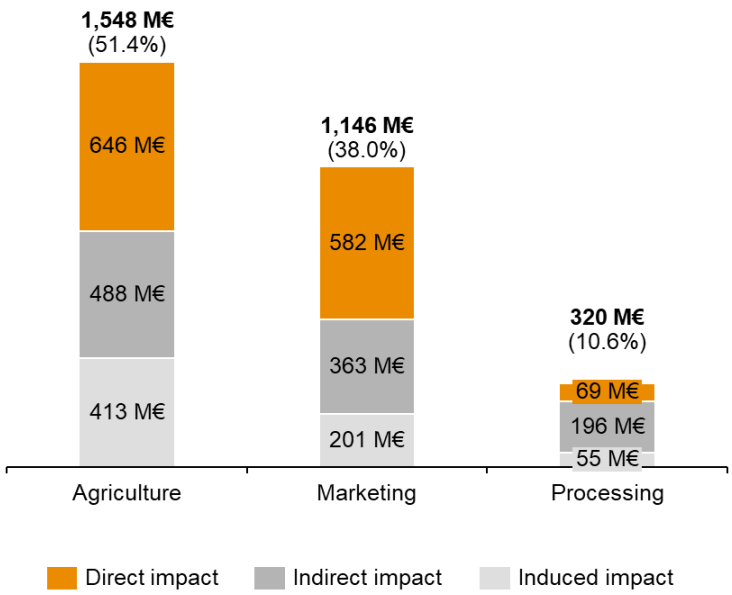
*Source: In-house using data from MAPA, INE and regional statistics portals.*

As can be seen in Figure 35, more than half of the total impact (51.4%) is generated by agriculture, while 38% of the impacts derive from marketing and the remaining 10.6% from the processing activity.

[50] Data from 2017, latest year available. Source: INE.

[51] Data for 2017, the latest year available for this level of detail. The contribution to GDP estimated in our study includes not only agriculture but also related activities (marketing and processing), as well as direct, indirect and induced impacts, while the contribution data by branch of activity include only the direct effect. This comparison is therefore made with the sole aim of establishing a benchmark for contextualising the size of the estimated contribution to GDP. Source: INE, Annual National Accounts.

**Figure 35. Total contribution to GDP of agriculture-related activities in the Tajo-Segura aqueduct area in 2019, by economic activity**




*Source: In-house using data from MAPA, INE and regional statistics portals.*

**The aqueduct is** also **a powerful driver of employment in the regions concerned and overall it provides 106,566 absolute jobs** and 97,230 FTE jobs, **equivalent to 5.8% of the working population in the Alicante and Murcia provinces.**[52]

The contribution to FTE jobs by the Tajo-Segura aqueduct is greater than the contribution in Spain of certain relevant sectors such as the chemicals industry or the telecommunications industry and is more than six times greater than the FTE jobs generated by the forestry and logging sector, and nearly three times the employment generated by fishing and aquaculture in Spain. [53]

**Figure 36. Total contribution to employment by agriculture in the Tajo-Segura aqueduct area[54]**

| Contribution to employment | FTE jobs |
|---|---|
| Direct impact | 71,024 |
| Indirect impact | 16,098 |
| Induced impact | 10,108 |
| **TOTAL** | **97,230** |

*Source: In-house using data from MAPA, INE and regional statistics portals.*

Figure 37 includes a breakdown of total impacts by sector of activity. As may be observed, over 70% of the impacts on employment derive from agriculture and therefore the relative importance

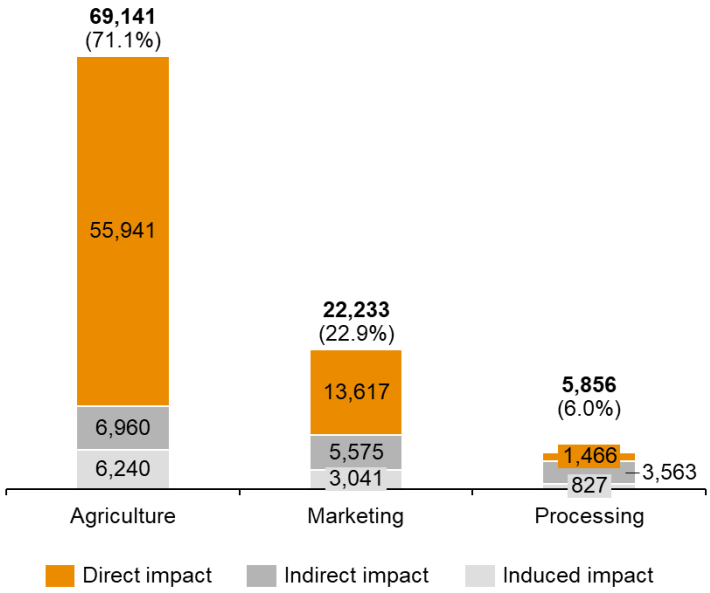
[52] Data from 2019. Source: INE.

[53] Data for 2017, the latest year available for this level of detail. It should be borne in mind that, as with GDP, the contribution to employment estimated in our study includes the impact generated by agricultural, marketing and processing activities, directly, indirectly and induced, whereas the data on the contribution by branch of activity only include the direct effect. Therefore, this comparison is used only for illustrative purposes to contextualise the size of the estimated impact. Source: INE, Annual National Accounts.

[54] In terms of absolute jobs, the total impacts would be: Direct impact 78,053, indirect impact 17,231, and induced impact 11,282, giving a total impact of 106,566 jobs.

of this activity is proportionally higher than in the case of GDP. This difference is due to the fact that agriculture is more labour-intensive than marketing or industrial activities.

**Figure 37. Total contribution to employment of agriculture-related activities in the Tajo-Segura aqueduct area in 2019, by FTE jobs**




*Source: In-house using data from MAPA, INE and regional statistics portals.*

# 4

# Conclusions

# 4. Conclusions

The main findings of our study are as follows:

- The main use of water supplied by the Tajo-Segura aqueduct is irrigation for agriculture. Agriculture is a strategic sector for Spain: its relative contribution to GDP is greater than in neighbouring countries and the EU average. In addition, Spain has a competitive advantage thanks to its privileged climatic conditions, which are hard to replicate and provide favourable conditions for agricultural production.

- In many cases, the area affected by the aqueduct has a greater relative economic dependence on agriculture, in GVA and employment terms. At the same time, this area makes a greater contribution to a sector which, as indicated above, is strategic on a national level, with almost half of Spanish fruit and vegetable exports being concentrated in the aqueduct provinces. Moreover, thanks to the economic dynamism it brings, agriculture is a means of generating employment and settling the rural population, as has been seen in recent decades.

- The water from the aqueduct is a fundamental resource for irrigation in this area, although the water transferred is often not sufficient to meet the entire demand for crops. This has led farmers to seek alternative resources, such as seawater desalination, which provides an inexhaustible source. However, desalinated water cannot be applied directly for irrigation purposes due to its composition and the high cost of its production. Therefore it is a necessary resource, but complementary to the water from the aqueduct.

- The implementation of the Tajo-Segura aqueduct has been accompanied by the development of a modern and high-tech agricultural sector, which ranks amongst the best in Europe in terms of technological development. According to our estimates, this sector contributes €1,547.5 million to regional and national GDP on a direct, indirect and induced basis, and provides 76,139 jobs in absolute terms.

- In addition to agriculture, the water from the aqueduct benefits other economic activities that are part of the agri-food industry value chain, particularly the marketing and processing of agricultural products. Taking into account the impacts generated by these activities in addition to the agriculture effect, the agri-food industry related to water from the Tajo-Segura aqueduct contributes a total of €3,013.1 million in GDP terms and 106,566 jobs.

- Agriculture in the aqueduct area and the related economic activities play an essential part in the provision of food products, which is particularly relevant in certain circumstances such as international conflicts, natural disasters, plagues or pandemics such as that caused by COVID-19, since they ensure security of supply and reduce dependence on external sources.

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# Appendices

# *Appendix A. Breakdown of exports from provinces in the aqueduct area by product (2019)*

| Product | Aqueduct province exports (€) | % national total |
|---|---|---|
| Artichoke | 15,219,228 | 92% |
| Spinach | 52,478,359 | 89% |
| Lettuce | 635,246,552 | 88% |
| Endive/curly endive | 57,235,114 | 87% |
| Courgette | 292,336,984 | 87% |
| Pepper | 958,938,513 | 86% |
| Aubergine | 131,657,257 | 86% |
| Celery | 55,672,159 | 81% |
| Cabbage | 423,707,178 | 81% |
| Grape | 246,729,549 | 80% |
| Melon | 253,216,951 | 79% |
| Bean | 35,095,860 | 75% |
| Cucumber | 438,721,522 | 73% |
| Tomato | 665,905,746 | 72% |
| Chard | 4,574,692 | 72% |
| Watermelon | 295,771,306 | 71% |
| Pumpkin | 17,361,874 | 67% |
| Pea | 3,213,458 | 65% |
| Other vegetables | 141,684,823 | 59% |
| Fig | 3,983,787 | 52% |
| Other fruits | 49,862,656 | 40% |
| Apricot | 40,514,128 | 34% |
| Garlic | 102,196,169 | 32% |
| Leek | 6,127,071 | 30% |
| Citrus fruit | 797,124,575 | 25% |
| Peach | 83,262,145 | 23% |
| Nectarine | 82,821,613 | 21% |
| Plum | 12,027,643 | 13% |
| Sweetcorn | 3,813,294 | 12% |
| Carrot and Turnip | 6,977,972 | 11% |
| Potato | 15,378,890 | 10% |
| Persimmon | 12,455,296 | 6% |
| Pear | 6,054,982 | 6% |
| Kiwi | 1,727,798 | 6% |
| Banana | 3,167,708 | 5% |
| Onion | 8,341,676 | 4% |
| Strawberry | 21,520,554 | 4% |
| Asparagus | 2,182,931 | 3% |
| Cherry | 2,163,478 | 2% |
| Other | 15,589,050 | 8% |

*Source: FEPEX*

# *Appendix B. Surface area, output and crop yield in the area irrigated by the aqueduct*

**Figure 38. Distribution of the land irrigated using water from the aqueduct, by crop type and geographical region (hectares)**

| | Alicante | Almería | Murcia | Total |
|---|---|---|---|---|
| Vegetables | 3,250 | 2,796 | 32,519 | 38,564 |
| Citrus fruits | 31,338 | 705 | 25,466 | 57,510 |
| Orchard fruits | 3,104 | 39 | 12,464 | 15,607 |
| Almonds | 2,371 | 252 | 1,080 | 3,704 |
| Olives | 1,529 | 0 | 2,979 | 4,508 |
| Grapes | 1,386 | 0 | 1,658 | 3,044 |
| **Total main crops** | **42,977** | **3,792** | **76,167** | **122,936** |
| Other crops | 1,137.3 | 38.8 | 1,978.6 | 3,154.7 |
| **Total** | **44,111.0** | **3,831.0** | **78,144.0** | **126,086.0** |

*Note: The category of other crops includes grain cereals, fodder crops, industrial crops, grain legumes and tubers for human consumption. These crops are, in general, mostly dry land and therefore have not been considered among the main crops for the area impacted by the aqueduct. Source: In-house using MAPA data, regional statistics portals and the Segura River Hydrographic Confederation.*

**Figure 39. Agricultural production of main crops in the aqueduct area by crop type and geographical region (tonnes)**

| | Alicante | Almería | Murcia | Total |
|---|---|---|---|---|
| Vegetables | 104,976 | 175,610 | 1,096,246 | 1,376,832 |
| Citrus fruits | 762,797 | 16,273 | 558,822 | 1,337,892 |
| Orchard fruits | 34,328 | 304 | 243,405 | 278,037 |
| Almonds | 1,530 | 84 | 424 | 2,039 |
| Olives | 2,543 | 0 | 8,532 | 11,075 |
| Grapes | 10,228 | 0 | 13,593 | 23,821 |
| **Total** | **916,404** | **192,270** | **1,921,021** | **3,029,695** |

*Source: In-house using data from MAPA and regional statistics portals.*

**Figure 40. Agricultural production of main crops in the aqueduct area by crop type and geographical region (tonnes)**

| | Alicante | Almería | Murcia | Total |
|---|---|---|---|---|
| Vegetables | 32.3 | 62.8 | 33.7 | 35.7 |
| Citrus fruits | 24.3 | 23.1 | 21.9 | 23.3 |
| Orchard fruits | 11.1 | 7.8 | 19.5 | 17.8 |
| Almonds | 0.6 | 0.3 | 0.4 | 0.6 |
| Olives | 1.7 | 0 | 2.9 | 2.5 |
| Grapes | 7.4 | 0 | 8.2 | 7.8 |
| **TOTAL** | **21.3** | **50.7** | **25.2** | **24.6** |

*Source: In-house using data from MAPA and regional statistics portals.*

# *Appendix C. Average prices received by farmers*

**Figure 41. Average vegetable prices in the home market and weighted average for the category (2018)**

| Crop | Price (€/100 kg) |
|---|---|
| **Vegetables*** | **49.28** |
| Chard | 52.31 |
| Garlic | 146.54 |
| Artichoke | 68.97 |
| Aubergine | 53.70 |
| Courgette | 58.87 |
| Onion | 23.04 |
| Mushroom | 147.03 |
| Cauliflower | 46.81 |
| Cabbage and Sprouts | 34.93 |
| Curly endive | 46.16 |
| Asparagus | 225.49 |
| Spinach | 80.26 |
| Strawberry | 142.82 |
| Green Pea | 42.90 |
| Green bean | 104.89 |
| Green runner bean | 162.78 |
| Lettuce | 22.55 |
| Melon | 33.13 |
| Cucumber | 54.63 |
| Pepper | 80.79 |
| Leek | 57.20 |
| Watermelon | 51.69 |
| Tomato | 31.55 |
| Carrot | 32.26 |

**Weighted average.*
*Source: In-house using data from MAPA and regional statistics portals.*

**Figure 42. Average prices of citrus fruits in the home market and weighted average for the category (2018)**

| Crop | Price (€/100 kg) |
|---|---|
| **Citrus fruits*** | **37.86** |
| Lemon | 50.45 |
| Mandarin | 26.18 |
| Orange | 23.20 |

**Weighted average.*
*Source: In-house using data from MAPA and regional statistics portals.*

**Figure 43. Average prices of orchard fruits in the home market and weighted average for the category (2018)**

| Crop | Price (€/100 kg) |
|---|---|
| **Fruit*** | **72.91** |
| Avocado | 192.81 |
| Apricot | 65.95 |
| Cherry | 120.05 |
| Plum | 61.72 |
| Custard apple | 130.78 |
| Fig | 88.95 |
| Apple | 54.07 |
| Peach | 73.53 |
| Loquat | 122.09 |
| Pear | 55.96 |

**Weighted average.*
*Source: In-house using data from MAPA and regional statistics portals.*

**Figure 44. Average almond price in the home market (2018)**

| Crop | Price (€/100 kg) |
|---|---|
| Almond | 114.38 |

*Source: In-house using data from MAPA and regional statistics portals.*

**Figure 45. Average olive prices in the home market and weighted average for the category (2018)**

| Crop | Price (€/100 kg) |
|---|---|
| **Olive*** | 57.70 |
| Table olive | 73.82 |
| Olive for oil production | 57.29 |

**Weighted average.*
*Source: In-house using data from MAPA and regional statistics portals.*

**Figure 46. Average grape price in the home market (2018)**

| Crop | Price (€/100 kg) |
|---|---|
| Table grapes | 82.99 |

*Note: Price of grapes for winemaking/raisin production not available.*
*Source: In-house using data from MAPA and regional statistics portals.*

# *Appendix D. Breakdown of agricultural and marketing costs*

**Figure 47. Breakdown of production costs by crop type**

| Item | Vegetables | Citrus fruits | Orchard fruits | Almonds | Olives | Grapes |
|---|---|---|---|---|---|---|
| Seeds and plants | 18.9% | 0.1% | 0.5% | 14.1% | 0.1% | 0.1% |
| Fertilizers | 15.0% | 22.1% | 14.1% | 8.8% | 16.7% | 20.4% |
| Phytosanitary products | 10.7% | 14.2% | 12.0% | 4.3% | 9.2% | 9.1% |
| Other supplies | 17.9% | 27.9% | 41.7% | 18.8% | 29.5% | 18.1% |
| Irrigation water | 14.0% | 23.3% | 34.9% | 15.8% | 0.0% | 0.0% |
| Crop insurance | 2.3% | 2.3% | 3.5% | 1.5% | 29.5% | 18.1% |
| Materials | 1.6% | 0.0% | 3.5% | 1.5% | 0.0% | 0.0% |
| Transport | 0.0% | 2.3% | 0.0% | 0.0% | 0.0% | 0.0% |
| Machinery expenses | 11.7% | 13.2% | 8.6% | 23.7% | 14.1% | 19.3% |
| Contracted work | 2.3% | 3.8% | 1.3% | 4.3% | 1.9% | 10.3% |
| Fuel/lubricants | 8.3% | 5.5% | 4.5% | 9.9% | 8.2% | 5.8% |
| Repairs/spare parts | 1.1% | 3.9% | 2.8% | 9.5% | 4.0% | 3.2% |
| Insurance own funds | 3.8% | 0.8% | 1.3% | 0.8% | 1.4% | 1.8% |
| Interest/financial costs | 0.0% | 0.1% | 0.4% | 0.0% | 0.2% | 0.1% |
| Property rental fee | 5.3% | 4.8% | 3.1% | 5.0% | 12.0% | 10.7% |
| Contributions/tax | 3.0% | 2.3% | 0.9% | 2.6% | 1.5% | 1.8% |
| Building maintenance | 3.8% | 0.7% | 0.8% | 0.3% | 0.6% | 0.6% |
| Other general expenses | 0.8% | 4.9% | 7.1% | 8.7% | 4.4% | 5.4% |
| Depreciation | 9.2% | 9.0% | 9.5% | 12.8% | 10.3% | 12.7% |
| Land | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Buildings | 7.1% | 4.5% | 4.8% | 6.5% | 5.1% | 5.0% |
| Machinery | 2.2% | 4.5% | 4.8% | 6.5% | 5.1% | 7.7% |
| **Total** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** |

*Note: 0% may indicate both zero expenditure and unreported data.*
*Source: In house based on MAPA data (2018): Technical-Economic Results of Horticultural Crops 2015", Sub-directorate General for Analysis, Prospective and Coordination, Under Secretary's Office. Ministry of Agriculture, Fisheries and Food; MAPA (2019): Technical-economic results of Orchard Fruits 2017". Sub-directorate General for Analysis, Coordination and Statistics. Under Secretary's Office. Ministry of Agriculture, Fisheries and Food; MAPA (2019) Technical-economic results for Olive trees and Vineyards 2017". Sub-directorate General for Analysis, Coordination and Statistics. Under Secretary's Office. Ministry of Agriculture, Fisheries and Food; and PwC report (2013) Economic impact of the Tajo-Segura aqueduct.*

**Figure 48. Breakdown of marketing costs by crop type**

| Item | Vegetables | Citrus fruits | Orchard fruits |
|---|---|---|---|
| Transport to platform | 26.1% | 26.8% | 32.8% |
| General expenses | 18.3% | 15.0% | 22.5% |
| Fixed | 11.3% | 9.2% | 13.9% |
| Supplies | 4.8% | 4.0% | 5.9% |
| Water | 0.2% | 0.1% | 0.2% |
| Electricity | 4.3% | 3.6% | 5.3% |
| Gas | 0.3% | 0.2% | 0.4% |
| Association fees | 0.3% | 0.2% | 0.3% |
| External services | 6.2% | 5.1% | 7.6% |
| Depreciation | 7.0% | 5.8% | 8.6% |
| Buildings/facilities | 2.2% | 1.8% | 2.7% |
| Machinery and equipment | 4.2% | 3.5% | 5.3% |
| Vehicles | 0.6% | 0.5% | 0.7% |
| Manufacturing | 55.6% | 58.2% | 44.7% |
| Containers | 48.9% | 51.1% | 39.3% |
| Packaging | 5.6% | 5.9% | 4.5% |
| Labels | 1.1% | 1.2% | 0.9% |
| **TOTAL** | **100%** | **100%** | **100%** |

*Source: MAGRAMA and in-house.*

# *Appendix E. Municipalities in the areas irrigated by water from the Tajo-Segura aqueduct*

**Figure 49. Municipalities in the areas irrigated by water from the Tajo-Segura aqueduct**

| Alicante | Murcia | Almería |
|---|---|---|
| Albatera | Abanilla | Antas |
| Algorfa | Abarán | Cuevas de Almanzora |
| Alicante | Albudeite | Huercal-Overa |
| Almoradí | Alguazas | Vera |
| Benejúzar | Alhama de Murcia | |
| Benferri | Archena | |
| Benijófar | Blanca | |
| Bigastro | Calasparra | |
| Callosa del Segura | Campos del Río | |
| Campello | Cartagena | |
| Catral | Ceutí | |
| Cox | Cieza | |
| Crevillente | Fortuna | |
| Elche | Fuente Álamo | |
| Granja de rocamora | Las Torres de Cotillas | |
| Guardamar del Segura | Librilla | |
| Jacarilla | Lorca | |
| Muchamiel | Lorquí | |
| Orihuela | Los Alcázares | |
| Pilar de la Horadada | Mula | |
| Redován | Murcia | |
| Rojales | Ojós | |
| San Juan de Alicante | Ricote | |
| San Miguel de Salinas | San Javier | |
| Santa Pola | San Pedro del Pinatar | |
| Torrevieja | Sangonera | |
| | Santomera | |
| | Torre Pacheco | |
| | Totana | |
| | Ulea | |
| | Villanueva del Río Segura | |

*Source: SCRATS.*

# *Appendix F. The Input-Output model*

The Input-Output methodology is based on Leontief's production model, which states that the production requirements of an economy are equivalent to the intermediate demand for goods and services by the production sectors, plus final demand, as expressed in the following equation:

$$X = AX + y$$

where X is the column vector that represents the production needs of each sector in the economy (there are 63 in Spain's National Accounts in total), y is a column vector that represents the final demand of each sector, and A is a matrix (63 rows x 63 columns), containing technical coefficients, which by row indicate the percentage of production destined to each one of the other sectors in the economy for each specific sector, and by column indicate the weight that demand by each one of the other sectors in the economy has over its total production of goods and services for each sector. The aforementioned formula can also be represented in the following way:

$$\begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ \dots \\ X_{63} \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & a_{13} & \dots & a_{163} \\ a_{21} & a_{22} & a_{23} & \dots & a_{263} \\ a_{31} & a_{32} & a_{33} & \dots & a_{363} \\ & & \dots & & \\ a_{631} & a_{632} & a_{633} & \dots & a_{6363} \end{bmatrix} \cdot \begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ \dots \\ X_{63} \end{bmatrix} + \begin{bmatrix} y_1 \\ y_2 \\ y_3 \\ \dots \\ y_{63} \end{bmatrix}$$

where, e.g., X1 are the production needs of sector 1, y1 is the final demand for that sector and a11, a12, a13, …, a163 are the percentages of production of sector 1 used for sectors 1, 2, 3, …, 63, respectively, whilst a11, a21, a31, …, a631 are the weights of sectors 1, 2, 3, …, 63, respectively, over the production by sector 1 of the goods and services demanded.

If we rearrange the formula above, we can calculate the production needs of an economy (X) based on final demand (y). This takes the following structure:

$$X = (I-A)\text{-}1\ y$$

Where $(I-A)^{-1}$ is the inverse Leontief matrix or the production multiplier matrix, which is used to calculate the impacts.

The production multiplier matrix that we have used in our analysis has been calculated using data published by INE. This matrix has allowed us to calculate, for each euro spent or invested in the various sectors recorded in Spain's National Accounts (that is, for each euro of final demand), the impact in terms of gross production (i.e. in terms of the production needs).

Using the production multiplier matrix, we have proceeded to calculate the employment multipliers. To that end, using data from INE, we have firstly calculated the direct employment coefficients for each sector (the ratio between the number of employees and production). Subsequently, we have calculated the employment multipliers by multiplying the production multiplier matrix by a column vector containing the direct employment coefficients calculated for each sector. Figure 50 shows the value of the production and employment multipliers that have been obtained using the methodology described above.

The induced production multipliers have been calculated on the basis of the weight of household incomes (compensation received by employees) over the production of each one of the affected sectors and their marginal propensity to consume (we have adopted a conservative value of 0.64 taking into account the findings reported in the relevant literature).

**Figure 50. Production and employment multipliers for the sectors in Spain's National Accounts**

| Sector | Production | Employment (*) |
|---|---|---|
| Agriculture, livestock and hunting | 1.835 | 19.74 |
| Forestry | 1.256 | 19.07 |
| Fisheries and aquaculture | 1.781 | 20.69 |
| Extraction industries | 1.885 | 12.56 |
| Food products; beverages and tobacco | 2.532 | 13.81 |
| Textile products | 1.460 | 9.63 |
| Wood and cork industry | 2.043 | 14.87 |
| Paper industry | 1.990 | 10.08 |
| Publishing and printing | 1.946 | 17.07 |
| Coke and oil refining products | 1.239 | 2.37 |
| Chemical products | 1.958 | 8.79 |
| Pharmaceutical products | 1.722 | 8.22 |
| Rubber and plastic products | 1.846 | 11.29 |
| Other non-metallic mineral products | 2.051 | 11.13 |
| Metallurgical products and metal products | 2.098 | 8.36 |
| Metal products, except machinery and equipment | 2.024 | 16.64 |
| IT, electronic and optical products | 1.666 | 15.98 |
| Electric equipment | 1.897 | 7.89 |
| Other machinery and equipment | 1.893 | 14.04 |
| Motor vehicles, trailers and semi-trailers | 1.649 | 7.48 |
| Other transport equipment | 1.843 | 10.21 |
| Furniture and other manufactured products | 1.784 | 11.47 |
| Machinery and equipment repair and installation services | 1.628 | 10.10 |
| Electricity, gas and other | 2.156 | 5.88 |
| Water treatment and distribution | 1.706 | 11.26 |
| Sewerage and waste management services | 1.994 | 13.07 |
| Construction and building work | 1.945 | 13.80 |
| Wholesale and retail motor vehicle trade | 1.609 | 15.69 |
| Wholesale trade | 1.727 | 16.69 |
| Retail trade | 1.505 | 26.92 |
| Land transport | 1.739 | 13.61 |
| Sea transport | 2.039 | 11.79 |
| Air transport | 2.053 | 8.91 |
| Storage and ancillary transport services | 1.898 | 13.17 |
| Mail and courier services | 1.773 | 22.74 |
| Accommodation, food and beverages sector | 1.746 | 15.80 |
| Publishing services | 1.924 | 11.12 |
| Cinematographic, video and television services | 1.988 | 9.83 |
| Telecommunications services | 1.643 | 7.23 |
| IT and information services | 1.633 | 13.26 |
| Financial services | 1.431 | 8.91 |
| Insurance, reinsurance and pension plan services | 1.841 | 8.87 |
| Ancillary services | 1.505 | 9.97 |
| Property services | 1.207 | 2.97 |
| Legal and accounting services | 1.590 | 20.54 |
| Technical architectural and engineering services | 1.731 | 15.29 |
| Scientific research and development | 1.401 | 10.02 |
| Advertising and market research | 1.793 | 17.81 |
| Other professional services | 1.536 | 10.13 |
| Rental services | 1.542 | 9.11 |

| Sector | Production | Employment (*) |
|---|---|---|
| Employment-related services | 1.134 | 36.52 |
| Travel agency services | 2.223 | 13.03 |
| Security and research | 1.447 | 26.94 |
| Public administration and defence | 1.365 | 19.10 |
| Education | 1.177 | 20.16 |
| Healthcare | 1.429 | 14.79 |
| Social services | 1.471 | 23.31 |
| Creative, artistic and entertainment services | 1.575 | 21.54 |
| Sporting, leisure and entertainment services | 1.665 | 18.93 |
| Services rendered by associations | 1.640 | 20.66 |
| Repair of computers and other items | 1.585 | 27.43 |
| Other personal services | 1.398 | 32.25 |

*Notes: (*) Jobs per million euro of final production value in the sector.*
*Source: PwC analysis using data from the Spanish National Accounts.*

# *Appendix G. Major processing companies*

**Figure 51. Ranking of the top 30 processing companies in the provinces affected by the aqueduct by revenue, 2018**

| | Name | Province | Literal primary CNAE 2009 code | Revenue (€'000) | Number of employees 2018 |
|---|---|---|---|---|---|
| 1 | AMC Natural Drinks, S.L. | Murcia | Manufacture of fruit and vegetable juices | 293,383 | 385 |
| 2 | Hero España, S.A. | Murcia | Other processing and canning of fruit and vegetables | 171,673 | 814 |
| 3 | Juver Alimentación, S.L. | Murcia | Manufacture of fruit and vegetable juices | 127,121 | 324 |
| 4 | Quirantes Fruits, S.L. | Alicante | Manufacture of fruit and vegetable juices | 108,198 | 33 |
| 5 | Marín Montejano, S.A. | Murcia | Other processing and canning of fruit and vegetables | 76,943 | 184 |
| 6 | La Española Alimentaria Alcoyana, S.A. | Alicante | Other processing and canning of fruit and vegetables | 76,886 | 191 |
| 7 | Ultracongelados Azarbe, S.A. | Murcia | Other processing and canning of fruit and vegetables | 73,692 | 156 |
| 8 | Fruveco, S.A. | Murcia | Other processing and canning of fruit and vegetables | 71,937 | 207 |
| 9 | Cándido Miró, S.A. | Alicante | Other processing and canning of fruit and vegetables | 38,496 | 84 |
| 10 | Frutas y conservas de Murcia, S.L. | Murcia | Other processing and canning of fruit and vegetables | 32,361 | 80 |
| 11 | Alcurnia Alimentación, S.L.U. | Murcia | Other processing and canning of fruit and vegetables | 30,106 | 6 |
| 12 | Aceitunas Cazorla, S.L. | Alicante | Other processing and canning of fruit and vegetables | 29,871 | 12 |
| 13 | Golden Foods, S.A. | Murcia | Other processing and canning of fruit and vegetables | 27,025 | 211 |
| 14 | Agrotransformados, S.A. | Murcia | Manufacture of fruit and vegetable juices | 26,629 | 52 |
| 15 | CRA Juice, S.L. | Alicante | Manufacture of fruit and vegetable juices | 19,550 | 19 |
| 16 | Hida Alimentación, S.A. | Murcia | Other processing and canning of fruit and vegetables | 18,156 | 43 |
| 17 | Productos Bionaturales de Calasparra, S.A. | Murcia | Other processing and canning of fruit and vegetables | 17,281 | 87 |
| 18 | Vegetales del Sudeste 2018, S.L. | Murcia | Other processing and canning of fruit and vegetables | 16,973 | 274 |
| 19 | Citromil, S.L. | Murcia | Manufacture of fruit and vegetable juices | 16,951 | 33 |

| | Name | Province | Literal primary CNAE 2009 code | Revenue (€'000) | Number of employees 2018 |
|---|---|---|---|---|---|
| 20 | Mensajero Alimentación, S.L. | Murcia | Other processing and canning of fruit and vegetables | 16,798 | 236 |
| 21 | Faroliva, S.L. | Murcia | Other processing and canning of fruit and vegetables | 16,730 | 42 |
| 22 | Hortofrutícola 3 puentes, S.L. | Alicante | Other processing and canning of fruit and vegetables | 14,895 | 44 |
| 23 | Cítricos del Andarax, S.A. | Almería | Manufacture of fruit and vegetable juices | 13,123 | 48 |
| 24 | Paprimur, S.L. | Murcia | Manufacture of spices, sauces and condiments | 12,526 | 40 |
| 25 | Congelados Pedáneo, S.A. | Murcia | Other processing and canning of fruit and vegetables | 12,456 | 87 |
| 26 | Juan Navarro García, S.A. | Murcia | Manufacture of spices, sauces and condiments | 12,280 | 20 |
| 27 | Pedro Guillén Gomáriz, S.L. | Murcia | Other processing and canning of fruit and vegetables | 11,960 | 51 |
| 28 | Tropicana Alvalle, S.L. | Murcia | Manufacture of fruit and vegetable juices | 10,987 | 67 |
| 29 | Manuel Mateo Candel, S.L. | Alicante | Other processing and canning of fruit and vegetables | 10,557 | 62 |
| 30 | Riverbend España, S.A. | Murcia | Manufacture of fruit and vegetable juices | 10,284 | 36 |

*Note: The revenue figures relate to the latest information available in SABI. Companies whose most recent annual accounts in SABI pertain to periods prior to 2018 have been excluded, with the exception of Hero España SA. The revenue for that company has been extracted from Informa. Source: SABI, Informa and in-house.*

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