

PORT COMPETITIVENESS SCENARIOS LINKED TO BASIC INFRASTRUCTURES IN THE SOUTH MEDITERRANEAN SPAIN

A.L. Grindlay^{1*}, G. Martínez-Montes²

1 Department of Urban and Spatial Planning.

2 Department of Construction and Engineering Projects

Higher School of Civil Engineering,

University of Granada, 18071 Granada (Spain).



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PORT COMPETITIVENESS SCENARIOS LINKED TO BASIC INFRASTRUCTURES IN THE SOUTH MEDITERRANEAN SPAIN

- I. Port competitiveness and its multidimensional nature.
- II. Spanish Port System.
- III. Hinterland-related factors.
- IV. Maritime related factors.
- v. Endogenous factors.
- VI. Strategic Planning Scenarios.
- VII. Conclusions.

I. PORT COMPETITIVENESS AND ITS MULTIDIMENSIONAL NATURE (1/2)

► The key drivers of port competitiveness

1 Port costs

- The costs bearded by port's customers is a function of direct port costs such as port charges, storage and stevedoring, as well as indirect costs incurred during lengthy port stops.

2 Hinterland proximity

- Refers to the geographical proximity of the main hinterland markets served by a port (both local/captive markets and others)

3 Hinterland connectivity

- Refers to the efficiency of inland transport networks (e.g. rail and road transport).

4 Port geographical location

- Refers to the spatial positioning of the port respect to shipping networks, inland market areas, inland transport infrastructures, logistics centres, consuming markets, urban areas, etc

5 Port infrastructures

- Are evaluated on the basis of the number and quality of available infrastructures (e.g. breakwater, quay wall, yard surface, etc.),

I. PORT COMPETITIVENESS AND ITS MULTIDIMENSIONAL NATURE (2/2)

► The key drivers of port competitiveness

6 Operational efficiency

- Capacity of a port to employ all its resources efficiently to deliver high operational performance.

7 Port service quality

- Refers to the quality of (all) port facilities, and to the capacity of differentiating the services supplied from competitors.

8 Maritime connectivity

- Refers to the efficiency of shipping transport networks (e.g. number and variety of served destinations)

9 Nautical Accessibility

- Refers to the capacity of a port to accommodate large vessels at anytime, regardless of tide and weather conditions.

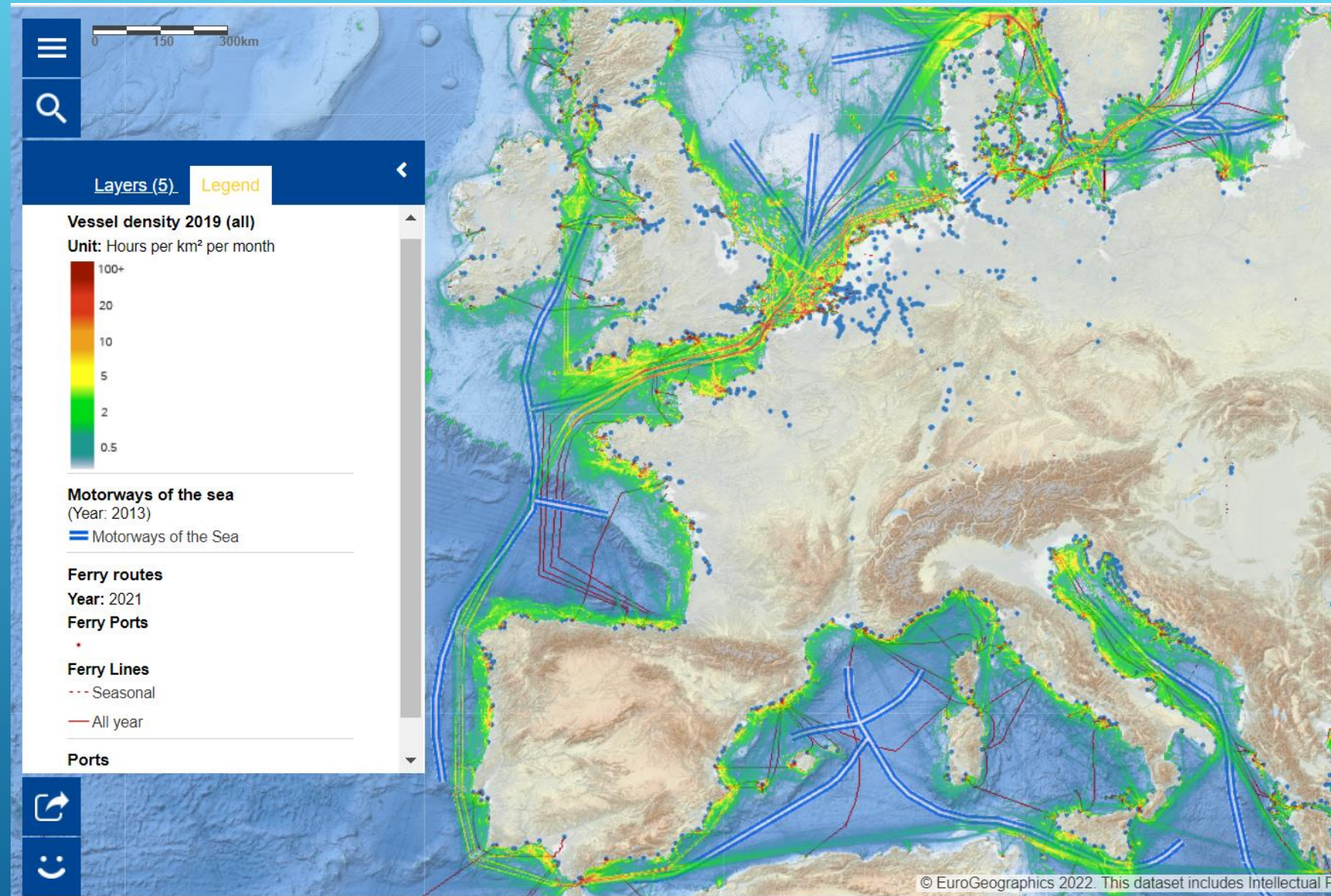
10 Port site

- Refers to the extension of the entire port area, the quality of terminal layouts and common spaces, as well as its appropriateness respect to the needs of port users.

II. SPANISH PORT SYSTEM (1/4)

- ▶ About 60% of exports and 85% of imports pass through the Spanish ports, which represents 53% of Spanish foreign trade with the EU and 96% with third countries.
- ▶ In addition, the activity of the state port system contributes close to 20% of the GDP of the transport sector, which represents 1.1% of Spanish GDP.

Source:
<https://www.puertos.es/en-us>



Source: https://ec.europa.eu/maritimeaffairs/atlas/maritime_atlas/

II. SPANISH PORT SYSTEM

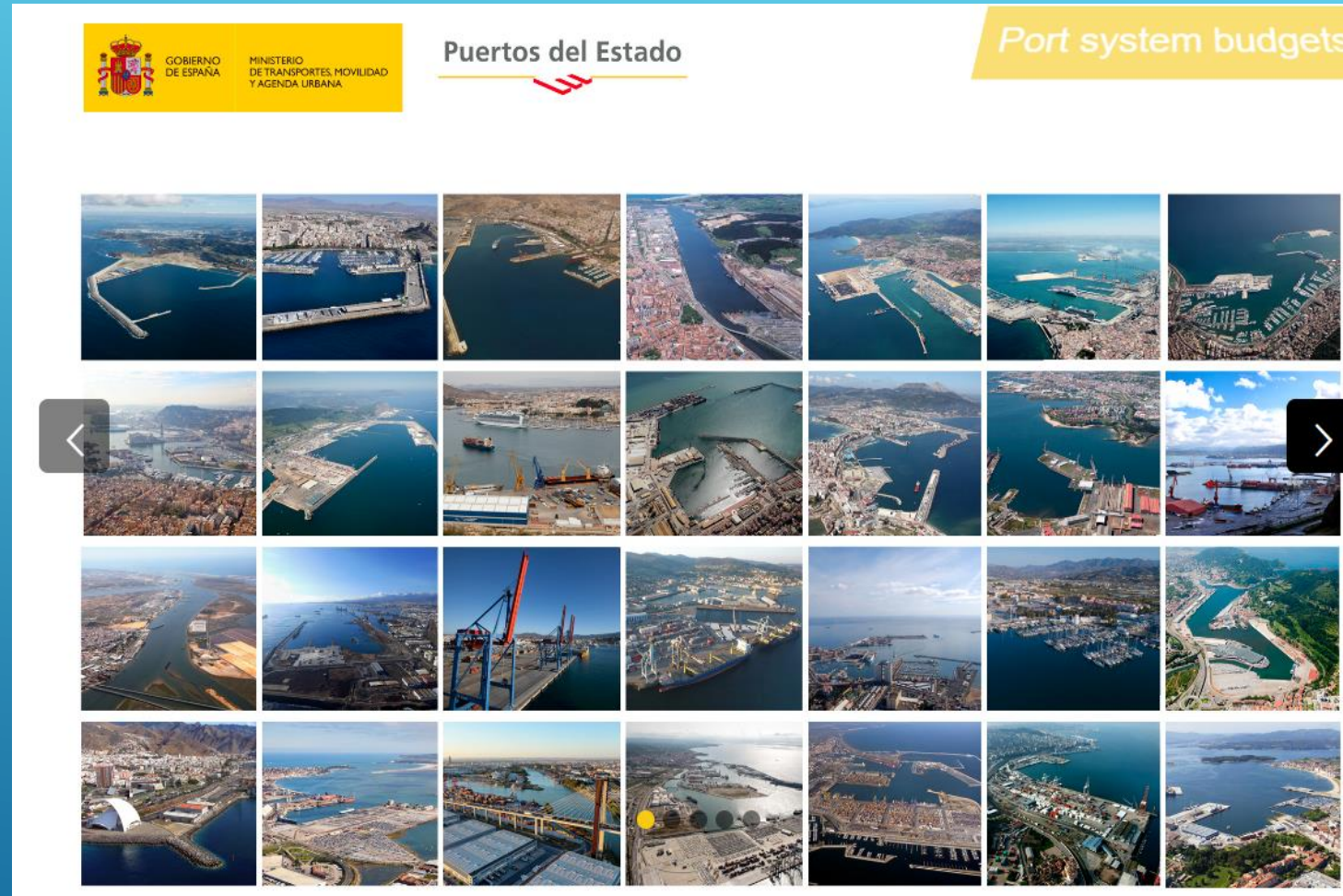
- ▶ The Spanish ports are state-owned bodies affiliated to the Ministry of Transport.
- ▶ There are 28 Port Authorities that manage 46 ports, with the Spanish Ports Authority (“Puertos del Estado”) responsible for the implementation and development of the government’s port policy and economic policy.
- ▶ The Port Authorities function as “infrastructure managers”.
- ▶ Revenues must cover operating and financial expenses as well as any investments or loan repayments.



Source: Puertos del Estado. Competitiveness of Spanish ports in the service of the global economy. http://brainbox-net.co.jp/spanish_logistics_forum/puertosestado_p.pdf

II. SPANISH PORT SYSTEM (3/4)

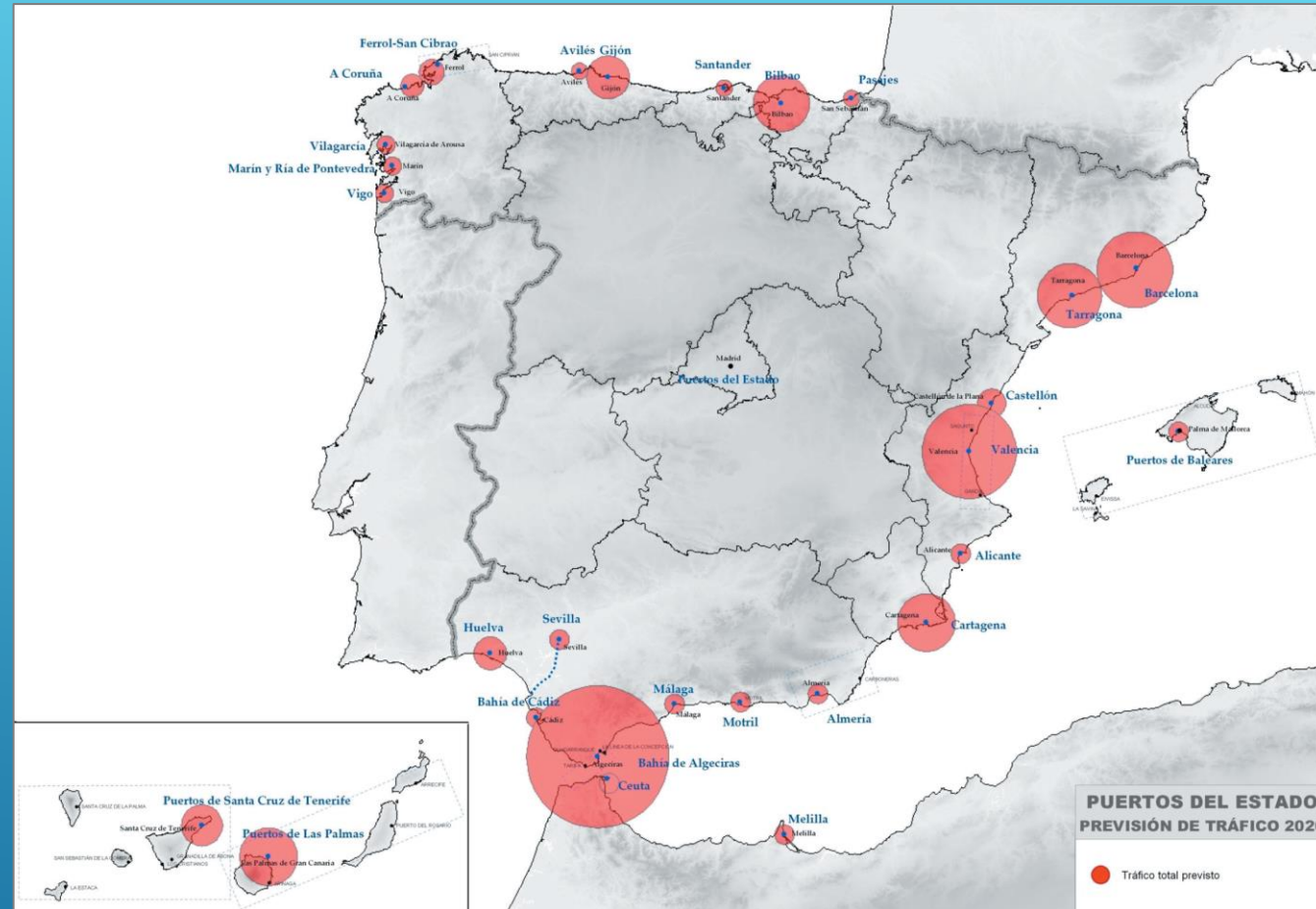
- ▶ The Port Authorities do not provide port services (cargo handling, loading and unloading of passengers, pilotage, towage and mooring). These services are provided by private operators in a framework of free access and competition.
- ▶ The Spanish model of ports is based on the so-called 'landlord port' model, in which the provision of services is fully liberalized.
- ▶ Each Port Authority confines itself to providing basic port infrastructures and regulating the economic activity undertaken by private operators on the basis of free access and the non-exclusive provision of services.



Source: Puertos del Estado. Competitiveness of Spanish ports in the service of the global economy. http://brainbox-net.co.jp/spanish_logistics_forum/puertosestado_p.pdf

II. SPANISH PORT SYSTEM (4/4)

- ▶ The management model promotes a culture of competition in the global logistics market, leading to efficiency improvements that are reflected in the prices of services.
- ▶ It also boosts the competitiveness of ports and reduces logistical costs for operators.
- ▶ It prevents monopolistic behaviour and anti-competitive practices, especially with regard to the provision of technical-nautical port services.



Source: Puertos del Estado. Competitiveness of Spanish ports in the service of the global economy. http://brainbox-net.co.jp/spanish_logistics_forum/puertosestado_p.pdf

III. HINTERLAND-RELATED FACTORS (1/12)

Hinterland-related factors are those regarding inland transportation and onshore port commercial influence:

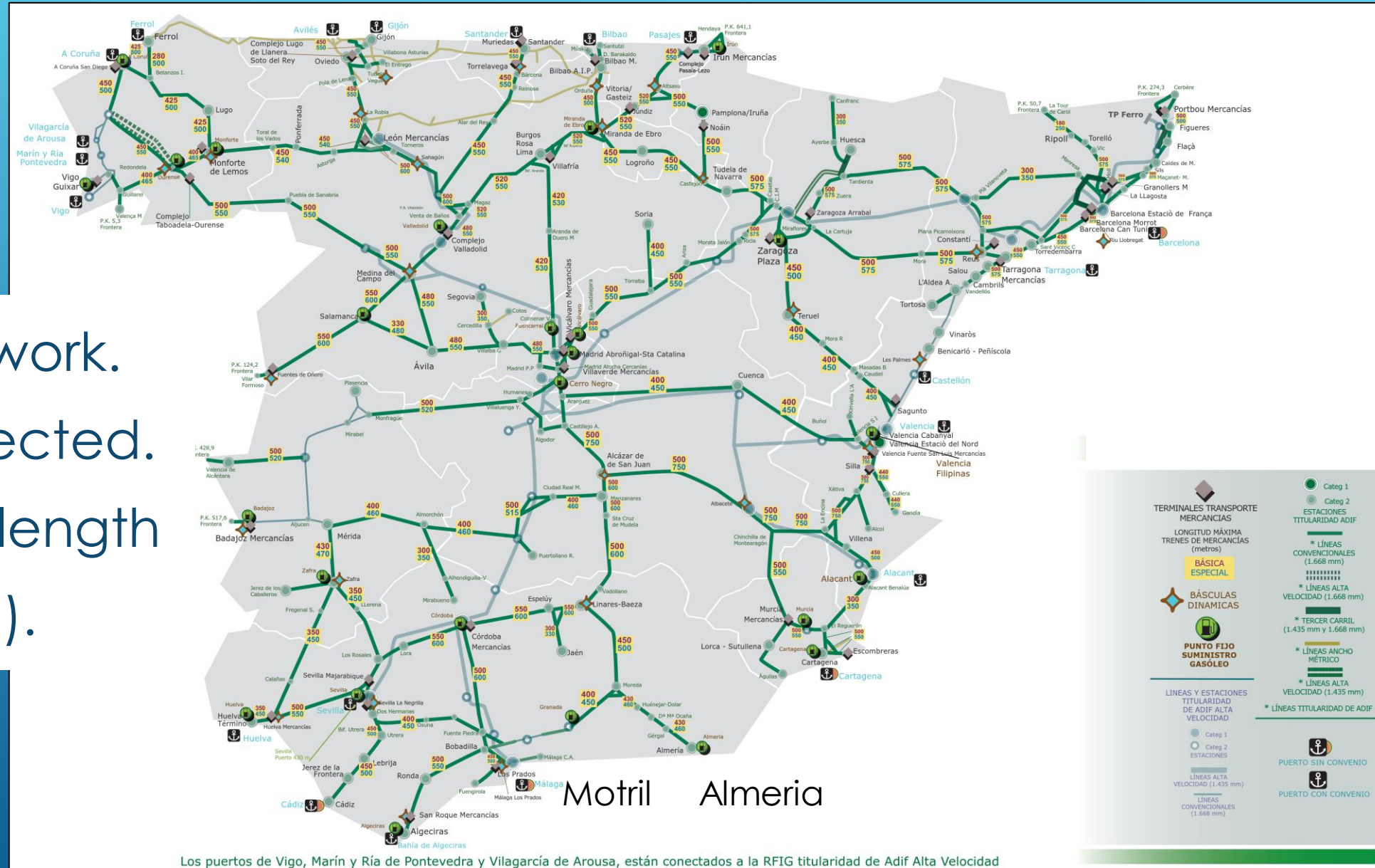
- ▶ Road network
- ▶ Rail network
- ▶ Logistic centres
- ▶ Connectivity/Intermodality Index
- ▶ Accessibility Index
- ▶ Attractivity Index

III. HINTERLAND-RELATED FACTORS (2/12)



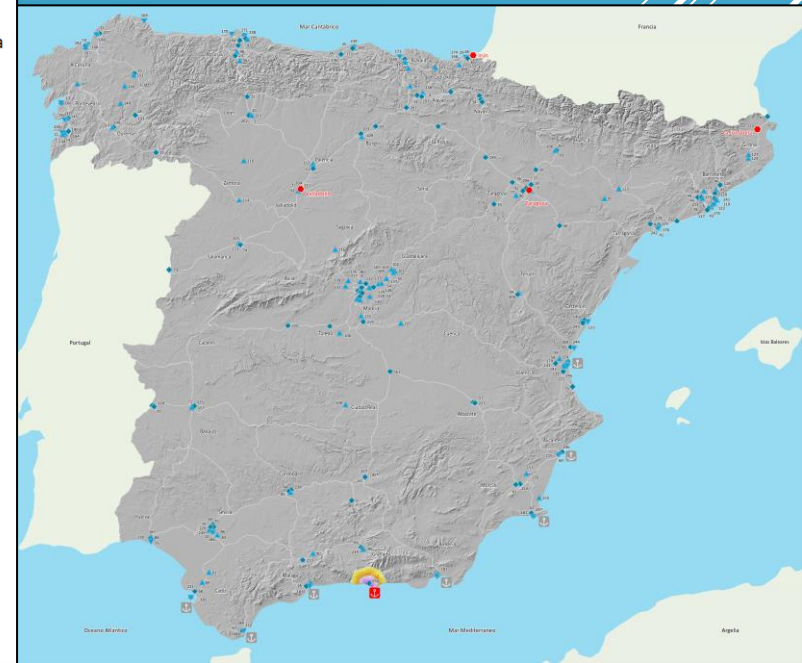
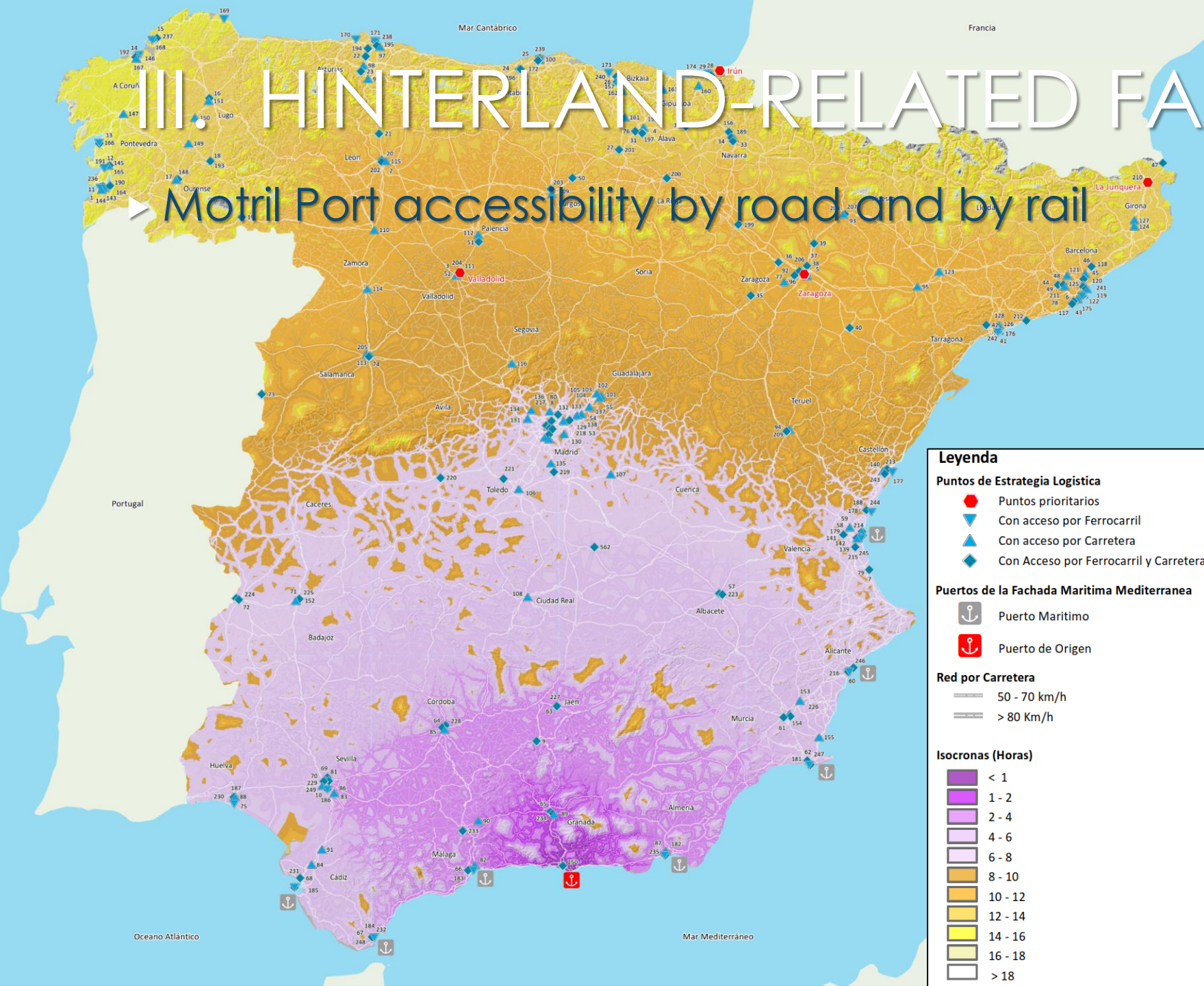
III. HINTERLAND-RELATED FACTORS (3/12)

- * Weak rail network.
- * Ports unconnected.
- * Limited trains length to 400m (750m).



III. HINTERLAND-RELATED FACTORS (4/12)

► Motril Port accessibility by road and by rail



III. HINTERLAND-RELATED FACTORS (5/12)

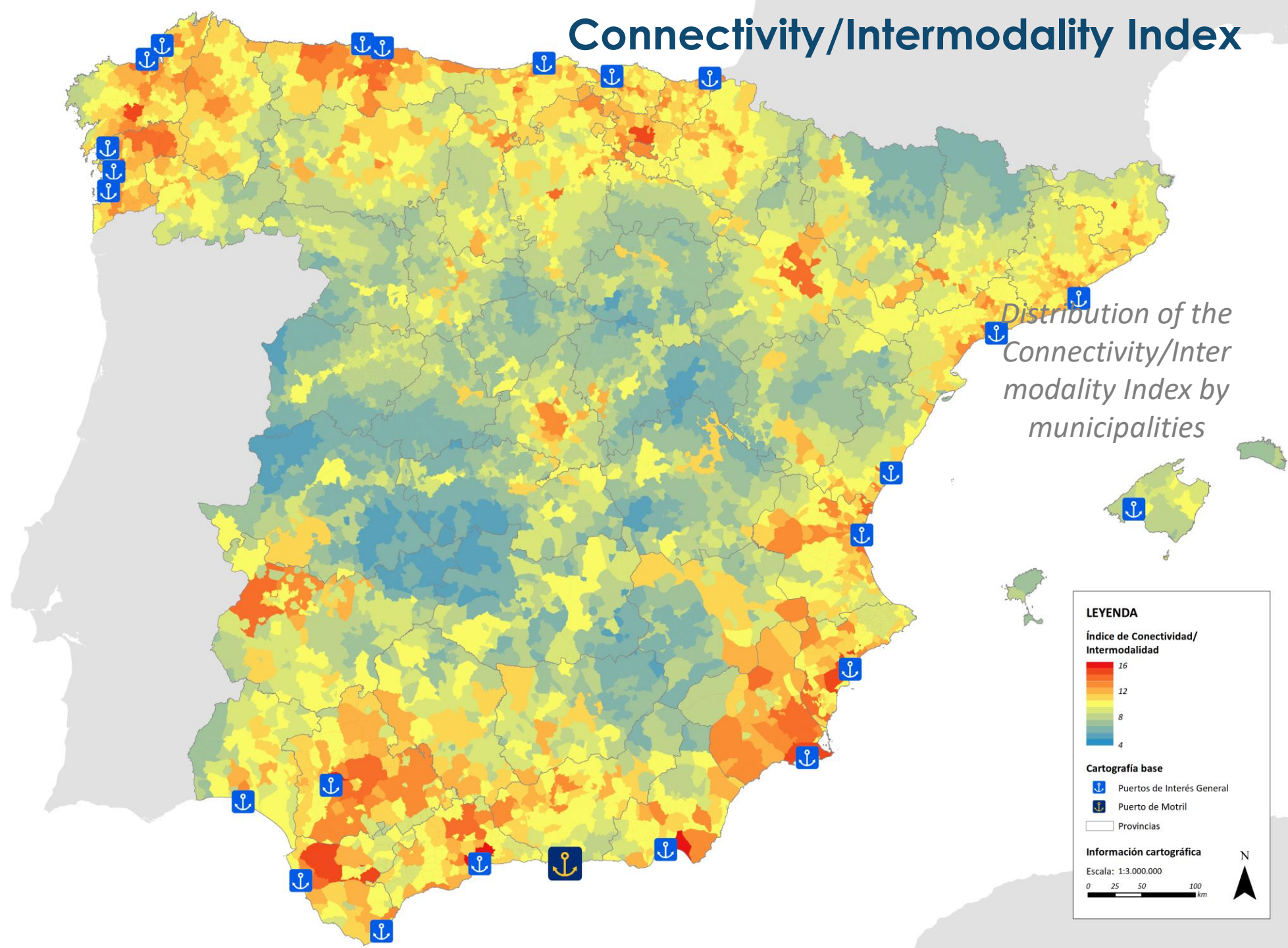
► **Connectivity/Intermodality Index**

- - Proximity of the municipality to a port.
- - Proximity of the municipality to an airport.
- - Proximity of the municipality to a railway line.
- - Kilometers of motorways and conventional roads that run through each municipality.

$$I_{C/I,PROVINCIA} = \frac{\sum_{i=1}^n I_{C/I,i} \cdot S_i}{\sum_{i=1}^n S_i}$$



Connectivity/Intermodality Index

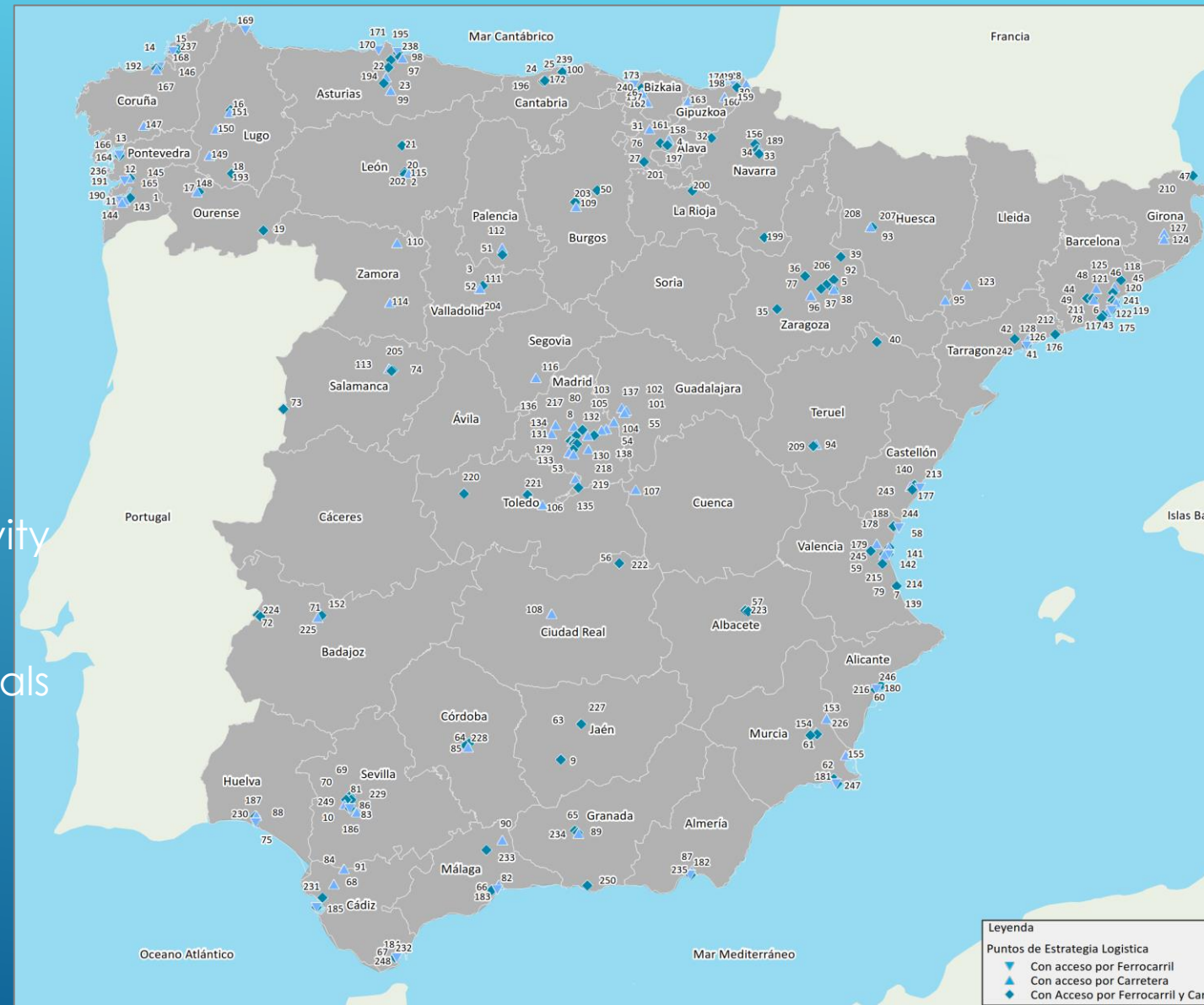


III. HINTERLAND-RELATED FACTORS (7/12)

► Logistic centres



- Ports with rail connection
- Main cargo airports
- Rail logistics facilities
- Logistics Activity Zones
- Intermodal Logistics Terminals
- Main Transportation Centers
- Car manufacturing industries



III. HINTERLAND-RELATED FACTORS (8/12)

► Accessibility Index

- - V1: Accessibility by road to logistics elements of interest
- - V2: Accessibility by rail to logistics elements of interest
- - V3: Road accessibility to the road network
- - V4: Accessibility by rail to the rail network

$$I_{ACC,i} = V_{NORM1,i} + V_{NORM2,i} + V_{NORM3,i} + V_{NORM4,i}$$

III. HINTERLAND-RELATED FACTORS (9/12)

► Accesibility Index

Puerto de Cádiz y su bahía
I. Acc = 2,75

Puerto de Bahía de Algeciras
I. Acc = 2,54

Puerto de Málaga
I. Acc = 3,01

Puerto de Motril
I. Acc = 2,2

Puerto de Almería
I. Acc = 2,81




Puerto de Cartagena
I. Acc = 3,17

Puerto de Alicante
I. Acc = 3,02



Puerto de Valencia
I. Acc = 3,70

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Cartografía base





-  Puerto de Motril
-  Puertos de I. General estudiados
-  Resto de Puertos de I. General

Red de carreteras

-  Autovía
-  Carretera convencional

- - - Red ferroviaria

Puntos de Estrategia Logística

-  Puntos prioritarios
-  Con acceso por Ferrocarril
-  Con acceso por Carretera
-  Con Acceso por Ferrocarril y Carretera

Índice de Accesibilidad

-  Alto (4)
-  -
-  Bajo (0)

Información cartográfica

Escala 1:3.000.000

0 50 100 km

N



III. HINTERLAND-RELATED FACTORS (9.2/12)

► Accessibility Index

Puerto de Cádiz y su bahía
I. Acc = 2,94

Puerto de Bahía de Algeciras
I. Acc = 2,74

Puerto de Málaga
I. Acc = 3,66

Puerto de Motril
I. Acc (E1) = 3,16
I. Acc (E2) = 2,11

Puerto de Almería
I. Acc = 3,00

Puerto de Cartagena
I. Acc = 3,27

Puerto de Alicante
I. Acc = 3,76

Puerto de Valencia
I. Acc = 3,89




HORIZONTE 2050

Escenario 1. Línea f.c. Granada - Motril




Escenario 2. Sin línea f.c. Granada - Motril

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Cartografía base

-  Puerto de Motril
-  Puertos de I. General estudiados
-  Resto de Puertos de I. General

Red de carreteras

-  Autovía
-  Carretera convencional
-  Red ferroviaria

Puntos de Estrategia Logística

-  Puntos prioritarios
-  Con acceso por Ferrocarril
-  Con acceso por Carretera
-  Con Acceso por Ferrocarril y Carretera

Índice de Accesibilidad

-  Alto (4)
-  -
-  Bajo (0)

Información cartográfica

Escala 1:3.000.000

0 50 100 km



III. HINTERLAND-RELATED FACTORS (10/12)

► Attractivity Index by road and by rail

El índice se define mediante la siguiente expresión:

$$IA_p = \frac{IAR_p}{IA} 100$$

donde, para el caso de la carretera:

$$IA_{C,p} = \sum_p \sum_i TC_{ip} DC_{ip}$$

mientras que para el caso del ferrocarril:

$$IA_{F,p} = \sum_p \sum_i TF_{ip} DF_{ip}$$

y en ambos casos:

p: port

i: Province

$$IAR = \sum_p P_p IA_p$$

[TC]_{ip} : Volume of goods transported by road between province i and port p

[DC]_{ip}: Road distance between province i and port p

[TF]_{ip}: Volume of goods transported by rail between province i and port p

[DF]_{ip}: Distance by rail between province i and port p

P_p: Proportion of the volume of goods received by port p in relation to the total volume received by all ports.

Source: Villaverde Castro, J., and Maza Fernandez, A. Port competition and competitiveness: An application to the Spanish seafronts. *Revista de Evaluación de Programas y Políticas Públicas*, 1(4), 59–85, (2015).

P. Marín
3,80

P. Vigo
9,24

III. HINTERLAND-RELATED FACTORS (11/12)

► Attractivity Index by road

Portugal



P. Barcelona
268,36

P.Tarragona
19,63

P. Castellón
9,67



P. Valencia
121,47

P. Alicante
8,40

P.Cartagena
37,38

P. Sevilla y su ría
10,86

P. Huelva
4,96

P. Cádiz y su bahía
3,51

P.Bahía de Algeciras
124,73

P. Málaga
5,73

P. Motril
1,34

P. Almería
24,65

LEYENDA

Cartografía base



Puerto de Motril



Puertos de I. General

Red de carreteras

— Autovía

— Carretera convencional

- - - Red ferroviaria

Índice de Atracción



Mayor atracción que la media (> 100)



Media Nacional (100)



Menor atracción que la media (<100)

Información cartográfica

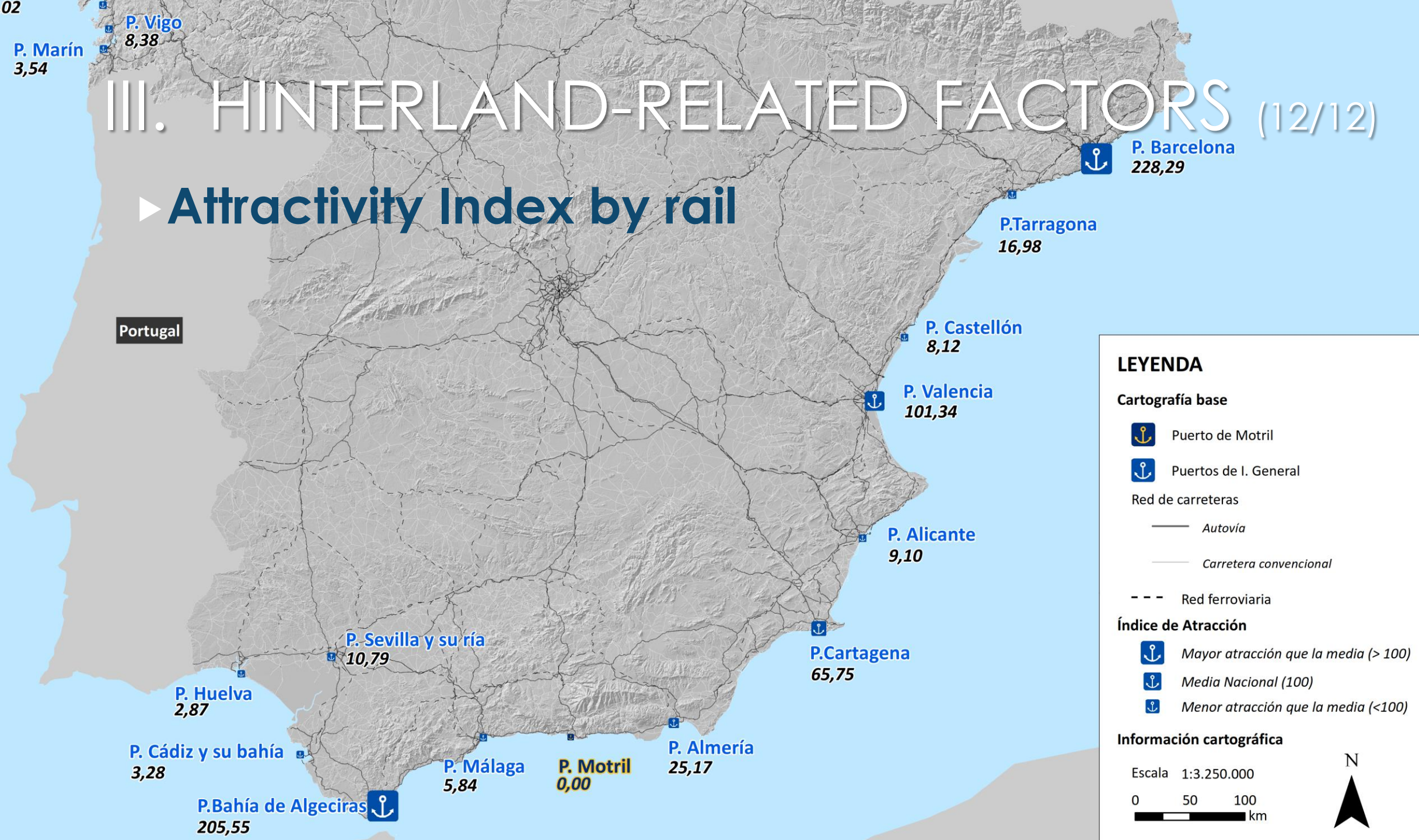
Escala 1:3.250.000

0 50 100
km



III. HINTERLAND-RELATED FACTORS (12/12)

► Attractivity Index by rail



IV. ENDOGENOUS FACTORS

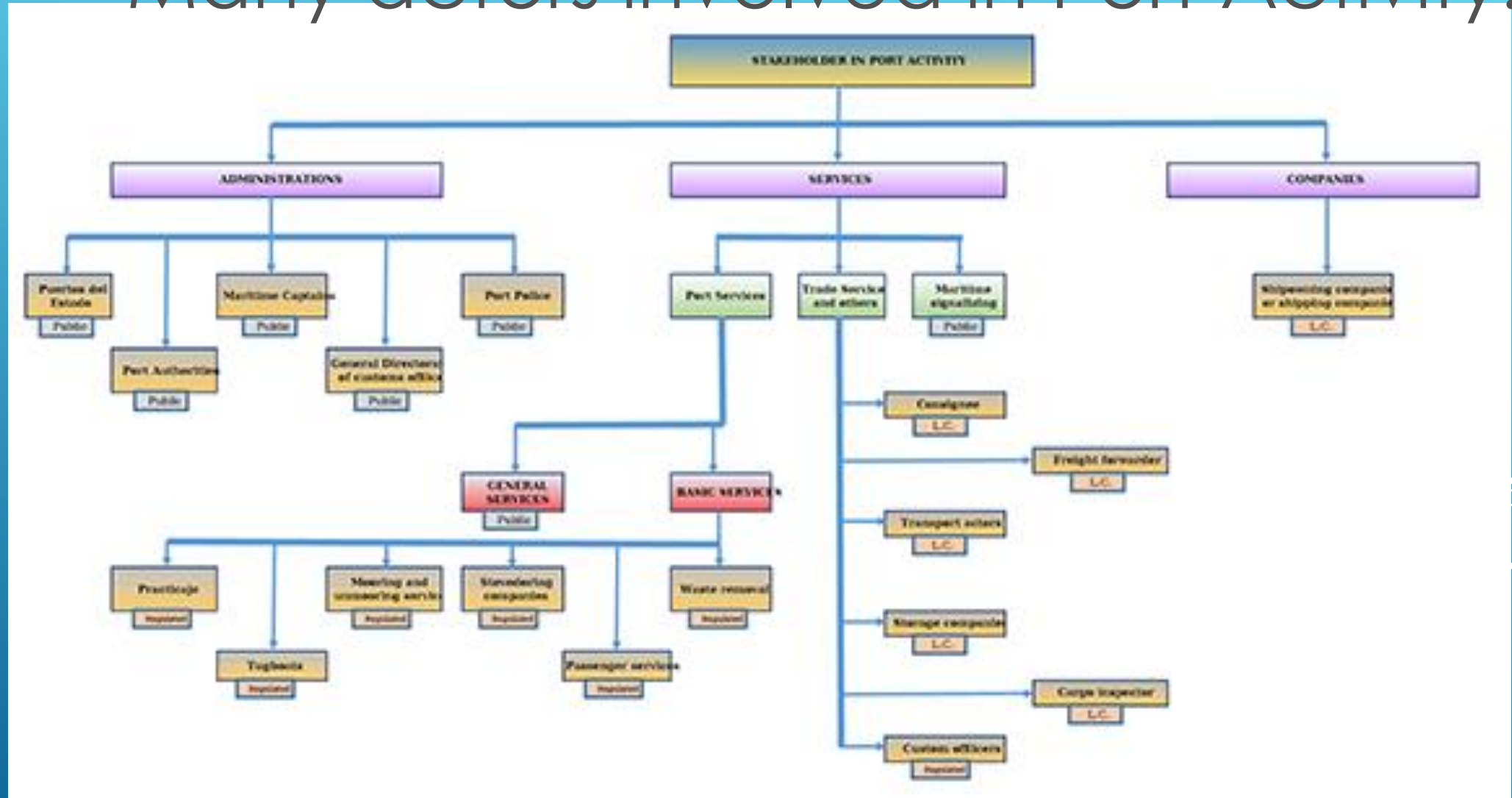
- ▶ The endogenous factors are linked to the actual port itself – such as infrastructures, operational efficiency, costs, etc.
- ▶ Classification of Spanish ports according to their type of traffic and infrastructure (2018):
 - ▶ “Factor 1” of container traffic.
 - ▶ “Factor 2” of liquid bulk traffic and refineries.
 - ▶ “Factor 3” of cruise passenger traffic.
 - ▶ “Factor 4” for solid bulk traffic

Autoridades Portuarias	Factor 1	Factor 2	Factor 3	Factor 4
Valencia	3,5187	-1,0069	-0,0577	0,4099
Bahía de Algeciras	2,94	1,6302	-1,6491	-1,313
Barcelona	1,3893	-0,4808	3,0866	1,0446
Las Palmas	0,4861	-0,1806	1,6484	-0,6618
Bilbao	0,0415	1,1805	0,1603	1,6159
Vigo	-0,0559	-0,6414	-0,2533	-0,3709
Marín y Ría de Pontevedra	-0,0758	-0,727	-0,671	-0,0243
Castellón	-0,1759	0,9942	-0,1795	0,477
Málaga	-0,1865	-0,6267	0,368	-0,7723
Alicante	-0,2223	-0,6623	-0,3766	-0,0547
Vilagarcía	-0,2271	-0,6575	-0,6268	-0,1349
Sevilla	-0,2273	-0,6955	-0,4208	0,2885
Tarragona	-0,2779	1,5009	-0,0269	1,6397
Bahía de Cádiz	-0,2835	-0,5189	0,0507	-0,3511
Ferrol-San Cibrao	-0,294	-0,8228	-0,349	0,4449
Santa Cruz de Tenerife	-0,2962	1,2186	1,3744	-1,0636
Pasaia	-0,3603	-0,6465	-0,8567	-0,3887
Gijón	-0,3704	-1,1581	-0,4368	3,1093
Melilla	-0,4176	-0,5711	-0,4088	-1,0625
Santander	-0,4235	-0,7481	-0,7621	0,6462
Cartagena	-0,4642	2,0222	0,0436	0,622
Ceuta	-0,4737	-0,5069	-0,2883	-1,1373
Avilés	-0,4966	-0,457	-0,4442	-0,6669
Almería	-0,5263	-0,7235	-0,4548	-0,1257
A Coruña	-0,5285	1,2542	-0,2197	-0,0802
Huelva	-0,555	1,9996	-0,5082	0,0254
Motril	-0,5688	0,1056	-0,2091	-1,1248
Baleares	-0,8677	-0,0746	2,4673	-0,9906

Source: Cortés Rodríguez, C., Cordon Lagares, E., González Galán, A. N. A., & García Del Hoyo, J. J. (2018). Clasificación de los puertos españoles atendiendo a su tipología de tráfico e infraestructuras. *Estudios de Economía Aplicada*, 36(3). 765-788

IV. ENDOGENOUS FACTORS (2/4)

Many actors involved in Port Activity.



IV. ENDOGENOUS FACTORS (3/4)

- Regulated competitiveness according port services



Port Services Market Observatory

The Port Services Permanent Market Observatory, which was established in 2012, in accordance with the criteria of the Revised Text of the Law on State Ports and the Merchant Marine, as an instrument for analyzing conditions of competitiveness in relation to port services prices and quality, and setting the competitiveness variables regarding which to establish recommendations.

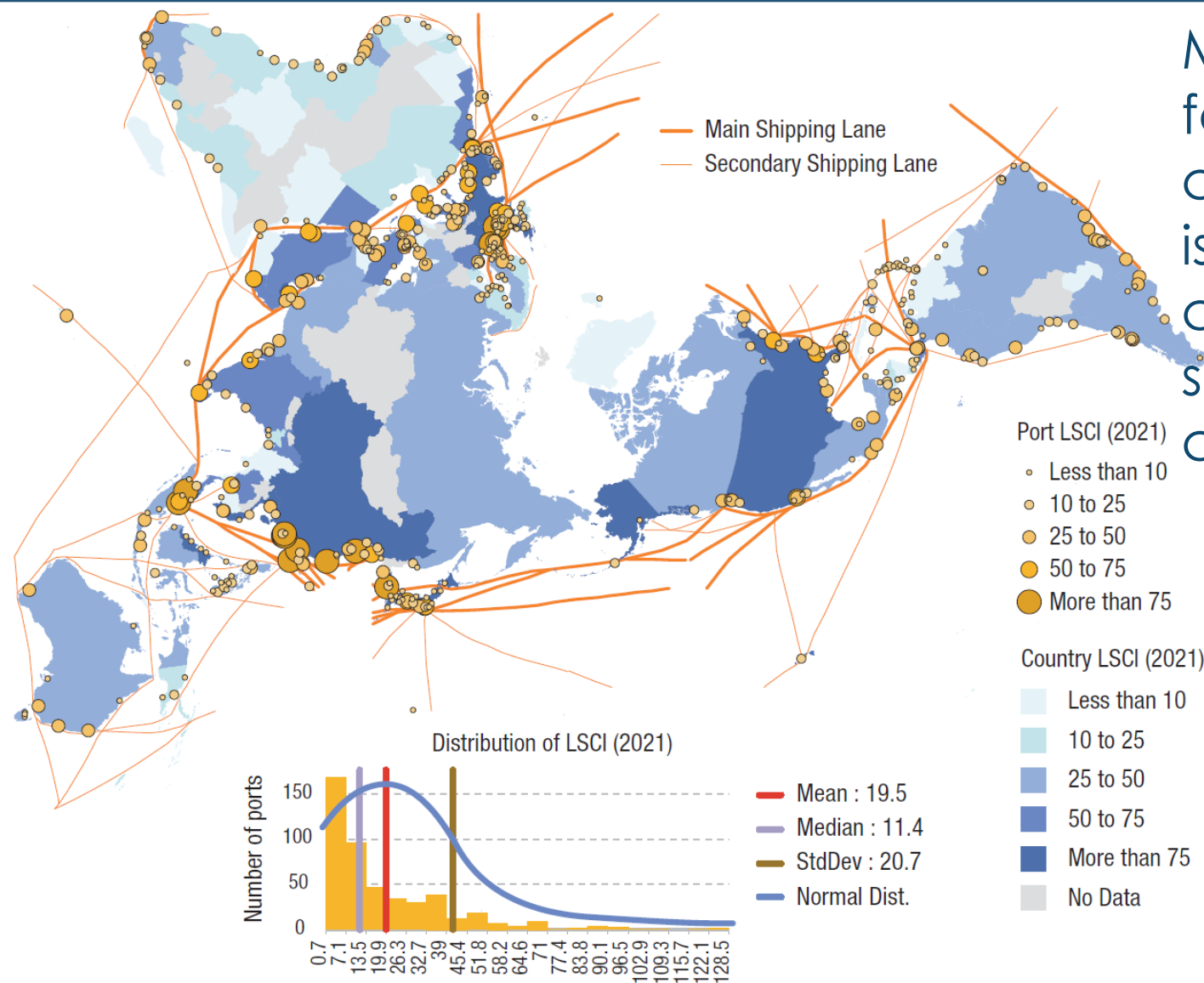
Source: <https://www.puertos.es/en-us/Pages/Observatorio.aspx>

IV. ENDOGENOUS FACTORS (4/4)

- Regulated competitiveness according port services: **Ports Services Market Observatory**
 - ▶ This is an instrument for analyzing conditions of competitiveness in relation to Spanish port services prices and quality, and setting the competitiveness variables regarding which to establish recommendations.
 - ▶ Conditions of competitiveness are monitorized, through an annual report on competitiveness and a guide to best practices.

Source: <https://www.puertos.es/en-us/Pages/Observatorio.aspx>

Figure 4.10 Liner Shipping Connectivity Index, country and port level, 2020

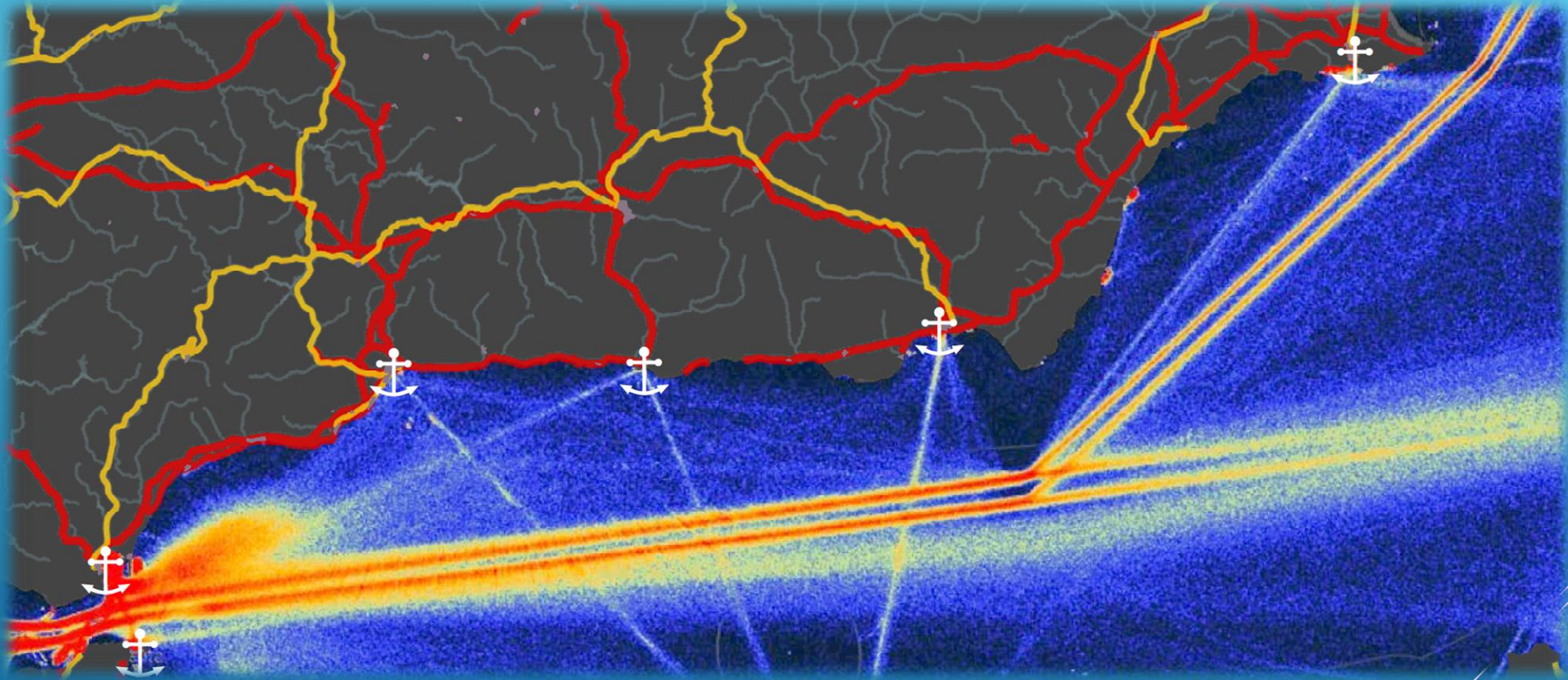


Maritime-related factors are concerned more with issues of maritime cargo demand and shipping service connectivity.

Source: Jean-Paul Rodrigue, Dept. of Global Studies & Geography, Hofstra University, based on data provided by UNCTAD.
LSCI values are average of all 4 quarters of 2020.

Source: https://unctad.org/system/files/official-document/rmt2021_en_0.pdf

V. MARITIME RELATED FACTORS (2/2)



Source: United Nations. Review of Maritime Transport 2021.
https://unctad.org/system/files/official-document/rmt2021_en_0.pdf

VI. STRATEGIC PLANNING SCENARIOS

► The main drivers of port competitiveness moderated by cutting-edge industry changes.

TRENDS	Critical success factors	Main drivers of competitiveness
a) Economies of scale in shipping	i) synchronization of sea-land operations, ii) presence of dedicated terminals ensuring a stable cargo base, iii) tailored landside infrastructures and inland connections/dry ports,	Port costs, hinterland connectivity, operational efficiency, nautical accessibility, port infrastructures, port expansion, maritime cargo volumes (dedicated terminals), etc.
b) Governance changes	i) governance framework and managerialization of the Port Authority, ii) agile and coherent institutional chain	Port Authority strategies, interorganizational relationships, port infrastructures, hinterland connectivity
c) Co-opetition among ports in proximity	i) (degree of) competition for attracting customers and investors, ii) development of joint-projects on R&D,	Inter-port cooperation, local governance, institutional environment, scale economies, hinterland connectivity, inland investments in logistics, ICT services
d) Inter-firm networks	i) bargaining power of customers and users, ii) influence of port multinationals on long-term port development and strategic decisions,	Port costs, port infrastructures, port service quality, operational efficiency, Port Authority strategies,
e) Green and sustainability challenges	i) respect of international green regulations, ii) green innovations in processes and facilities, iii) sustainable port planning,	Environmental issues, port infrastructures, port site, Port Authority strategies, local governance, etc.

Source: Parola, F., Risitano, M., Ferretti, M. and Panetti, E. The drivers of port competitiveness: A critical review, *Transport Reviews*, 37(1), 116–138, (2017).

VI. STRATEGIC PLANNING SCENARIOS (2/6)

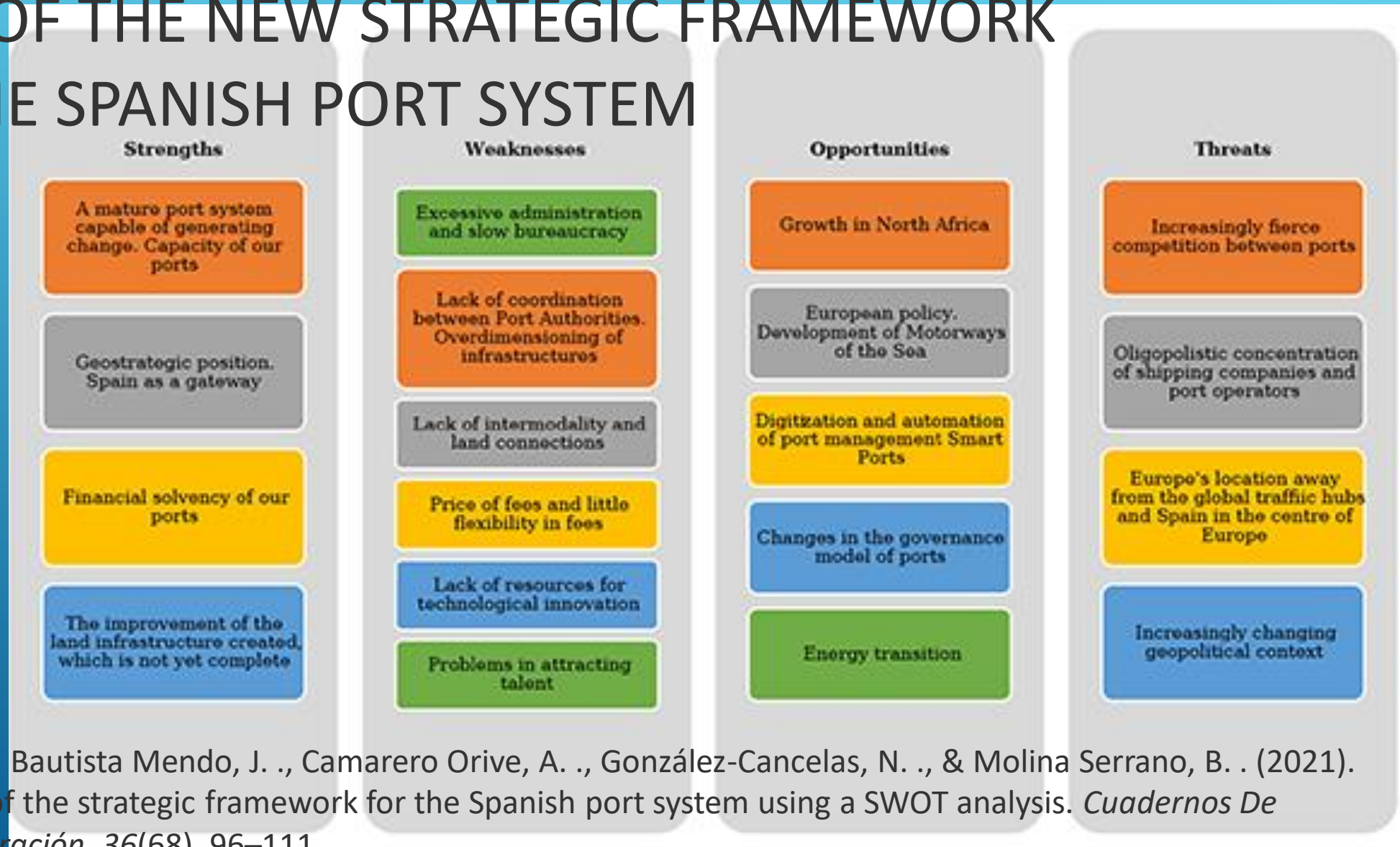
STRATEGIC OBJECTIVES OF THE SPANISH PORT SYSTEM



Source: Bautista Mendo, J. ., Camarero Orive, A. ., González-Cancelas, N. ., & Molina Serrano, B. . (2021). Update of the strategic framework for the Spanish port system using a SWOT analysis. *Cuadernos De Administración*, 36(68), 96–111. <https://doi.org/10.25100/cdea.v36i68.9459>

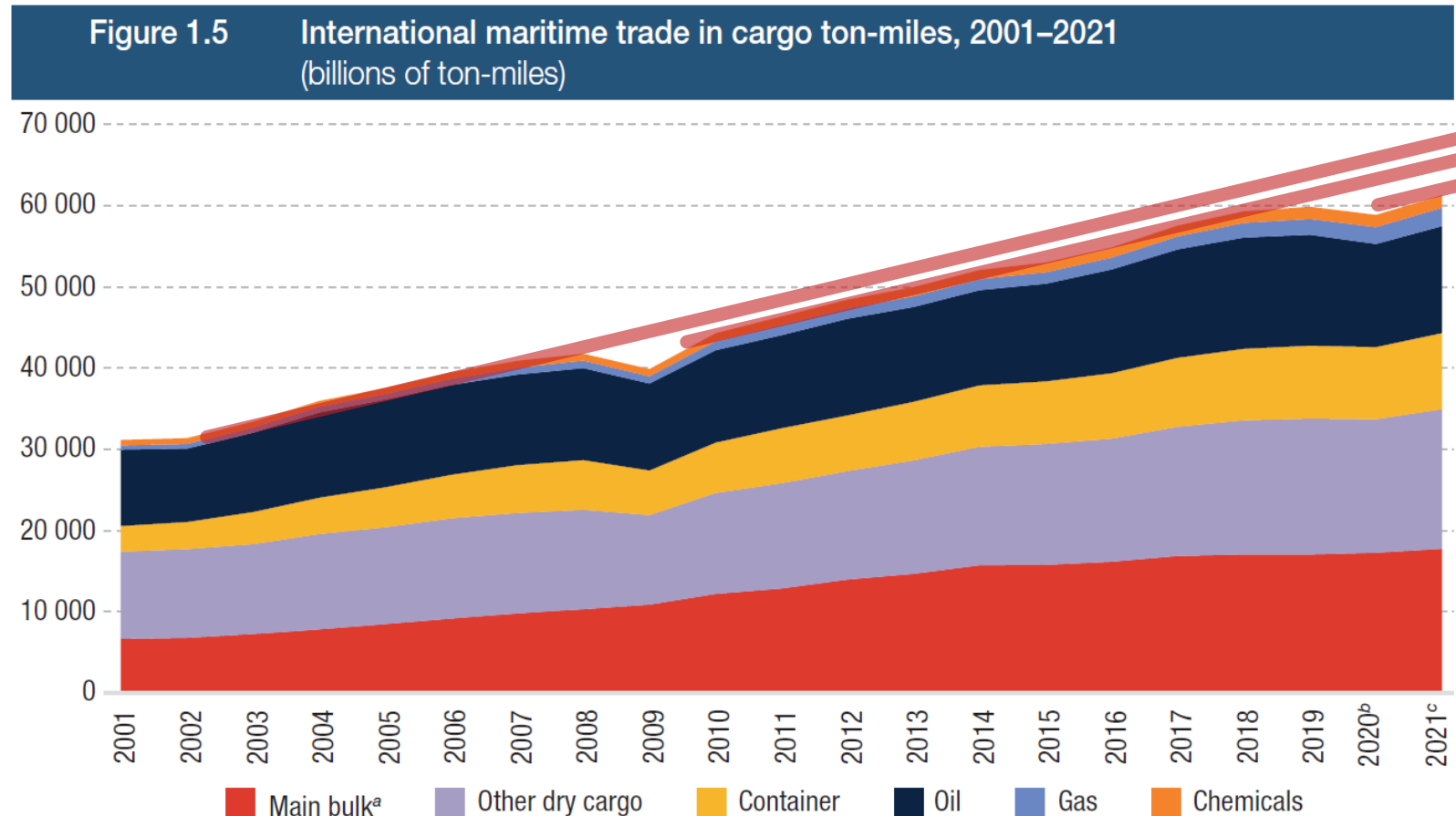
VI. STRATEGIC PLANNING SCENARIOS (3/6)

SWOT OF THE NEW STRATEGIC FRAMEWORK FOR THE SPANISH PORT SYSTEM



Source: Bautista Mendo, J. ., Camarero Orive, A. ., González-Cancelas, N. ., & Molina Serrano, B. . (2021). Update of the strategic framework for the Spanish port system using a SWOT analysis. *Cuadernos De Administración*, 36(68), 96–111.

VI. STRATEGIC PLANNING SCENARIOS (4/6): GLOBAL TRENDS



Source: UNCTAD secretariat based on data from Clarksons Research. *Shipping Review and Outlook*, Spring 2021.

^a Includes iron ore, grain, coal, bauxite/alumina, and phosphate.

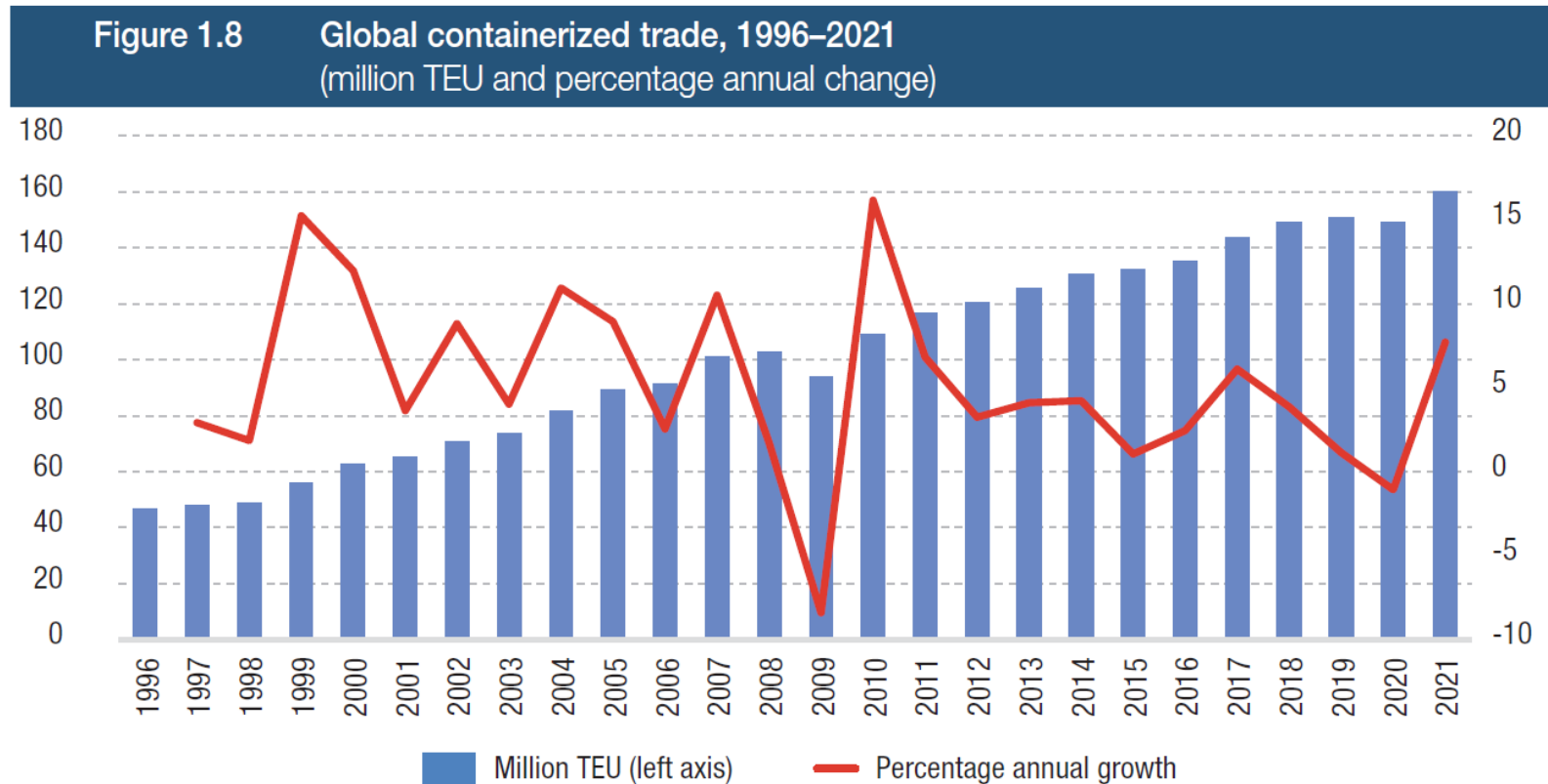
^b Estimated.

^c Forecast.

https://unctad.org/system/files/official-document/rmt2021_en_0.pdf

VI. STRATEGIC PLANNING SCENARIOS (5/6)

GLOBAL TRENDS:



Source: UNCTAD secretariat calculations, based on MDS Transmodal, World Cargo Database, June 2021.

Note: Projected figure for 2021 based on table 1.11 of this report.

Source: United Nations. Review of Maritime Transport 2021.

https://unctad.org/system/files/official-document/rmt2021_en_0.pdf

VI. STRATEGIC PLANNING SCENARIOS (6/6)

GLOBAL TRENDS:

The long-term outlook is shaped by a range of continuing structural trends. These include

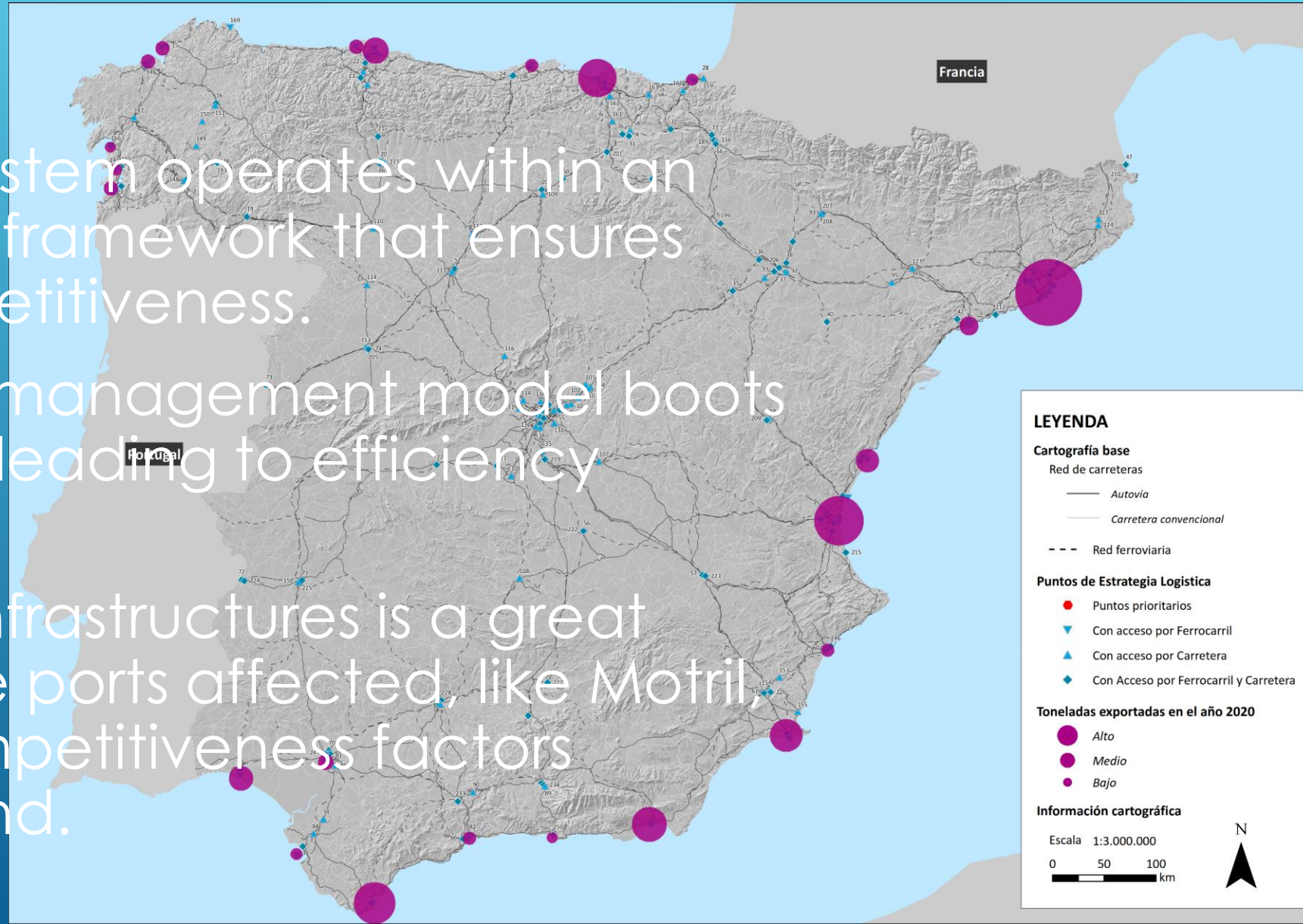
- ▶ changing patterns of globalization,
- ▶ the drive for more-resilient supply chains, avoiding bottlenecks,
- ▶ changes in consumer spending and the growth of ecommerce,
- ▶ the global energy transition, and the continuing uptake of digitalization,
- ▶ the need for environmental sustainability,
- ▶ growing uncertainty after the war in Ukraine...

Source: United Nations. Review of Maritime Transport 2021.

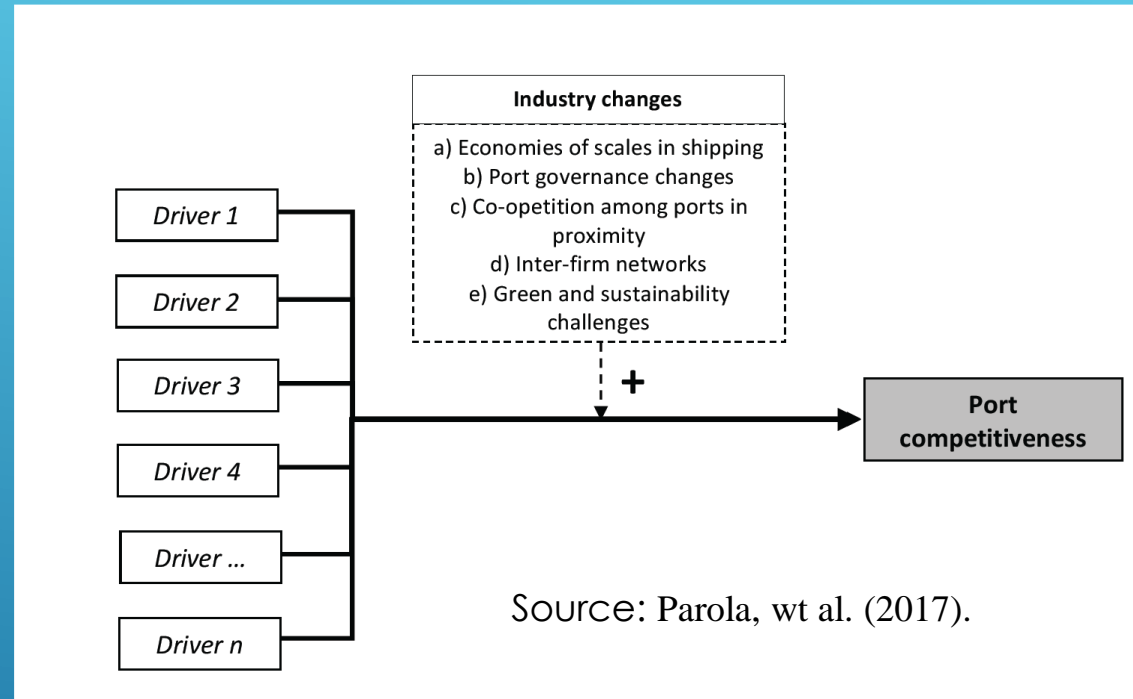
https://unctad.org/system/files/official-document/rmt2021_en_0.pdf

VII. CONCLUSIONS (1/2)

- ▶ The Spanish port system operates within an agreed regulatory framework that ensures stability and competitiveness.
- ▶ The common port management model boots more competition leading to efficiency improvements.
- ▶ The lack of basic infrastructures is a great handicap for those ports affected, like Motril, in terms of the competitiveness factors related to Hinterland.



VII. CONCLUSIONS (2/2)



- The main drivers of port competitiveness moderated by cutting-edge industry changes will affect port competitiveness according to different scenarios.

THANK YOU FOR YOUR ATTENTION

PORT COMPETITIVENESS SCENARIOS LINKED TO
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MEDITERRANEAN SPAIN

Grindlay & Martínez-Montes
grindlay@ugr.es

GSCAEE2022 Copenhagen.



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