



**Economic impact
of the commercial
activity and
digitalisation of the
Port of Barcelona**

Summary

Introduction

3

01. The economic impact of the Port's commercial activity

4

02. The economic and environmental impact of digitalisation of the Port

8

1. Short-term economic impact of digitalisation 9
2. Long-term economic impact of digitalisation 10
3. Environmental impact 10
4. Pull effects on the Catalan economy 12
5. Qualitative assessment 14

03. Methodology

17





INTRODUCTION

This study, based on 2018 data and conducted by the consulting firm ECOATENA, highlights that the importance of the Port of Barcelona is revealed and measured not only in traffic figures, but also in terms of the Port's impact on job creation, wealth creation, environmental sustainability and, ultimately, the creation of prosperity.

Since the last impact study, corresponding to 2006, the Port of Barcelona has considerably increased its commercial activity and has established its position as the leading port in southern Europe and the Mediterranean in terms of passenger movement and car traffic, short sea shipping, containers trade, hydrocarbons and rail intermodality.

Along with this diversification of traffic, the Port has experienced a quantum leap during this period, with the introduction of digital technology playing a significant role. Among the main results of this study, it is clearly shown that the digitalisation of processes and services has led to a more competitive Port of Barcelona, with lower environmental impact and greater productive capacity.

01. THE ECONOMIC IMPACT OF THE PORT'S COMMERCIAL ACTIVITY

The Port of Barcelona encompasses 562 companies, which provide services to supply chains as they pass through the Port: services for vessels, goods and passengers, logistics services and intermodal transport services.

Profile of companies and administrations that make up the Barcelona Port Community

Shipping agent companies	Technical and maritime service companies – Mooring – Towage – Pilotage
Stevedoring companies and specialised terminals	
Freight forwarders / Neutral consolidators	
Customs agents	
Container depots	Technical and ancillary service companies – Quality inspections / surveyors – Ship repairs – Bunkering – Ship chandlers – Waste management (hazardous waste, treatment & recycling services) – Ship lashing
Road haulage companies	
Rail operators	
Centro Intermodal de Logística (CILSA)	
Estibarna	
Maritime Customs and Border Inspection Services (BIS)	
PortIC	
Barcelona Port Authority (APB)	



The commercial activity of the Port of Barcelona generates an impact of **€4.213 billion in gross value added (GVA)** and helps sustain **46,469 jobs**.

The Port's contribution to the economy represents **2% of Catalonia's GVA and 1.4% of jobs**.

Of the total GVA generated, €1.852 billion is directly attributable to Port Community companies (direct impact). The remaining €2.361 billion corresponds to cross-sectoral impact, that is, to the total income that port activity generates over the rest of the economy. This figure underscores the Port's strategic importance for the functioning of the rest of the industrial and commercial sectors in the territory.

Of the total employment generated, 16,519 jobs are directly attributable to Port Community companies.

The tax yield generated by the Port's economic activity amounts to **€849 million, representing 2% of tax revenues in Catalonia and 0.4% in Spain**.

Of this total, 44% corresponds to tax paid directly by Port companies and the remaining 56% to the revenue generated by the Port over the rest of the sectors.



Pull effect on the economy

€4.213 billion impact on GVA = 2% of GVA in Catalonia and 0.4% in Spain

For every €100 of GVA directly generated by the Port of Barcelona, €127 of additional income is produced in the economy.

Direct effect

Corresponding to revenue and employment generated directly or immediately by Barcelona Port Community companies.



Pull effect on employment

46,469 jobs = 1.4% of employment in Catalonia and 0.23% in Spain

For every 100 jobs directly provided by Port companies, 181 jobs are created additionally

Indirect effect

Corresponding to the effects generated by the Port's supplier sectors through the purchases they make from other sectors to provide the services required by Port companies.



Effect on tax revenue

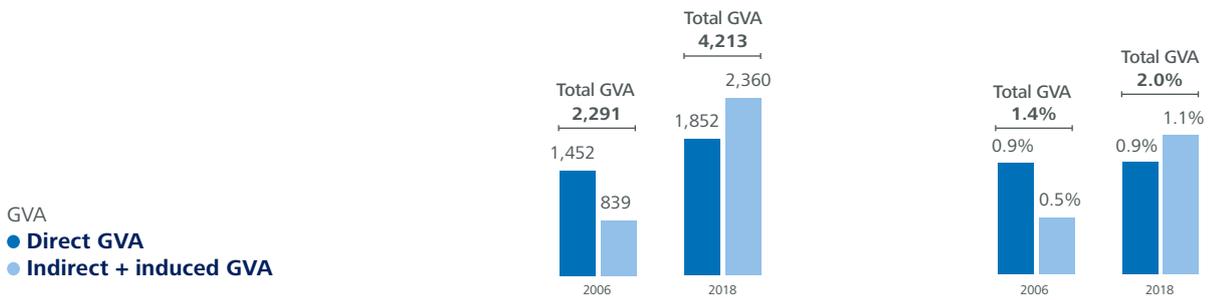
€849 million in tax income generated = 2% of tax collection in Catalonia and 0.4% in Spain

For every €100 of tax paid directly by Port companies, €128 of additional tax income is generated.

Induced effect

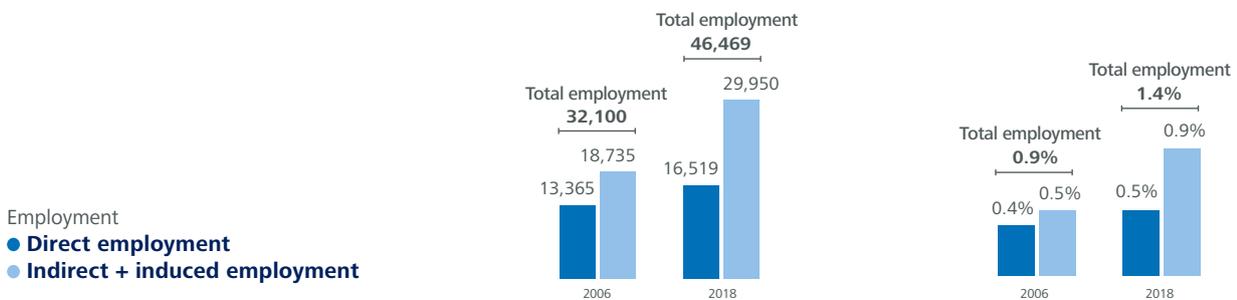
Corresponding to consumption resulting from earned income obtained from employment generated in both of the previous effects.

Port's economic impact, 2006-2018



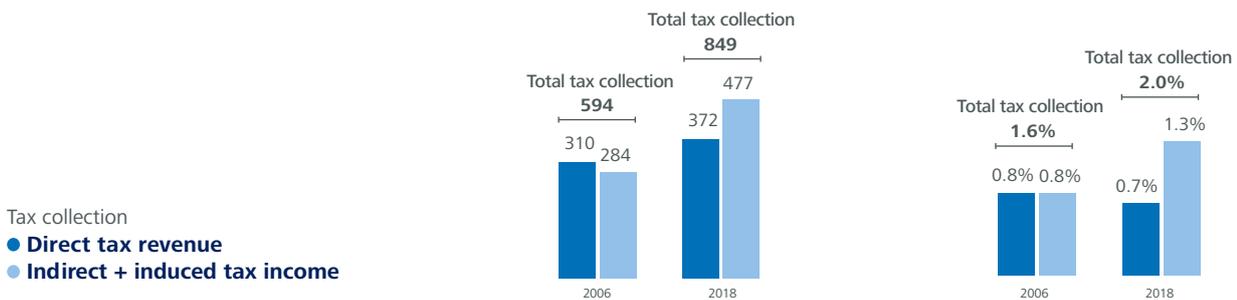
€ billion and number of persons employed

% of total for Catalonia



€ billion and number of persons employed

% of total for Catalonia



€ billion and number of persons employed

% of total for Catalonia

A comparison of the results of this study with those of the previous one reveals that in the period 2006-2018 the Port's total impact on GVA in Catalonia recorded accumulated growth of 84% (increasing from 1.4% to 2%) and the impact on employment rose 45% (increasing from 0.9% to 1.4% of the total for Catalonia). The fact that the increase in GVA is greater than the rise in employment illustrates the improvement in the Port's productivity.

02. THE ECONOMIC AND ENVIRONMENTAL IMPACT OF DIGITALISATION OF THE PORT

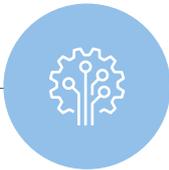
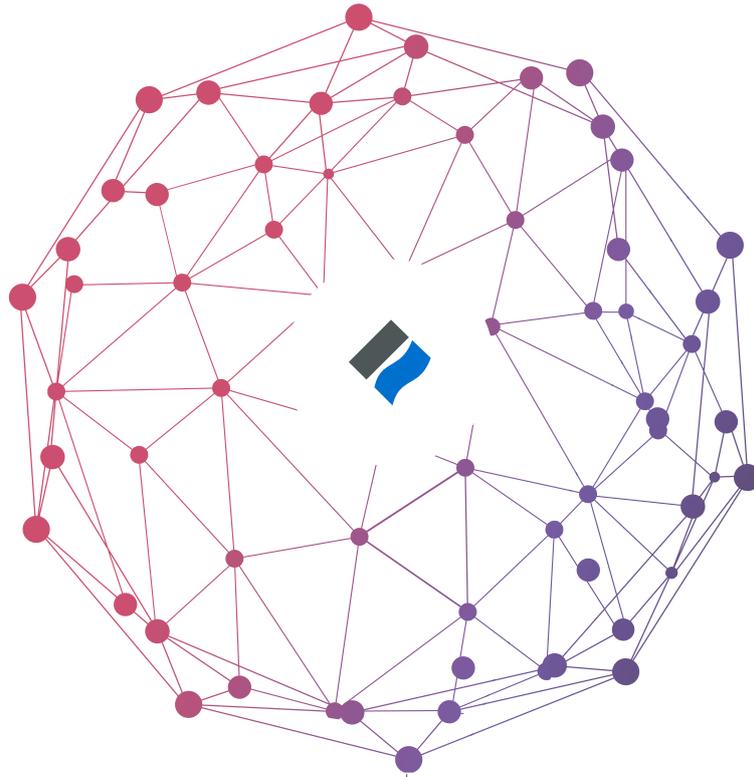
One of the key aspects to explain the growth in the Port of Barcelona's activity in recent years, both in terms of traffic and, in particular, of qualitative growth, is the level of digitalisation that has been brought into its processes and operations.

This study examines the following aspects of digitalisation:

- Transferring documentary processes online (administrations, suppliers and customers).
- Information, communication and management systems for vessel traffic.
- Management and planning operating systems: advanced software systems for terminal operation management and planning; automated management of truck entry/exit; operational automation; storage management systems, and truck fleet management.
- And all other digital processes, services and systems designed to improve customer and supplier management.

The digitalisation of processes and services has led Barcelona to be a more competitive port, with lower environmental impact and greater productive capacity.





1. Short-term economic impact of digitalisation

The main benefit of digitalisation of the Port has been a notable improvement in productivity that has enabled it to gain growth potential and increase its competitiveness:

€450 million

in cost reduction per year, representing 15% of the Port's operational expenditure

2,700

jobs saved

These results only reflect the short-term impact of digitalisation.

The applied methodology in the study evaluated the companies' volume of business in 2018 and calculated the differences in costs and time used in management and operational processes compared to a non-digitalised setting. Although digitalisation has developed progressively over the years, the methodology that was used produced results for 2018 only. These results are expected to increase as digitalisation intensifies so their significance will grow in the years ahead.



2. Long-term economic impact of digitalisation

Digitalisation has resulted in an increase in the ability of port companies to grow in terms of business activity and, consequently, in job creation:

€427.4 million

in increased sales (39% of the total for 2006-2018)

2,564

jobs created, the equivalent of 16% of direct employment at the Port in 2018

To identify the **long-term impact**, the participating companies were asked to evaluate the degree to which digitalisation affected their sales or volume of business during the period 2006-2018.

As such, for the Port Community as a whole, digitalisation is responsible for almost 40% of the increase in the Port's business activity or turnover in this period.

As regards the turnover/jobs ratio, **although the increase in productivity caused by digitalisation leads to a short-term jobs saved, the long-term impact is different: digitalisation has led to an increase in commercial activity and higher volume of sales. This has led to a growth in employment quantified at 2,564 jobs**, representing 16% of direct employment at the Port. In addition, it is a type of employment with a higher level of training and quality that is not comparable to job profiles in a non-digitalised setting.



3. Environmental impact

The improvements in productivity were also quantified based on a series of actions relating to port operations and movements, which involve a reduction in fuel consumption and consequently in polluting emissions:

- Reducing terminal access and exit times for trucks thanks to the introduction of smart gates.
- Reducing average docking times for vessels and optimising the performance of land-based machinery through the introduction of advanced operating systems (TOS).
- Reducing the number of visits required for companies to complete administrative formalities by transferring services online.



2018	Transit of trucks (smart gates)	Vessel operations (TOS)	Land-based machinery (TOS)	Visits for administrative formalities (online services)	TOTAL
 Minutes saved	 14,448,349	 2,207,712	—	 13,257,312	29,913,373
 ▼ fuel (litres)	 2,222,367	 7,742,626	 1,846,399	 434,789	12,246,181
 ▼ polluting NOx and PM emissions (kg)	 23,104	 735,549	 17,625	 5,425	781,703
 ▼ CO ₂ eq emissions (kg)	 6,978,233	 24,962,227	 5,323,661	 1,365,236	38,629,357

The direct impact of digitalisation has represented an improvement in environmental efficiency equivalent to a 13% reduction in the total polluting emissions emitted by the Port and 12% in the carbon footprint.

Reduction of 781.7 tonnes in polluting emissions (NOx and PM), representing 13% of the Port's total emissions.

Reduction of 38,629 tonnes of CO₂eq in carbon footprint, representing 12% of the total CO₂eq produced by the Port.

The CO₂eq saving is highly significant overall and is the equivalent of planting 234,117 trees or 316 ha of new forest.¹



1. Calculated on the basis of 165 Kg CO₂/tree and a planting density of 739 trees per hectare.



4. Pull effects on the Catalan economy

The Port is a key strategic sector for the functioning of industry and commerce.

Thanks to digitalisation, the production of goods and services in Catalonia entails lower costs and greater energy efficiency.

4.1. Pull effect on competitiveness

€1.184 billion

impact on reducing costs in the production of goods and services in the Catalan economy.

These are cross-sectoral effects of transferring the improvement in productivity, worth €450 million, to the Port's customers and suppliers and, through their interrelationships, to all 65 sectors of the Catalan economy.

For every cost reduction of €100

in the Port of Barcelona's activity caused by digitalisation, there is a reduction of €263 in production costs for goods and services in Catalonia.

4.2. Pull effect on decarbonisation

Reduction of

96,320 tonnes CO₂eq

in carbon footprint, representing 0.27% of GHG² emissions in Catalonia.

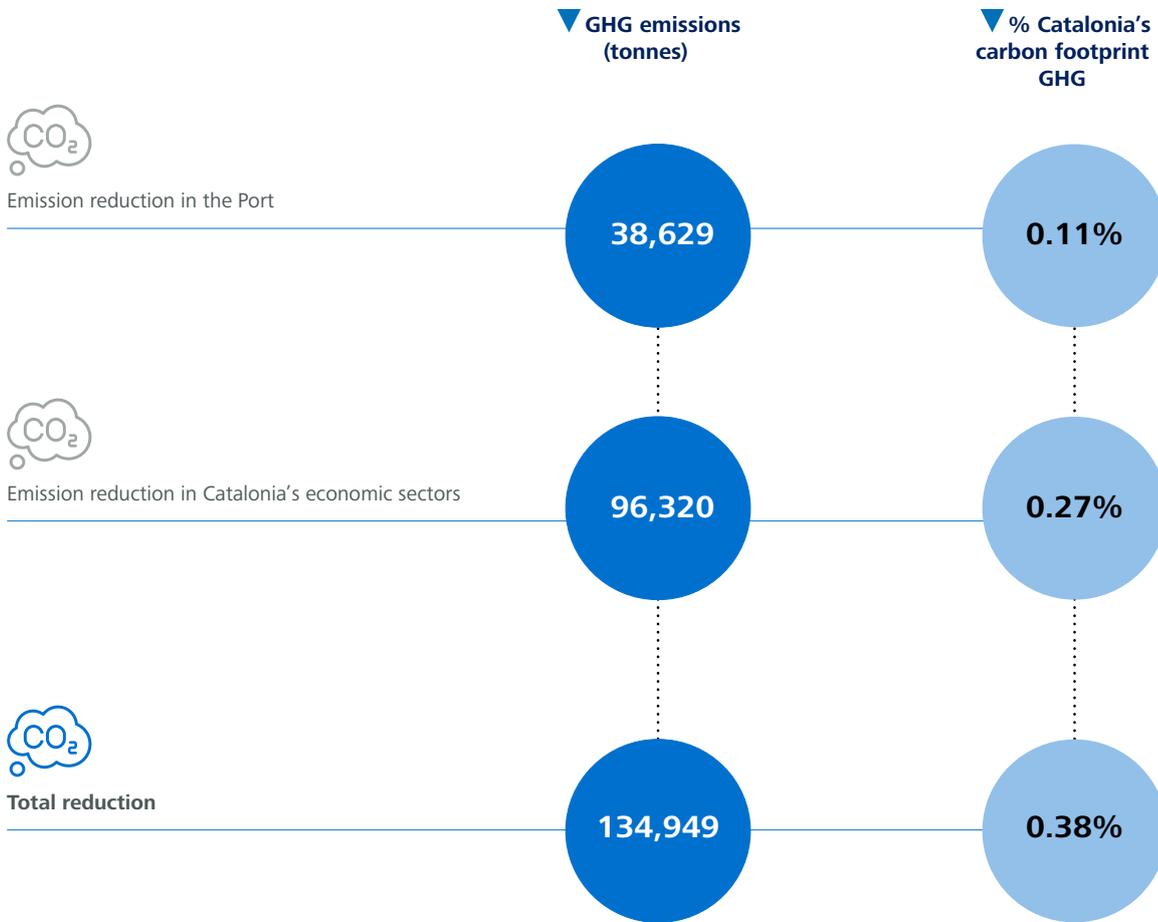
The greater energy efficiency achieved by improving productivity at the Port is also transferred to the rest of the sectors of the Catalan economy, leading to this reduction in emissions in the territory.

The overall results of the environmental impact indicate that the digitalisation of the Port of Barcelona achieves emissions savings representing **0.38% of the greenhouse gases (GHG) in Catalonia**. In absolute terms, the contribution made by digitalisation to decarbonising the Catalan economy represents a reduction of almost **135,000 tonnes of GHG**. This figure should not be taken lightly; it equates to slightly more than the annual emissions generated by Retail sector in Catalonia (124,000 tons) or a little less than those generated by the Textile sector (140,000 tons).

2. Greenhouse Gases including CO₂eq, HFCs, PFCs and SF6.



Impact of Port's digitalisation to decarbonising of Catalonia

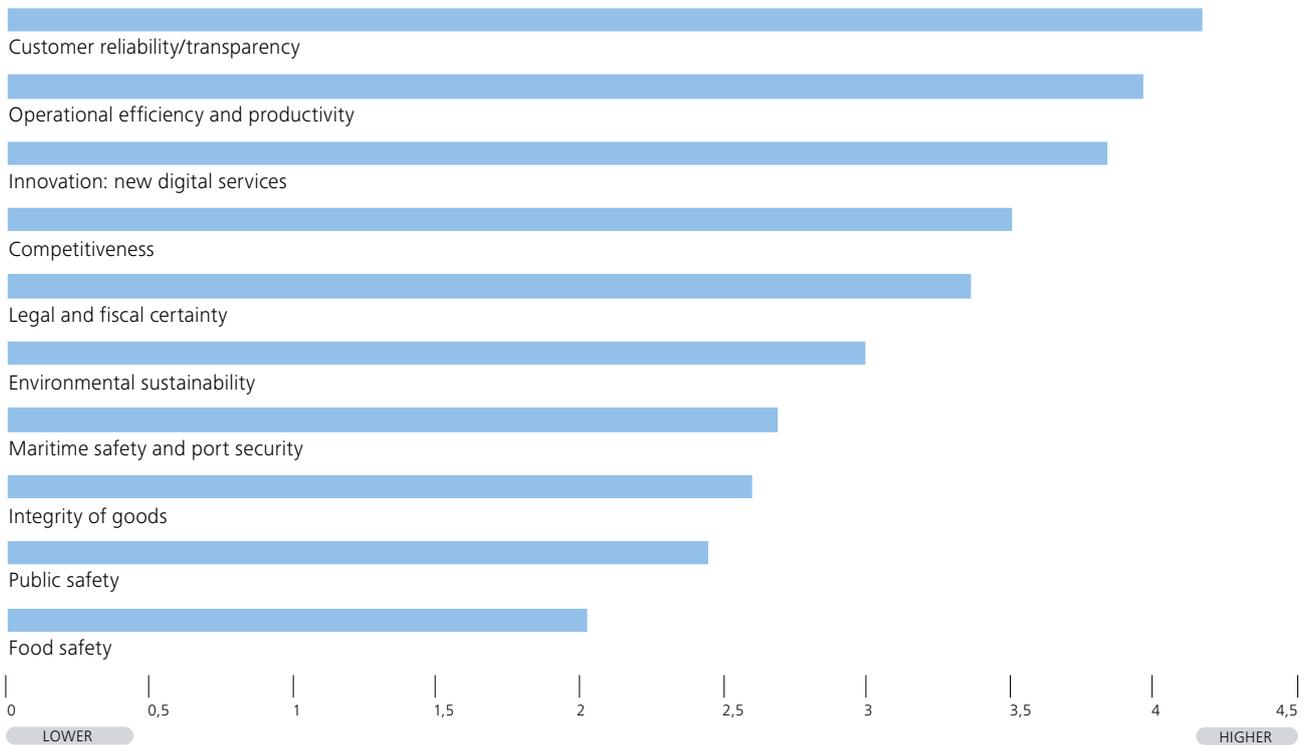


5. Qualitative assessment

The digitalisation of the Port of Barcelona generates significant qualitative benefits that make up the economic, social and climate environment of all the companies.

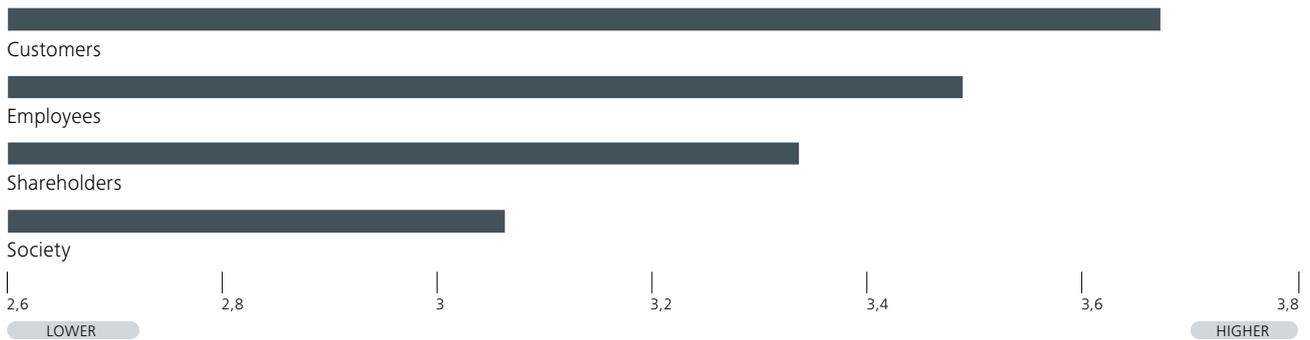
The benefits most highly valued by the companies (on a scale of 0 to 5, lower to higher) are those relating to **customer transparency and reliability, operational efficiency and productivity, as well as an innovative capacity to create new digital services.**

Benefits of digitalisation in internal processes



As regards the image of the companies, **reputation to customers** is valued highest, followed by **reputation to employees**, who view developments in digitalisation as an improvement of their skills, performance and work-life balance.

Benefits in corporate reputation



Port companies consider that the key aspects for continuing digitalisation are **employees’ and managers’ digital skills, developments in technology and the impact of digitalisation on cost/time reduction**. In this regard, as indicated above, improved productivity is the main benefit of digitalisation.

Slow progress or delays in digitalisation throughout the value chain of suppliers and customers are also considered a decisive factor. Port companies argue that the opposite effect has also occurred: in other words, they have been forced to invest in digitalisation in order to be able to link into their customers’ highly digitalised supply chains to avoid being driven out of the market.

In short, the surveyed companies see digitalisation as a process that is ongoing, inevitable and far from complete.





03. METHODOLOGY

The economic impact of the commercial activity and digitalisation of the Port of Barcelona was produced by the consulting firm ECOATENEA.

Methodology for measuring the economic impact of commercial activity

The methodology was based on input-output table (IOT) model that reflects and quantifies the economic transactions of the sectors into which Catalonia's economic activity is divided.

- Step 1**

The starting point was the most recent input-output table available, referring to 2014, meaning that it was necessary to take the preliminary step of estimating a new IOT for 2018.
- Step 2**

Next, a new sector, "Port of Barcelona", was added and individualised in the 2018 IOT. Given that the Port is listed in the official table as part of the "Transportation support activities", sector that groups together the airports, motorways and also ports in Catalonia, it was essential to establish the Port of Barcelona as a separate sector to calibrate the entire analysis of the economic impact with total accuracy.
- Step 3**

The fieldwork was based on a questionnaire designed to obtain economic and financial information from a sample of companies representing all the services that make up the Barcelona Port Logistics Community.
- Step 4**

To define the sample universe, a census of all the companies in the Barcelona Port Community was produced with detailed information on sales volumes and employee numbers, variables that were used to extrapolate the survey results to the universe of Port companies.

Methodology of the economic and environmental impact of digitalisation

Step 1

The direct impact of digitalisation was quantified using a specific questionnaire involving the companies in the Barcelona Port Community. This questionnaire was designed using the contributions received in focus group sessions held with companies representing a wide range of port services: bulk, ro-ro, container and multipurpose terminals, shipping agents, freight forwarders, customs agents, road haulage, Customs, border inspection services, pilotage, towage, mooring, Estibarna, PortIC and Barcelona Port Authority.

Step 2

The impact was assessed by determining the “costs and times” needed to perform the companies’ regular business without the advantages of digitalisation, and these were compared with the “costs and times” used in the current setting of digitalisation. The cost and time differences were quantified for a set of processes and operations that were identified by the companies themselves.

Step 3

As regards the Port’s contribution to decarbonising the Catalan economy, a GHG production-emissions matrix was used with data from the 2018 Catalonia Input-Output Table — a table updated by ECOATENEA from the last IOT published in 2014, to which the Port of Barcelona was added as a separate sector — and with the Emissions Inventory of the Spanish Ministry for the Ecological Transition. The inventory was used to obtain the data for Catalonia, which can be consulted on the Transparency Catalonia Open Data website of the Generalitat (Catalan Government): https://analisi.transparenciacatalunya.cat/widgets/7xn6-46kz?mobile_redirect=true.

This method of transferring the impact of digitalisation of the Port to emissions in Catalonia has been groundbreaking, as was the calculation of the economic impact of digitalisation performed in this study.



Methodology for calculating savings in emissions from port operations

The analysis of calculations of savings in emissions from port operations — maritime and land-based — in container terminals and their monetisation was undertaken by the consulting firm MCRIT. Since 2010, this company has been developing a methodology for calculating emissions and externalities in the transport sector for the Barcelona Port Authority which has been applied to numerous studies and tools and certified by TÜV Rheinland.

