Journal of ETA Maritime Science 2024;12(1):36-49

Competitiveness Factors of a Shipyard in the Era of New Uses of Oceans

Brais Preto-Fernández[1], Natalia Paleo-Mosquera[1], Almudena Filgueira-Vizoso[2], Ramón Yáñez-Brage[3], Laura Castro-Santos[4]

[1]IES Lamas de Abade, Santiago de Compostela, Department of Education of the Xunta de Galicia, Department of Mathematics, Spain
[2]University of Santiago de Compostela Faculty of Political and Social Sciences, Department of Political Science and Sociology, Santiago de Compostela, Spain
[3]University of A Coruña, Polytechnic School of Engineering of Ferrol, Department of Chemistry, Coruña, Spain
[4]University of A Coruña, Polytechnic School of Engineering of Ferrol, Department of Naval and Industrial Engineering, Coruña, Spain

Abstract

The aim of this paper is to examine the most relevant competitive factors of a shipyard. The method conducted interviews and questionnaires with multiple agents related to the company and analyzed several institutional, business, and academic documents. The case of study considered was the manufacturing center of Navantia, S.A. in the Ferrol estuary (A Coruña, North-West of Spain). The results indicate that the five most important competitive factors are the government and political support, the production organization, the product technology, manpower, and skills and knowledge. Thus, these five competitive factors are critical to analyze the competitiveness of a shipyard with the characteristics of the one studied for new uses of the ocean, such as offshore wind, wave energy, or aquaculture.

Keywords: Competitiveness factor, Shipyard, Shipbuilding, Oceans, Offshore renewable energies

1. Introduction

The European shipbuilding industry decayed in the 1990s mainly because of the great international competition in East Asia [1]. They usually carried out traditional shipbuilding [2]: building and repairing civil and military vessels.

Nowadays, the European shipbuilding industry has a chance of diversifying its order books to introduce new products derived from the offshore wind sector. Shipyards are the facilities where offshore wind platforms [3], both fixed and floating, are built. Therefore, Europe can lead the new era of uses of the sea by providing additional activities to its shipyards. It will generate thousands of jobs in different sectors, such as shipbuilding, industrial engineering, energy sector, and maintenance, which will enrich the areas where they were carried out.

Husumer Schiffswerft, FR. Fassmer and Abeking & Rasmussen are German shipyards that consider the offshore wind sector as a complementary business [1]. Since 2014, the Navantia Fene shipyard has built 29 fixed offshore wind structures called jackets for the Wikinger project and floating offshore wind substructures (5 spar Hywind platforms for the Hywind Scotland Pilot Park of Statoil offshore wind farm in United Kingdom and 5 semisubmersible WindFloat platforms for Portugal) [4].

Therefore, knowing what the most important factors for competitiveness are in marine clusters [5,6], and, mainly, in the shipbuilding industry, is critical in order to introduce the shipbuilding sector in one of the new uses of the ocean [7,8]: generating electricity using offshore energy [9] or aquaculture.

Address for Correspondence: Almudena Filgueira-Vizoso, University of Santiago de Compostela Faculty of Political and Social Sciences, Department of Political Science and Sociology, Santiago de Compostela, Spain
E-mail: almudena.filgueira.vizoso@udc.es
ORCID ID: orcid.org/0000-0002-2212-8094

Received: 15.05.2023
Last Revision Received: 21.12.2023
Accepted: 26.12.2023

To cite this article: B. P. Fernández, N. P. Mosquera, A. F. Vizoso, R. Y. Brage, and L. Castro-Santos. "Competitiveness Factors of a Shipyard in the Era of New Uses of Oceans." *Journal of ETA Maritime Science*, vol. 12(1), pp. 36-49, 2024.

The goal of this paper is to identify the most relevant competitiveness factors of a shipyard [10,11]. Considering far away the conventional competitiveness factors (cost, delivery time and quality). The case study analyses the manufacturing center of Navantia, S.A., the Ferrol estuary (A Coruña, North-West of Spain). The complete list of competitiveness factors is suitable for people who are responsible for a shipyard to help you see where the competitiveness of a shipyard could be improved with a view to new uses of the oceans, such as offshore renewable energies.

2. Materials and Methods

2.1. Definition of Competitiveness

A large quantity of definitions of competitiveness were studied. The term competitiveness is no longer a static and purely economic concept and now includes factors such as culture, environmental sustainability, politics, human resource training, and spatial location. Thus, the definition of competitiveness acquires greater complexity, giving rise to many definitions for the same term. Rojas and Sepúlveda [12] stated that these definitions "*range from very specific and limited proposals, in which one of the central axes was international trade, to broader, complex and general ones that are confused with concepts such as development and economic growth, incorporating from purely economic aspects to those of a technical, socio-political and cultural nature*".

In addition, Bejarano et al. [13] indicated that "*It is possible to find definitions at several levels: those based on the firm, those based on the sector, and those that refer to the national economy as a whole. In the definitions that refer to the firm's competitiveness, the ability to design, produce, and sell goods in the global market (and to defend the domestic market) is usually emphasized, having as a parameter the efficiency standards in force in the world market. Those definitions that refer to the sector or the economy as a whole do not differ essentially from those just mentioned, except that the condition is added that competitiveness must lead to an improvement in the standard of living*".

Based on the table of Castellanos et al. [14], which orders the definitions by authors, levels, and according to the approach given to competitiveness, and adding the different definitions found in other reference texts, the definitions given by different authors are presented below, giving the term competitiveness, separating them according to the approaches and according to whether they correspond to the macroeconomic, industrial, or microeconomic level (see Table 1).

A) Macroeconomic Level

1. An approach that relates competitiveness to the results of foreign trade

- "*Capacity of a country (or group of countries) to face (to meet) competition at the world level. It includes both the ability of a country to export and sell in foreign markets and its ability to defend its own domestic market with respect to an excessive import penetration*" [15].
- "*A country's ability to create, produce, distribute, and/or serve products in international markets obtaining increasing profits on their resources*" [16].
- "*Sustainable ability to earn profits and maintain market share*" [17].
- "*Ability of a country, a sector or a particular company, to participate in extreme markets*" [18].
- "*Increase or at least a maintenance in participation no volume traded internationally or for certain areas or segments of the world market in which the product is competing*" [19].
- "*The capacity of said economy to supply and supply its internal market and to export goods and services abroad*" [20].
- "*A competitive economy is one that exports goods and services profitably at world market prices*" [21].
- "*Trade competitiveness is the ability of a country to effectively compete with foreign supply of goods and services in markets domestic and foreign*" [22].

2. An approach that relates competitiveness to the contribution of foreign trade to growth and general well-being

- "*The ability to produce, distribute, and provide the service of goods in the international economy in competition with goods and services produced in other countries and to do so in a way that raises the standard of living*" [16].
- "*The degree to which a nation can, under free and fair market conditions, produce goods and services that meet the requirements of international markets and, simultaneously, maintain or expand your real income citizenship*" [23].
- "*The degree to which a country, in an open market world, produces goods and services that meet market demands and simultaneously expands its GDP and GDP per capita by at least as quickly as their trading partners*" [24].
- "*A country's ability to achieve fundamental policy objectives economic growth, such as growth in income and employment, without incurring difficulties in the balance of payments*" [25].
- "*The ability to provide an acceptable rate of growth and a sustained standard of living for its citizens, while efficiently*

providing employment without reducing the potential life growth of future generations" [26].

3. Approach that relates competitiveness to the results of foreign trade

• "*The production of goods and services of higher quality and lower price than domestic and international competitors, which translates into increasing benefits to a nation's inhabitants by maintaining and increasing real incomes.*" Porter, (1990) [27], cited by Castellanos et al. [14].

• "*National competitiveness is the extent to which a nation, under free and fair market conditions, can produce goods and services that can successfully pass the test of international markets, maintaining and even increasing at the same time the real income of his citizenship*" [28].

• "*Competitiveness reflects the extent to which a nation, in a system of free trade and fair market conditions, can produce goods and services that pass the test of international markets, while maintaining and increasing income real of his people along deadline*" [29].

• "*A national economy is competitive when it is able, through its exports, to pay for the imports necessary for its growth, growth that must be accompanied by a standard of living*" [30].

• "*The sustained increase in income and the standard of living of nations or regions, with a job offer wide enough to cover all possible applicants. The activity economic should not result in unsustainable external imbalances, nor in compromising the well-being of future generations.*" European Report on Competitiveness, European Commission, (2009) [31], cited by Castellanos et al. [14].

• "*The competitiveness of nations is a field of economic knowledge that analyzes the facts and policies that determine a nation's ability to create and maintain an environment that sustains the generation of greater value for its businesses and more prosperity for its people. The competitiveness of nations is related to how they create and maintain an environment that sustains the competitiveness of their companies*" [32].

• "*A sustained increase in the standard of living of the nation or region and unemployment levels as low as possible*" [31].

4. Approach that relates competitiveness to the levels of efficiency and productivity of a company's economy

• "*Development of a higher efficiency and with the capacity of an economy to increase the product of higher activities productivity, which, in turn, can generate high levels of salary in real terms*" [33].

• "*From a medium- and long-term perspective, competitiveness consists of a country's ability to sustain and expand its participation in international markets and simultaneously raise the standard of living of its population. This requires increased productivity and, therefore, the incorporation of technical progress*" [34].

• "*An economy is competitive in the production of a given good when it can at least match the current efficiency standards in the rest of the world in terms of the use of resources and the quality of the good*" [35].

• "*Competitiveness involves elements of productivity, efficiency, and profitability, but it does not constitute an end or a goal in itself. It is a powerful means to achieve better standards of living and greater social well-being - a tool for achieving goals. By increasing productivity and efficiency in the context of international specialization, competitiveness provides the global basis for increasing people's incomes without generating inflation. Competitiveness should be seen as a basic medium to improve the standard of living, create jobs for the unemployed, and eradicate poverty*" [36].

• "*Ability of companies, industries, regions and nations, and supranational regions, to generate, while exposed to international competition, relatively high factors of income and factors of employment at sustainable base levels*" [29].

B) Industrial Level

• "*The ability of an industry to produce goods with patterns of specific quality, required by specific markets, using resources at levels equal to or lower than those that prevail in similar industries in the rest of the world, for a period of time*" [37].

• "*An industry is internationally competitive if it produces goods interchangeable and is profitable. A reduction in competitiveness is, then, a reduction in the profitability of some or all tradable product industries*" [38].

• "*The ability to win and execute shipbuilding orders in open competition and stay in the business*" [39].

C) Microeconomics Level

• "*A firm will be competitive if it is victorious (or in a good position) in the confrontation with its competitors in the market*" [40].

• "*A company is competitive when it can produce products and services of higher quality and at lower costs than its domestic and international competitors. Competitiveness is synonymous with a company's long-term profitability performance and its ability to remunerate its employees and generate a higher return for its owners"* [41].

• "*Ability of companies in a given country to design, develop, produce, and sell their products in competition with companies based in other countries*" [42].

• "*Competitiveness is the ability to sell what is produced*" [43].

• "*The sustained ability to gain and maintain market share*" [44].

• "*The firm's ability to deliver goods and services at the time, place, and manner preferred by its customers, at prices as good or better than those offered by the other bidders, obtaining at least the opportunity cost of the resources used*" [45].

• "*Derives the concept of competition competitiveness, a word with the meaning of "possibility of equaling one thing to another in perfection or properties"* or *"the degree of economic rivalry existing in a market or the way of acting between the competitors in the said market". Thus, competitiveness is understood, for this author, as the ability of an economic agent to compete*" [46].

• "*Set of skills and conditions required for the use of competence*" [47].

• "*Competitiveness is what makes a consumer prefer a company's products and buy them. The essence of competitiveness is value creation*" [48].

• "*Ability to successfully enter the market, to obtain a share and sustain it or increase it over time*" [49].

• "*Competitiveness is an attribute or quality of firms, not of countries. The competitiveness of a firm or group of firms is determined by four fundamental attributes of its local base: factor conditions, demand conditions, related and supporting industries, and firms' strategy, structure, and rivalry. Such attributes and their interaction explain why they innovate and sustain competitive companies located in certain regions*" [50].

• "*Capacity that an organization has to increase, consolidate, and maintain its presence in the market*" [51].

• "*Business competitiveness is the ability to maintain a position in the market, in particular, by offering quality products in a timely manner and at competitive prices, with flexibility to respond quickly to changes in demand and properly managing the differentiation of the products by the creation of innovative capacity and an effective marketing system*" [52].

• "*It is defined as the ability of an organization, public or private, with or without profit, to achieve and maintain advantages that allow it to consolidate and improve its position in the socioeconomic environment in which it develops*" [53].

• "*A company is competitive if it can develop and implement strategies that lead it to a sustained or expanded market position in the industry segment where it operates*" [54].

• "*Ability to maintain and expand the participation of companies in local and international markets in a profitable way that allows their growth*" [55].

• "*An industry is competitive if:*

a) *total factor productivity is equal to or greater than that of its competitors.*

b) *the average unit costs are the same or lower than those of its competitors*" [56].

Table 1. *Main authors who have defined competitiveness previously*

Macroeconomic level	Industrial level	Microeconomics level
[15,16,57,58] ...	[14,39,59,60]...	[40-42,61,63]...

Then, considering our object of analysis, the definition of competitiveness for companies is defined as follows: "*Competitiveness for a shipyard in the global era, is the capacity to produce goods, equipment, and services, remaining in the profits in the middle and long term when selling them in the market*".

Therefore, competitiveness has one dimension: obtaining benefits in the medium and long term.

2.2. Grouping of Competitive Factors

most authors make a grouping of the competitiveness factors considering their relation to resources (material resources, labor, capital, etc.) and to the environment (legal framework, monetary change, etc.).

The present paper will group the competitiveness factors in a manner similar to that of the members of the ECORYS SCS group [62], but contemplating the legislative framework and analyzing a series of factors that have been detected by the authors that were not contemplated in the study of that group.

The factors that will be studied within each of the above groups are shown in Table 2.

In addition to the factors listed above, two additional factors should be mentioned because they have been highlighted by several authors:

1. Price [63-67].

2. Time [63,65,67-69].

This paper aims to go a little further than the three-term price-time-quality to enrich the debate on the factors of competitiveness in a way that is useful for shipyards. Therefore, time and price will not be studied as factors in themselves, as they are derived from many of the factors that will be studied. For example, time could be considered as a consequence of the shipyard's production capacity [CGT(Compensated gross tonnage)/year], the number of people working in the company, and the productivity of its human resources (CGT/person-year). The company could play with capacity (even through cooperation with other shipyards or the complementary industry), productivity, and the number of human resources to adjust deadlines. The example for prices is more obvious because it is a consequence of any production process carried out in the shipyard,

Table 2. *Proposed competitiveness factors for a shipyard*

1. Industry structure	2. Competitive environment
A. Value chain and production processes	**A. Competitors development (supply)**
I. Product technology	I. Competitors development (supply)
II. Quality	**B. Market development (demand): Buyers**
III. Attractiveness of the product	**C. Bargaining power of suppliers**
IV. Added value	I. Bargaining power of suppliers
V. Marketing	**D. Other exogenous factors**
VI. Selling	I. Political framework
VII. Product range	II. Currency and Exchange Rates
VIII. Customer service. After-sales service	III. Economic stability
IX. Cost control	IV. Political and legislative instability
X. Purchasing management	V. Government support - Political support
XI. Risk management	
XII. Productivity	
XIII. Production organization	
XIV. Co-operation between shipyards	
XV. Co-operation between shipyards and complementary industries	
XVI. Co-operation between shipyards and scientific institutions	
XVII. Cluster	
XVIII. Location	
XIX. Competitor Intelligence System	
B. Access to resources	
I. Manpower	
II. Capital and financing	
III. Raw materials and basic resources (e.g. energy)	
IV. Knowledge	
V. Technology and facilities	

organizational decisions, purchase and sale of materials and services, expenses and investments in different concepts, access to resources, risk management, etc. Thus, as time and price are derived factors, they will not be considered independent variables of competitiveness.

1. Industry Structure

A. Production Processes and Value Chain

I. Product technology

It is the technological level that a product incorporates (both for its design and for its engineering).

II. Quality

These are the normative standards that the shipyard can achieve in its manufacture and in the finishing of the products and services it sells (quality of the materials used, tolerances, useful life of the products, behavior throughout the life cycle, etc.).

III. Attractiveness of the product

It is the value that the market gives to a given product.

IV. Added value

It is the economic value that the company can inject into the product during manufacturing.

V. Marketing

The management process is responsible for identifying customer needs, as well as anticipating and satisfying them.

VI. Selling

Capacity to sell the company's products or services through its sales department.

VII. Product range

They are the different types of ships and structures, as well as the variants and degree of customization of the design of these, that are offered by the company.

VIII. Customer service. After-sales service

Customer service is the total sum of what an organization does to achieve customer expectations and leave them satisfied. After-sales service is the sum of everything that an organization does to achieve customer expectations and leave them satisfied after the sale of the product or service offered.

IX. Cost control

It is the control that is carried out from the management system or cost control of the company to assess the cost of production, to analyze costs and profitability, and to make management decisions related to the products or services offered.

X. Purchasing management

It is the process of planning, implementation, evaluation, and control of operational and strategic purchases, through

which all the company's purchasing activities are directed to achieve its objectives.

XI. Risk management

It is a global and integrative approach followed by a company to manage its risks and opportunities and maximize its value.

XII. Productivity

Productivity is the number of products that can be manufactured from a given number of resources. In the case of this company and for the manufacture of ships, the gross compensated tonnage produced by one person in a year (CGT/person-year) will be considered.

XIII. Production organization

They are the systems of organization and management of the company that take care of: the manpower and the organization of the work, the systems of planning and methodologies, the programing of the works of structures, the programing of the works of assembly, the control of the production, the control of warehouses, efficiency and profitability calculations, quality control, and production management information systems.

XIV. Co-operation between shipyards

Cooperation between different shipyards (from the same company or from different companies) in areas such as building blocks, equipment installation, hull and steel work, design, joint purchasing, marketing, or R&D.

XV. Co-operation shipyards: auxiliary enterprises

They are cooperative relations between the main company and complementary (auxiliary) companies. It also refers to the type of relationships that can range from simply contractual and short-term practitioners to a cooperation of long-term partnership.

XVI. Co-operation between shipyards and scientific institutions

These are the relationships between the parent company and institutions dedicated to education and training, research, development, and innovation.

XVII. Cluster

It is a group of interconnected companies and associated institutions within the same sector of work that are geographically close and linked by similarities and complementarities. The geographical area of effect of the cluster is that in which the informative, transactional, and incentive effects derived from the existence of the cluster can be observed.

XVIII. Location

It is the geographical location of the company, and it is studied in relation to the conditions of the competitive environment of that geographical location.

XIX. Competitor Intelligence System

It is an open system through which the company takes a global approach to competitive strategy. It is a system that analyzes the activities of the main company, the complementary companies, the market, and the production processes of others to make the best decision regarding the activities to be carried out. This system aims to put the company in the best possible position to implement strategic planning and to be able to defend itself and influence the competitive forces of the industry.

B. Access to Resources

I. Manpower and skills

This factor refers to the relevance that access to the workforce and the skills of the workforce may have. It considers union unity, labor costs, working conditions, and staff motivation.

II. Capital and financing

This factor refers to the relevance of access to the capital needed to develop the company's activities and the costs of financing.

III. Raw materials and basis resources (e.g. energy)

This factor refers to the relevance of accessing raw materials and equipment that the company needs to conduct its activities. It also considers the availability of companies supplying raw materials and equipment in the geographical environment of the company.

IV. Knowledge

This factor refers to the relevance that accurate knowledge may have for present and future company activities and focuses on the study of the following areas: know-how, company-owned knowledge, knowledge management, access to information, and R&D.

V. Technology and facilities

This factor refers to the relevance of accessing technology and the necessary facilities for the company's activities. Technology refers to the equipment and facilities used to build ships and other marine products: equipment and facilities necessary for steel work, production and assembly of systems and equipment, other pre-assembly systems, shipbuilding and equipment installation, shipyard and surroundings plant design, services, design, delineation, engineering of production and elaboration, means of loading and transport, and computerization.

2. Competitive Environment

A. Competitor Development (Supply)

I. Competitor's development (supply)

It is the construction capacity of shipyards globally. It will be more relevant for companies that do not operate in a niche market. It is determined by existing and future facilities, the productivity of companies, and the manpower available.

B. Market Development (Demand)

I. Market development (demand): Buyers

The development of the markets and the consequent demand reflect the construction requests of merchant companies. The relevance of demand on the competitiveness of the company can be altered depending on the ability of the company to influence the factors of demand, as well as depending on the business lines of the company and its situation or not in a niche market that offers protection against variations in demand.

C. Bargaining Power of Suppliers

I. Bargaining power of suppliers

This factor refers to the relevance that may have on the competitiveness of the company the strength of the bargaining power of companies that provide services and equipment to the parent company. Supplying companies are those that produce steel, motors, other types of equipment, components, and subcontracted services. However, labor is also considered when it is unionized and united and has bargaining power as if it were a supply company.

D. Other Exogenous Factors

I. Political framework

It is the set of rules and laws that establish the legal framework of the shipbuilding sector. These rules operate at the national level, regionally (such as in the European Union) and internationally and deal with different topics: public aid schemes, barriers to entry and exit to the market, technical standards, safety standards, environmental protection standards and intellectual property rights.

II. Currency and exchange rates

The value of the local currency or the value of the local currency at the exchange rate is the value that one currency has with respect to another in the world market. The evolution of exchange rates and the strength of the currency in which purchases are paid and sales are collected may be relevant because they are made in different currencies and because the value of the currency changes over time.

III. Economic stability

This is the economic situation resulting from a system with the absence of large variations in macroeconomic variables, along with low inflation and sustained growth in trade and employment.

IV. Political and legislative instability

It is the propensity for change in the executive of a government (either by constitutional or unconstitutional means), increasing instability when changes in government are significant.

V. Government support: Political support

Government support or political support is the help that a government provides to an industry through its actions, legislation, and institutions to enhance its competitiveness or to help it sustain itself in times of special difficulty.

2.3. Way of Observing the Information

2.3.1. Methodology

In case studies, it is necessary to use triangulation to obtain information from various perspectives. Thus, by using multiple sources of information, the result will be more accurate, reliable, and valid [70].

The instruments that will be used will be as follows (see Table 3):

1. Interviews.
2. Document analysis.
3. Questionnaires.

Table 3. *Sources of the different instruments considered. Source: Own elaboration considering González [73]*

Instrument	Source
Interviews	Multiple agents related to the company
Document analysis	Institutional, business, and academic documentation
Questionnaires	Multiple agents related to the company

2.3.2. Interviews

The interviews focused on three groups of people who had a relationship with Navantia:

1. Intermediate positions of Navantia in the Ferrol sea loch.
2. Union representatives of Navantia in the sea loch of Ferrol.
3. Management supervises the most relevant auxiliary and complementary companies for Navantia in the estuary of Ferrol.

Selecting people for the intermediate positions of Navantia, the people selected covered all areas of work of the Navantia company in the estuary of Ferrol, from the quality areas to the work carried out abroad (for instance: Australia), as well

as the specialties of repairs, technical office, production, organization, and management of the different guilds and turbines.

Regarding the group of union representatives, the unions represented in the production center of Ferrol or in the production center of Fene have been interviewed.

To select the most relevant auxiliary and complementary companies for Navantia in the Ferrol estuary, a brief questionnaire was administered to several union representatives, intermediate positions in the company, and qualified staff of the Higher Polytechnic School of the University of A Coruña. Through this brief questionnaire, these individuals help to determine the most relevant auxiliary and complementary companies to Navantia in past and present times, and from which their management staff could have a better overview of how Navantia operates. Thus, of the 44 initial companies identified as companies working with Navantia, this group of people determined that 28 were the most relevant to Navantia in the manufacturing core of the Ferrol estuary. Of the 28 companies initially identified, 10 were dependent and organically linked or run from others who were also on that list of 28. Therefore, interviews were only conducted with the management staff of the parent company. Thus, there was a group of 18 companies that were considered relevant for the purpose of this study.

The intention was that the interviews would be individualized and with a semi-structured script. That is, to meet individually with each person and follow a semistructured script of questions: with key questions but being flexible in questions and answers and encouraging the interviewees to delve into those areas of greatest interest or that provided with interesting information.

The identity of the interviewees will be coded to distinguish people from auxiliary and complementary companies, from the unions, and from the intermediate positions of the company, without knowing the comments of a particular person. Thus, there is no way to identify to whom the appointments correspond.

2.3.3. Document analysis

The document analysis is based on studying documents directly from social and institutional agents, from the company's website, from the website of the group that owns the company [Sociedad Española de Participaciones Industriales-Spanish Society of Industrial Participations (SEPI)] from various websites of magazines, associations, and individuals, from the unions, from libraries and virtual libraries, from virtual databases, from requests made to organizations and associations organizing congresses and conferences, and from applications made through "*Law 19/2013, of 9 December, on transparency, access to public information, and good governance*" [71].

2.3.4. Questionnaires

The questionnaire developed consists of a group of questions that attempt to obtain relevant information to achieve the objectives of the research. The questions are focused on obtaining information to determine what the most competitive factors are relevant to the competitiveness of Navantia.

The respondents were asked to what degree they considered each of the 32 competitiveness factors relevant to the competitiveness of the manufacturing core of Navantia Ferrol. There are four possible grades of importance: "not important" (NI), "little important" (LI), "important" (I), and "very important" (VI). However, in some questionnaires, an intermediate degree between important and crucial or between little important and important was considered, at the request of the person questioned.

2.3.5. Criteria for determining the most important competitiveness factors

Given the definition we have given of the different factors of competitiveness and considering the theoretical proposal formulated, to define the most important factors of competitiveness of the manufacturing core of the company Navantia, SA in Ferrol, a criteria to assess the most important factors of competitiveness should be defined. It is important to determine, depending on the information collected and in a descriptive way, the factors of competitiveness that the multiple agents related to the company consider of greater importance for the industrial core.

Therefore, the social and institutional agents related to the company will decide the most significant elements of competitiveness for the company based on its privileged position. Thus, the criteria for interpreting the information are as follows:

1. To each assessment made by each of the people questioned on the relevance of each of the factors of competitiveness, a numerical value will be given: "0" for "not important", "1" for "little important", "2" for "important" and "3" for "very important".

Thus, the degree of relevance that the interviewees and respondents consider will be averaged. For the calculation of this average degree of relevance, we assume:

- 0<=x <=0.5: the factor is unimportant.
- 0.5<x<=1.5: the factor is little important.
- 1.5<x<=2.5: the factor is important.
- x>2.5: the factor is critical.

2. There are significant discrepancies regarding the importance of the factors between the different agents when

there are at least two degrees of relevance of difference between one of the agents consulted and the average of relevance achieved for all agents. For example, when the relevance given by a questioned agent is of no importance and the average relevance is important or very important, or when the relevance given by a questioned person is of little importance and the average relevance is very important.

3. Case Study

3.1. Units of Analysis

As Martínez [72] explains, once the theoretical propositions have been made, it is necessary to define the units of analysis. The same author, citing Yin [73], explains that there are four basic types of units of analysis that consider the number of cases to be studied (single case or multiple cases), as well as the level of analysis (simple: main unit or multiple unit).

According to the typology described in the previous paragraph, this paper analyzes a unique and simple case: the industrial core of Navantia, S.A. in Ferrol.

The reasons why this case was selected were:

• They are the largest shipbuilding facilities in Galicia.

• Socioeconomic importance of the company in the region of location.

3.2. Description and Contextualization of Navantia, S.A.

Navantia, S.A. (simplifying Navantia), is a Spanish state-owned company in the form of a public enterprise wholly owned by the SEPI [4].

According to the SEPI website and SEPI corporate brochure [74], Navantia's lines of activity areshipbuilding, especially in the military sector, but not exclusively, control and combat systems, life cycle support, repairs and transformations, diesel engines, turbines, and naval and power generation equipment.

Navantia is a company dedicated to the design, construction, and integration of ships, mainly dedicated to military shipbuilding, despite maintaining a complementary activity in the civilian market. It has more than 250 years of experience in the construction, maintenance, and transformation of Spanish military ships [74].

3.3. Navantia Production Units and Their Locations

The company Navantia has three industrial centers: estuary of Ferrol, bay of Cádiz, and Cartagena, whose address is centralized in the social headquarters of the company in Madrid [4]. In addition to its industrial centers and headquarters, the company has subsidiaries in Spain (SAES, Submarine Electronics Joint Stock Company; and SAINSEL, SAU Naval Systems) and abroad (Australia, Chile, etc.) [4]. The company maintains its presence outside Spain with the aim of being closer to its customers and having a presence in strategic markets.

The industrial cores are made up of different production units, with centralized management in the central offices in Madrid, as follows [74]:

• Bay of Cádiz: shipyard of Cádiz, shipyard of San Fernando, and shipyard of Puerto Real.

• Cartagena: Cartagena shipyard.

• Estuary of Ferrol: Fene shipyard and Ferrol shipyard.

The present paper focuses on the Estuary of Ferrol, whose production units are divided between Fene and Ferrol (see Figure 1).

Figure 1. *Location of Navantia in Galicia. Source: elaboration by Google Earth [75]*

3.4. Present of the Navantia Industrial Center in the Ría de Ferrol: Importance of Offshore Wind

The manufacturing core of Navantia in the estuary of Ferrol is located in the municipalities of Ferrol and Fene, in the estuary of Ferrol, in Galicia, in the northwest of Spain.

The Navantia industrial core in the Ferrol estuary is made up of two production units (see Figure 2): Fene, whose facilities come from the company ASTANO, and Ferrol, whose facilities come from the company Bazán.

These production units build military ships (aircraft carriers, frigates with the AEGIS26 combat system, amphibious ships, fleet tankers and corvettes, etc.), steam turbines, wind turbines, gear reducers, shaft lines, torpedo tubes and other ship equipment [4].

Figure 2. *Location of the facilities of Navantia in the Ferrol estuary. Source: own elaboration using Google Earth [75]*

In addition to the production highlighted in the preceding paragraph, these production units have an important technical office and an after-sales service.

However, the company also dedicates these facilities to ship repair and conversion, technology transfer and technical advice, as well as life-cycle support.

Finally, the enterprise develops designs for offshore wind: jacket structures for fixed offshore wind, spar floating offshore wind structures, semisubmersible floating offshore wind structures, weather towers, installation vessels, and support vessels for deep-sea offshore wind farm. Therefore, shipbuilding can be a great pillar in the development of future new uses of the ocean.

4. Results

The interviews were focused on three groups of people who had a relationship with the company studied:

- Intermediate positions.
- Union representatives.
- Management staff of the most relevant auxiliary and complementary companies.

In the interviews with intermediate positions, all the areas of work of the enterprise Navantia in the estuary of Ferrol were considered: area of quality, works in Norway and Australia, area of repairs, area of systems, area of technical office, area of production, customer service of the life cycle, different guilds and turbines. However, not in all cases was it possible to get an interview. In this context, seven people with a very outstanding global perspective of the company were interviewed.

In the group of union representatives, the interviewees showed full collaboration and interest in the research. They were 15 people from five different unions and two production units.

The management staff of 12 auxiliary and complementary companies were interviewed of the 18 auxiliary or complementary companies or groups of companies that were considered relevant. Fifteen people were interviewed of these 12 companies, representing 67% of the companies identified as most relevant for the company Navantia in the location selected. These auxiliary and complementary companies cover various Navantia services and supplies, such as:

- Mechanized.
- Boiler making.
- Factory maintenance.
- Ship repairs.
- Detailed engineering and project development.
- Wind energy.
- Supply of parts, equipment, and industrial machinery.
- Pipe and plate welding.
- Manufacture and assembly of pipes.
- Sheet metal cutting and repair
- Surface preparation and painting.
- Habilitation work, insulation, ventilation, fine boilermaking, metal carpentry, wood carpentry.
- Construction and assembly.
- Design and execution of all types of electrical installations, elaboration of electrical panels, control consoles, and repair of electromechanical equipment, products, or services.
- Pre-assembly, piping, assembly, prefabrication of complete blocks, and joining of blocks in bleachers.

The questionnaires were given to the same people who were interviewed. Therefore, 37 people answered the questionnaire.

Figure 3 shows the assessments of these 37 people regarding the relevance of each of the competitiveness factors for the competitiveness of the Navantia industrial center in the selected location.

The following codes and valuation methods were used:

- When a cell is empty, it is because the person questioned considered that the factor was not assessable, he/she did not have the information necessary to make an assessment, or he/she did not want to do so.
- 0: Unimportant (NI).
- 1: Little important (LI).
- 2: Important (I).
- 3. Critical (VI).

On the other hand, some of the most relevant documents obtained during the observation, which were relevant, are as follows:

- Strategic reflection workshop. Navantia Strategic Plan 2014-2018 [76].
- Working document on the future of Navantia 2015–2019 (DTFN 2015) [77].

Questionnarie number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
1. Industry structure																																					
A. Value chain and production processes																																					
I. Product technology	3	3	3	3	3	3	3	3	3	3	3	3	3	3		3	2,5	3	3	2	2	2	3	3	3	3	3	3	3	3	3	3	2	3	3	3	2
II. Quality	3	3	3	3	3	2	3	3	3	2	3	3	3	3		2	3	1	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3
III. Attractivenesss of product	2	3	3	3	2	2	2	2	2,5	3	0	0	0	0	0	2	3	2	2				2	2	3	2	3	3	3	3	2	3	2	2	3	2	2
IV. Added value	2	1	2	3	2	2	2	2	3	3	3	2	2	2	3	3	3	2	2	2	2	2	2	3	3	2	3	3	3	3	3	3	2	2	2	2	3
V. Marketing	2	3	2	3	2	2	3	3	2,5	1	3	3	3	3	3	3	3	2	2	2	2	2	1	2	2	1	3	3	3	3	2	3	2	1	2	2	3
VI. Selling	2	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	1	1	3	3	3	3	3	3	2	3	3	3	3	2,5	3	2		3		3
VII. Product range	1	3	3	3	3	2	2	2	3	3	3	3	3	3	3	3	3	2	2	2	2	3	3	3	3	2	3	3	3	3	3	3	3	2	3	2	2
VIII. Customer service. After-sales service	2	3	2	3	3	2	3	3	2	2	3	3	3	3	3	2	3	3	3	2	2	2	3	2		2	3	3	3	2	3	3	3	2	3	2	2
IX. Cost control	2	1	2	3	3	3	2	2	3	3	2	2	2	2	2	3	2	3	3	3	3	3	2	2	3	2	3	3	3	2	3	3	3	2	3	2	3
X. Purchasing management		2	2	3	2	3	3	3	1	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	2	3	2	2
XI Risk management	0	2	2	3	3	1	2	2	3	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	1	3	3	3	2	2	3	2	2	2	2	3
XII. Productivity	2	2	2	3	3	3	2	2	3	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	2	3		3	3	3	2	2	2	2	3	2	3
XIII. Production organization	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	2	3
XIV. Co-operation between shipyards	2	2	2	3	1	2	2	2	3	0	2	2	2	2	2	2	2	2	2	2	2	2	2,5	2	3	1	2	2	2	1	1	2	2	1	0	2	3
XV. Co-operation betwee shipyards and complementary industry	3	2	2	3	3	2	3	3	3	2	1	2	2	2	2	3	2	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	2	3	2	3
XVI. Co-operation between shipyards and scientific instituttions	3	3	3	3	3	2	2	2	3	1	3	3	3	3	3	3	3	3	3	3	3	3	1,5	3	3	2	3	3	3	2	3	3	2	3	2	2	3
XVII. Cluster	2	1	2	2	3	2	2	2	2	0	3	3	3	3	3	2	2	3	3	3	3	3	2	3	3	1	2	2	2	2	3	3	2	3	3	2	2
XVIII. Location	0	2	2	2	1	3	0	0	3	0	3	3	3	3	3	3	3			3	3	3	3	3	3	1	2	2	2	2	2	1	2	0	2	2	3
XIX. Competitor Intelligence System	2	2	3	3	2	2	2	2	2	2	3	3	3	3	3	3	3	0	0	3	3	3	3	3	3	3	3	3		3	2	3	2	1	2	2	2
B. Access to resources																																					
I. Manpower and skills	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	2	3	2,5	2,5	3	3	3	3	3	3	3	2	3		3	3	3	3	2	2	3	2
II. Capital and financing	1	2	2	3	3	2	3	3	3	1	3	2	2	2	2	2	3	3	3	3	3	3	3	3	3	2	3	3		3		3	2	0	2	3	3
III. Raw materials and basic resources, components and equipiment	2	1	2	3	3	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	2	1	3	2	0	2	2	2
IV. Knowledge	3	3	3	3	3	2	2	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	2	2	2	3
V. Technology and facilities	3	2	2	3	3	2	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	2	2	3	3	2	2	2	3
2. Competitive environment																																					
A. Competitors development (supply)																																					
I. Competitors development (supply)	2	3	3	3	3	2	3	2	3	1	3	3	3	3	3	1	3	3	3	2	2	2	3	2	3	3	2	3		1,5	3	3	2	2	2	1	3
B. Market development (demand) - Buyers																																					
I. Market development (demand) - Buyers	2	1	1	3	2	3	1	1	3	2	3	3	3	3	3	3	3	3	3	2	2	2	3	3	3	2	2	3		3	3	3	2	1	2	2	3
C. Bargaining power of suppliers																																					
I. Bargaining power of suppliers	2	3	3	3	0	2	2	3	2	2	3	3	3	3	3	2	3	3	3	1	1	1	1	2	1	2	1	1		2	2	2	3	1	1	2	0
D. Other exogenous factors																																					
I. Political framework	3	3	3	3	2	3	2	3	1	3	3	3	3	3	3	3	1	1	3	3	3	2		3	2	1	2			2	1	2	2	1	2	2	0
II. Currency and exchange rates	2	1	2	3	3		2	2	1	0	2	3	3	3	2	2	3	1	1	3	3	3	3	3	3	2	1	3		2	1		2	1	1	2	0
III. Economic stability	2	2	2	3	3	3	2	2	3	1	3	3	3	3	3	3	2	2	2	3	3	3	3	3	2	2	2	3		3	1	3	2	1	2	2	0
IV. Political and legislative instability	2	2	2	3	3	3	2	2	3	0	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3		3	2	3	2	1	3	3	3
V. Government support - Political support	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		3	3	3	3	3	3	3	3

Figure 3. *Assessments of the questioned people regarding the relevance of each competitiveness factor*

• Accounts of Navantia, SA, disaggregated by industrial and joint nuclei from 2005 to 2012 [78].

• Accounts of Navantia, SA, disaggregated by industrial and joint nuclei from 2008 to 2013 [79].

• Evolution of the staff of Bazán, ASTANO, and Navantia from 1970 to 2015 [80].

5. Discussion

The greatest relevant competitive factors for the company Navantia, SA in the location selected, among the 32 initial factors taken into account by the researchers referenced, are shown in Figure 4.

Therefore, the five most important competitive factors of the Navantia production units in the Ferrol estuary are the government and political support, the production organization, the product technology, manpower, and skills and knowledge.

Thus, these five competitive factors are critical to analyze the competitiveness of a shipyard with the characteristics of the one studied for the new uses of the ocean such as offshore wind, wave energy, or aquaculture.

6. Conclusion

This study has identified the most relevant competitiveness factors of a shipyard. The method conducted interviews and questionnaires with multiple agents related to the company (intermediate positions, union representatives and management staff of the most relevant auxiliary and complementary companies) and analyzed several institutional, business and academic documentation.

The competitiveness factors were grouped into factors associated with the structure of the industry (considering the value chain & production and its access to resources)

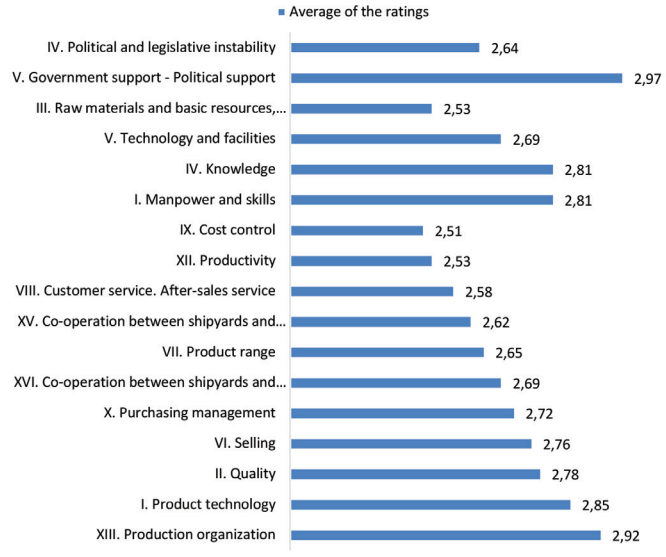

Figure 4. *The greatest competitiveness factors for Navantia's manufacturing units in the selected location. Source: Own elaboration*

and those associated with the competitive context (related to the development of competitors, the market progress (demand), bargaining power of suppliers, and other external elements).

The case of study considered was the manufacturing center of Navantia, S.A. at the Ferrol estuary (A Coruña, North-West of Spain).

After analyzing the interviews, questionnaires, and documents, the most significant competitive factors of the Navantia manufacturing units in the selected location were established. They are: the government and political support, the production organization, the product technology, manpower, and skills and knowledge.

Regarding government and political support, it can add value to the shipyard considering interest rates fewer than the competence, for instance. Considering the production organization and considering that some shipyards in the future will be focused on building offshore renewable energies, they can be re-organized considering "mass production" for building offshore substructures, such as monopiles, jackets, spar, or semisubmersible offshore wind platforms. Regarding product technology, the shipyard can design its own technology (their own designs in terms of offshore wind substructures or special vessels for offshore maintenance, for instance), not only building the technology developed by others. In terms of manpower, it is important that people have a career during their life at the enterprise, considering their qualifications and the quality of their salaries. Finally, regarding skills and knowledge, it is important that old people provide young people with all their acquired knowledge and experience before they are retired, in order to try to maintain the permanence of this knowledge at the enterprise during years.

The complete list of competitiveness factors is useful for the people who manage a shipyard, allowing them to identify where they could improve the competitiveness of a shipyard in the era of new uses of the oceans. In fact, these new uses of the ocean, such as offshore wind, wave energy, and aquaculture, can improve the competitiveness of shipyards in future years.

Future studies can investigate the difference between traditional shipyards, which are building and repairing vessels, and new production shipyards focused on offshore renewable energies (for example: offshore wind or wave energy), which should be reconverted to increase their productivity and adapt to the new uses of the sea.

Authorship Contributions

Concept design: B. Preto-Fernández, Data Collection or Processing: B. Preto-Fernández, and N. Paleo-Mosquera, Analysis or Interpretation: B. Preto-Fernández, A. Filgueira-Vizoso, R. Yáñez-Brage, and L. Castro-Santos, Literature Review: B. Preto-Fernández, N. Paleo-Mosquera, A. Filgueira-Vizoso, R. Yáñez-Brage, and L. Castro-Santos, Writing, Reviewing and Editing: B. Preto-Fernández, N. Paleo-Mosquera, A. Filgueira-Vizoso, R. Yáñez-Brage, and L. Castro-Santos.

Funding: The authors declare that no funds, grants, or other support was received during the preparation of this manuscript.

References

[1] D. Fornahl, "From the old path of shipbuilding onto the new path of offshore wind energy? the case of Northern Germany," in *Innovation, Strategy And Structure - Organizations, Institutions, Systems and Regions*, vol. 20, pp. 835-855, May 2011.

[2] C. K. Lin, and H. J. Shaw, "Feature-based estimation of preliminary costs in shipbuilding," *Ocean Engineering,* vol. 144, pp. 305-319, Nov 2017.

[3] L. Castro-Santos, V. Diaz-Casas, and R. Yáñez Brage, "The importance of the activity costs in a shipyard: a case study for floating offshore wind platforms," *Ships and Offshore Structures,* vol. 15, pp. 1-9, May 2016.

[4] Navantia, "Navantia Web Page" [Available online: www.navantia.es (accessed on 8 February 2021)].

[5] P. J. Stavroulakis, S. Papadimitriou, and F. Tsirikou, "Perceptions of competitiveness for maritime clusters," *Ocean & Coastal Management,* vol. 205, pp. 105546, May 2021.

[6] L. Jiang, E. Bastiansen, and S. P. Strandenes, "The international competitiveness of China's shipbuilding industry," *Transportation Research Part E: Logistics and Transportation Review,* vol. 60, pp. 39-48, Dec 2013.

[7] Y.-J. Song, J.-H. Woo, and J.-G. Shin, "Research on systematization and advancement of shipbuilding production management for flexible and agile response for high value offshore platform," *International Journal of Naval Architecture and Ocean Engineering,* vol. 3, pp. 181-192, Sep 2011.

[8] C. S. Tang, and L. P. Veelenturf, "The strategic role of logistics in the industry 4.0 era," *Transportation Research Part E: Logistics and Transportation Review,* vol. 129, pp. 1-11, Sep 2019.

[9] L. Castro-Santos, A. Filgueira-Vizoso, C. Álvarez-Feal, and L. Carral, "Influence of size on the economic feasibility of floating offshore wind farms," *Sustainability,* vol. 10, pp. 1-13, Nov 2018.

[10] M. Kafalı, and M. Özkök, "Evaluation of shipyard selection criteria for shipowners using a fuzzy technique," *Journal of Marine Engineering & Technology,* vol. 14, pp. 146-158, Aug 2015.

[11] A. Resa Nurlaela, F. Danny, Q. Melani, S. Hermin, and S. Rini, "Competitive advantage analysis of shipyard companies in Indonesia," *International Journal of Marine Engineering Innovation and Research,* vol. 5, pp. 111-116, Jun 2020.

[12] P. Rojas, and S. Sepúlveda, *Cuaderno Técnico Nº 09. ¿Que es la competitividad?* San José, Costa Rica: Instituto Inter-American Institute for Cooperation on Agriculture (IICA), 1999. [Online]. Available: https://www.google.com.tr/books/edition/Qu%C3%A9_es_la_competitividad_No_9/e0bC_zcWBfUC?hl=en&gbpv=0

[13] J. A. Bejarano, *Coleccion Documentos IICA. Serie Competitividad 2. Elementos para un Enfoque de la Competitividad en el Sector Agropecuario*. Ministerio de Agricultura y Desarrollo Rural de Colombia y Instituto Inter-American Institute for Cooperation on Agriculture (IICA), 1998.

[14] C. A. Castellanos Machado, Z. M. Vila Alonso, J. R. Castellanos Castillo, N. Machado Noa, and G. Barbosa Iglesias, "Contribution of clusters to the competitiveness of enterprises," *Técnica Administrativa,* Accessed: March 12, 2021. [Online]. Available: http://www.cyta.com.ar/ta/art_ficha.php?id=110202

[15] F. Chesnais, "The notion of internacional competitiveness," *Mimeo, OCDE, Paris*, 1981.

[16] B. R. Scott, G. C. Lodge, and J. L. Bower, "*US competitiveness in world economy,"* Boston: Harvard Business School Press, 1985.

[17] R. Tamanes, *Diccionario de Economía*. Madrid: Alianza Editorial, 1988.

[18] R. Feenstra, "*Trade policies for international competitiveness*," Chicago: University of Chicago Press, 1989.

[19] A. Di Filippo, "La competitividad internacional en economías abiertas de América Latina" in *Seminario-taller coordinación de políticas de fomento de la competitividad y nuevos desafíos para la integración regional*, 1991.

[20] J. I. Pérez, "Costes laborales y competitividad de la economía española," *Revista de Economía Y Sociología Del Trabajo*, 1994.

[21] T. Economist, "The economics of meaning," *Econ.*, pp. 17-18, 1994.

[22] A. Ten Kate, "La competitividad y factores que lo determinan," México, 1995.

[23] President's commission on industrial competitiveness, "Global competition: a new reality." Washington DC., 1985.

[24] P. Jones and D. Teece, "The research agenda on competitiveness. A program of research for the Nation's business schools," in *Cooperation and competition in the global economy: Issues and strategies*, A. Furino, Ed. 1988.

[25] J. Fagerberg, "International competitiveness," *The Economic Journal,* vol. 98, pp. 355-374, Jun 1988.

[26] R. Landau, *Technology, Capital Formation and U.S. competitiveness,* Oxford University Press, 1992. Accessed: March 12, 2021. [Online] Available: https://www.econbiz.de/Record/technology-capital-formation-and-us-competitiveness-landau-ralph/10001283573

[27] M. E. Porter, "The competitive advantage of nations," *Harvard Business Review*, vol. 68, pp. 73-93, Mar 1990.

[28] J. Ivancevich, *Gestión, Calidad y Competitividad*, 1° Edición. Madrid: IRWIN, 1996.

[29] T. Hatzichronoglou, "Globalisation and Competitiveness: Relevant Indicators," 1996.

[30] B. Coriat, *Los desafíos de la competitividad*. EUDEBA. Argentina, Apr 1997.

[31] European Commission, "European Competitiveness Report 2008," Brussels, 2009.

[32] IMD 2003, *Anuario de competitividad mundial*. IMD 2003, 2003.

[33] L. Cohen, S. Teece, D. Tyson, and L. Zysman, "Competitiveness in global competition. The new reality, vol. II," *Work. Pap. Pres. Com. Ind. Compet.*, 1984.

[34] F. Fajnzylber, "Competitividad internacional: evolución y lecciones," *Revista de la CEPAL,* pp. 7-24, 1988, Accessed: Mar. 12, 2021. [Online] Available: https://repositorio.cepal.org//handle/11362/11714

[35] J. T. Araújo, *Proteçao, competitividade e desempenho exportador da economia brasileira nos anos 80. IEI/UFRJ*. Mimeo, 1989.

[36] Grupo consultivo sobre la competitividad (GRUPO CIAMPI), "*La mejora de la competitividad europea. Primer informe al Presidente de la Comisión Europea, los Primeros Ministros y los Jefes de Estado. Junio 1995*" 1995.

[37] L. Haguenauer, "Competitividade, conceitos e medidas. Uma resenha da bibliografia recente com êmfase no caso brasileiro. Texto para discussão No 208." IEI/UFRJ, Rio de Janeiro, 1989.

[38] J. Lucángeli, "La Competitividad Del Mercosur Frente Al Alca".

[39] KPMG Peat Marwick, "Report of a study into the competitiveness of European Community shipyards," 1992. Accessed: March 12, 2021. [Online]. Available: https://core.ac.uk/download/pdf/10593069.pdf

[40] C. A. Michalet, "*Competitiveness and internationalization*" París, 1981.

[41] H. of Lords, "*Informe da Comisión Especial da Cámara dos Lores sobre Comercio Internacional*" London, 1985.

[42] J. A. Alic, "Evaluating industrial competitiveness at the office of technology assessment" *Technology in Society,* vol. 9, pp. 1-17, Jan 1987.

[43] J. Mathis, J. Mazier, and D. Rivaud-Danset, "*La compétitivité industrielle*" Paris 1988.

[44] E. Van Duren, L. Martin, and R. Westgren, "Assessing the competitiveness of Canada's agrifood industry," *Canadian Journal of Agricultural Economics,* vol. 39, pp. 727-738, Dec 1991.

[45] M. L. Cook, and M. E. Bredahl, "Agri-business competitiveness in the 1990s: Discussion," *American Journal of Agricultural Economics,* vol. 73, pp. 1456-1464, Dec 1991.

[46] E. Bueno, "La competitividad en la empresa: un enfoque de organización y una referencia a España," *Dirección y Organización: Revista de Dirección, Organización y Administración de Empresas,* vol. 13, pp. 5-15, 1995.

[47] G. Muller, "El caleidoscopio de la competitividad," *Revista de la CEPAL*, vol. 56, pp. 137-148, Aug 1995.

[48] J. P. Sallenave, *La gerencia integral*. Grupo Editorial Norma. Colombia, 1995.

[49] C. Pérez, "La modernización industrial en América Latina y la herencia de la sustitución de importaciones," *Comercio Exterior,* vol. 46, pp. 347-363, 1996.

[50] M. E. Porter, "*Construyendo las Ventajas Competitivas del Perú*" Lima, 1996.

[51] M. G. Álvarez, *Manual de competitividad*. México, D. F.: Ed. Panorama, 1998.

[52] J. Altenburg, Tilman ; Hillebrand, Wolfgang ; Meyer-Stamer, "Building systemic competitiveness Concept and case studies from Mexico, Brazil, Paraguay, Korea and Thailand - OpenGrey," 1998. Accessed: Mar. 12, 2021. [Online]. Available: http://www.opengrey.eu/item/display/10068/133852

[53] J. C. Mathews, *El significado de la competitividad y oportunidades de internacionalización para las mypes*, Primera. Nathan Associates Inc., 2009.

[54] J. Ferraz, D. Kupjer, and M. Looty, "Competitividad Industrial en Brasil. 10 años después de la liberalización," *Revista de la CEPAL*, vol. 82, pp. 91-119, 2004.

[55] A. Cebreros, "La competitividad agropecuaria en condiciones de apertura comercial," *Comercio Exterior*, vol. 43, pp. 946-953, 1993.

[56] J. Markusen, *Productivity, Competitiveness, Trade Performance and Real Income: The Nexus Among Four Components*. Ottawa: Supply and Services Canada, 1992.

[57] S. Tamames, R., & Gallego, *Diccionario de economia y finanzas - Libros Deschargar*. 1994. Accessed: Mar. 12, 2021. [Online]. Available: http://319110.bvw-rollgitter.de/descargar/319110/Diccionario%2Bde%2Beconomia%2By%2Bfinanzas.pdf

[58] A. Di Filippo, "La competitividad internacional en economías abiertas de América Latina," in *Seminario-taller coordinación de políticas de fomento de la competitividad y nuevos desafíos para la integración regional*, 1991.

[59] A. Pego, M. Marques, R. Salvador, C. Guedes Soares, and A. Monteiro, "The potential offshore energy cluster in Portugal," in *Proceedings of Renew 2016, 2nd International Conference on Renewable Energies Offshore.* 2016.

[60] L. Haguenauer, "Competitividade: conceitos e medidas: uma resenha da bibliografia recente com ênfase no caso brasileiro," *Revista de Economia Contemporânea,* vol. 16, pp. 146-176, Apr 2012.

[61] G. Müller, "*El caleidoscopio de la competitividad*" 1995, Accessed: Mar. 12, 2021. [Online]. Available: https://repositorio.cepal.org/handle/11362/11993#.YEuda8fzJ-U.mendeley

[62] ECORYS SCS Group, "Study on Competitiveness of the European Shipbuilding Industry." Rotterdam, 2009.

[63] V. Bertram, "Strategic control of productivity and other competitiveness parameters," in *Proceedings of the Institution of Mechanical Engineers Part M Journal of Engineering for the Maritime Environment,* vol. 217, pp. 61-70, Jun 2003.

[64] C.-C. Chou, and P.-L. Chang, "Core competence and competitive strategy of the Taiwan shipbuilding industry: a resource-based approach," *Maritime Policy & Management,* vol. 31, pp. 125-137, Apr 2004.

[65] M. Guisado Tato, Mercedes, V. Alonso, Carlos, and F. Soto, "Estado de la cuestión de la construcción naval gallega: los nuevos factores de competitividad," *Revista Galega de Economía,* vol. 11, 2002.

[66] F. C. M. Pires, and T. Lamb, "Establishing performance targets for shipbuilding policies," *Maritime Policy & Management,* vol. 35, pp. 491-502, Oct 2008.

[67] A. Rashwan, and A. Naguib, "Toward improving the cost competitive position for shipbuilding yards- Part I: Impact of technology changes," *Alexandria Engineering Journal,* vol. 45, pp. 537-543, 2006.

[68] R. Gutiérrez, "Soluciones técnicas y soluciones políticas," *Ing. Nav.*, vol. LXXIV, pp. 877-878, 2005.

[69] R. Mickeviciene, "Global competition in shipbuilding: trends and challenges for Europe," *The Economic Geography of Globalization,* pp. 201-222, 2011.

[70] M. E. González, "Intervención de la universidad en la promoción de la salud de sus estudiantes". *Innovación Educativa*, 2008.

[71] Boletín Oficial del Estado (B.O.E.), *Ley 19/2013, de 9 de diciembre, de transparencia, acceso a la información pública y buen gobierno*. Spain, 2013.

[72] P. C. Martínez, "El método de estudio de caso: estrategia metodológica de la investigación científica," *Revista científica Pensamiento y Gestión,* vol. 20, pp. 165-193, Jul 2006.

[73] R. K. Yin, *Case Study Research: Design and Methods, Applied social research, Methods Series*. Newbury Park CA: Sage, 1989.

[74] Sociedad Española de Participaciones Industriales, "SEPI webpage," 2021.

[75] Google Earth, "Web Google Earth," 2021.

[76] Navantia, "Workshop de reflexión estratéxica. Plan estratéxico de Navantia 2014-2018. Working paper, Los peñascales. Torrelodones: CIG Navantia- Ferrol.," Torrelodones, Madrid, 2013.

[77] Navantia, "Documento de traballo sobre o futuro de Navantia 2015-2019 (DTFN 2015). Working paper, Los peñascales. Torrelodones: CIG Navantia- Ferrol.," Torrelodones, Madrid, 2014.

[78] CIG Navantia - Ferrol, "Contas de Navantia desagregadas por núcleos industriais e conxuntas no período 2005-1012," Ferrol, 2013.

[79] CIG Navantia - Ferrol, "Contas de Navantia desagregadas por núcleos industriais e conxuntas no período 2008-1013," Ferrol, 2014.

[80] CIG Navantia - Ferrol, "Evolución dos cadros de persoal de Bazán, ASTANO e Navantia dende o 1970 até o 2015," Ferrol, 2016.