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The Competitiveness of Spain's Port Cluster

[1]Andrés Felipe Yanes Quintero, [2]Jairo Jamith Palacios Rozo, [3]Lugo Manuel Barbosa Guerrero

[1]Master's student in International Business Administration – Universidad Autónoma de Colombia
Full-time Professor at Universidad Colegio Mayor de Cundinamarca. Bogotá, Colombia.
Email:
ayanes@unicolmayor.edu.co

ORCID: https://orcid.org/0000-0002-8699-5066

[2]PhD Candidate in Socioformation and Knowledge Society – CIFE. Master's in Education.
Full-time Professor at Universidad Colegio Mayor de Cundinamarca. Bogotá, Colombia.
Email: jjpalacios@unicolmayor.edu.co

ORCID: https://orcid.org/0000-0002-1437-9838

[3]PhD Candidate in Administration – Universidad La Salle. Master's in Educational Informatics. Full-time Professor at Universidad Colegio Mayor de Cundinamarca. Bogotá, Colombia. Email: lmbarbosa@unicolmayor.edu.co

ORCID: https://orcid.org/0000-0002-0871-8637

Abstract: The world economy is dominated by industrial conglomerates - clusters - which interact in different aspects to generate value and competitiveness. The purpose of this study of ports from the port community and their competitive influence in Spain. Study with a descriptive qualitative methodology. The result of this study of the port system was to achieve logistics based on modal interchange, expanding the traditional boundaries of markets and competitiveness between ports, i.e. logistics chains, the port cluster makes decisions to strengthen production. It is concluded that Spanish maritime transport has advantages in terms of cargo size, as well as the flexibility of its itineraries, these advantages depend on the adequate Spanish maritime infrastructure.

Keywords: *port cluster, competitiveness, value chain.*

Introduction

In order to obtain this theoretical framework, research was carried out based on the bibliometric or scientometric model. These instruments are part of the sociology of science, and with them, guidelines are sought as to how the study was developed and the way of thinking of the authors, among others. With the use of bibliometrics or scientometrics, a series of indicators are calculated according to the type or diversity of documents, such as articles published in different research journals, which can be analyzed bibliometrically. Bibliometric indicators allow

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evaluating, specifying and providing information on the performance of research processes in any field of science, such as volume, evolution, visibility and structure. Thus, they allow estimating the quality of the scientific activity, and the influence of both the work and the sources consulted. Accordingly, they can be classified into two groups: a. quantitative indicators of scientific work, which include the number of publications and allow visualization of the real state of science, and b. impact indicators, which are based on the number of citations obtained from the work, and characterize the importance of the document according to the recognition given by other authors. For the search we used information sources such as databases and international directories called high impact, the present exploration was carried out for the period from 1980 to 2018, forming with this the most relevant authors and topics around research in port clusters. For this process we used the logical or Boolean operators in the search which are: AND, ET, Y for data intersection, NO, NOT, AND NOT, BUT NOT, NON, SAUF for negation or exclusion, OR, OU, O for union or separation.(Pinto, 2013).

Next, the following step is shown, where the search by key words (Port, Competitiveness, Cluster) is demonstrated, followed by the selection of the items of interest, export of the data, extraction of the information and with the results start the clarification of the information (Perestelo-Pérez, 2013). In such a way and on the previous analysis it is found that since the mid-twentieth century competitiveness has been a topic of great relevance, not only for academics, Liu.D. and Hsu. H. (2009), Smit. A. (2010), Wyk, J (2010), but for countries and industries, where there is a growing need to seek to increase the productivity of goods and services, to compete globally and thus seek to improve levels of competitiveness, in addition to improving and sustaining the quality of life of people Krugman, P. (1979). Since 1989, the Institute of Management and Development (IMD) and since 1995 the World Economic Forum (WEF) have published their annual reports on national competitiveness, which are widely used by governments almost everywhere in the world and by various economic agents.

Competitiveness towards the port cluster where the principles of the study of competitiveness can be seen from the classical theories of the theory of absolute advantages Smith, A. (1776), the theory of comparative advantages Ricardo, D. (1817), and Hecksher and his disciple Bertil Ohlin, known as the theory of the proportion of factors, and the paradox of Leontief, W. (1953). Thus, Peña-Vinces, J.(2009), says that up to this point all these theories are the basis of international trade as the basis of international competitiveness.

In the middle of the 20th century, the study of competitiveness is added to new theories, Linder, S. (1961), shows two significant variables: domestic demand and economies of scale. Vernon, R. (1966). He proposed the theory widely used in marketing and business called the product life cycle. Krugman, P. (1979) and Lancaster, K. (1979), individually, proposed two models of trade for differentiated products. Where it is explained that, if there are economies of scale in the production of a good in an express country, that country would have an advantage when it

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specializes in the production of that good. However, these theories alone do not provide a profound explanation of competitiveness. But in the last thirty years there have been changes in the world economy and the analysis of competitiveness has been presented with new variables such as the globalization of markets, the management of knowledge, the use of information technologies and an external environment of continuous and uncertain change. Peña-Vinces, J. (2009).

However, what the studies of clusters (which have been created in recent years) highlight is their viability to develop efficiency through different forms of business articulation (Altenburg, 2001, p. 7). Other authors refer to "industrial networks, industrial systems, technological systems, and resource areas as similar meanings to cluster" (Almquist, Norgren and Strandell, 1998, p. 14). Other researchers state that a cluster is commonly understood as a: ... sectoral and/or geographic concentration of companies engaged in the same activities or in activities closely related both backwards, with suppliers of inputs and equipment, and forwards and sideways, with processing and user industries as well as service companies and activities closely related to external economies, which generally bring together the presence of producers, suppliers and specialized labor and related services and with the possibility of carrying out a joint action in search of collective efficiency (Ramos, 1998, p. 108). (Ramos, 1998, p. 108). Clusters can also be understood as: ..." a set of similar geographically delimited activities, with active channels of commercial transactions, communication and dialogue, sharing specialized infrastructure, labor and service markets, and facing common opportunities and threats".

The literature review provides a very clear definition of the concept of cluster, which in turn will be used later on to define a maritime cluster, since it points out the different components involved, such as universities, research institutes, etc. Altenburg in his paper defines that "a cluster is an agglomeration of a significant number of firms in a delimited geographical area that has a clear specialization profile and in which the degree of division of labor and interaction between firms is high" (Altenburg 2001, p. 8). Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, companies in related sectors and related institutions (e.g. universities, standardization institutes, trade associations) that compete but also cooperate. As critical masses of unusual competitive success in specific areas of activity, it is a characteristic activity of all or almost all national, regional and even metropolitan economies, especially those of the most advanced countries (Porter, M. 2003, p. 203). As critical masses of unusual competitive success in specific areas of activity, it is a characteristic activity of all or almost all national, regional and even metropolitan economies, especially those of the most advanced countries (Porter, M. 2003, p. 203). Based on the above definition is Porter's theory of location and economic geography (Porter, M. 1990), which analyzes the strategic resources and dynamic capabilities within the value chain.

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In this way, within the literature review, different definitions of port clusters can be found, thus allowing the analysis of their advantages. Some scholars and researchers use the definition of Maritime Clusters as "a geographic concentration of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (e.g., universities, standards agencies, and trade associations) in particular fields that compete, but also help each other." Porter, M. (1998, p. 197). Porter, M.'s (1998) definition shows two fundamental elements. First, clusters are organized by interconnected firms that complement each other within a common value chain. Local rivalry, collaboration, specialized factors and demanding customers produce benefits for groups of companies.

The second element shows that clusters are geographically proximate groups of interconnected companies whose geographic proximity creates an economic environment conducive to competition and innovation. Within the scientometric analysis it is found that these authors Benito, G. (2003). Laaksonen, E., & Mäkinen, H. (2013), Makkonen. T, (2013). Pinto, H. (2013) use the definition of Porter, M. (1998) to explain the characteristics and effect of clusters at the national level, and of this maritime industry, understood as an agglomeration phenomenon. In addition to examining the characteristics and efficiencies of clusters through specific strategies and market structure. Benito, G. (2003) examines the dynamics and effects of clusters in the Norwegian context. It demonstrates that innovation and entrepreneurship, as well as strong interdependencies between players in the maritime sector are the key factors that have unlocked the growth of the Norwegian Maritime Cluster.

Similarly, Jenssen. J. (2003) investigates changes in firm innovation in the Norwegian cluster and shows that the cluster has generated opportunities for participation that can translate into the creation of new innovative capabilities and competitiveness. Other research provides details on the internal structure and innovation strategy of maritime companies in the Atlantic countries, the Netherlands, Finland and the Baltic region. These studies identify specific activities and strategies at the organizational level for the management and consolidation of national maritime clusters. On this approach, the Cluster concept involves a vision of maritime industries as an admitted agglomeration phenomenon, which is stimulated by competitive and cooperative factors. This representation has been sufficiently used by national policy makers. This type of definition provides a wealth of detail on the key characteristics of the business activities and strategies of companies competing and collaborating with maritime clusters, but is not useful for identifying the boundaries, both industrial and geographic, of a maritime cluster. In particular, this definition provides little information on the level of industrial aggregation at which maritime clusters should be defined or the spatial scale and geographic range at which clustering processes occur.

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Methodology

This qualitative approach aims to recognize the link with the reality being studied in order to get closer to reality. According to Sandelowski (2000), the inductive method is used where a situation is described according to the data collected. This research is based on the descriptive method, which was called descriptive research because its purpose was to define the port cluster and characterize the object of study, which is the loading and unloading of ships, transportation, logistics, manufacturing and trade.

Results

For this project, the definition of port cluster was taken as "A set of activities strongly related to the construction and operation of ships, such as port services, maritime services and ship suppliers" (De Langen, PD. 2002). Thus, the term port clusters has emerged in a period when organizational and state policies have focused on the fourth industrial revolution, making innovation and industrial competitiveness visible. The concept or definition of port clusters will allow better decision making and determine the strengthening of the production of different sectors (maritime industries and related activities), allowing collaboration between companies and organizations for the generation of knowledge.

Where port clusters as a value chain, following the definition of Porter et al. (1991) the conformation of the economic process these days, and determined by global changes and the economy, its regional and local environments, a criterion emerges that has gained much strength, that of the cluster or agglomeration, which became important in their research. These clusters are a new strategy to standardize the value chain, research, design, manufacturing, development, marketing, purchasing, sales, distribution, sales and after-sales service. Mode that defines in the process the margin of contribution to the different activities of the organization in terms of infrastructure, human talent management, management and development of new technology, supplying and primary activities (such as inbound and outbound logistics, operations, marketing and provision of pre- and post-sales services). Ports, from the perspective of the cluster, are an intermodal point and the areas where different logistic activities are carried out, specialized in the arrival of goods and ships. Their activities include cargo handling and ship loading and unloading (pilotage, towing, mooring), transportation (movement of goods for shipping companies and land transport companies), logistics (warehousing, packaging, blending), manufacturing (refining, products for the chemical and steel industry) and trading (warehoused goods).

In general, port clusters include: 1) The port transfer and service area. 2) Port city area. 3) Territories neighboring the port with an agglutination of port service activities. Cluster activity is influenced by the organization: agglomeration economies (attracting new companies, concentration of knowledge, can generate concentration or dispersion); inter-port

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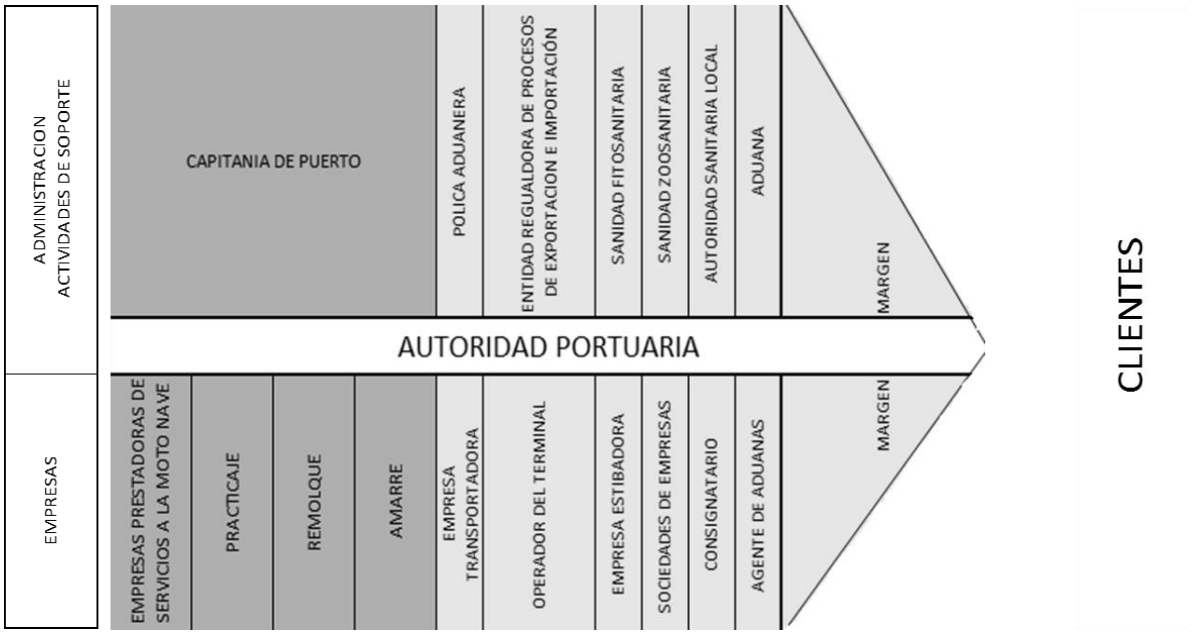
competition; existence of entry and exit barriers, heterogeneity to create innovation opportunities. And on the other hand, the government: business confidence, intermediaries, leading companies with the capacity to invest in innovation and, in general, collective actions.

Fig.1. Value chain of a port's dependents



Source: Own based on Vitsounis, T. K., & Pallis, A. A. (2012).

Port planning, as a management tool, guarantees the proper functioning of the port; that is: short and medium term planning, long term planning and planning without a time horizon. Quality (port capacity, efficiency), economic (return on investment) and social (promotion of employment, environment) factors are taken into account.

Where the Spanish Port System (SPE) is characterized by its heterogeneity, its structure is based on the activity that each port carries out and the physical, immobilized and human resources at its disposal. The ports that compose it are specialized in the traffic of solid and liquid bulk, mainly dedicated to the trade of general and mixed merchandise. Emphasis is placed on competitiveness and productivity indicators for comparative analysis and best practices. Among the indicators of port operations in container traffic used are container handling operations, such as container and vessel unloading, and with container inbound management, operating yields and annual container transfer.

Research, Development and Innovation I+D+i work is identified based on its nature, scope or level of action and its subject matter. The thematic lines are as follows: 1) Automation of data capture for port authority invoicing. 2) Optimization of administrative processes through

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ICT. 3) Automation of operational information flows. 4) Technical lines: electronic data interchange platforms (MNSW, PCS), automatic identification and location technologies (GPS, RFID, AIS), seal control, big data analysis, etc. On the other hand, there are strategies and instruments for coordination and inter-port cooperation in I+D+i to overcome the deficiencies and allow for the competitive improvement of this sector, such as: 1) Lisbon Strategy and Blue Growth (EU). 2) TEN-T Guidelines. 3) H2020. 4) International regulation and guidelines. The Spanish port model in the European Union has adopted management models in accordance with the legal competencies of each country, although it sets out a series of guidelines and principles of port policy, such as: modernization of port capacity, integration into transport policy, free competition and respect for the environment.

In the European Union, the development of infrastructures/superstructures, promotion of Mediterranean transshipment, development of intermodal links, technological innovations, professional training, updating and standardization of safety and environmental protection statutes, control of subsidies to ports and transparency of accounts, costs and prices. In the case of the Spanish Port System SPE, within the elements developed by Law 33 of 2010 of August 5, 2010, amending Law 48 of 2003 of November 26, 2003, on the economic regime and provision of services of ports of general interest, is the “Advanced Landlord” management model, in order to facilitate the economic activity and competitiveness of the socio-business fabric and its environmental sustainability.

The “Organismo Público Puertos del Estado” (OPPE) is either an active member or a guest member of several clusters and platforms that bring together the different stakeholders of the port community in various areas of interest to it. Since the areas of interest of some platforms/clusters differ from one another as a general rule (although in some cases, the same aspect is studied in several platforms), different members of OPPE are assigned to participate, assist and contribute to the same platform. Therefore, each member only has knowledge of the operation of the platform in which it participates, partial knowledge, not global knowledge of all the maritime platforms/clusters in which OPPE is involved. In Spanish Maritime Transport Compared to other transportation systems, maritime transport has the following advantages and disadvantages.

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Table 1.

Advantages and Disadvantages of Spanish Maritime Transportation

Advantages	Disadvantages
As it is not conditioned by a specific infrastructure, it has great flexibility in its itineraries.	It requires inland transportation from the area of origin to the port and from the port to the final destination of the goods.
Load capacity, as it is suitable for the transport of large masses.	Conditioned by infrastructure (port, access channels, loading facilities, warehousing)
Ability to travel long distances	Slow speed or slowness to cover distances
Relatively low cost	

Source: own elaboration.

Maritime transport has clear advantages in terms of cargo size and routing flexibility; however, these advantages depend on adequate infrastructure. In Spain, maritime transport can be delimited in four zones according to the influence that the riverine states and the baseline have on them, these are: rivers and lakes, territorial sea, proximate zone and exclusive economic zone. The boundary between a country's inland waters and its territorial sea is called the baseline. Navigation can be classified into four categories: inland, coastal, foreign and extra-national. When it is carried out in Spanish territory, it can be considered as inland or cabotage. Inland is carried out within a certain port, either rivers, lakes or inland waters. Cabotage includes that which, not being inland, takes place in areas under the sovereignty of a country. Maritime transport can be of passengers or goods, the latter being the predominant factor. According to its relationship with trade, it is classified as: internal transport (cabotage), import or export transport, and extra-national transport. By the system of operation it can be classified into: regular lines, which are developed on a fixed, periodic itinerary and with previous tariffs, conditions and itineraries; or, free navigation, or *tramp*, which is developed without an itinerary, generally used for transporting or chartering in a complete way on a one-time basis. The main routes developed in today's maritime transport are: 1) America and Europe, crossing the Atlantic: this was the main route until 30 years ago. 2) Pacific route linking the Orient with the United States. 3) Asian countries with each other. 4) Far East and Southeast Asia and Europe. 5) The last two are the ones that have had the greatest growth in recent years. In Spain, ports such as Algeciras, Barcelona and Valencia stand out. In Spain, ports such as Algeciras, Barcelona and Valencia stand out. Barcelona is a transit port for European Union trade through the Mediterranean and seeks to become a distribution port taking advantage of the Far East routes. Port traffic in Spanish ports has been growing steadily for the last three (3) years, thanks to the elements of clustering and competitiveness, as reflected in figures. According to information and data from the Ministry of Development of Spain in 2019, within the 46 ports

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of analysis in 2018 the cargo movement was 563.4 million tons and with an increase of 3.3% makes them to be seen as the most productive in the area, being the Bay of Algeciras an important node for port traffic.

It is also found that the Spanish ports have become the most important logistic platform in Southern Europe and a link for the traffic of goods between the continent and Asia, the Americas and Africa, as demonstrated by the increase in transit traffic, which reached 148 Mtn. It should be noted that one of the most important indexes by which ports are measured is the movement of containers, for which the measure is TEU'S, moved by port of entry and exit. In the case of total general cargo, 191.3 million tons were moved in 17.2 million TEUs, demonstrating the exponential growth of the Spanish port system, its clustering and increased competitiveness. In maritime transport, it implies the generation of: regulations, procedures, routes and logistic and storage forms that allow them to be competitive and respond to the needs of the market. This involves the specialization of vehicles, in this case ships, adapting their storage form and size. And the diversification of land and sea routes, and specialization of logistics based on modal interchange, expanding the traditional boundaries of markets. It can be said that competition between ports is, in reality, between logistics chains, since the customer wants an effective, just-in-time, low-cost operation, with safety, economy and speed. This is part of companies' competitiveness strategies, regardless of whether they belong to a country or whether the goods move within or outside the territory.

The sea is the main traditional source of wealth generated in Spain. Its shipyard ports are internationally qualified and it is the most fishing country in Europe. Due to their geographical position, the most important Spanish ports play an outstanding role in international maritime traffic. In addition, it can be said that the tourism cruises that dock on its coasts, have been the main attraction to develop an amazing tourism sector that generates one of the main items of income of the GDP of Spain in recent decades. Esteve, F (2015). The Iberian country has 8000 km of coastline, making it the European Union country with the longest coastline. Its ports develop supply or provisioning services. Among the figures for the last few years, the following stand out: 1) Transportation of more than 20 million passengers. 2) More than 35,000 direct jobs and more than 110,000 indirect jobs. 3) 50% of exports and 75% of imports. 4) 15% of domestic trade flow. 5) 20% of the Gross Domestic Product of the transport sector and 6) 1.1% of the national GDP.

In Spain, ports belong to the State, being public ports under the Ministry of Public Works, which is responsible for the port system as a whole. Therefore, it coordinates the 28 port authorities and the 44 ports of interest. In terms of total area, Spain has 218,000 hectares of floating area, 69,262,356 square meters of land area, 229,627 linear meters of deep-water quays and 15,778,029 square meters of storage areas. Cargo volume is at 4 times the number of ships, and the average size of vessels has increased by 30%. Therefore, greater port depths and

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dredging are required, as well as better infrastructure and equipment. The issue of security should be included in the policies and activities of an antisocial nature, general port security and passenger traffic. With regard to the environment, it is important to work on the management of waste generated by ships and on the care and combating of marine and atmospheric pollution (noise, dust, gases).

Spain's maritime sector is made up of activities such as: the navy; shipyards; maritime industry and engineering; maritime transport; fishing and marine husbandry; recreational boating industry, marinas and marinas; marine energies; ports and port services; maritime services, as well as regional clusters; marine research; agents of the I+D+i system; university research organizations; and professional associations; trade unions. In the world there have been basically three types of port administration: *landlord port*, *tool port* and *servicesport*, where the intervention of public agents, who are owners by law of the land adjacent to the beaches, coasts, infrastructure and superstructure, and private entrepreneurs, who own the machinery, equipment and manage the port, is harmonized.

Conclusion

Spanish maritime transport has advantages in terms of cargo size, as well as the flexibility of its itineraries, these advantages depend on the adequate Spanish maritime infrastructure. As the achievement of logistics specialization based on modal interchange, expanding the traditional boundaries of markets.

Today's customers require an effective operation, at the lowest cost and in the shortest time. Where The Spanish maritime cluster has allowed the identification of common interests in the development of the sector, allowing a greater integration of national and trans-European networks, achieving an increase in the number of ships using Spanish ports. The formation of regional maritime clusters will allow the identification and grouping of common interests, which will be able to respond to the strategic challenges of competitiveness of the sector in each region.

Where studies show a diversity of topics on clusters, but no specific topic is developed on port clusters, leaving a gap in the literature on the subject, and a lack of national policies for the implementation of these types of economic development; therefore, a study and implementation of a policy at the national level with insertion in the national and local development plans that are agreed upon in each region is lacking.

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