Beyond Iberian Bizcayan shipbuilding:

A transnational network in transition,1550-1650

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A papa y mama,

a mis abuelas,

Sabina y Raquel

y a Andreas y Martin

Que me dejaron soñar libre,

me enseñaron a dar,

y a vivir con el corazón

Abstract

The following pages will concentrate on developing a new understanding of the Bizcayan tradition, what could be considered a sub-category of the Iberian family, including the Portuguese shipbuilding. Initially, I will start by locating the ships built in the area of the North of the Iberian Peninsula, particularly within the provinces of Cantabria, Bizcay and Gipuzkoa, within Spain, as well as Labort, in the South of France. Despite the initial traditional spatial constraint, the propositions in this research challenge traditional archaeological and historical understandings of culture. During the period 1550-1650 major changes affected the shipbuilding industry of this coastline, when trading networks and forestry practices were affected by a reaction from the Monarchy. This reaction was meant to control Bizcayan shipbuilding, according to the justification of the king's agents; to avoid an inevitable shipbuilding crisis caused by a timber shortage and poorly managed forest usage. In this section cultural influences and the transmission of technology will be analysed in a historical-archaeological manner. The search for notions of the attributes of a shipbuilding tradition will be deconstructed. The idea of the transmission of technology from one tradition to another will be pondered, in order to point to the essence that lies at the bottom of the idea of an "Iberian Bizcayan" shipbuilding tradition in the archaeological discipline.

Table of Contents

Table of Figures

List of Tables

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1 *Atlantic Iberian shipbuilding: An introduction to Archaeological and Historical perspectives*

1.1 *Introduction*

This thesis is an examination of the Bizcayan shipbuilding tradition, through the period 1550-1650, when major changes occurred in the construction of vessels within the Spanish kingdom. This study was part of a larger scientific project called ForSEAdiscovery: Forest Resources for Iberian Empires: Ecology and Globalization in the Age of Discovery (16th-18th centuries). This project was funded under the People Programme (Marie Curie Actions) and

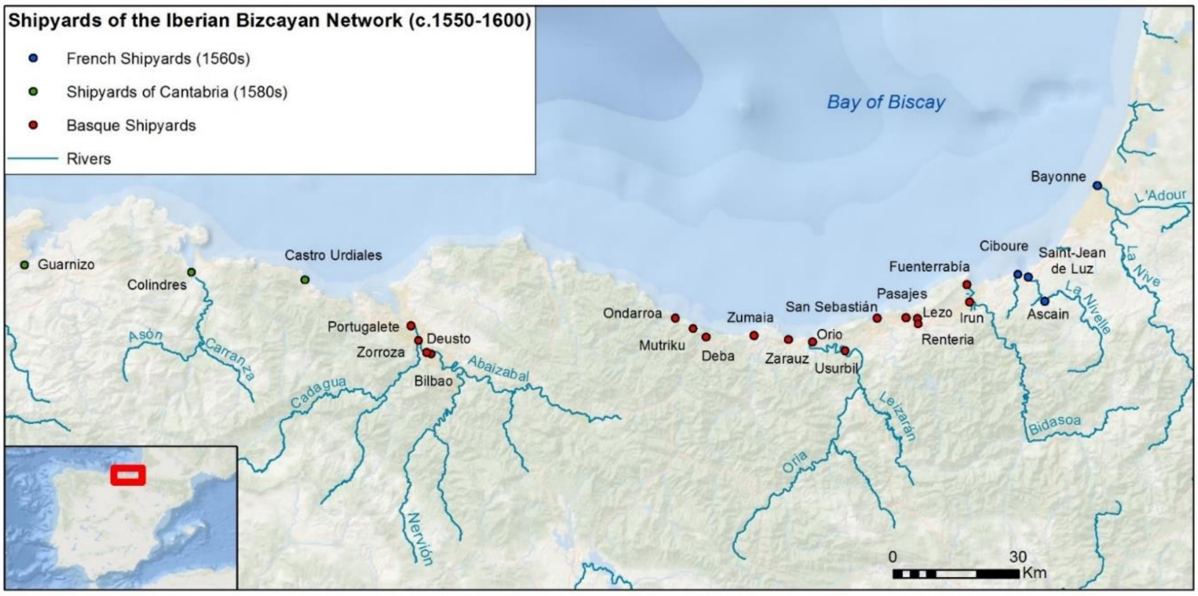

Figure 1.1 Main Bizcayan shipyards during 1550-1600. The expansion of Bizcayan shipbuilding during the second half of the 16th century occurred due to the pressure by the monarchic agents on the region and migration of labour to other areas. Map Produced by Maria José García Rodríguez (2017) using data from: (Barkham, 1984; Casado Soto, 1988; Fernandez Gonzalez, 1992; Odriozola, 1998; Goyenetche, 2000)

within the European Union's Seventh Framework Programme (FP72007-2013) under the REA grant agreement nº PITN-GA 2013-607545 (Crespo Solana, 2019: 116).

For a more regional initial approach, the term Bizcayan will be used in this research to refer to a minor area in the Iberian Peninsula and the South of France from the mid-16th century onwards. During the 16th century and 17th century, the word Bizcayan was a common term used by contemporary scribes and writers (Cano, 1611: 18)[1]. The phrase Bizcayan shipbuilding will be proposed to refer to the area in the Iberian Peninsula, particularly the Basque region and what nowadays would include Cantabria in Spain, but also to refer to the spread of technique of the Bizcayan tradition into the south of France.

Bizcayan ships were built mainly in Bizcaya and Guipuzcoa, also including the four western cities in Castile (nowadays Cantabria), or "*Las cuatro villas de la Mar*" as they used to be called, San Vicente de la Barquera, Santander, Laredo and Castro Urdiales. Ships were also built on the other side of the Bidasoa river, in the French Labort, including Bayonne, Ciburu and San Jean de Luz, after the migration of shipbuilders to this area during the 1560s, as will be explained in Chapter 3 (Enriquez and Sesmero, 2000: 705; Truchuelo García, 2007: 174).

1.2 Main Hypothesis: The Bizcayan shipbuilding tradition as a network

Initially, the notion of Iberian ships, particularly Bizcayan ships, will be examined using archaeological material, but also ship types such as *naos*, *naves*, *navios* and galleons, which have been recorded by studying historical sources. Departing from the concept of the Iberian shipbuilding tradition in the archaeological tradition, this work will show a new understanding within the concept of the Iberian tradition. This thesis will put forward a concept of a regional tradition of a distinct cluster, but also showing the mixture of the Bizcayan shipbuilding with its neighbouring shipbuilding communities. By using the theory of hybridization (Bhabha, 1994), as mentioned by other archaeologists before, the mixture between traditions will show a more complex understanding of the Iberian shipbuilding, and a more nuanced cultural approach to the idea of a homogeneous Spanish shipbuilding, not exact both in terms of space and cultural forms. Mainly, the concept of the Bizcayan tradition will aim to show the spread of technology beyond the limited confines of a Spanish nation, into the French shore, as well

[1]AGS, GyM, Leg. 652, nº 39 "*Información de la falta de madera de la obligación de Isidro Sanchez y declaración de los Maestros m. que fabrican los 4 galeones que es de su majestad del cargo del capitan Jacome Juan de Polo*"

as the complex shared techniques of a wider shipbuilding trend, such as carvel construction technique. This European Atlantic process and spread of a shared shipbuilding technique will be reflected in the period 1550-1650, as well as mirrored by the close communities with which the Bizcayan shipbuilders were in contact with. It could be said that the spread that came from the Mediterranean, joined the local techniques of the Atlantic, resulting in unique clusters of communities, as well as shared transnational construction methods that were possible to be traced across the Atlantic façade, with various local adaptations.

The main emphasis will be on the technological exchange in which the Bizcayan tradition was part of a wider spatial network, as traditions were inherently transnational and porous. This work will show the mixture and influence that received the Bizcayan tradition through this period, as well as the other traditions that were influenced by it. Through the evidence of such a mixture in the Bizcayan shipbuilding tradition, by proving there were adaptations and acquisition of attributes from different areas, the idea of a non-separated cluster or an interdependent tradition will be defined. It will be argued that the trading and fishing routes in which Bizcayan shipbuilding was involved, acted as meeting points for Bizcayan ships to receive influence, but also to influence other traditions. This research will be particularly relevant to the study of those ships built in the North of Spain and South of France. Considering the 16th century as a pre-industrial time technologically, the construction of ships is considered as a guild-like activity rather than the modern shipbuilding industry of more developed periods. For this

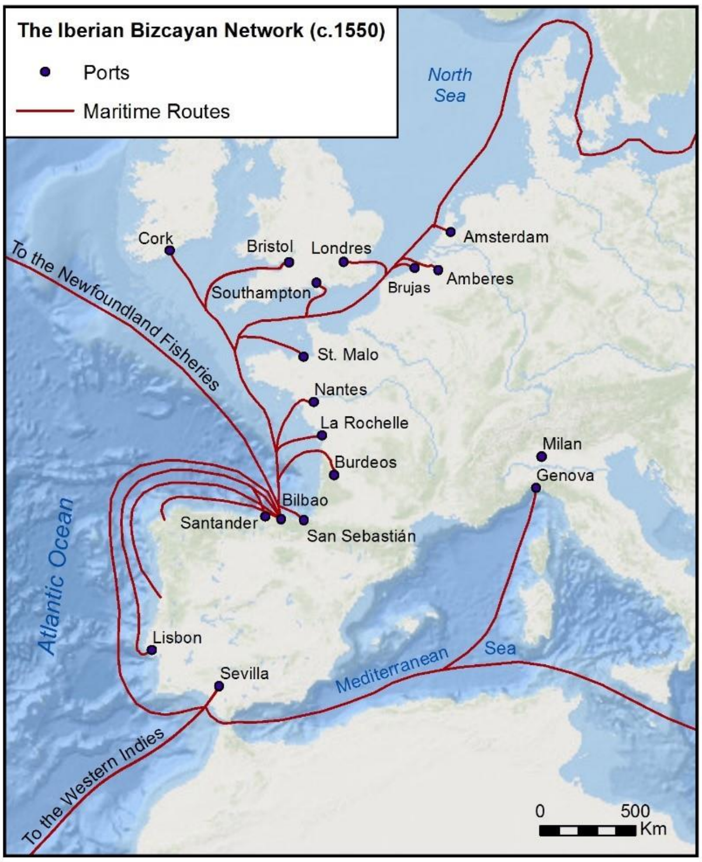

Figure 1.2 The Iberian Bizcayan network. Basque trading routes during the 16th century. Map Produced by Maria José García Rodríguez (2017) using data from: (Barkham, 2000; Grafe, 2002; Priotti, 2003; Tena García, 2003; Alberdi, 2012)

reason, this research will provide evidence of a heterogeneous range of forms within the same region, by showing a variety of designs for ships which varied slightly from one to the other within the same tradition. At the same time these designs inspired each other, giving them a higher level of similarity. However, the spatial category of the Bizcayan shipbuilding tradition is called into question here. Not because there were no regional local practices that could be identified as different from other areas and shipbuilding traditions, but because of the level of similarity with other regions and communities as well as those differences.

For that reason, the heterogeneity within the Bizcayan tradition is taken as a concept to understand the complex variety of this spatial category of a shipbuilding tradition. But at the same time, due to the similarities of this region with other areas, the Bizcayan tradition is considered as part of a wider network that grew in a natural exchange of ideas, concepts, designs, techniques, materials and technology across a vast transnational landscape. In other words, this thesis will argue that there is a non-existent clear-cut cultural boundary between the category of Iberian-Bizcayan ships, and other regional categories, for example Portuguese shipbuilding, Mediterranean shipbuilding and other northern shipbuilding traditions, such as the English tradition. This thesis will challenge traditional archaeological and historical categories of a Spanish shipbuilding tradition's space limited to the Iberian Peninsula. This research will aim to bring more detail into the idea of a commonality of Iberian ships as well as determining local clusters and difference within the family, for that purpose a local cluster will be proposed as against a national generic Spanish concept of a shipbuilding tradition.

1.3 Objectives

The aim of this research is to understand Bizcayan shipbuilding as a cultural cluster, and by comparing it to other Iberian and distant traditions, to technologically broaden the spatial framework established by preconceived ideas of a Spanish national identity, adopted over the Basque region, which brings anachronic cultural borders of only viewed by contemporary nationalism. Instead, as an alternative, a transnational cultural perspective will be incorporated into the Spanish shipbuilding, particularly applicable to the Bizcayan region, by illustrating the connections between ships from different areas, connected to the Iberian Bizcayan area and the way this affected the ships built there. In this case, this view is providing evidence of cultural processes beyond concepts of the Spanish national border and beyond the idea of a

Spanish national coherent culture. By showing the diversity of ships within the same region, the idea of a cultural coherence will be challenged for the concept of an Iberian shipbuilding, instead by using the theoretical concept of hybridization, the concept of the Bizcayan shipbuilding tradition is proposed, as against the Portuguese shipbuilding, and the anachronic idea of a Spanish shipbuilding.

This Spanish nationalistic approach is further explored in chapter two, with reference to the influence it has have in how shipbuilding cultures have been understood, but particularly how the Iberian shipbuilding has been understood only from a Portuguese and Spanish identity, and not from a regional identity, such as the Bizcayan tradition, that had a cross-border nature, as it will be proved in latter chapters.

The idea of the constrained space of a shipbuilding tradition is related to this clear influence from a Spanish nationalist background in the study of shipbuilding. Our research is an attempt to look beyond concepts of the Spanish national border, as well as those of the Basque region, that have created illusory ideas of separated cultures and identities.

The main purpose is to find whether the evidence for Bizcayan ships shows a sufficiently clear boundary between concepts of a shipbuilding tradition, compared to its contemporary neighbours. The question to be answered is whether the technology of the Bizcayan shipbuilding tradition is limited to this initial space within the confines of the borders in Spain, or whether the Bizcayan shipbuilding tradition's technology can be found in other areas commonly, and beyond the geographical boundary of the Iberian Peninsula. By comparing Bizcayan ships to other traditions, such as the Portuguese, we will find out whether there are regional differences, or whether they are common to other shipbuilding traditions.

For this reason, the aim is going to be to find distinctive local features, mainly between large historical ship types, the so-called *naos, navios, naves,* and galleons and compare them with other contemporary ships of other areas. During this one-hundred-year period (1550-1650), Bizcayan ships experienced a shipbuilding transition, mirroring the activities that these vessels were designed for, but also evidencing a social conflict of interests on a local and monarchic scale. In other words, the transition in the Basque area, part of the Spanish crown, brought with it complex social tension both at a monarchic level, and also in the form of local disputes (Alberdi, 2012: 441; Wing, 2012: 116). Ultimately, the research will reflect a shipbuilding process, which changed from the predominance of the mercantile and fishing interests in the Spanish Basque area, to the predominance of the militarized purposes of a vessel, with trading purposes as well.

It is also the intention of this research to unite Spanish and Basque historiographic views and merge them with archaeological studies in a way that some cross-disciplinary observations can be made. The predominant national historiography does not often take into account some of the regional narratives, for example, the cultural view of the Basque area. Although the work of many previous Basque historians is not new to this research perspective, it is the purpose of this research to give more international voice to this regional part of Spain and to be able to acknowledge both the Spanish and the Basque roles in this historiographic narrative.

The relationship of this area to the whole of Spain was interdependent. In this relationship both areas worked together and benefited as well, despite causing some harm. However, between Spanish and Basque historiography, there has been a predominance of the first one over the second one, and this impacted on the historical narrative on how we understand the Iberian shipbuilding. The prevalent view in Spanish historical narratives has only followed the monarchic viewpoint and has somehow set aside the local viewpoint in the Bizcayan region of private investors and merchant entrepreneurs, of what we could call an emerging "*proto-bourgeoisie*". In this research the local interest and its perspective will be joined to the Spanish viewpoint. It could be argued, that on the other hand, Basque historiography has been more biased towards changing the major drift of the historiography, dominated by Spanish nationalist narratives, and working more on the inclusion of regional or ethnic narratives and viewpoints, a common trend in Spanish historiography, a turn towards the inclusion of regional stories, somehow re-gaining authority from Basque historiography into the more general narratives of the state, with respect towards the works of other Spanish historians and vice versa.

By merging these two sides of the Bizcayan shipbuilding, some of the mainstream ideas about the shipbuilding decline and crisis will be reviewed, taking into account the two economic poles present in the same territory. Firstly, that of the investors that adhered to the Spanish Monarchic efforts in the Indias routes and Spanish Armadas, and secondly, that of the investors that migrated to the French side and continued with their activities in the late 16th century. By looking at the people with an interest in various economic activities, the interests of the diverse individuals in the Basque area and the alternative activities to the crisis at the end of the 16th century we can provide an alternative narrative to the mainstream idea of decline and crisis proposed and rooted in Spanish historiography, but also international historiographic trends about Spanish history, involving the Basque region.

The intention is not to mark which of the narratives is right or wrong but to try to limit the bias towards a particular viewpoint and to include in a horizontal way the two sides, their particular adaptations to the changes at the end of the 16th century. But also, to look deeply into this society through these ships and conflicts around ship construction, as researched by Alberdi (Alberdi, 2012), timber supply and economic alternatives in which the division between groups and actors does not seem clear.

It is the intention of this work to offer a synthesis of historical and archaeological narratives together, in order to reveal aspects of both disciplines which are relevant to each other. Some of these investors previously involved in private trading routes and Atlantic fisheries, ended up in the service of the king's Armadas, whereas others migrated to the French side and continued fishing and trading as private citizens. This clash has been evidenced by previous historical work, related to the acquisition of wood and usage of timber in the Basque area, but has also been presented as a conflict of interests (Alberdi, 2012: 435; Serrano Mangas, 1998). However, the migration of shipbuilders of the Bizcayan tradition to the French Basque territory and its implications for the study of Iberian shipbuilding, dendrochronology and historical sources has not received much attention, despite previous historical work, from Manex Goyenetche (Goyenetche, 1998). The implications of combining these views and looking at how they can affect future research in Iberian and particularly Bizcayan shipbuilding can open up future research lines, particularly pertinent for future archaeological and dendrochronological discoveries.

Finally, this research will attempt to collect in a chronological way previous studies that have been made in Iberian shipbuilding in an attempt compile and synthesise the research. To sum up, one of the key objectives will be to find the changing elements in Iberian shipbuilding through space and time, particularly with regards to Bizcayan shipbuilding. Despite this, the focus will be limited to the period 1550-1650 in the Iberian Bizcayan shipbuilding network and areas that influenced this process.

1.4 A multidisciplinary methodology: A transnational view of shipbuilding

The method used to study the Bizcayan shipbuilding tradition will be a comparative model for analysing archaeological and historical information based on the archaeological criterion, as it will be described in chapter two. In other words, comparing different ships with archaeological and historical data and analysing their similarities and differences in order to find repetitive patterns of techniques and also to find differences characterising a regional cluster. A combination of disciplines and perspectives, archaeology and history, will be used to study the Bizcayan tradition.

1.4.1 Historical Archives and sources

Each source has in itself a unique value and a different range of information that combined, can shed light on new research questions and research lines. The real aim of this section is to encourage future Iberian ship studies but also those following up the study of Bizcayan ones, to combine these multiple disciplines in order to have a wider understanding of the material culture on the seabed, as has been done before in previous successful studies, such as the Red Bay Project.

Different types of documents have provided a considerable variety of data related to these Bizcayan ships. They consist mainly of letters, private shipbuilding contracts, royal shipbuilding contracts and some other document types, such as classic texts on shipbuilding from the time, treatises, and ordinances. Shipbuilding *asientos*, that is, shipbuilding contracts signed for being in the King´s service, are one of the main sources of information[2].

Date	*Name or title of the document*	*Contents and information related to the vessels*
28/12/1602	*Asiento con Martin de Bertendona para la fábrica de 10 navíos en Vizcaya*[3]	*Contract clauses of the service, ship measurements and tonnage*
22/05/1603	*Asiento con Jorge de Oliste para la fábrica de doce galeones*[4]	*Contract clauses of the service, ship measurements and tonnage*
29/8/1603	*Asiento con Martín del Hoyo Setién para la fábrica de dos galeones*[5]	*Contract clauses of the service, ship measurements and tonnage*
11/10/1603	*Asiento con Isidro Sanchez de la Mota sobre entrega de madera y tabla*[6]	*Wooden quantities and measurements, planking specifications, ship parts*
6/12/1604	*Asiento con Juan de Polo para la fábrica y servicio de un galeón*[7]	*Contract clauses of the service, ship measurements and tonnage*
30/03/1607	*Asiento con Domingo de Goizueta para la fábrica y servicio de tres galeones*[8]	*Tonnage of ships, where were they built, clauses of the contract and service agreed.*

Table 1.1 Asientos for the construction of ships.

In this research, a distinction is made between royal contracts, signed on behalf of the king by the agents of the crown acting in local provinces, and private contracts, not directly related to the King's financial system and service. This is because they were conceived in different contexts. Royal contracts originated in such as the Council of War or the Navy and War Council, where the *asientos* or royal contracts were signed for the service of the monarchy. In these contracts, various aspects may have been specified, such as costs, salaries, crew, shipbuilding features, ship dimensions and so on. Monarchic and private contracts were signed with a different relative interest. The king's interests and those of a local merchant sometimes differed and sometimes coincided. Sometimes the *asientos* are contracts just to pay

[2] I am very grateful to Koldo Trápaga Monchet and José Luis Gasch Tomás for providing very generously these *asientos*, with much relevant information.
[3] AGMM, Tomo 19, 6665.485, Libro de registros, rollo 5, vol. 19, 2-12, "*Asiento con Martín de Bertendona para la Fábrica de 10 navíos en Vizcaya. 28/12/1602*"
[4] AGMN, Tomo 19 6665.501 Libro de registros, rollo 5, vol. 19, 57r-66r, *"Asiento con Jorge de Oliste para la fábrica de doce galeones, 22/5/1603"*
[5] AGMM Tomo 19, 6665.508, Libro de registros, rollo 5, vol. 19, 77-82, "*Asiento con Martín del Hoyo Setién para la fábrica de dos galeones, 29/8/1603*"
[6] AGMM, Tomo 19, 6665.516, Libro de registros, rollo 5, vol. 19, hoja 102-105, "*Asiento con Isidro Sanchez de la Mota sobre la entrega de madera y tabla, 11/10/1603*"
[7]AGMM, Tomo 19, 6665.637, Libro de registros, rollo 5, vol. 19, 257a-262r, "*Asiento con Juan de Polo para la fábrica y servicio de un galeón, 6/12/1604*"
[8] AGMM, Tomo 18: "*Asiento con Domingo de Goizueta para la fábrica y servicio de tres galeones. 30/03/1607"*

the salaries of the crew, in other cases the whole timber supply needed to build two fully equipped galleons was specified. *Asientos* have a variety of contents, as they represent contracts between the monarchy and local people to deliver different initiatives, although it is in their relationship that these bondages forged the monarchy itself[9].

From these types of documents, the tonnage, dimensions, shipbuilding details, forestry practices and proportions of Iberian ships can be found. Also, other details related to rigging elements, crew, artillery, wood supplies and other aspects were revealed in these sources. However, this research will focus solely on the measurements for ships from historical sources, as not all the listed elements above are always available.

Correspondence is another main source of information. This correspondence can be found in archives as a result of activities in the shipyard and the decisions taken by the Council of War and the Navy. The context of the production of these documents can be understood as an essential network to deliver the purposes of the central monarchy, always reliant on local economic and political entities. These letters are an attempt to coordinate and direct the work in royal shipyards, or in private shipyards which had been commissioned by the king. However, each document always needs to be understood in its unique context of production to be able to critically extract the information available.

In terms of primary sources, the historical documents from 16th and 17th century have been of crucial importance. Shipbuilding private contracts are documents that specified an official agreement signed by a scribe. In these contracts the specifications of the ship to be built were written and very often shipbuilding features were specified, as well as wood supplies. Shipbuilding *Asientos,* or contracts signed to serve in the King's navy, were similar to private contracts, the latter ones not being signed to serve the king, where a long agreement was specified. This included different points and clauses, to do with payments, crew salaries, food supplies, specifications of the ships to be built, and the official agreement with the king by the person with whom it was agreed, who would normally be someone capable of supplying galleons for the King´s service.

[9]AGMM, 6665.637 Libro de registros, rollo 5, vol. 19, 257a-262r "*Asiento con Juan de Polo para la fábrica y servicio de un galeón*" 6/12/1604

Shipbuilding *Ordenanzas* or Ordinances, were royal regulations or laws by which shipbuilding was controlled by the Spanish Monarchy. Although there were three consecutive Ordinances during the early 17th century, 1607, 1613 and 1618, the regulations did not solve the clash of interests between monarchic central power and its defence of the empire and private merchant owners' interests in the trading routes and transportation of cargo.

Shipbuilding treatises, were technical procedures, explaining step by step how to build a ship according to the understanding of an expert in ship design. Very often treatises have been the ultimate ideals of shipbuilding, although these were not necessarily the reality of the majority of shipbuilders. It should also be considered that these documents were normally written for the king, or paid by the king, for the purpose of innovating or finding the ideal ship type.

Relaciones, (Accounts) or ship reports, were literally accounts of ships, in harbours or in shipyards, very often indicating their tonnage, but rarely specifying their dimensions and the sorts of supplies and soldiers these fleets needed, sometimes they specified rigging for ships as well, whereas most of the time they were simply accounts providing information regarding the state of a particular group of ships harboured in a particular city.

Memorial were written by people that served or advised the king, they were designed to raise awareness of problems in the Kingdom and also to suggest solutions for them. Memorandums were accounts describing the state of an area and its shipbuilding industry for example, the problems experienced by the shipbuilding industry and the recommendations made by advisors. Sometimes these memorandums included the complaints of influential people of the area, who knew which channels to follow to reach the kings ear and let their voice be heard in the king's hall.

Shipbuilding debates on ship design, were discussions about what ship design was best for construction and the reasons behind it. Sometimes in these debates different people give their opinion and suggestions on how to build ships, and their specifications, therefore, there are very technical accounts of 16th century shipbuilding. These include lists of timbers supplied for repairs and construction of ships, *Arqueamientos* or ship gauging, where the size of ships was specified, in order to pay the compensation to the owners of private ships, confiscated by the king for the service in the armadas and trading routes.

There are also speeches on Monarchic issues, which were personal requests to the king, made by very influential people, or people close to the king who either knew him or were his advisors on a particular topic. Other items include complaints to the king, suggestions written to the king, payments for the construction of ships and letters to the king which gave vivid impressions of 16th and 17th century shipbuilding in the Iberian Peninsula.

All of these documents were extracted from many archives. *Archivo General de Simancas* has endless collections of *legajos* or documents. *Guerra y Marina* is the section related to shipbuilding and maritime warfare, this is the section most commonly visited by historians and maritime archaeologists. However, other sections such as *Contaduría Mayor de Cuentas*, particularly the section called "*primera época*" also contains documents related to the construction of ships, such as payments or funds for the construction of vessels.

Archivo del Museo Naval de Madrid is where 18th century scribes made a lot of copies of older documents, some from the 16th and 17th centuries. Many of the documents here, were copies from the originals from Simancas.

Archivo de Protocolos de Guipuzcoa contains mainly ordinary everyday documentation, such as wills, contracts payments and so on. In between the millions of protocol books that one can choose from, there are shipbuilding contracts and timber supply documents hidden away.

However, due to the volume of information in some of the sections, not only in *Archivo del Museo Naval*, in Madrid, *Archivo General de Simancas*, in *Archivo de Protocolos de Guipuzcoa* but also in other archives such as *Archivo General de Indias* there is still information that has not been used. Also, only a small sample of the French archives has been used, from the *Archives Municipales de Bayonne*, which gave very scarce information. In the *Archivo de Protocolos of Guipuzcoa*, for example, from approximately 3.000.000 documents in all the years they have been open they have gone through 400.000 documents. This gives an idea of the amount of information we do not know about. However, in the case of Simancas, this information was not found, that is the information related to what has been researched and what is still virgin. Because of this problem of volume of information, but also due to only three years of research being available, the material that was used for this research was selected as something that could be useful for archaeology, for explaining shipbuilding differences, but also something relevant to other disciplines, in this case for example documents related to timber supplies, which provide information to dendrochronologists.

All historical documents from historical Spanish sources with their descriptions, dimensions and features were found and recorded on a spreadsheet in order to compare with other data. In these tables, different fields form a frame to interpret these documents. This table was created in order to compare the data from a variety of sources, some coming from ship construction contracts, both private and royal; some on ship gauging, where ships were measured and some were sourced from treaties and discussions on ship design.

The table is composed of all the collected data from shipbuilding contracts, treaties and gauging of ships. This table attempts to define more specifically what Iberian Bizcayan ships were and whether it has any distinctive feature that differs from the so-called galleon or *nao* from other ship traditions. From this table an attempt is made to understand whether there is a real distinction between ships built for the king and those built for private purposes. In this area the dimensions of ships play a central role. Proportions and dimensions are analysed by looking at ratios between different parts of the ships, principally the breadth or beam, the keel, the depth of the hold and the overall length. Many other variables have been introduced, however, there are nearly no two documents that provide the same information, so the variety of contents of each document make every piece of source material a different specific example of the time. By comparing the proportions of ships and their measurements shipbuilding patterns will be studied, as well as differences and similarities between ship types, particularly between Red Bay and Santiago de Galicia.

1.4.2 Archaeological sources

The main archaeological sources that will be used for this research are those to do with ships potentially from this Iberian Bizcayan area. However, as this research will try to find out whether a local shipbuilding tradition can be identified, there will be a range of archaeological findings that will be used as sources. This will be further specified in the archaeological section. However, some of the examples covered will range from 16th century ships, such as *San Juan*, thought to be cargo-carrying Iberian ships, but also the Orio IV vessel.

Period	*Name*	*Found*
1500	*Cais de Sodre*	*Portugal*
1500	*Cattewater*	*United Kingdom*
1510	*Highborn Cay*	*Bahamas*
1510	*Molasses reef wreck*	*Bahamas*
1525	*Studland bay*	*United Kingdom*
1554	*San Esteban*	*Texas*
1550	*Rye A*	*United Kingdom*
1550	*Angra B*	*Azores*
1559	*Emmanuel Point*	*Florida*
1560	*28M*	*Canada*
1560	*27M*	*Canada*
1560	*Orio IV*	*Basque Country (Spain)*
1560	*29M*	*Canada*
1564	*St. John Bahamas Wreck*	*Bahamas*
1565	*San Juan*	*Canada*
1580	*Western Ledge Reef*	*Bermuda*
1600	*Yarmouth Roads wreck*	*Solent (United Kingdom)*
1600	*Angra D*	*Azores*
1606	*Nossa Senhora dos Mártires*	*Portugal*

Table 1.2 Iberian shipwrecks. Table of site names, location and period of origins.

Archaeologically, as well as historically, the argument will be based on the dimensions, proportions and tonnage of ships. The archaeological section will be based on bibliographic information from published archaeological work. However, many other aspects need to be considered. Fastening, rigging, caulking, tar, cooperage, ballast, pottery, artillery, weapons, material items such as wooden plates or pipes and many other elements are to be considered as potentially indicatory of the origin of the vessel, however they can both confuse or clarify the origin of the ship depending on how and when they came to be on the ship. Therefore, the argument will concentrate on the wooden structures of the ship, such as timbers, upperworks, masts and mainly the hull structure.

In order to try to understand shipbuilding influences, different elements are taken into account to see whether there is a local pattern or whether these attributes are common in a broader spatial context. Transnational relations and contact could be interpreted between different areas by looking at a variety of elements, both historically and archaeologically.

However, only measurements, proportions and archaeological characteristics will be applied in this research. The reason for choosing these aspects is because in terms of shipbuilding, measurements and proportions are some of the elements that appear in documents, which are very often difficult to obtain through archaeological data, unless the preservation of the shipwreck is remarkable. Looking at the features from archaeological publications a comparison amongst shipwrecks will shed light upon the similarities and differences between presumably Iberian ships and to see whether there is complete coherence or not.

Another table was made up using ship archaeological data, with archaeological elements from ships considered as Iberian. This table contains characteristics of the collected Iberian/Bizcayan ships that have been selected. This table will be discussed in Chapter 4, where the Iberian attributes will be analysed and to see whether the belong to broader Iberian methods, or more particularly to the Bizcayan tradition.

1.4.3 Previous Experimental Archaeological experience

During the course of this research project, the author was given the opportunity to participate in the ongoing reconstruction project of the 16th-century Red Bay ship (*San Juan*) at the Albaola Foundation in Pasaia. This provided direct and practical experience in traditional shipbuilding on a vessel that is an exemplar of the Biscayan tradition. Despite it will not be used as a direct source, the experience I had in experimental archaeology during the reconstruction of the of this vessel in Pasaia, found by Parks Canada in 1978 (Grenier, 2007: I-1) had strong steer on this research.

Historian Selma Barkham provided the clues found in historical documents to discover the Red Bay wreck during the 1970s. After having identified the harbour names used in the 16th century by Basque fishermen and matching them with the ones used today for the Canadian shore, the harbour named "*Buytres*" by Basques in the 16th century, was identified as being what nowadays is known as Red Bay (Grenier, 2007: I-2). These archaeological remains were used to reconstruct the ship that has been identified as presumably being the San Juan, a ship that sunk during a winter storm in Labrador, in 1565, Red Bay (Grenier, 2001: 269; Grenier, 2007: I-2, 179). The main hypothesis of the origin of the ship is that it had been built in the Bizcayan area.

For this reason, the Red Bay vessel was being reconstructed in Pasaia, in the province of Guipuzcoa, in the Basque Country, Spain. This reconstruction is a project in Albaola Faktoria, a society that promotes the maritime heritage of the Basque Country. After the experience of spending some weeks with the project reconstructing a 16th century ship, this chapter attempts to show the research through an experimental archaeological view. During September 2015 I took active part in the reconstruction of the ship. The main reason to do this was to learn shipbuilding techniques, experience the process of building a ship first hand and to put oneself in a scenario where the possible problems in the mindset of a shipbuilder could be recreated, of building a ship, in a similar way a shipbuilder had to deal with them. During a period of three weeks, through an active engagement in the project, I worked very close to the construction stage of the second futtocks. By recording information about the construction process, and through previous visits to the shipyard at the initial stages, the different construction stages of the ship were recorded. Thanks to the questions, problems and hypotheses that were tested and put into practice with one of the main shipbuilders, the experience was very informative to my understanding of 16th century shipbuilding techniques used in the Iberian Bizcayan ships. This experimental research became essential to put into practice some of the concepts of the research in an experimental way, but also informed many of the difficult theoretical concepts of ship construction and clarified some of the essential elements in shipbuilding traditions of the 16th century in the Iberian Peninsula.

The construction of replicas has been traditionally considered a national symbol of the maritime tradition of a region and the connection of a ship reconstruction to a community is clear, as a ship can link different identities within its story. During my stay, I learned that the Bizcayan tradition in the 16th century did contain some elements unique to the region, but it also had much in common with other shipbuilding communities of distant regions. Through the relationships of wide networks of supplies of materials and resources, knowledge transfer was found in the similarities of ship construction techniques. The repetition of a shape, or the attempts to recreate a ship through proportional methods, ship design and construction attributes were considered to be those of a shipbuilding tradition.

Experimental archaeology carries its own challenges, but it would be important to say that as an experience, it can help to inform traditional archaeological knowledge. It is through the insights described in this section, that some of the questions about shipbuilding and ship design, were clarified. Experimental archaeology is not a passive exercise, instead it offers some insights, that a historical treatise could not have showed otherwise. Practicing shipbuilding is a way of engaging with the theories in a dynamic way, and experiencing these as well as testing them. As an archaeologist, it is a rather difficult thing to identify “the technique” of a shipbuilder from an archaeological find. This technique which would be the idea which the boatbuilder, after discarding many others, somehow choose to follow to construct the ship in that particular form. However, identifying this “technique” or “idea” is almost an impossible task. The reasons why the ship took that shape and not another, as if there were a single factor triggering an understanding, might be rather complex. In other words, to find the reasons of a shape could be so many, that it is not attempted here to answer this question. The complexity of building a boat is affected from a whole variety of factors. In a way, the shipbuilder is just one small part of a much broader network of influence.

Similarly, a shipbuilder does not always choose, or is not in sufficient “control” to make a conscious choice regarding shape. The shape of a ship, is in itself the relationship of a number of elements, together, pushing and pulling in a way, the idea and the shape of the ship. Shipbuilding seems to be like a tension between what we want to do and what we actually achieve. In other words, sometimes what might appear as a disappointing shape, in fact, was a perfectly made boat, considering the quality of the material, or despite not having exactly made the ship that was “ordered” in a signed document, the ideal is sometimes “defeated” by the raw material of reality. In this, the boatbuilder is like the master of a large enterprise of different crafts and interests and he has to opt for those choices that will allow the construction to be finished as best as possible. Somehow, the ship, once built, is a balance between all the elements involved in constructing a vessel.

Experimental archaeology is more an empirical source for the historian and archaeologist to contrast previous evidence and theories on shipbuilding, rather than a source of past material culture. Although it is not the past itself, this method can reconstruct similar situations and problems to which a shipwright or a shipbuilder might have been exposed. This has been a common practice together with the increasing research in the maritime archaeological field. Particularly, some places have shown good practice of experimental archaeology, such as the Danish archaeologists, in Roskilde, which is perhaps the clearest example, both in the construction techniques and in the sailing activity of the boats.

When reconstructing ships, it is not possible to get into the mind of a 16th century shipbuilder and ask him why he decided to build that timber in a certain way, or why this hull surface was apparently constructed to follow certain proportions, but instead of attempting the impossible, the experimental method is a way of finding glimpses of empirical solutions and answers, with very particular examples. It is more of a training experience for a beginner archaeologist or historian in shipbuilding, than a source of how ships were built (Crumlin-Pedersen, 2006: 4). This method is more like a resource to contrast a lot of the theory that shows a possible example of how to build a ship, but not an exact replica of a ship which really existed. In other words, it is a concrete example of theory, and shows the paradoxes between ideal theory and raw empirical shipbuilding.

In particular, a ship being built in the Basque area, the Red Bay whaling ship was my main experimental source. The ship is being built according to the archaeological discoveries found in Red Bay, Canada, in 1978. It is part of the Basque Maritime Cultural Society, known as *Albaola Faktoria*. The ship is being built with oak from the Iberian Peninsula and, specifically, 200 oak trees from Sakana, in Navarre. This ship is an example of a 16th century Bizcayan ship, Techniques used in the shipyard, such as *"hauling down the futtock"*, fastening techniques, use of tree species and aspects such as the requirements for a ship to sail in warm or cold waters in relation to the distance left between joints for the different pieces of wood were revealed in a very informative way, essential to my understanding of 16th century shipbuilding practices.

1.5 Conclusions

The Bizcayan area was a bridge between the North and the South of Europe, as well as the departing harbours of the first Trans-Atlantic fishing industries that settled in North America. Due to the transporting and trading role of Basque merchants, their shipbuilding was mainly designed for those same purposes. In the same way, the Bizcayan tradition incorporated elements from northern and southern shipbuilding communities. During the 16th century however, the Spanish Monarchy saw the importance of this area in the grand scheme of the Spanish Oceanic Empire and how it could be used to exploit forests as well as extend its influence in order to gain control over local timber management and available shipyards.

By looking at the ships that navigated the European trading routes, Newfoundland fisheries and also Spanish warships, the ships built on the Bizcayan shore will be explored in order to understand the Bizcayan tradition. Through experimental archaeology, historical documents, as well as archaeological evidence, the comparison with contemporary ships from other areas will show the evidence of common influences as well as similarities between them.

The main narrative in this work looks towards an inclusive discourse that reinforces similarities and difference within a broader region, which looks in this instance further than the north of the Iberian Peninsula, into the South of France and other influences that Bizcayan ships had over the Atlantic façade's communities. This is achieved by taking into account those examples of crossed influence between distant communities, where they have been found. This work does nothing but see diversity and heterogeneity as something naturally representative of the reality of the Bizcayan shipbuilding tradition, rather than a singular homogeneous model, as proposed in the concept of a Spanish shipbuilding tradition. By taking the paradoxical similarities and differences within a tradition's characteristics, the separation of these seemingly distant regions, we can show how interrelated the Bizcayan shipbuilding tradition was with others, and how they all had an effect on each other in a wider chain effect than simply in regional terms.

Coming from Spain and the Basque region, the reality of a diverse identity, of overlapping layers of culture of different origins, or mixed "hybrid" cultures feet relevant to this research as it is quite a living experience. The essence of a "mixed" tradition contradicts the idea of a homogeneous "essence" and rather points to the interdependence, rather than just concentrate on the separation. As we know, a region's tradition was never the same, neither did it had "pure" values. This tradition was inherently porous and received clear influences as well as mixed with other regions by influencing them. Translated into shipbuilding terms, attributes travelled in time-space, but did not have a consistent "essence", e.g. an unchanging form, in other words, they were always needing to adapt wherever they were incorporated.

Attributes can be adopted by different regions, and can also be modified and assimilated in order to suit different purposes. For this reason, it felt relevant to take into account those seemingly opposing ends, as part of a broader scenario. The mixed identification, or that of a variety of identities, is very much representative of the Bizcayan area. In other words, the Bizcayan shipbuilding tradition could be said to be a community of a variety of different combinations of elements within the same region, or a multiplicity of origins that conform a mixed “varied” tradition.

But those distant spaces, are taken as belonging to the broader spectrum of a transnational shipbuilding process of cultural interactions. The Bizcayan tradition is part of a wider scene, mixed within that scenario. In fact, the Bizcayan tradition, or the forms we identify it with, is nothing but the remains of what we could identify as a broader process, it is not just Bizcayan, but it is not “only” Bizcayan. In this case, Oertling, already found this terminological problem, having the feeling he was lacking an adequate word to classify the set of ships under study, with no clear spatial belonging to the technological remains, but rather a mixture somewhere in between (Oertling, 2004: 133). Similarly, the prehistoric “Neolithic” wave, what we are seeing in the North of the Iberian Peninsula, is in broader terms, a renaissance wave of technique, construction attributes and in many cases physical migration of labour going south to north. The period in which the Carvel construction influenced the Atlantic façade might need more detail on its spread, but there is no doubt that the Mediterranean techniques influenced the Iberian traditions and hybridized with them. The intense shipbuilding of the Iberian traditions, made them some of the most pioneering traditions of ship construction in Europe by the early 1500s. We can mention the Portuguese shipwrights with their pioneering explorations towards Africa and East India, reaching Japan by the 1560s, and on the other hand the Basque shipwrights, who were known as the Bizcayan community, intense traders and fishermen involved in the trading routes that went as far as the Mediterranean in the South and the lower countries and Southern Ireland and England in the North, but particularly, Basques, together with the Portuguese, carved their shipping tradition in the Newfoundland fisheries during the late 15th and early 16th century, that then passed on towards the northern growing Monarchies, such as the English, French, Danish, Dutch and Swedish. The exchange went both ways, as southern shipbuilding traditions benefited from the influx of pine masts and tar from northern countries. It must be mentioned that Atlantic Iberian traditions such as the one from Andalusia, had an immense role in the spread of Spain in the Americas and the voyages that were organised to colonise the Indies came mostly from this region, with ships that were also built in Andalusia. Despite this it will not be studied here, it is relevant to highlight the importance of the Andalusian shipbuilding community in the exchange of technology, incorporation and adaptation of Carvel to their methods and the historical role they played within the Spanish kingdom (Gonzalez Cruz (Coord.), 2018). Some of these voyages were done by *Cristóbal Colón* (First one in 1492, and another three in the years up to 1502), *Yañez Pinzón* (1495), *Cristóbal Guerra* and *Alonso Pinzón* (1499) and many others that will be not mentioned, as the role of Spanish explorations for the European expansion, was as important (But not as early) as the Portuguese voyages during the 15th century (1415-1499), whereas the Spanish only started by the late 15th century.

In this research, we will see how this southern influx of carvel-built design spreads beyond the Mediterranean, by reaching a moment of rapid flux and change. This rather clear shift is conceptualised as the transition, with all its further repercussions for shipbuilding, both for Bizcayan ships, but also for other shipping traditions. At that point, the Iberian shipbuilding communities, particularly the Bizcayan shipbuilding tradition that it will be studied here, become receptive receivers of the northern influence of ship design, as it will be explained in later chapters. However, the Mediterranean influence towards the conception of galleons, their fusion with the Bizcayan *naos*, and hybridisation towards military-cargo vessels called galleons is definitely a north-south axis of influence, both ends seem to meet and experience original different designs particularly in the Bizcayan area, as we will see in Chapter 5.

2 Beyond National and Transnational Narratives: A state of the art

2.1 Introduction

The correlation of the Iberian culture with Spain and not with a regional tradition as the Bizcayan one, had been limiting the concept of the Iberian culture to the borders of the Spanish political kingdom. When trying to understand the Iberian Bizcayan local tradition, the clear-cut boundary of the Spanish monarchy did not give the most appropriate framework to study the spread of the Bizcayan technique, that crossed the border and spread into France as well as influenced other European regions.

In this chapter the main views from Spanish culture and how these have influenced how maritime archaeology has understood the Basque region will be reviewed. Particularly, in order to show how this work will concentrate on explaining a different understanding of the Iberian shipbuilding tradition, as singular concept, based on the Bizcayan case study, as against the idea of a Portuguese/Spanish dichotomy. Here two elements sum up the aspects that will be discussed further, that of the paradox of a heterogeneous shipbuilding tradition, in this case the Bizcayan one, derived from the Atlantic-Iberian concept, that contradicts the idea of a coherent and unified Spanish shipbuilding. But also, the importance of how interdependent shipbuilding networks are, as mentioned in archaeology already, which clearly proves how technology in shipbuilding traditions were ***inherently*** transnational, and not just locally bound by a single space. This will link with the transnational spread of the carvel technique that was reflected differently in every nation. The Bizcayan tradition was no exception to this new adoption of a Mediterranean technique of shipbuilding, that hybridized with the local shipbuilding characteristics, as it will be shown in chapter 4. In other words, this section emphasises the relationship of unique characteristics traditionally used in maritime archaeology, to prove differences between regions, in this case to distinguish the Bizcayan ships, within the Iberian shipbuilding family, as against the Portuguese region and Spanish Monarchy. But also finding a place in the Spanish and international historiographic and archaeological narrative for the Bizcayan tradition, already emphasised by the work of Parks Canada, and their main work on the Red Bay shipwreck (Grenier et alii, 2007), showing an Iberian overlap with the Portuguese shipbuilding, in a similar way, as pointed out by Oertling (Oertling; 2001; 2004), as well as the distinctions between regions. By showing similarities between traditions, it is of our interest to show a concept of a shipbuilding tradition, applied to the Basque region, and particularly to the concept of an Iberian Bizcayan tradition that also highlights the mixture with other traditions beyond the spatial boundary, in this case acknowledging the external transnational influences pointed out by early works, e.g. Castro (Castro, 2008). But also, to show the influence and transfer of the Iberian Bizcayan technique into France, that has not been object of debate in the study of Iberian ships.

The uniqueness of those groups will be questioned, in this case with the Bizcayan tradition, showing commonalities with other traditions, such as the influence with the English tradition and shared characteristics with the Portuguese one. Therefore, I will explain how the Bizcayan tradition was a shipbuilding cultural process beyond the constrains of the Spanish political boundary framework, based on modern contemporary nationalism and which is not representative of the reality of shipbuilding traditions of the early modern age.

As an alternative concept to the dominating theoretical paradigm of an Iberian Spanish homogeneous shipbuilding tradition, defined by a single space, and limited by the modern boundaries of the Spanish state, as a complementary view of the "local" distinctions, the broader similarities amongst shipbuilding traditions will be proposed as part of an interdependent network. This view will be used as a perspective to look at the Bizcayan shipbuilding tradition, by using the theory of hybridization, in which the mix between traditions is evident. Following the theory of hybridization (Bhabha, 1994: 7), the concept of a homogeneous coherent nature of a shipbuilding tradition proposed by Spanish historiographical understanding will be deconstructed. Particularly, the notion of the Bizcayan tradition as a homogeneous culture will be challenged by focusing on the plurality of ship shapes within a region, related to social agents and groups of interests and activities, as well as their trading relationships with other areas.

This will be a complementary alternative narrative to the national and ethnic trends in Spanish historical and archaeological narratives of shipbuilding, but will also question the Bizcayan tradition's nature, by showing similarities with other traditions. This cross-fertilization of technology has started to take place in some of the latest historical and archaeological work to do with the Iberian Peninsula and more internationally. Not only Castro's work (Castro, 2008), but Adams also pointed out the influence of the Basques over the English tradition (Adams, 2013: 74). Similarly, but in distant scenarios, in Japanese archaeology, Kimura has made transnational comparisons to study technological influence across the Chinese, Korean and Japanese nations (Kimura, 2017). Other authors, such as Barros, have emphasised the technological influence beyond the political boundaries in the early modern period (Barros, 2018: 32).

2.2 The birth of regional narratives for Spanish maritime archaeology: A historical view of shipbuilding and ship types

By the late 19th century *Cesáreo Fernández Duro's* work (1830-1908) revived the memories of Spanish naval history through an extensive work of publications. But perhaps his publication *Armada Española: desde la unión de los reinos de Castilla y de Aragón* was the most influential one (The Spanish Armada: From the union of the kingdoms of Castile and Aragón) (Duro, 1972). In this book, Duro narrated the history of the Spanish navy, through nine volumes, in a very descriptive manner, trying to compile historical sources relevant to the maritime history of Spain covering the last five centuries (15th, 16th, 17th, 18th and 19th centuries). Another famous book was "*Disquisiciones Náuticas*" also on the topic of the 16th century Spanish shipbuilding's history (Duro, 2007). The revival of the history of the Spanish navy, was as well a way to remember the golden age of the Empire. Despite his work was, what we describe as a positivist history, one should not be judgmental of the work he did, as it was a contemporary trend at the time, and he gathered much information that has been used by other historians as well.

Cesáreo Fernández Duro revived the victories of his country, but he was also concerned with the defeats. His work was published in a crucial moment for the old Spanish colonial Empire. Spain lost all its lands overseas. Of the lands lost, the Philippines and Cuba were the last ones. By the end of 1898 all the former Spanish American and Asian colonies were gone (Casanova and Andrés, 2009: 4-9). Duro personally faced the fall of an empire as he was an Admiral in the Spanish Navy or Armada. He saw and heard about the times when Spain explored and conquered lands. However, Spanish historians ostracised their history to a dogma where decadence, shame and the loss of their honour was mostly remembered. The effect of *Cesáreo Fernández Duro* in Spanish historians left a variety of traces. Historically, defeats and the crisis of the Empire seemed to have left wounds in the identity of a nation. Such sense of defeat, together with other historical events, influenced a crisis in Spanish identity, leaving a marked sense of loss and defeat, still noticed nowadays, despite some efforts of Spanish contemporary historiography (Fernandez Albaladejo, 1998: 75).

By the late 19^{th} century, it was the 300 anniversaries of the failure of the Spanish Armada in its landing to control England by 1588, in 1888. Soon later, by 1892 it was the 400 anniversaries of the discovery of America. It was not that much the discovery of America, but the failure of the Spanish on that catastrophic expedition that revived a nationalistic historical debate, in a time of a flowering national rivalry between the English and the Spanish (Casado Soto, 1988).

Duro left a clear footprint; that of the Spanish maritime tradition, recognisable since the 15^{th} century or in other words, the idea of an identifiable Spanish "trait". The terminology of ships, found in historical documents, or ship types, such as galleons and naos were some of the inherited work that archaeologists and historians received as well. This historical beginning of the study of shipbuilding related to the Iberian/Spanish /Bizcayan tradition, are key to track down the root of concepts and terminology, inherited and borrowed by maritime archaeologists. Therefore, the nationalist environment in which ship terms and the Spanish shipbuilding tradition's concept were conceived, was linked to their purpose as a tool for the nationalist narrative of history. This was revised throughout the 20^{th} century.

2.3 Recent historical and archaeological works related to the Basque region and Spain (Late 20th and early 21st centuries)

An early regional focus on the topic of Basque shipping on the 16th century led to the body of work published by Shelma Barkham in the 1970s (Eguiluz Miranda, 2013: 16). As a result of these publications, the study of ship types was present at an early date, defining these boats in accordance with the available historical data. In this case ships were described through their measurements and proportional ratios in comparison to other contemporary ships from other regions.

The description and definition of the nao as a Basque ship type was done through the use of historical documents (Barkham, 1984). The rise of alternative regional narratives as against the dominant view in Spanish shipbuilding, was evident by the late 20th century. The labels used to name these ships in this case Basque, Cantabrian or Spanish followed new and old trends in historic research.

Some of these studies continued to describe the national narrative of Spanish ships, related to the Spanish Empire and process of the production of ships for the king (Phillips, 1986). Through this work, the validity of the use of different ship terms as a consistent definition was questioned (Phillips, 1986). Although these historical terms were applied, none of them were clearly defined. In fact, although it seemed that the galleon came from the Mediterranean, this type was confused with the carrack (Phillips, 1986: 41). Proportions and ratios are also values used to distinguish ship type categories from one another. However, even the use of the word nao or galleon could be used to refer to the same ship (Phillips, 1986: 43). "But the nao and even the carrack, had adopted some of these features as well, which should warn us against rigid distinctions based solely on shape, size or presumed function" (Phillips, 1986: 44). Phillips concluded that "it is not clear if the refitted nao would have been called a galleon, but there continued to be a certain looseness between the two terms, as well as between galleon and navio" (Phillips, 1986: 46). According to Phillips the historical definitions covered a range of different "galleons", but did not properly fit all of them in a singular way. Finally, she added that the main points of confusion between naos and galleons had not been resolved (Phillips, 1986: 45). Chapters 6and 7 will expand on Phillips' view regarding the notions of galleons and naos of the late 16th and early 17th century. Despite clear problems were found early on in the historical discipline when using ship types and their overall coherence, the influence of these historical denominations of ship types continued to have an effect on later archaeological research:

> *"In nautical archaeology, however, the evolutionary concepts strongly bias the literature. That apart, the literature on ships, ship-types and shipbuilding traditions can hardly be described as consistent where classifications and classificatory criteria are concerned." (Maarleveld, 1995: 4)*

On the anniversary of the Spanish Armada, in 1988, the study of Spanish shipbuilding was influenced in a considerable way by a major work related to the historical Spanish Armada (Casado Soto, 1988). It seemed the anniversary triggered some research in the Spanish history of shipbuilding, focused also on woodland management, Spanish treatises and shipbuilding proportions (Varela, 1988). Later studies related to Atlantic ship typologies (Casado Soto, 1991) and the Cantabrian shipyards of Santander and Guarnizo described the ships of the north and focused on a particular region, named Cantabria nowadays (Casado Soto, 1993). However, parallel to the study of the Cantabrian tradition, Basque shipping and more regional studies were carried out considering the merchant and investors' networks involved in the production of ships in the Basque region (Barkham, 1990). Particularly the galleon as a ship type drew the attention of historians, who considered this ship to be a Spanish invention and called it, the "Spanish Galleon" (Fernandez Gonzalez, 1992, Casado Soto, 2003). This has been challenged by English literature, which takes the credit for the invention of the "English Galleon", arguing it was the English that sorted out the problems of the artillery, by placing them in lower decks, therefore inventing a new ship type (Myers, 1987). Thompson studied Spanish naval and military administration, through analysing the development of a state bureaucracy to armed forces predominantly run by private agents, and not that much concentrated on the ship typology side (Thompson, 1981; 1991; 1992).

Through iconography and documents, the descriptions of these ships were defined following the historical ship types, in particular the origin of the term Galleon and its description as a ship type (Casado Soto, 1998; 1999; 2001). Similarly, in the study of Cantabrian ships, other contemporary studies focused on the description of Basque boats and terminology of smaller boats in the region (Barkham, 1996).

By the late 20th century, the history of Spanish shipbuilding had moved on and studied not only the ships, but also the actors behind the construction of these as well as the resources from which these floating wooden machines were made; forests. Conflicts of interests related to shipbuilding and the political changes that affected the development of Spanish shipping during the 17th century were also considered relevant to explain what international history described as the crisis of Spanish shipbuilding in the late 17th century (Goodman, 1997; Serrano Mangas, 1998).

Some more regionally focused research into the shipbuilding industry in the Basque area, particularly Guipuzcoa, took place (Odriozola, 1998). Historians on the French side of the Basque region developed common narratives linked to Spanish history, particularly linked to the story of the Basque area, and the history of shipbuilding, fishing and trade (Goyenetche, 1998).

The study of the forests in the Iberian Peninsula during the early modern period gained momentum, with some major studies carried out using historical sources focused on timber supply and forest management from a local perspective, focused on the Basque province of Guipuzcoa (Aragón Ruano, 2001). Through the study of forest types and the evolution of their use, the Basque area and the shipbuilding interests that shaped new laws and old practices were studied. A variety of conflicts of interests behind these forests show the complexity of the industry and the economy in the Basque area and the investors' networks related to the shipbuilding, charcoal and iron industries (Aragón Ruano, 2004; 2009; 2010a; 2010b; 2013).

An essential piece of work for this research, was particularly that studying the Basque cultural and commercial bonds between the French and the Spanish side (Alberdi and Aragón, 2007). Although focused on a specific region, the authors looked more broadly at how Basque merchants were connected in the early modern age with the economic processes of their time. Not many authors in Basque historiography have been associated with the topic of shipbuilding. In one of the major works for the maritime economy of the Basque region, the conflicts of interests in Guipuzcoa were studied (Alberdi, 2012). The clash of diverse groups relating to different activities were linked to shipbuilding, fishing and trading economic activities covering the period of the 15th, 16th, 17th and 18th centuries.

The study of ship types was reviewed after the publication of the finds of the Red Bay vessel (Grenier et Alii., 2007). More specifically, the ship type controversy between the concept of a nao and a galleon was reconsidered (Loewen, 2007: III-14-16; Barkham, 2007: V-1-42). The introduction of a regional view and a vast amount of archaeological remains refreshed a traditionally solely historical narrative, and gave new direction to the study of maritime history both for Spanish and Basque history. Although a great amount of archaeological work had already been done, by American archaeologists in the Caribbean, from Texas A & M, it had not yet been integrated into Spanish historiography,

According to the argument made by the work of Canadian archaeologists, distinctions could be made between naos and galleons and navio and zabra ship types, despite confusing terminology (Barkham, 2007: V-1). The root of the argument lay in the proposition that distinctions between ship types could be made by looking at their tonnage and proportions (Barkham, 2007: V-2). This perspective will be further expanded in Chapters 5 and 6.

The conceptual propositions described the ship type nao and were compared to contemporary ship types such as the French *nef* or the keel in the British Isles, or *knörr* used by Norse traders (Loewen, 2007: III-16). Just like the problem of ship types in Iberian shipbuilding, other ship type categories suffered a similar fate, such as the search for a hulk, keel and cog, a search for a concept that did not exist in maritime archaeology. This has been criticised by maritime archaeologists such as Adams and Zwick (Adams, 2013: 99-110; Zwick, 2016). Instead of focusing on distinctions in the bow castle, some of the central points of the argument to describe the differences between *naos* and galleons suggested essential changes in the hull proportions in the early-17th century's royal ordinances. This was what was considered the end of the traditional 1:2:3 proportional system for what they called Biscayan *naos* (Loewen, 2007: III-16). The search to find archaeological material belonging to a specific ship type, described by the written sources, was something which continued to be applied in the archaeological sources, however impossible to discern (Castro, 2017a: 231). Functionality and patterns, did not solve the problem of discerning ship types (Oertling, 2001). Further studies by other archaeologists searching for a concept of a ship type, in this case the caravel, came to some overall general conclusions, although without having found a particular (specific) definitive definition for caravels as a model to cover all examples (Castro, 2017b).

Ship type denominations such as nao, caravel or galleon, were not conclusively proved to be archaeologically different, in fact, Oertling's archaeological comparative study showed a paradox of the set of features of ships (Oertling, 2001; 2004). The shipbuilding set of techniques regarding hypothetical Portuguese and Spanish ship finds, shared features but also had evident distinctive characteristics. In this case Oertling went in search of a distinctive set of features representative of a ship type, the caravel. However, what he found, in his own words, surprised him with something else:

> *"It was something of a disappointment to discover that the difference between a caravel or a nao, a nao and a galleon, could not be discerned based on the construction features" (Oertling, 2001: 237).*

Combining ship types, elements from the galley were implemented with the round ship, a different vessel used for Atlantic navigations, referred to later as a galleon (Valdéz Bubnov, 2011: 51). However, historical work has brought attention to the fact that the word galleon was a generic term and did not refer to a particular set of features (Valdez Bubnov, 2011: 58).

Studies in regulations continued, this time related to the forestry management of the Spanish Empire during the 16th, 17th and 18th centuries in relation to the construction of vessels. One such study focused on the conflicts of interests behind these valuable forests. Through the regulations of the King, the Monarchy gained influence and extended and strengthened their power in the Basque region and other northern areas with important forests, such as Galicia and Asturias (Wing, 2009, 2013). Further extensive studies in the Spanish shipbuilding Ordinances from the early 17th century expanded the historical research into Spanish shipbuilding and in particular gave a detailed account of these proportions and ship architecture (Rodriguez Mendoza, 2008).

All of these views helped placing this research into a clearer gap that have not been covered, and that was perhaps the historical archaeological remarks related to the Bizcayan region that affected the way we can understand the Iberian shipbuilding, particularly the ships from the Basque region. Consciously or not, it can be argued that the mainstream narrative applying to the study of the Basque region, was driven by a "Spanish" narrative. In this sense, history could be used as a legitimator for a cohesive group, from previously chosen information, in order to contribute, consciously or not, to the reinforcement of nationalism, nation states, symbols and so on (Hobsbawm and Ranger (Eds.), 1983: 12-13). The use of history has sometimes been to legitimize a state's history (Real Alcalá, 2007: 46). However, defining a nation's boundary has been problematic, at least to determine the extent of it by limiting it to a single space and separated, seems problematic:

> *"What is a nation …it is not possible to discover any satisfactory criteria that allows us to say which of the numerous human colectivities should be labelled this way… there is no way to tell the observer how to distinguish a priori a nation from other entities…The*

attempts to determine nationalist objective criteria have been frequent… based in language, ethnicity, … a common land, common history, cultural characteristics… ” (Hobsbawm, 1991: 13)

“How indeed could it be otherwise, given that we are trying to fit historically novel, emerging, changing and, even today, far from universal entities into a framework of permanence and universality?” (Hobsbawm, 1991: 6)

Historians warned us already about the effect of pre-constructed narratives of identity that have not been fully addressed critically. Hobsbawm and Ranger warned that until history looks beyond inherited narratives of self-identity, past nationalist or ethnic preconceived identities, such as the essence of Spanish, Portuguese or Basque shipbuilding traditions, “*they are meant to be represented, recreated and reinforced in a cycle*” (Hobsbawm and Ranger (Eds.), 1983). In this sense, through the study of the ships of the Bizcayan tradition, I would like to highlight the ***mixture and porosity of traditions***, inherent to the Bizcayan case, but also their uniqueness, in order to acknowledge the local details, but also the similarities and mixture with Spain, commonality with Portugal and other regions showing a connected interdependent network. In the following section, I will argue that the Iberian Bizcayan ships shared individual characteristics, but also had their own cluster, as against the idea of only a Spanish overarching culture, that covered all of the Spanish Iberian side.

2.4 Archaeological theory of the 20th and 21st century:

The notion of Iberian ships was influenced by a search for a Spanish national narrative back in the late 19th century. The classic question of what a Spanish ship was, or what an Iberian ship is nowadays, is still steered by this Spanish nationalist view of defining what is within the boundary of the modern state. As pointed out by Ucko, the emphasis of much of the archaeology has been in pointing out the separation between “cultures” (Ucko, 1995: 12). Therefore, the focus has been mostly in creating a clear-cut distinctive idea of what each group would be, which could be said to be that of the Spanish shipbuilding’s space. Portuguese archaeologists Jorge and Jorge refer to how some debates are engaged archaeologically in a way that do not seem to look beyond, as referred to by other archaeologists, very particular identities in an “…*anachronistic and culturally provincial attitude…*” (Jorge and Jorge, 1995: 256). This is the main problem that this thesis is dealing with, which is the limits imposed through the view of the Spanish modern nation, setting a cultural boundary for the Bizcayan shipbuilding tradition similar to that of the political state of the Spanish monarchy. This view is anachronic for the 16th century, and does not take into account the transnationality of the Bizcayan shipbuilding tradition, that hybridized with other traditions and spread into France and the rest of Spain.

This will show a complex cultural variety within our notions of delimited "spaces" and how related to other separate entities the Iberian Bizcayan shipbuilding tradition was. But also, there is an interest in challenging the notions of separate "spaces" as if there were a clearly distinguishable border to be found for the Basque tradition. Social theory has shown how these "border areas" show a perspective of how "local" areas are tied into a dialectic relationship with other areas distant from their own society and that these took precedence, while their local culture was perceived as a backdrop by their own state (Wilson and Donnan, 2012: 7). As an example, it is no wonder why the spread of Basque shipbuilders has been not interesting for Spanish historiography, whereas local historiography in the Basque region has taken account of it, as it will be shown later on.

The term culture was used in a general sense by nineteenth century evolutionary archaeologists as only representing a single culture, referring to all the knowledge and beliefs of humanity that were transmitted by teaching or imitation, and that were believed to grow more complex and refined over time (Trigger, 1989: 233). This notion of culture could be said to be the one used in Spanish shipbuilding, which was seeking to find clear cut identity traces. While historians have been working on contradictory written records regarding ship types and confusing datasets, archaeologists did not have it any easier. Maritime archaeologists inherited decades of the use of historical ship terms, as will be explained below, and applied them to ship studies, particularly to notions of culture based on those complex ship remains.

2.5 Culture history and Diffusionism: Is there a sufficient proof for cultural continuity?

In this section, the idea of cultural continuity will be called into question, which has been theoretically inherited by archaeology from *culture history* (Harris and Cipolla, 2017: 16). When the word cultural continuity is used in this text, its meaning is that the same culture travels through space and time, as would be understood in the theory of diffusionism. This concept has dominated the idea of a Spanish shipbuilding, homogeneous within the same state, as understood in nationalism.

However, this chapter will present a view between the idea of repetition and replication of the same cultural forms, but it would be wrong to say that there is no continuity at all. As an alternative perspective, rather than proposing that the Bizcayan shipbuilding tradition did not replicated, this tradition will be presented as continually readapting in every network they create, particularly in the transition that occurred between 1550-1650. In this way, the concept of the ship as a network will be put forward, a view that attempts to see beyond the political boundaries of Spain of how ships were influencing each other. Considering the relationship between the idea of cultural continuity and hybridity, it would be relevant to point out one of the major problems found when using hybridization in order to explain cultural mixture, and trying to find the origins of cultural influences, e.g. tracing the origin of "technological diffusion". The problem of hybridity stems from the idea that something comes from somewhere else and becomes a new "thing". The trouble is that, if you could find the origin of that culture, you would not be objectively able to identify the separation, unless you create a word to distinguish it. Therefore, the separation is a construct, through language. This theory, however, has still not had a great influence on how the dominant view from Spanish history has understood the Bizcayan tradition, therefore the influence of nationalism needs to be addressed first.

Although this is a subtle influence, the idea of cultural continuity, is at the core of the most influential perspectives found in archaeology and history when speaking about culture, that had influenced the idea of a homogeneous Spanish shipbuilding. Culture history has been the canvas of most modern theoretical approaches of archaeology, concerned with "*establishing chronologies and sequences of types within specific regions… influences between regions can be documented, and so that regional traditions and the movements of people between them can be identified*" (Hodder, 2002: 80).

Vere Gordon Childe influenced the way culture is understood in archaeology, as he emphasised the need to delineate each culture spatially or temporally, in order to establish its duration (Trigger, 1989: 244). Childe influenced the way we think of culture from a diffusionist perspective, where culture travels from one area to another due to the technological rapid trade or copying (Trigger, 1989: 245; Johnson, 2010: 69). The result of the theoretical influence of culture history and Childe's approach to archaeology can be found in the interest for defining cultures and their origins with a diffusionist perspective. In other words, through an explanatory model of migration of culture (Trigger, 1989: 311). The archaeological theoretical background related to ships and shipbuilding inherited a similar approach, applied to the understanding of Spanish ship remains from that of land archaeology, and the notions of culture and tradition. The term "*cultural group*" or "*culture*" applied to archaeology was coined by Childe in 1929:

> "*We find all sorts of remains -pottery, implements, ornaments, burial rituals and ways of habitation- very recurrent. These complex associated features could be named as a "cultural group" or simply "culture". We understand that every one of these complexes is the material expression from what we would call nowadays a "nation"* (Johnson, 2010: 33).

The idea of a coherent Spanish maritime ship culture had much to do with this previous theoretical origin, in which the concept of archaeological culture was influenced by a nationalistic mentality. The idea of clearly separable regional traditions, was altogether emerging from the nation-state atmosphere of the late 19th century Europe (Hodder, 2002: 81). Childe himself doubted the validity of categories of archaeological culture, and left a dilemma, that had not echoed in the shipbuilding study of traditions, particularly to do with the Basque region and Spanish shipbuilding, as counter to the concept of a Bizcayan tradition reviewed in this chapter. By 1942, V. Gordon Childe was concerned as well, despite his initial conviction, with the inconsistency of a cultural category when he wrote:

> "*It would be rash to define precisely what sort of social group corresponds to the archaeologist's "culture" ... Culture and language need not coincide*" (Johnson, 2010: 22).

However, archaeological and historical sources have proved to be multiple in forms and variety, and the previous culture historical model has been problematic in a way, as we will find with the archaeology in Chapter 4, when applied to the Spanish concept of a homogeneous shipbuilding tradition. Particularly when regarding the shipwrecks and historical documents of ships, these sources are difficult to categorize when defining what belongs to which tradition. Here the theory of hybridization can point out to how culture or ideas do not just belong to a single group or space, instead, they might be common in different places or have "mixed", using the terminology of hybridization (Bhabha, 1994). This could be considered the evidence pointing to a cultural exchange of ideas far from the boundaries of political units, as it has been limited by the Spanish notion of its culture limited within its borders.

2.6 The introduction of Hybridization: A porous boundary and a mixed culture

Hybridisation will be taken as a theoretical basis taking Homi Bhabha's foundational work, *The Location of Culture* (Bhabha, 1994). Through the mixture between coloniser and colonised, Bhabha proves these categories are not true and instead proposes the ambivalence resulted of a cultural hybridization (Bhabha, 1994). In this, the use of the theory of hybridization between cultures has become more common in the archaeological and historical discourses (Castro, 2008; Van Pelt, 2013: 1-4; Herren, Rüesch and Sibille, 2012: 6; Adams, 2013; Kimura, 2017: 7).

Despite we cannot copy his model completely, as the Bizcayan region was already a *colonised* region, not by modern terms of colonialization, but by gradual conquest. In 1512, the conquest and surrender of the whole of the area of Navarre by the kingdom of Castile and Aragon, was the end of the political control of this area. Previously, the privileged region that the Basque provinces were, had allowed them an early Medieval development of a mercantile elite. The pressure from the growing Spanish Monarchy in the process of the creation of a fiscal-military state (Glete, 2002) during the 1560, it can be said that the Bizcayan "Bourgeoisie" cooperated under a clearly coercive manner, by which the Spanish state developed new bonds of loyalty and service, with the old noblemen's household in the Basque province's or the "*Parientes Mayores*", as we will see in depth in chapter 5. This way, it can be argued that the state's impositions by which the interests of the Spanish Monarchy to obtain military-cargo vessels were forced upon a mercantile construction of ships, became the way by which the traditional *naos* hybridized with these designs from the Monarchy, forcing a transition in ship design during the period 1550-1600 as it will be explained in chapter 6. This hybrid could be said to be a ship more ready for war, which had more elongated and shallower hull measurements and proportions to its predecessor the merchant *nao*. These apparent two ends of the pole, such as the war nao, galleon or call it navio or nave, were not but just inseparable stages of the adaptations of the Bizcayan tradition to the different contexts by the late 16th and early 17th centuries.

2.7 The influence of social agents and the interests of a growing Spanish fiscal-military state

This research, however, will not limit its scope to a technological-cultural perspective, or that of a simple object such as the ship, but will link the interests of local communities and monarchic Spanish agents with historical processes that influenced and built these ships. During the 16th century, the development of Spain as a nation-state, in a modern fiscal military state was developing (Glete, 2002). Parallel to this process, the status quo of medieval mercantile elites in the Bizcayan region was being challenged. This competition between the monarchy and the local bourgeoisie will be one of the theoretical stances to develop the concept of the Bizcayan tradition. An emerging bourgeoisie clashed against the old noblemen of the Basque lands or "*Parientes Mayores*" as it will be explained in detail in chapter 5. These two sides of the Bizcayan or Basque community fought for their control and use upon the timber usage and forests in this region.

The different interests were mirrored in diverse shipbuilding types, aiming towards specific functions, such as carrying cargo, and maritime warfare. Despite the Spanish monarchy sought to find an even balance between those two, the problems caused by the development of a military-cargo vessel purposely built to suit the interests of the Monarchy's expansion became a far ideal in an uneven reality. This different functions and interests will help characterising the Bizcayan tradition as an adaptation of carvel technique to a region that divided its journeys between the traffic of the Indies and Spanish Armadas, and the merchant and fishing voyages to trade with iron, fleece, cod fish and whale oil. This simplified dichotomy will give us further clues about the inner tensions within the Spanish Kingdom that favoured a privileged elite at the service of the King.

The Spanish monarchy gradually marginalised the merchant entrepreneur bourgeoisie. Ships built and used for the purpose of trading and fishing were confiscated on the Indias Routes and Spanish Armadas, became a problem for the Monarchy. In the loose territorial control that the state had over the Bizcayan region, the need for the Monarchy to find a useful war fleet made this region more strategic for a growing Atlantic empire that was the Spanish Empire.

However, by the 1550s, the development of Spain as a modern state, was still far from reality:

> "*The development of states with extensive bureaucracies, permanent armies and navies and a centralised political control over territories fundamentally changed the relations between state and society…At the same time the transnational power of composite empires and the church as well as the localised power of feudal and mercantile groups was reduced. Their ability to use violence independently of the centralised territorial state declined decisively."* (Glete, 2000: 5)

The monopoly of violence and the increasing ability to extract resources from society and the creation of permanent institutions, armies and navies (Glete, 2000: 5), was still not a reality by the mid-16th century for Spain. In fact, the institutions to manage woodland in the Bizcayan region, and the role of an agent of the King to supervise the construction of ships only settled down by the early 17th century as a leading role that was passed on by generations (Gomez Rivero, 1986). As Glete argues, the development of state formation linked to the creation of a navy, needs to be considered. In this case, the understanding of Spain as still a challenged power by territorial elites, such as the bourgeoisie of the Bizcayan region, was a reality during the 1550-1650 period. Glete himself criticized some of the views that have dominated the study of naval history in Spain and Portugal, claiming the following:

> "*The Atlantic concept that navies may have a dynamic inertia of their own and that they embody the sea power of the nation is seldom to be found in the Mediterranean area. Fernand Braudel's magnum opus about sixteenth-century Mediterranean is typical of this type of history. It is a study of structures and events but in spite of Braudel giving much scope to warfare at sea, he does not treat navies as parts of the structure. The same approach to history has dominated the analysis of Spain's and Portugal's naval activities even outside the Mediterranean area*" (Glete, 2000: 8)

These ships were designed to carry cargo and had deep holds; however, those were the majority of ships that were confiscated for the Armadas of Spain. The merchant ships were the ones that were taken to France and also those that returned to the traditional fisheries in Asturias and Galicia (Enriquez and Sesmero, 2000: 705; Truchuelo García, 2007: 174). The integration of the regions with the monarch was interdependent. At the same time the Spanish Monarchy used old noblemen to gain influence over local provinces, the old feudal power holders found a way of gaining influence and recovering a lost fight of power in the Basque provinces. The organisational structures developed by the state (Glete, 2000: 61), there was a two-sided benefit, that of the central state obtaining administrative ability to extract resources, and the compromises made with local elites, who profited from this relationship:

"*State formation or state building expressed itself in organisational structures of which armies and navies were the most important consumers of extracted resources: men and money. But in the early phase of state formation, coercion, violence-control and protection might also partly organised through various networks or coalitions between the elite groups in society.*" (Glete, 2000: 61).

2.8 Shipbuilding traditions in maritime culture: An inherited ontology from Culture History

After Childe's influence, culture-history remained the prevalent group association that the study of shipbuilding traditions followed. This notion of identifiable categories of cultural groups was used by maritime archaeologists and applied to the study of Iberian shipbuilding based on the ship's contours. The way the Spanish side was understood culturally emerged from a nationalistic view, a way we see the world in the 21st century, by defining and describing which individuals belong to this state and which not, and to which extent this space extends as a state (Real Alcalá, 2007: 48). This is a typical trend that started in the late 19th century in Europe, still influencing a Spanish narrative of shipbuilding (Real Alcalá, 2007:48). It could be said the objective of this type of research is to find the essence and original concept of this nation, by legitimising it and maintaining it. This perspective seeks to preserve the nation as it is and to define it in a spatial way (Real Alcalá, 2007: 51). This has been translated as the "*ontology of the nation*", as well as the "*ontology of the state*" (Real Alcalá, 2007: 51). It is relevant to mention the spatial dimension of this type of perspective, was anchored in a geographically definable area, in this case the Iberian Peninsula. In this sense, one space is separated from others according to their "cultural differences". This geographical denomination limits some of the processes inherent to the spread of technique in Bizcayan shipbuilding into France by the mid-16th century as it will be seen later on.

There is a duality here to be mentioned, that it is necessary, and in a way, we have to create the "other" in order to be able to fit our research within this narrative's framework. Sustaining an opposition is something that has been considered of major importance in order to maintain an identity, by stating what it is not. Therefore, a nation could be said to be constructed due to the necessity of opposing a defined "other". By emphasising this separation, the nation reaffirms itself. In a way this is what Western thinking has been based on, by defining what it is not (Harris and Cipolla, 2017: 173). In this way, based on the dual atmosphere of the archaeological discipline, the cultural landscape has been depicted as one in opposition to other entities. Again, this view seems to have steered more influentially how the shipbuilding of the Basque region evolved, within the confines of the Spanish nation, and not that much in a transnational way. However, contemporary archaeological works have already moved from static, separated frameworks of cultures, and started to use more connected concepts, for example the term "synaptic" meaning that traditions and cultures in maritime archaeology are more complex. Shipbuilding traditions have been said to have more value and more potential than "*archaeological cultures*", due to their interconnectedness and synaptic nature, as they overlap and interact (Adams, 2013: 25).

However, thanks to the theory of hybridization, we can incorporate a scenario where these binary notions are revealed as constructions, both for the idea of a "Basque" as against a "Spanish" shipbuilding. This will not be a classic colonial discourse of "coloniser" and "colonised" binary opposition, as was criticised by Bhabha (Bhabha, 1994). Instead, through the hybridization of culture, Bhabha denies the dualism, arguing it is false, by proving the blend (Cipolla and Harris, 2017: 178). The theory of hybridization shows an alternative scenario, where the binary cultural view of the "other" is in fact "mixed" or not rooted in the idea of a "pure" culture, as in the case of the Iberian Bizcayan shipbuilding, a mixed case with Spanish, Portuguese, English and other techniques. This idea is contrasting that of an idea of a "pure" essence:

> "*Essentialism assumes that all members of a group possess key characteristics and values. These characteristics and values are unchanging and essential*" (Harris and Cipolla, 2017: 177).

In this apparent binary opposition, a typical/common attitude is to take a stance either against the great *nations* and in favour of the small *nations* or vice versa (Real Alcalá, 2007: 47). However, in this work the defence for either one side or the other is replaced with a broader spatial and cultural context of archaeological and historical research, leaving aside the negative/positive discourse. For this reason, regional perspectives will be the starting ground, followed and broadened by a transnational cultural view in order to address the "mixture" with "other" shipbuilding traditions. This trend has already been emphasised in many maritime archaeological works, and it is not unique to this one (Castro, 2008; Adams, 2013).

2.9 The emergence of Shipbuilding Traditions in Maritime Archaeology

On the following lines, the concept of a tradition will be explained, which will be used during the whole thesis for analytical purposes, hoping to clarify the narrative of a Bizcayan shipbuilding tradition. During the early 1970s some of the first identifiable characteristics of a shipbuilding tradition were described. These were very similar to what was also a traditional viewpoint in Anthropology. In anthropological categories, prejudged views on the nature of cultural continuity were described by the space of the factors determining the form of units, in this way anthropologists could identify the elements to distinguish ethnic groups (Barth, 1969: 12). In other words, anthropologically, cultural characteristics were spatially recorded, in order to define to which extent, the space of such group could be defined. This would be conceptually how the view of the Basque region was understood before, as being equal to the Spanish states' modern borders.

By the 1970, maritime archaeological research used similar categories of culture, to refer to "different" groups. Initially the shell and skeleton techniques became a foundation, by which active or passive elements were identified in the construction sequence, as well as mixed techniques between those two initial categories (Basch, 1972: 16-29). Some of these techniques used by shipbuilders who built without a mould, or by eye, were used to distinguish from those using moulds, as these latter ones were considered to be of Mediterranean origin (Basch, 1972: 34-38). The similarities between ships in distant areas were considered a result of diffusionism, implying a contact and transfer of technology between distant areas (Basch, 1972: 53). This therefore implied, assuming the resulting technique and the original technique did not change, that ship techniques were transferred in space maintaining their essential form in origin, similar to the idea that a nation's essence is permanent through time and space.

Initially, the notion of a distinguishable cultural border was still maintained in maritime archaeology, despite anthropologists having begun to describe an unsolved notion of cultural borders from the late 1980s. Particularly, some obvious problems on how to find an essential criterion to define a cultural border was critically addressed (Kahn, 1989). There are potential uses of technology in every space, but to "*objectively demarcate these cultures is impossible*" based on these cultural traits (Kahn, 1989: 20). Anthropological theory was already aware that the idea that there were discrete or fixed cultural groups had no scientific validity, as there were no common ideational features and forms to separate a population unit (Kahn, 1989: 21).

This trend will be picked up much later by some fine maritime archaeologists who acknowledged a more complex cultural scenario as it will be shown later on.

Maritime archaeologist Christer Westerdahl mentioned: "*The validity of the use of term culture in an anthropological sense has recently been called into question... This critique seems mainly based on the problems of delineating borders between cultures. There are, according to this view, no clear-cut cultures. They are all products of creolization, how is then a border to be discerned?"* (Westerdahl, 1994: 265).

Despite these problematic considerations to define boundaries, the term "maritime traits" was coined in the early 1990s and the idea of centres of maritime cultures was a result of these maritime spaces (Westerdahl, 1994: 267). The idea of a Bizcayan tradition will be similar to these spaces. These centres were sometimes a core of transporting activity, of transporting zones, where building, maintenance and management of ships took place (Westerdahl, 1994: 267). The term tradition was defined as a repetitive human behaviour according to Westerdahl's view (Westerdahl, 1994: 267), therefore, according to this view the idea of a tradition was that of a homogeneous space of construction techniques, similar to how Spanish shipbuilding has been considered to be.

Some authors had been critical of concepts of groups, in maritime archaeology, not supporting the idea of a completely consistent group. Hocker himself mentions; *"…concepts of similarity and dissimilarity are highly idiosyncratic, so there might not be such a thing as a cultural norm.*" (Hocker, 2004: 3). He continues; "*If archaeologists attempting to impose a completely rational, if subjective, typology on a group of artefacts cannot agree on which criteria are significant and which objects belong together, why should they expect people of the past to be any less vague or inconsistent…* (Hocker, 2004: 3).

2.10 The birth of the concept of Iberian Atlantic ships: Requirements for a local shipbuilding tradition

The idea of a set of techniques was considered by archaeologists when they were dealing with potential remains of Spanish and Portuguese ships, which due to their similarity of construction were initially considered of the same tradition. In other words, that there was a singular set considered to be common to many ships of both nations. Although some presupposed ideas were aiming in the right direction, some other views have had the opposite simplifying effect when studying the Iberian family; in this case the remains within Spain.

This is not a general statement, but the following is applied to the study of the Bizcayan region, in shipbuilding terms, in Iberian and Spanish archaeology: National self-determination has been pursued through these archaeological findings (Trigger, 1989: 311), despite being often the case that archaeologists have to "read" the remains, as Adams mentioned, when referring to the remains of a ship, that "*however painstakingly described, it often remains frustratingly mute*" (Adams, 2013: 50). This "reading" lens which has been used lately, in Spanish history, and generally in Iberian shipbuilding studies, but particularly with regards to the correlation of the Spanish shipbuilding as against the Bizcayan tradition, has been similar to that of land archaeology. Many times, archaeology has been searching for national assertion, defence of national identity and promoting national unity in opposition to class conflict (Trigger, 1989: 311), although it cannot be generalised, it can be argued that to a certain level, this view could be representative of the "Spanish shipbuilding" concept for the 16th century and 17th centuries.

This view has limited the understanding of the Bizcayan region, particularly the way in which archaeology related with the Iberian Peninsula has been understood through the idea of an early Spanish unified culture. Despite this having been the case, in this study the culture historical view, applied to Iberian-Atlantic shipbuilding, particularly Bizcayan, will be deconstructed. This claim for a need to diversify archaeological theory is to incorporate other voices with alternative narratives to the dominant ones (Hodder, 2002: 86-87).

However, this should not be seen as an attempt to challenge mainstream narratives and authorities, but to actually show a valid view that is complementary to these, and not an argument in opposition to the main views, but rather together with them. In this way, one believes that the acknowledgement of a Bizcayan shipbuilding tradition is a nourishing narrative that can be incorporated to understand Spanish history and archaeology of ships, in a way that the mixture of Basques and Spanish communities have no separation, as well as the incorporation of those differences to a broader narrative of exchange in a Euro-Atlantic scale.

Some of the limits of equalling national identities with archaeological remains, and the limiting effect of nationalism in archaeological studies has already been called into question. In this study, the need for a regional narrative is highlighted, in order to appreciate "*the specific qualities of archaeological deposits*", in this case the Bizcayan tradition. Archaeology has been required to move beyond a national narrative, limiting "*new understandings of the past*" (Maarleveld, 2012: 422-423) which has clearly changed in many countries and their archaeological tradition, but perhaps still drives the lens through which the Spanish case for the 16th and 17th centuries has been dealt with:

> "*…the archaeological discipline started to realise how fundamentally nationalistic some phases in its development had been… and how much it had served national, colonial and imperialistic agendas…*" (Maarleveld, 2012: 419)

In this sense, more related to the Spanish shipbuilding, and particularly the Bizcayan one, the limiting effect of a presupposed cultural homogeneous reality in Spain, had not highlighted the details of regional differences and spread of the culture beyond the Spanish national borders, in a time were the Spanish state was still developing and was not fully formed.

Steffy himself, spoke about the ship as a representation of the economic, political and mercantile values of a society as well; "*This is where we can learn about the disciplines, the economics, the technology, and the philosophies of societies. And each society approached these problems in different ways*" (Steffy, 1994: 11). In a way, it seemed that there was a commonality of a social group, which would apply to the Bizcayan Bourgeoisie and their large ships. From these notions of commonality, in 1989, the concept of an Atlantic vessel's tradition was born, by describing a set of traits of construction from a number of shipwrecks with similar characteristics related to the Iberian Peninsula (Oertling, 2001: 237). Oertling perhaps subconsciously, assumed that he would find an identifiable "Iberian-Atlantic trait", different from other "shipbuilding traditions". The concept of Atlantic vessels had an extensive archaeological view grounded in a set of different characteristics that became a guideline to identify these Iberian-Atlantic patterns:

> *"This author's initial objective in studying the Molasses Reef and Highborn Cay wrecks was to identify the characteristics of a hull that would indicate a caravel. But instead, a fairly consistent set of features unrelated to size, purpose, or geographic location were found. What did these traits represent? A unified and accepted method*

> *of shipbuilding representative of the practices on the Basque, Portuguese and Atlantic Spanish coast"* (Oertling, 2001: 237).

This compilation from different shipwrecks became an original theoretical framework created to identify Iberian ships from many archaeological discoveries, continuing from the Atlantic concept (Oertling, 2004). However, this Atlantic notion of tradition was not fully consistent or homogeneous when pinpointed as a ship culture, including some variations, as it will be seen in Chapter 4.

This is the paradox that will be discussed when studying Oertling's concept. Although Oertling's concept grouped Iberian ships of both the Spanish and Portuguese sides into the same categorical label, there were remarkable differences within the Iberian Peninsula in terms of the construction of ships, which challenge the Iberian-Atlantic model as an general overarching model to define all ships built in the Peninsula. The Atlantic shipbuilding features table, later named as Iberian (Oertling, 2001: 234), provided specific characteristics that could be identified in shipwrecks in an archaeological way.

Oertling's attempt to prove such coherence, however, did not consider proportional differences, and differing elements of ship design, sometimes not accesible to the maritime archaeologist, unless extremely good preservation of the wreck was provided. In other words, the concept of Iberian ships was overly focused on shipbuilding construction characteristics, truly similar on a broad scale, but did not address dimensional and proportional differences within the Iberian Peninsula, that were remarkably different.

For example, one could not simply label ships designed to travel for eight months, as far as Indonesia and Japan, such as the enormous 16th century Portuguese naus das Indias, e.g. Nossa Senhora dos Mártires (Castro, 2001; 2005) of perhaps 800 tons, under the same category as much smaller vessels designed for two to three months of travel, to go to the Newfoundland fisheries, that were considerably smaller, eg, the Red Bay vessel, of roughly 200 tons or perhaps a little more (Grenier et alii, 2007).

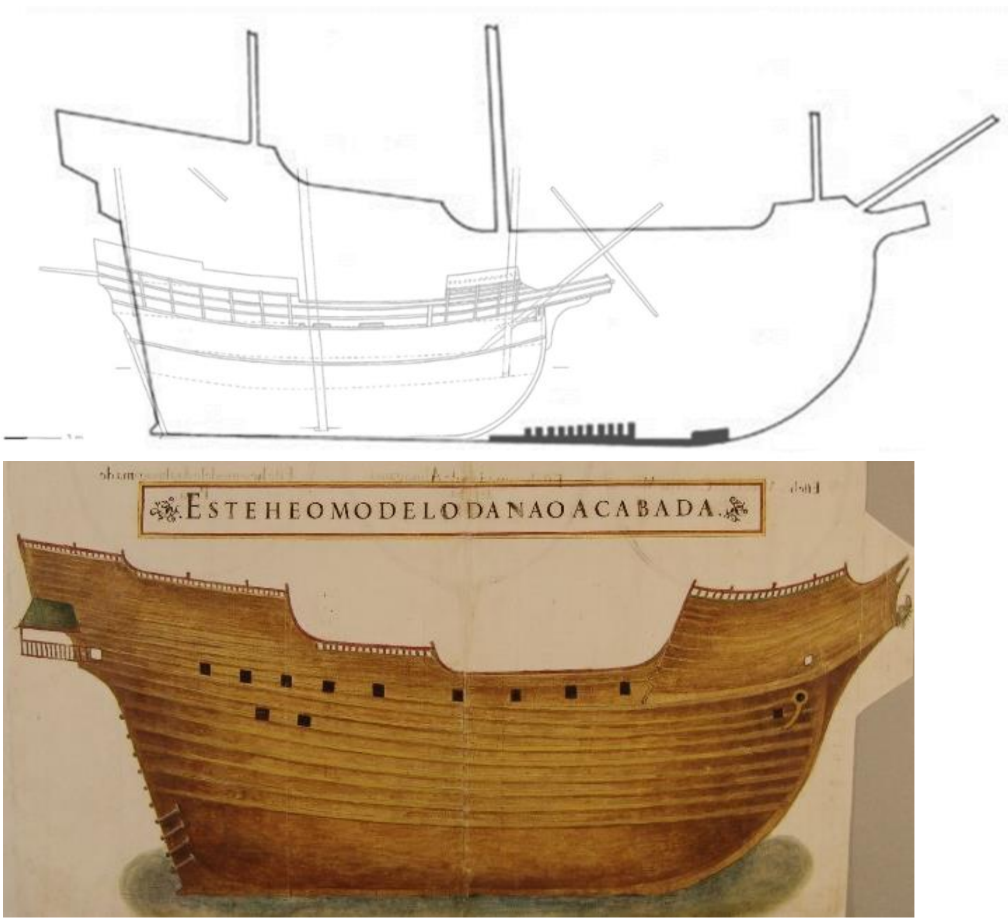

Figure 2.1 (Top)Reconstructions of the Red bay vessel (1563) as against the larger Nau das Indias, nearly double in size, Nossa Senhora dos Mártires (1606), or Pepper Wreck. (After Grenier et alii, 2007; Castro, 2001; 2005). Comparison made by the author. Both reconstructions are at the same scale. (Bottom)Portuguese Nau das Indias 1616 (After Manuel Fernandez, Libro das traças de Carpinteria).

The quantitative differences of these varied examples of ships built in the Iberian Peninsula, required a more detailed definition and perhaps exhaustive categorization of an overly generalistic attempt to describe the whole Iberian Peninsula. Despite Oertling's observations on ship construction similarities being right by showing that overlap, other elements showing differences will be outlined in Chapters 5 and 6.

Many relevant ship design aspects have been addressed after Oertling's work. Particularly Castro has moved forward the study of the Iberian shipbuilding concept (Castro, 2008). The inclusion of ship design in the Iberian concept was a crucial process to be studied, relevant to the transitory practices in the Iberian Peninsula. Mediterranean ship design techniques were introduced into the crafts of the Atlantic. In the long term, these practices gave more control "points" to the shipbuilder, instead of using the "eye" technique and having fewer undefined parts. As an example of the mixture of the Atlantic and Mediterranean techniques, from which most of the Iberian "traits" could be found, was the Red Bay vessel, considered an Iberian ship by Loewen (Loewen, 2007: III-316-317). However, the clear Mediterranean influences in the vessel, blur the lines between what the concept of a Mediterranean ship and an Atlantic one is as it will be seen in Chapter 4. Trying to understand ship design in these Iberian features, some emphasis was made in the design of the ships and influences from an archaeological perspective. This was based on the identification of shipbuilding features, as well as adding to the debate naval architectural elements of the master frames, particularly the rising and narrowing techniques, known as *besta* in Italian (Castro, 2008). The contributions of a historical-archaeological perspective in Iberian ship studies have been challenging to the theoretical framework of a coherent Iberian tradition;

> "*Although a sizeable overall sample of shipwrecks has been studied around the world, there is no one type with a sample large enough to approximate the principle of redundancy practiced in terrestrial archaeology. From a history of technology perspective, synthesis of broad interpretive schemes and conceptual modalities is not possible from shipwreck data alone.*" (Castro, 2008: 63)

Many shipwrecks found in the Caribbean were potentially labelled as Iberian after being analysed, taking into consideration the high similarity of elements that could be observed in their remains, using this idea of the Iberian Atlantic concept created by Oertling (Steffy, 1994: 128-149). However, the shipbuilding tradition some of these construction characteristics belonged to was not clear. In some cases, it was possible that the ship remains were English, but they could also be of Iberian origin. Differences between ships have not been taken into account as much as similarities. The overall emphasis has been on the separation, and inner similarities, or homogeneity, but not on what does not fully adhere to the concept. And that is why the Atlantic-Iberian conception is reviewed in this work, because it has not explained the exceptions to the selected characteristics by Oertling (Oertling, 2001; 2004). In other words, there are some cases that challenge the technological spatiality of the Iberian Atlantic concept, and suggest we should be looking beyond the Iberian Peninsula as will be addressed in Chapter 4. It is thought very likely that Arab shipbuilding has influenced Iberian shipbuilding in a major way as well (Castro, 2008: 63). External influences to the Iberian tradition were therefore addressed by Castro, from Arab, Mediterranean and Baltic techniques (Castro, 2008: 74-76). Therefore, I consider Castro as being a pioneer in the understanding of the Iberian family as a transnational process, by identifying the influences received and areas influenced. This will be further studied in Chapter 6. However, due to the idea that the Basque region's culture reached the borders Spanish nation and not beyond, all of the spread of the Bizcayan technique of shipbuilding by the late 16th century was not taken into account when studying the Spanish case, particularly the Bizcayan shipbuilding tradition.

2.11 How can you define a cultural boundary?

> "*From the end of the Middle Ages, the idea of a territorial sovereignty, together with the rise of some national identities, prompted the creation of a primitive concept of border…during the 16th century cartography was exceptionally developed. Maps and Atlases became for monarchs and states symbols of power and instruments for their own political and military strategies."* Translation by the author. (Pelayo and Tarrés, 2008: 112-113)

The concept of borders from the 18th century has been so ingrained in the study of Spanish historical and archaeological cultures, that it has been imposing a dividing view, anachronic to the 16th century. Borders have been identified according to Paasi as being a socio-cultural construction, those of a nation state (Paasi, 1999). This is quite a typical anachronic misconception because, in the 16th century, territories still had no defined shape (Pelayo and Tarrés, 2008: 113):

> *"More than static and impermeable, boundaries were elastic and porous. There was linguistic continuation, jurisdictions that would transcend towards the "other" side, and endless disputes, as a result of long revindications over land ownership and so on… It should be remarked that the development of cartography and geography contributed - Together with history, the literature of traditions and so on- as an affirmation of national identities…"* (Translation by the author)
>
> *In the texts of those primitive geographer there was an interpretation and an appropriation of space over which the geography of an economy, physical and human was constructed, and they made it belong to a particular collective: The "French", the "English", the "Scottish", and so on, of whom they made an anthropologic characterization*" Translation by the author (Pelayo and Tarrés, 2008: 113).

For Maritime Archaeologists studying the remains of Iberian Spanish 16th century vessels, the concept of borders, which influences the way we see the 16th century from the 21st century, can affect the way we understand the past. The Cattewater wreck was an example to illustrate this point, which will be addressed in Chapter 4. This ship sank in English waters. However, its origin is still unknown. Whether this ship is evidence of the remains of English or Iberian Bizcayan shipbuilding is unclear. Connections between the English and Iberian traditions have already been pointed out. For example, Adams mentioned there is strong evidence showing an early exchange of technology between Basque and English shipbuilding (Adams, 2013: 74).

Culturally speaking, the uncertainty of the spatial-technological origin connection being of a possible English or Iberian Bizcayan construction is problematic to say the least. This will be dealt with in Chapter 4. However, there is some opportunity for a narrative that could go beyond the general identity framework that we are used to in the 21st century. In other words, a cultural reality that does not match our identity framework. Could we speak of a culture that seemed to have clear similarities, despite being spatially distant? These notions will be discussed in Chapter 4 in more depth.

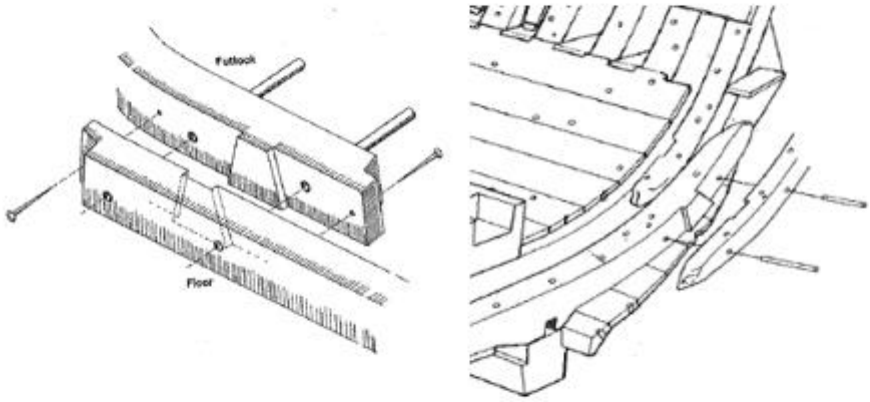

Figure 2.2 Example of common features. Dove tail joints, iron fastenings and treenails. Examples from the Molasses reef wreck (On the left) after Oertling (Oertling, 1989b: 233) and Cattewater (On the right) after Redknap (Redknap, 1984: 99).

Although we can see similarities and compare features, there is a spatial designation to these wooden remains that is unknown. It is known that technology is not fixed to a particular space, but rather can travel and be adapted and modified to other spaces and contexts. In this sense, the future of dendrochronological approaches here could be essential as a research line to give a closer spatial-temporal context to ship remains. However, the combination of dendrochronology and the study of shipbuilding has not been very popular until recently, due to the disparity of recording methods, as a result of which a general overarching analysis of a large sample of shipwrecks has been very problematic. The application of dendrochronological practices in Iberian shipwrecks could potentially be used as they have been in other archaeological periods and cultures:

> "*Early examples of successful application include the dating of the Bremen cog to AD 1378-1379…During the early 1990s tree-ring results were presented for the first time for a number of ships finds which had been excavated many years before. One of the iconic ship finds from Roskilde Fjord, Skuldelev 2, was not only dated precisely to AD*

> *1042 but shown to be constructed from oak derived from Ireland, an early instance of dendro-provenancing…Developments in methods to identify the source of timber employed in ship construction drawing on the increased geographical availability of historic tree-ring data have been applied successfully in sourcing timber for the planking of the Karschau Ship from Schleswig-Holstein to the area around Odense, a medieval town on the island of Funen, Denmark in the AD 1140s*"(Nayling, 2009: 67-68)

Different archaeologists recorded different elements and used a variety of methodologies. But this was common in Archaeology in general. Archaeological works have been very different from one another, *"…almost of a different planet of assumption and activity…archaeologies driven variously, and to different extents, by ethnicity, by heritage concerns and by nationalism*" (Ucko, 1995: 8). When it comes to Maritime Archaeology, Steffy himself makes a comment related to the study of shipwrecks: *"…the details recorded varied with different academic priorities and as such, the information reported was difficult to compare across wrecks…"* (Found in: Castro et alii, 2017a: 3).

The development of the concept of a boatbuilding tradition continued to be used, considered as a style at a particular time and space of building. These "*building traditions*", as mentioned by McGrail, were an abstraction from reality, therefore the complexity of the concept was not completely representative of all the variations from ship to ship. According to McGrail, each ship was in a class of its own due to the unique forms that were built in a pre-industrial era. Ignoring some particular dimensions, it was considered fair to claim that different ships were of the same tradition, despite the diversity in construction (McGrail, 1995: 139). This is the view we take to understand the Iberian Bizcayan tradition. The arbitrary nature of concepts of traditions in terms of time for the purpose of classification were obvious, as earlier and later phases of traditions were thought to merge with other ones, as McGrail described. However, for the purpose of showing patterns otherwise obscured, complexity was openly discarded, with the danger that if it was driven too simplistically, it could lead to ways of drawing unwarranted conclusions (McGrail, 1995). Schemes were considered that should not be fixed into static theory, but that paradoxically, they needed to be updated with new discoveries to fit the facts of traditions (McGrail, 1995: 139-140).

Following up this stream of ship features and traditions, the proposal of an identifiable system of architectural signatures led to a continuation in the efforts to define and distinguish shipbuilding traditions in a spatial manner. According to this view, a variety of features in a wreck could be designated as part of a shipbuilding group or tradition. This is the criterion used in this research to claim that there is a Bizcayan cluster of a ship tradition. These "*signatures architecturales*" or architectural signatures, became the marks of a shipbuilding tradition according to Rieth's contribution (Rieth, 1995).

In 1984 in Dorset, the Studland Bay wreck was discovered. Thomsen mentioned that the wreck had a similar construction to the concept of an Iberian-Atlantic vessel (Thomsen, 2000: 83). However, Thomsen critically emphasised that: "*The concept of "a shipbuilding tradition" is artificial (Though useful) and that perhaps the concept of a "continuum" of several interrelated "traditions" is perhaps better suited to describe the reality of an ancient hull structure*". In this work I believe Thomsen is right in pointing the non-separated nature of traditions.

Identifiable patterns, fundamental differences and shifts in technology were the categories that were proposed in order to deal with "*a near-chaos otherwise unwieldy*" (McGrail, 2001: 7). Similarities between far distant boatbuilding traditions, were not necessarily the result of influence from other shipbuilders, from whom they learned. On the contrary, seeking more structural, hydrodynamic and hydrostatic requirements in a ship, humans followed these needs, common amongst maritime communities (McGrail, 2001: 435).

As with the work related to the Atlantic tradition, Crumlin-Pedersen defined the "*Nordic clinker construction*", based on the characteristics of archaeological finds. The shape, the shell of the hull, interior timbers, plank fastenings and caulking materials and tools, were considered to be essential features of the Nordic tradition (Crumlin-Pedersen, 2004: 47-49). The focal area of a region, particularly the Scandinavian one, included the areas of Norway, Denmark and Sweden. Despite the initial consideration of the tradition, similar examples were found beyond that region; "*some isolated examples of the Nordic clinker technique were found on the Iberian Peninsula*" (Crumlin-Pedersen, 2004: 43). This again would show a problematic ambivalence of the idea of a technique solely linked to an original space over time and points out more towards a transnational cultural exchange.

Maritime Archaeologists described further classification characteristics and two were considered to be the major construction phases distinguished in the history of shipbuilding. An older one in which traditional shipbuilding, with an elementary conceptual phase, would use a simple global idea of the ship based on fundamental dimensions and proportional ratios, and a modern one in which the use of line drawings and hull calculations were used for the same purpose (Pomey, 2004: 27). Pomey, together with Kahanov and Rieth grouped, according to shipbuilding characteristics, what they identified as shipbuilding traditions in transition from the Mediterranean shell technique to skeleton based construction (Pomey, Kahanov and Rieth, 2012: 305-308). This previous research has also influenced the idea in this thesis of a trend of ship design that passed through the Iberian Peninsula and spread towards the northern nations.

From these notions, other archaeologists have further identified potential Iberian archaeological sites. New works in The Azores in recent years have shed light on Iberian shipwrecks, in a classic shipbuilding approach defined by Oertling, which was used this time as well to ascertain the ship's identity as Iberian. In particular, the examples of the Angra D and C were identified as Iberian Bizcayan ships. (Garcia, Monteiro, 2001: 168; Bettencourt and Carvhalo, 2009; Fraga and Bettencourt, 2017: 445-449).

Some new discoveries in the Mediterranean extended the debate of distinctions between the Atlantic and Mediterranean traditions, through the shipwrecks of Mortella II and III (Cazenave, 2011). Pursuing a traditional archaeological approach based on the hull remains and having initially potentially associated them with the Atlantic tradition, these remains were associated in the end to a "*Mediterranean maritime space*" (Cazenave, 2018: 33).

This transnationality of culture is the view we take with the study of the Iberian Bizcayan shipbuilding tradition. In his approach, the craft tradition was considered a system of ideas about how to build boats and ships and design them (Adams, 2013: 24). These were also considered to be bound by inner and outer tensions, expressed in the changes by which "traditional" values are similar to a push and pull relationship between conservative and innovative attitudes in the practice of a tradition. "External" influences to these traditions, have been considered to be in; "*a constant dialectic tension*" (Adams, 2013: 25).

A shipbuilding tradition however, must also be considered as not necessarily clear, or coherent, when practiced by individual shipwrights. After serious consideration on the construction of the Duart Castle shipwreck (1653), Martin considered it likely that no norm was followed in 17th century shipbuilding, despite our belief in a ship construction norm, which one believes at some stage there might have been coexisting methods, particularly with regards to the change of technique from clinker to carvel; "*No attempt has been made to apply formal contemporary rules for developing the hull shape, since these are varied, often* *ambiguous, and (one suspects) rarely followed by practising shipwrights*…(A little further on he continues)*… even as late as 1668 the 1200-ton 1st rate Charles had been built, according to the diarist John Evelyn ...'by old Shish, a plain, honest carpenter, master-builder of this dock, but one who can give very little account of his art by discourse, and is hardly capable of reading, yet of great ability in his calling. The family have been ship carpenters in this yard above 300 years'…*" (Martin, 2017: 81-82).

Traditional approaches to classify the archaeological evidence of a shipbuilding tradition have not found a clear classificatory criterion to distinguish one shipbuilding tradition from another. This is one of the ideas we implement into the concept of a Bizcayan tradition. This is very likely a result of the variety of details and construction diversity of each ship find, compared to its contemporaries (Schweitzer, 2013: 175). Schweitzer mentioned the limiting effect these concepts can produce in shipwrecks that do not fit into them, which could instead challenge and bring new questions to the topic (Schweitzer, 2017: 304-308).

Schweitzer's point can be related to the 16th century context in which there were no fixed closed borders, but rather permeable open ones (Pelayo and Tarrés, 2008: 113). For this reason, a limited or isolated ethnicity, such as the Basques, the Spanish, or the Portuguese, can instead be seen in a wide spatial context with no limits between people, but those imposed by our national mentalities. Although nationalist Spanish historiography has disregarded this historical fact, there is a whole historical-archaeological research line which has studied the changes in the Bizcayan shipbuilding tradition, a tradition which extended its influence into the French side and western part of Spain during the late 16th century, as it will be seen in Chapter 3.

2.12 A proposition for a Ship ontology: The Bizcayan shipbuilding as a network of an interdependent Tradition:

One of the main driving ideas regarding Iberian shipbuilding is that of a homogeneous "set" of characteristics, belonging to the Iberian tradition. While it will not be denied in this work that there were ships built with methods and conceptual approaches of similar use in the Iberian Peninsula, the perspective proposed here is that there is a great deal of details we miss with all-encompassing generalist labels such as Iberian. Iberian cannot be denied as a spatial reference to the ships built within the Iberian Peninsula, however, the cultural influences and traditions from which they flourished are a little bit more complex than an overarching concept applicable to all cases found in the Iberian space, considered of the Bizcayan Tradition.

Generalisation has been a common theoretical attitude in ship archaeology, in order to set theories that explain vast amounts of data that connect wide areas with some commonality among them, despite the individual differences between communities. In 1978, Keith Muckelroy wrote: "*Generalisation is fundamental to all academic studies. In the physical sciences, no two experiments or samples are exactly alike in all respects, but the scientist must concentrate on those similarities which appear to him to be significant in the context of his particular study, be it colour, chemical composition, size, shape, or whatever and overlook the evident differences; the results will be enshrined in hypotheses, theorems and laws*" (Muckelroy, 1978: 226). In 1978, Keith Muckelroy defined three ways of studying ship archaeological contexts; the ship as a machine, the ship as an element in a military or economic system and the ship as a closed community (Muckelroy, 1978: 215-225). To these different angles from which a ship could be considered, Jonathan Adams added the element of the ship as a society (Adams, 2013: 22). Following these views, the network view and mixed view is pointed out.

2.13 Conclusions

The transnational aspects of the Bizcayan tradition, a sub-category of the Iberian one, not only give emphasis to those elements they have in common with distant traditions far from the Peninsula, but also to emphasise differences within the Peninsula. This view shows some of the elements that have not been considered when dealing with the Bizcayan region, mostly understood and limited by the idea of the Spanish nation and its closed borders. In order to understand the "tradition" from these remains, but also so as not to ignore those individual cases, a heterogeneous shipbuilding tradition as a concept will be proposed, to show cultural diversity within a region. Without trying to establish a new paradigm, the use of a transnational network of culture will be a perspective that shows how interrelated some places were, without forgetting the different and unique elements of the Bizcayan tradition. The notion of a network of an interdependent shipbuilding tradition will be proposed to analyse the transnational aspects of the Bizcayan culture, similar to those of other areas.

3 *Adapting to a period of crisis: The reorganization of the resources of the Spanish maritime Kingdom and economic alternatives of the Bizcayan Bourgeoisie. 1560-1618.*

3.1 *Introduction*

This chapter attempts to develop a transnational cultural perspective applied to the study of Iberian ships, particularly the study of Spanish shipbuilding, and the case study of the Bizcayan tradition. This view was initiated by other authors (Alberdi and Aragón, 2007), using different terms, by other authors, such as cross-border culture, but with similar meaning (Loewen and Delmas, 2012) and discoursed with the influences of other cultures, such as the influence on Iberian shipbuilding from Baltic, Mediterranean and Arabic traditions (Castro, 2008: 74-76) particularly applied to the Iberian Bizcayan shipbuilding case. The concept of “deforestation” of the North Eastern corner of the Iberian Peninsula (Aragón, 2001, Alberdi,

2012) will be considered as well as a major factor for the changes at the end of the 16th century in Bizcayan shipping.

The views that are presented in this chapter give a different angle to the academic debate making the traditional argument of the so called “shipbuilding crisis” or “crisis” in the late 16th and early 17th century a matter of perspective. It is the intention of this chapter to show the multiplicity of interests within a political unit, that is the Spanish Monarchy, and how these conflicts of interests did not give the developing state a common direction, whereas the clash of interests and how these were related to the construction of ships show more than one way of building ships within the same region, or a conflict of interests over the usage of the same timber resources and forests in the north. Therefore, the intention of this chapter is to give a historical background to the archaeological remains that will be discussed in chapter 4, so that we can see the depths and complexity behind these apparently coherent and sound ship remains, in other words, to contest the idea of a fully coherent set of a Iberian shipbuilding tradition and a Spanish tradition, as a singular expression or set of characteristics. The ships built in this period were the result in many cases of tensions within the Monarchy, which clashed in a way with the growing influence of merchant investors that was strongly rooted in the Basque area.

In fact, although there is a strong perception of a crisis particularly in Bizcayan shipbuilding, prevalent within the Spanish and international historiography, other historians have already questioned this through contradictory evidence to the so-called decline of the industry in the late 16th century. Indeed, several authors, such as Odriozola, Alberdi and Valdez-Bubnov (Odriozola, 1998: 101; Alberdi, 2012: 424; Valdez Buvnov, 2009: 76; 2011: 72) have mentioned the expansion of the same sector during that late sixteenth century. Other authors, such as Glete, mention the growth and development of the Bizcayan region during the 15th and 16th centuries (Glete, 2000: 131). In this chapter it will be proposed, that despite numbers declining on the Spanish side, the creation of an idea of a crisis in Bizcayan shipbuilding, was in fact an orchestrated intervention of the Spanish Monarchy in order to gain influence and take control of an essential resource for the Spanish Empire: shipbuilding timbers. It will be argued, that the narrative of a shipbuilding crisis, allowed the Spanish monarchy develop their extraction of resources for the trade with the Indies and protection of their maritime routes of Flanders, as well as to have ships suitable for the defence of Spain, whenever requested or in need.

This chapter will explain the effect of the transition on the Iberian Bizcayan network, in which Bizcayan shipping and the Spanish monarchy were related. In this transition, the ships built from the Bizcayan area were gradually forced, to change their measurements to suit navigating the Indias routes and to take part in the various Spanish Armadas, to be apt for more militarized purposes, rather than simple cargo carrying vessels. The interests of the Kingdom were imposed over the interests of the local bourgeoisie investors in an attempt to control and use them to maintain the communications to sustain the Spanish Empire. (Alberdi and Aragón, 2007: 251). In the following lines, the medieval growth of the Bizcayan area and development of its trading routes will be analysed, in order to understand the context leading up to the 16th century, underpinned by a division of interests, fuelled by economic bias, regarding the use of timber and how to build ships according to their economic biases.

3.2 The Medieval emergence of a mercantile elite in the Bizcayan area

Basques became very involved in transporting activities from Medieval times and during the 16th century, developing a very strong connection with the Mediterranean and Northern seas (Arizaga, 2003: 51). From a maritime trading perspective, the north of the Spanish Kingdom was the trading centre for northern and southern European routes, but also a source of ships to be confiscated for the Kings service, which did not own its own war fleet. The merchants of these northern shores were articulated around institutions and local networks, such as the so called "*Hermandad de las Marismas*", (*Brotherhood of the Marshes*) also called "*Hermandad de las villas de la marina de Castilla*", founded in 1296 (González Mínguez, 2000: 22; Angulo Morales, 2004: 187). This was a medieval and early modern administrative entity that since the 13th century had grouped the Northern coastal villages in Castile (belonging nowadays to the province of Cantabria). The institution included the villages of *San Vicente de la Barquera, Santander, Laredo* and *Castro Urdiales*. At the end of the 15th century this entity was integrated in the *Corregimiento de las Cuatro Villas*, a juridical institution established by the Catholic Kings in 1496 and in 1514 the province changed the name to the *Corregimiento de las Tres Villas de la Costa*. These coastal villages and what nowadays is the Basque Country and Cantabria belonged then to the Castilian Crown were part of this "Brotherhood of the Marshes" that bonded many coastal Basque and Cantabrian villages (Añibarro, 2013: 55).

They formed a strong maritime power and their economic relevance that stopped the expansion of the Hanseatic League in the Iberian Peninsula. From the 1450s this brotherhood dealt with 40% of all the commercial activity generated in the Iberian Cantabrian Sea. During the War of the Roses, 1455-1487, trade was affected and perhaps some of the Basque ships could have been captured, as has been suggested with the Newport ship (Nayling and Jones, 2013). Many peace treaties were signed between England and the Basque provinces, even with Bayonne, and the Hanseatic league during the 14th and 15th centuries (Tena, 2003: 133).

By the late Medieval period, the northern shipyards were already active and flourishing, due to the exportation of Iron (Tena García, 2003: 131). Iberian wool was exported to the Northern communities, such as France, England and Flanders, a traditional merchant activity well established in the later Medieval period, but already operating in the 16th century (Grafe, 2005: 49-52). During the 15th century, Basque Iron had an expanding 15th century, that tended towards a further development of the trading routes linking with places such as London, Bristol, Dieppe, Rouen and Bruges (Lema, 2004: 317). The intensity of Basque trade with English harbours varied in intensity, but was continued from the 13th century (1260-80). Basques traded mainly iron, wine and dye with the English, in exchange of clothes. By 1490 there were more than sixty Basque ships trading in English harbours, from Chester to Hull (Childs, 2003: 55).

Thus, the Northern eastern shore of the peninsula engaged in trading activity from the 14th century onwards in the flourishing economic stage of the Mediterranean, but while also participating with their ships in the war against the Genoese, together with the Catalans and against the Turks (Ferrer, 2003: 127). During the 14th and 15th centuries the traditional coastal trading routes expanded and these northern Basque ships reached and competed with Genoese, Pisano and Catalan merchant ships, in the Mediterranean, protected by the privileged position they had within the Castilian trading networks, in contrast to foreign vessels that did not enjoy priority (Fernández, 1989: 36). However, the predominance of Genoese ships was obvious when ships were hired to fight for the Castilian crown. In these years, Bilbao was a buoyant trading city, promoted by local authorities, that fostered a growing supply network for the shipyards and ship fitters (Fernández, 1989: 37).

3.3 Between the north and the south: The new American routes

These Bizcayan merchant entrepreneurs flourished in the Atlantic fisheries and with maritime trade during the 16th century. Their association as a mercantile elite grew during the 16th century settling as a group of interests in the Basque area with some common economic activities, in other words, the fisheries and the northern trading routes. The consulate founded in Bilbao in 1511, be*nef*ited from *foral* rights.

The consulate of Bilbao was an institution for the seaman, shipowners, and the merchants of the city. Founded by king Ferninand of Aragon, the consulate of Bilbao was a public and private institution. This consulate inherited the laws by which the consulate of Burgos had been governed previously from 1494 onwards. The consulate of Bilbao gave rights to the merchants to rule in their commercial relationships, supported by the monarchy. It could also be said, that the consulate protected and promoted Bizcayan commercial relationships. *Foral* rights were awarded in medieval times and allowed Basques to establish a free-trade area and to control their tax collection, thanks to those medieval privileges (Priotti, 2003: 199; Angulo Morales, 2004: 186). The transfer of the wool trade to Bilbao, due to the decadence of Burgos in the late 16th century, particularly harmed Santander, but opened the possibilities for English merchants instead.

The origins of Bizcayan fishing and trading routes were Medieval, despite this, it is not known when exactly the first fishing voyages navigated to America. Historic research suggests a date early as 1512 by which ships from Labourt recorded in documentary evidence that they had navigated to Newfoundland to fish for cod (Goyenetche, 2000: 154). The fleets of the Bizcayan area navigated in the Atlantic Ocean, along the Cantabrian and Basque shores, and concentrated on whale hunting and cod fish from the coast of the Islands of Ireland and as far as Newfoundland during the early 16th century (Barkham, 2000). In this way the fishing and trading scenario kept growing for Bizcayan merchant investors during the 16th century.

Cunliffe described this Atlantic façade and the relationships amongst distant communities: "*There was not one identity but a number of identities. This said, the similarities were such that adjacent communities along the Atlantic façade would have found neighbours across the sea more akin in their values, and safer to deal with, than neighbours adjacent on land.*" (Cunliffe, 2001: 364). Similarly the Mediterranean façade would have connected communities as well, as there were commercial relationships between different regions, such as the Atlantic Andalusia, the Portuguese coast, the Northern Iberian shore, including Galicia, Asturias, Cantabria and the Basque area, but also with strong bonds with the southern French area, especially with the area that spoke Basque (*Euskera*) (Alberdi and Aragón, 2007), the French Atlantic coast, Normandy, Brittany, Bordeaux, Southern England and Ireland (Oertling, 2004: 134; Parada Mejuto, 2004: 227; Castro, 2008: 74-76; Grafe, 2005: 46-60; Priotti, 2003: 198-202).

The Portuguese traded intensively with the Basque area, for example for the Iron trade, in exchange for salt (Barkham, 2003: 148). The scale of interdependence in this shipbuilding network, was on a Euro-Atlantic scale and even greater (Eguiluz, 2013: 9. Non-published).

Bizcayan shipwrights enjoyed a privileged position in terms of resources, such as wooden materials, like oak, and iron fastening, which made it easier for local shipbuilders (Grafe, 2005: 47). Due to their accessible resources, Basques became the main transporting seafarer's between Scandinavia and the Mediterranean, and were particularly key in developing the trading routes into the Mediterranean by the 14th century (Phillips, 1986: 20). The role of Basque trading vessels with other areas of Europe that enabled their merchant enterprise to flourish as a means of transport in this particular area between northern Europe and southern Europe (Angulo Morales, 2004: 188; Alberdi, 2012: 75). According to Jean-Phillipe Priotti:

> "*During the majority of the 16th century, Bilbao played a dominant commercial role over the Spanish northern façade. Some of the accounts for products entering the port, dating to 1563, gave an idea of the variety of origins of the products, amongst which England, France, Flanders, Germany, Bohemia, Portugal, Milan and the Levant could be found*" (Priotti, 2003: 194) Translation by the author.

It was the merchant activities and entrepreneurial vision of the area with regard to northern and southern routes but also to the Atlantic fisheries and American trade, that caused the shipbuilding of this area to flourish and develop throughout the late medieval and modern era (Alberdi, 2012: 74). This latter one, the American trade, was called by the Spanish "Indias", and commonly known in Spanish to refer to the American colonies.

The rediscovery of America by Columbus in 1492 became a new trading area, that gradually gained influence and interest in the Spanish kingdom. For Bizcayan investors, this meant that opportunities for trade and profit were found in the new Indias trade, and not only in the older traditional European trading routes and Atlantic fisheries. This eventually brought more people, interest and investments to the Sevillian entrepreneurship, which was the main departing harbour for the American trade. This Sevillian trade, was controlled by the monarchy and therefore had the monopoly over all ships that travelled for commercial purposes with the Spanish colonies.

However, the Bizcayan area was also dependant on the importation of goods from other areas, including all type of products and goods such as cloths and grain from the South of Spain, England and France. However, there were other origins for the grain transported to the Basque area; German and Dutch ships were coming from Ireland and the Baltic (Grafe, 2005: 53). The main exportation products were the wool from Castile and the iron from the Basque territories which were traded with France, England, the Netherlands, German cities and Ireland (Grafe, 2005: 46).

Basques were also selling ships built in the Bizcayan area outside of Spain. Some laws were made just to stop this exportation of ships, proving that the shipbuilding industry in the Bizcayan area was internationally spread (Alberdi, 2012: 421). The Mediterranean was a common place that had a demand of Bizcayan ships in the 16th century (Alberdi, 2012: 434). Due to the interests of the crown to control timbers, the exportation of ships made out of Iberian timber and sold in foreign kingdoms were perceived as a problem for the monarchy, as well as to local investors (Alberdi, 2012: 441). This problem had a major reaction from the kingdom, which created a royal law in 1567 in order to forbid the sale of Bizcayan ships and exportation of timber to foreign countries (Alberdi, 2012: 442). But not only ships were sourced from the Bizcayan area, but also sailors and crews, which reached a peak of exploitation and exhaustion of these by the 1580s. The constant wars in which Spain was involved in, such as the war of Flanders, the battle of Azores, conquest of Portugal and the war with England and France put a huge strain over the Bizcayan fisheries, nearly finished in this decade (Alberdi, 2012: 445). The constant confiscation and conscription of sailors, exhausted the Bizcayan shore of precious experienced sailors, that could only be trained in the trading and fishing journeys.

Due to the transfer of labour and shipwrights to the west and east during the 16th and 17th centuries, Iberian Bizcayan shipbuilding was not tied to a single location nor limited to being a uniquely regional process. During the period 1550-1650, this area received influences from others places as well, as explained in chapters four, five, six and seven. Bizcayan shipwrights and their influence varied through time. Their influence went eastwards during the 1560s towards France and to the West, towards the area of Colindres, Guarnizo during the late 16th century (Fernandez, 1989: 43). Also, by 1582, Bizcayan shipwrights were taken into the new shipyard of Guarnizo, in Cantabria (Casado Soto, 1988: 368). Basque shipwrights travelled to Galicia as well, both during the fishing campaigns by the 16th century, but also when the royal shipyards were stablished, such as the one in Ribadeo by 1605. Galicia was being supplied with Bizcayan shipwrights by the early 17th century, for example, with the shipyard of Ribadeo (Gasch-Tomás, Trápaga and Trindade, 2017: 189).

Diverse local areas of a theoretical network constitute a cultural bond that could be seen as one side of the coin, where the local and the wider scale, are just part of the same process. Nevertheless, as an extension of this idea, the space we are talking about is an area of relational connections and exchange. In the interests of practicality, we will use the term Euro-Atlantic to refer to the cultural connections regarding the relationships between different geographical areas from Europe, rather than refer to a cultural concept of a tradition representative of this network. Although this term is limiting the view, seemingly focused in the Atlantic, it includes also Mediterranean ships that have already been identified as part of this process, similarly to previous discussions on the use of the term Atlantic, Patrick Sarsfield made this point as well in 1989, that, connecting Italian and Mediterranean cultural traditions with the Atlantic ones, despite not proposing an original context to the Atlantic culture, a connected one instead (Oertling, 1998: 237). This Euro-Atlantic process extends beyond geographic linguistic terms, such as Europe, expanding to include the Northern African Atlantic, as well as Arabic shipbuilding and beyond the Atlantic including the Mediterranean shores that still have not been fully studied (Castro, 2008: 63).

3.4 A Division of interests in a Composite Monarchy

No unified Spanish shipbuilding interests existed by the 16th century. The reality of shipbuilding in the Bizcayan area was just mirroring that problem reflected in a conflict of interests. Spanish society was a good example of a heterogeneous gathering of communities by the 16th century. Spain as a nation with a political unity was not an entity before 1469; it has only existed for 500 years. In 1469, two Iberian monarchies were symbolically united; the crowns of Castile and Aragon. Other kingdoms were added afterwards. New conquests in the 15th century such as the last remains of the Muslim Al-Andalus, the kingdom of Granada, in 1492, the Canary Islands in 1495, taken from the Portuguese, who had conquered the island of the *Guanches* (Canarian natives) and the kingdom of Navarre, conquered in 1512, formed a diverse cultural cluster in early 16th century Spain. For this reason, the monarchy in its early years was a composite monarchy with diverse kingdoms and identities united under the same political and military union. These Basque provinces enveloped within the Castilian crown, that belonged to the Catholic or Hispanic kingdom of the Catholic Kings (Elliot, 1992).

The Historiography relating to the formation of the Spanish state has been emphasised as a "composite monarchy", a concept that is generically applied to a number of European monarchic systems, and not only the Spanish one (Elliot, 1992: 48-71). In this Monarchy, the King was a "Primus inter pares" a concept that has been coined to describe the way the Spanish Monarchy was absolutely dependent on the variety of fragments and jurisdictions that formed its Kingdom, like a King of smaller states with their traditions (Floristán, 2008).

However, the starting point of the Hispanic Monarchy could be considered, due to the particular political configuration, as being from the Kingdom of the Catholic kings and continuing during the 1580-1640's that the Kingdoms of the Iberian Peninsula, including Portugal, were united, under the domain of the Habsburgs (Elliot, 1992: 61; Fernandez Albadalejo, 1998).

This composite Monarchy was named the "Hispanic Monarchy", or Catholic Monarchy and it constituted a number of territories with their own institutional structures and judicial order. The Spanish Monarchs, from Charles I Habsburg and during the 16th and 17th centuries, governed these territories through a *polysynodial* regime of Councils. The term *polysynodial* refers to a central administration that organized a number of councils to which they responded as a political centre (Fernandez Albadalejo, 1998). This Monarchy included the Crown of Castile, with Navarre and the western Spanish Indies, Aragón, with Sicilia, Naples, Cerdeña, and the state of Presidios, Portugal and their sea territories between 1580 and 1640, the territories of the circle of Bourgogne, except between 1598-1621, the French Comte, Flanders, Charolais, Milan, the Marquisate of Finale and Spanish Africa.

This structure was composed of "reigns, states and manors". According to judge *Juan de Sólorzano* and *Pereira*: "*The reigns have to be reigned and governed, as if the king that binds them together, would only be of each one of them…*" in other words, it was expected that the King would maintain the distinctive identity status of each one of them (Elliot, 1992: 52). This mainly happened by respecting the privileges that had previously been acquired during Medieval times and maintaining their use under the power of the King.

3.5 The origin of an Atlantic Armada: Securing the Spanish maritime resources (1560s-1580s)

The Spanish Monarchy had foreseen the necessity to reinforce the control over the timber resources and shipbuilding activity by the middle of the 16th century. By 1562 the intervention of the king in the Basque provinces in the North East of the Iberian Peninsula was imminent. The reason why the intervention of the king was sudden, was not other than a reaction to maintain control over some new fronts that appear in the 1560s, such as the war of Flanders, that required of a navy in case a sudden military intervention was required (Alberdi, 2012: 426). The use of the idea of a shipbuilding crisis, and decadence, was not other than to reinforce and justify the intervention of the king's agents, in order to gain control over the resources of sailors and ships that were in the Bizcayan area.

In the year 1574 Cristobal de Barros y Peralta, was assigned as the "*Superintendent*" of the entire Bizcayan area. His role was to preserve and promote the forest plantations, but he was also in charge of supplying timber for the construction of vessels. He only responded to the King's will, and was not to be obstructed in his endeavour by anyone or any council, otherwise severe punishment would follow. His power was above local councils, and he rigorously enforced the *ordenanzas* (Laws by the king) and instructions he issued (Martínez, 2015: 57).

Cristobal de Barros was assigned superintendent of the shipyards, mountains and plantations in the North of Spain. The concept of "mountains" used here is not what we commonly understand as the physical landscape form. Mountains in Spanish were understood as the forests and slopes in which timber was harvested and forests were managed. Therefore, the association of the mountains to the role of the superintendent was that of supervising the growth and management of the forests for the purpose of building ships for the king. His role was to supply a sufficient Armada to fulfil the necessities of a Hispanic Monarchy threatened in its vast territories overseas. It was this person who, in the name of the King of Spain, started a very intensive reformation from 1562 onwards, in order to take stronger control over forest resources and the construction of ships (Martinez, 2015: 46-47). The main objective on the agenda of Barros was to meet the demands of a vast overseas empire.

The interests of Cristobal de Barros, representative of the interests of the King, clashed with those of the local Juntas or local Councils, due to their differing requirements for the use of wood. The councils defended the use of the forests for the charcoal industries and private merchant shipbuilding, for Newfoundland and other European trading routes (Enriquez, Sesmero, 2000: 689-690). These apparently different activities, such a private shipbuilding and the charcoal productions were interconnected as historian Huxley Barkham mentioned (In: Alberdi, 2012: 424). However, due to the scarcity of wood in the late 16th century, an adaptation of the forests was required and later in the early 17th century applied to serve the demand for shipbuilding timbers and charcoal industries, through the use of guided pollard trees or managed trees (Aragon, 2001: 158). In other words, the use of forests that were not traditionally used for ship timbers had to expand to other areas in the Bizcayan shore in order to feed the demand for the construction of ships.

Cristobal de Barros organised the Hispanic squadron that defeated the Ottomans in Lepanto and the Great Armada 1588, as well as being consultant on many occasions, from questions ranging from maritime issues to the repopulation of Andalusia (Enríquez and Sesmero, 2000: 686). Barros spent thirty years serving the King by gauging ships with mathematical formulas he himself created to calculate the volume of space in ships, measured in tonnage. His impact was felt long after his death in 1596 and his efforts were continued by others in the following decades.

Thus, he became a key person for the control over the resources in the Basque area, as he was well known by the local authorities he used to tax. He himself had to impose the king's agenda over the jurisdiction of the local "*Juntas*" or councils, political institutions that dealt with the issues of each province, such as Guipuzcoa and Bizcaya. He managed to get a royal provision accepted, to give preference to the construction and use of bigger ships, despite local disagreements. With regards to this issue, it could be argued that Seville and the *Casa de contratación* or house of agreements and the Sevillian interests, over the *Carrera de las Indias*, influenced how the ships in the Bizcayan area were built in the late 16th century, particularly to navigate up the river Guadalquivir, but especially to cross the Sanlucar sandbar (Serrano Mangas, 1998: 223).

The *Casa de contratación* or house of agreements in Seville, was not other than a centre for control over the monopoly that the king had over the American trade. This was also a centre from where ships departed to the Indias trade in convoys. The Sevillian *Casa de contratación* was the heart of the Spanish American trade, and a centre from which ships departed and were prepared from, as well as an important trading centre for the Spanish kingdom.

In fact, it is not a coincidence Cristobal de Barros was from Seville and had his own interests in this endeavour. This became more of a reality as the efforts of the Spanish monarchy materialised in a series of regulations, control systems of dimensions, through the *Arqueamiento* or gauging, finance incentives for ships bigger than 300 tons and shipbuilding debates sponsored by the King to determine the best ship type for the Armadas and Indias trading routes (Alberdi, 2012: 425). Especially following a shipbuilding report from which the ideal shipbuilding practices were defined by a number of experts in shipbuilding and ship design by 1581 (This will be explained in chapter 5)[10].

The laws imposed by Barros had to be somehow balanced with the interests of local authorities, however, the new size of ships that was promoted was much bigger than the average merchant ships in previous years, averaging 251 tons (Enríquez and Sesmero, 2000: 686). This would set an unprecedented turning point in the economy of Bizcayan investors and shipbuilding, that had to either accept the larger ship measurements and tonnage for trading and fishing or find alternatives to these new interests of the Crown. Despite this, local investors were also interested and tempted by the potential benefit that they could get from the service to the King's investments.

Cristobal de Barros wrote an account, a historical document, written apparently between 1570 and 1575, a speech for the King to promote the construction of war and trading ships in the Basque Provinces of Guipuzcoa, Bizcay and the four Villages (Nowadays Cantabria). In this text, he addressed some of the most concerning matters concerning maritime power and economic issues related to shipbuilding, but he focussed mainly on the decrease of the shipbuilding activity and its consequences for local people and the service of the King.

[10] *Santander, 19-21 de marzo de 1581: Primer informe de Cristóbal de Barros y la Junta de Santander sobre los galeones que mandaba construir Felipe II*. In, Casado, 1988: 307-314

This document had different versions of it, in different archives that can be found. The one consulted here is the one transcribed by Fernández de Navarrete in 1793 that is preserved in the Naval Museum in Madrid. Fernández de Navarrete includes an endnote, where he specifies that the *memorial* was apparently written by Cristóbal de Barros. There are other copies in different archives that have been used in other investigations, however each document contains slight variations worth mentioning. Moreover, this version includes a complaint report from the sea captains and owners of naos regarding the 1553 ordinances and their salaries in the royal armadas. The document was written by Diego Marroquin.

Barros, following the King´s agenda, wanted to re-establish the shipbuilding industry to bring sailors and supply the area with warships. The Iron industries in Bizcaya and Guipuzcoa created a necessity for charcoal and therefore felling and managing of forests as well. In fact, Barros specifically stated "*Guardar las guias y pujas que pueden hacer maderas tuertas para naos*" by which he meant to keep guided trees and "pujas", which are also curved branches, to produce curved timbers for naos. The tittle of this historical account was this:

> *"Discurso presentado al rey sobre el importante objeto de que hubiese navíos útiles para la guerra, trato y comercio, y aumento e industria de la gente mareante, proponiendo varios medios para fabricarlos en los astilleros del Señorío de Vizcaya, provincia de Guipúzcoa y Cuatro Villa de la Costa de la Mar, y para su conservación y fomento."*[11]

> *"Speech presented to the King regarding the importance that there would be warships available, trade and exchange and growth of the industry and sailors, suggesting various ways to build them in the shipyards of the Señorío de Vizaya, province of Guipúzcoa and the Four villages of the seashore, for their preservation and promotion" Translation by the author.*

He had an idea to revitalize the shipbuilding industry, that could only occur with the plantation of forests, funds to build ships and ship loads to maintain the trade and sustain their use and so that the local shipbuilding was not exported to foreign countries. He thought that the solution to solve the roots of the problems, was to plant oak trees, even ash trees. Also, some planting gardens in which trees could be planted and then transported for finally growing elsewhere.

In other areas, such as Asturias and Galicia, trading wood was forbidden, due to the interest in keeping the wood for the use of shipbuilding, since there was a lack of wood in

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[11] *Santander, 19-21 de marzo de 1581: Primer informe de Cristóbal de Barros y la Junta de Santander sobre los galeones que mandaba construir Felipe II*. In, Casado, 1988: 307-314

these two areas but not so much in las Cuatro villas or the four villages (nowadays Cantabria). The supply of wood to the Basque area occurred in exchange for salt from Galicia, that was carried down the rivers to the coast. In Asturias, Galicia and Santander shipbuilding had declined and it was a very poor area. In order to promote the industry in the area, Barros introduced direct economic aid to promote the construction of naos of 300 or more tons, 200 or more, and 100 or more without alcabala, for the king´s service. The Alcabala was one of the main taxes collected in Spanish Monarchy collected through trade (Lema, 2017: 185). This tax was normally charged for the construction of ships, however due to the poverty of the area in Galicia and Asturias, this construction was exempt. At the end of the document it is suggested the tax exemption should be extended 10 years, beyond the first 10 that were fixed. Behind the thinking of this policy was the fact that many shipbuilders had gone to France to build big naos with higher salaries than in the Spanish side and this way leaving fewer shipbuilders to construct ships in the Spanish shore. Some major problems were affecting the construction of ships, one of them the costing rise of timber prices, that influenced in the construction of new ships by private investors. Some of these problems gave way to the promotion of the idea of a shipbuilding crisis, and the necessity of the northern shipyards for some economic aid from the monarchy, in order to build new ships.

3.6 Timber shortage and rising wood costs

There have been claims over a wood shortage in the late 16th century that caused a rise in prices for timber and construction of ships from the Northern Iberian forests (Aragón, 2001: 158; Wing, 2009: 64; 2012: 125). This issue had become a concern to the status of the Spanish King by the end of the century, however this argument was also used by the agenda of the Spanish “Superintendent” in order to take greater control over resources. Spain demanded more timber to sustain their hegemonic position in Europe. The idea of the wood shortage was both a reality of the wood scarcity, but more the fear of loss of timber, and consequently the political status of Spain in Europe, due to the overexploitation of the local supplies of timber that the Bizcayan area was suffering (Wing, 2012: 117).

For example, the crisis mentioned by the Spanish agents, particularly the version from Cristobal de Barros, was already a preconceived part of the agenda to reorganise the whole shipbuilding industry in the Bizcayan area (Alberdi, 2012: 424). In other words, it was already an orchestrated intrusion to take hold of the northern shipping resources and use them for the benefit of the Spanish crown. Alberdi criticizes this quantitative argument of the decline of the shipbuilding. In short, by looking at the numbers from 1534 when the Bizcayan shipping fleet was registered as having 15042 tons and 80 ships, which decreased to 13074 and 73 ships by 1562. He takes into account the fact that ships were growing in size, but also point out that a reduction of seven ships and 1338 tons was not indicative of a shipbuilding decline (Alberdi, 2012: 431). Therefore, it can be said that the Spanish historiography, and those that have followed this viewpoint and concept of a shipbuilding crisis have only taken into account the views of servants of the Crown and their sources, strongly driven by a shipbuilding agenda to take control over the Bizcayan resources and shipbuilding for the interests of the Empire (Alberdi, 2012: 422; Wing, 2013: 125).

The shortage in timber supply was a factor, which affected the shipbuilding activity of the Bizcayan shipbuilders within the Spanish Kingdom, as a document of 1581 states:

> *"A este proposito y porque todos los que hablan en esto lo apuntan sea tratado de la gran falta que ay en estos reynos de arboles jarcia y antenas y otras cosas deste genero; y los excesivos precios a que lo venden los pocos que lo traen por estar el trato de Flandes tan enflaquecido, y a parescido cosa digna de mucha consideración, y en que convendrá poner remedio breve mandando V M que se escriba a alemana a su embaxador que procure que de ostelanda vengan algunos navios con carga destas cosas aunque sean por quenta de V M por que demas de tener provision vista dellas para las galeras y armadas se escusara una summa grande que en esto se gasta comprandolo a precios intolerables proveyendo desde luego al embaxador de algun credito para ayudar a que esto se haga y efectue con mas facilidad"*[12]

> *"Regarding this purpose and because everyone that talks about it points out that it should be dealt with the great scarcity that these reigns has of masts, rigging and spars, and other things of this genre, and the excessive prices to which those few that bring them sell them for, because the trade with Flanders has diminished, and it appeared very relevant to consider, that it would be convenient to find a remedy soon that your majesty can claim that germany is contacted to his ambassador, to provide that some ships come from ostelanda loaded with these things even if it is at the expense of your majesty because the provision of these (supplies) for galleys and armadas a big sum would be avoided on buying these supplies at inacceptable prices, providing of course the ambassador with some credit to help so that this is done and made with more ease."*

[12] AGS, GYM, LEG 109, page 91v, 22 May 1581 "*Lo que se consulto a su majestad en tomar a 22 de mayo 1581*"

Similarly, in the *memorial* written by Barros, the same problem of a lack of masts, sails, pitch, tar was mentioned. He also mentioned that those materials needed to be brought from Flanders and France[13]. This wood shortage was noted by other historians as well (Aragón, 2001: 26, Alberdi, 2012: 427). The increasing costs of ships for the Spanish crown by the end of the 16th century was due to a shortage of timber supply in the Guipuzcoan shore (Aragón, 2013: 153). The effect of the so-called shipping crisis was affected as well by competition between other countries and their cheaper shipbuilding costs, due to a wood shortage and a gradually increasing demand for timber to construct larger galleons (Grafe 2011, 94). However, the increasing size of the ships by the end of the 16th and early 17th century, is something to consider as a factor behind this timber shortage (Casado Soto, 1991, 135). The size of vessels on its own, did not suddenly change, but instead increased gradually. This could be taken as a factor, but the size by the late 1580s was not that different from previous decades of the 16th century. Again, the idea of the shipbuilding crisis does not match with the rising of the construction of galleons by the late 16th century and the increasing dimensions of the Indias and Armadas vessels (Casado, 1991: 135). Quantitative data from the construction of ships published by Odriozola proves that both the shipbuilding decline or crisis did not existed, or was not true, and also that the ships built were even larger, by the early 17th century, which would increase the quantity of wood used to build one vessel. In the following tables, the construction of vessels for the 16th and 17th centuries in Guipuzkoa is shown:

Tonnage	*Units*	*Production of the specified tons (%)*	*Total production (%)*
More than 1000 tons	*6*	*4.19%*	*1.68%*
1000-500 tons	*27*	*18.88%*	*7.56%*
500-250 tons	*54*	*37.76%*	*15.12%*
250-100 tons	*32*	*22.37%*	*8.96%*
100-50 tons	*9*	*6.29%*	*2.59%*
Less than 50 tons	*15*	*10.48%*	*4.20%*
Not specified	*143*	-	*40.05%*

Table 3.1Tonnage of the ships built in Guipuzcoa in the 16th Century (After, Odriozola Oyarbide, 1996)

[13] AMN, MS 31, sección Navarrete, doc 28, pp. 108: "*Discurso presentado al rey sobre el importante objeto de que hubiese navíos útiles para la guerra, trato y comercio…*"

Tonnage	*Units*	*Production of the specified tons (%)*	*Total production (%)*
More than 1000 tons	*12*	*11.42%*	*3.14%*
1000-500 tons	*63*	*60%*	*16.53%*
500-250 tons	*24*	*22.85%*	*6.29%*
250-100 tons	*12*	*11.42%*	*3.14%*
100-50 tons	*2*	*1.90%*	*0.52%*
Less than 50 tons	*2*	*1.90%*	*0.52%*
Not specified	*276*	*-*	*72.44%*

Table 3.2: Tonnage of the ships built in Guipuzcoa in the 17th Century (After, Odriozola Oyarbide, 1996)

During the 16th and 17th century the costs in the Spanish part of the Northern Iberian area underwent increasing prices for the materials used in the shipbuilding industries (Enriquez and Sesmero, 2000: 705). One of the reasons to reduce the amount of ships in the Northern Iberian part, within Spain, was the rising prices of resources for shipbuilding. This same reason caused Basque shipbuilders to migrate to France. Materials were cheaper, supplies for the freights of ships were also cheaper and the same activities, such as the wool transportation to Flanders or the newfoundland fisheries of cod and whale oil continued in the same way from there (Enriquez and Sesmero, 2000: 705).

3.7 A quantitative crisis?

The prevalent historiographic view is that there was a quantitative crisis in Bizcayan shipbuilding in the late 16th century (Phillips, 1986: 8; Casado Soto, 1988: 110; Rivera Medina, 1998: 63; Barkham, 2000: 75; Azpiazu, 2008: 128; Grafe, 2011: 92; Valdez-Bubnov, 2011: 59; Martínez González, 2015: 48-49). However, a transnational perspective shows a market adaptation in which many Bizcayan entrepreneurs joined the Indias route, whereas many others migrated with capital, labour and ships to the other side of the French border and adapted to the changes at the end of the century. Contrary to the traditional quantitative explanation, this view puts into perspective the argument of a shipbuilding decline, by looking at the French side of the border and the Bizcayan ships there, instead, revealing a continuation of the shipbuilding of merchant and fishing activities on the other side of the border. Despite this view not being new in terms of maritime economic history for Basque historiography, it brings new implications from an archaeological and a dendrochronological standpoint in the study of Iberian Bizcayan ships, mainly the consideration that southern French ships built in Labort, were very likely built by Bizcayan shipwrights. This viewpoint suggests future potential transnational research lines to compare the development of shipbuilding in the Spanish side and the French side of the Bizcayan area.

3.8 The factors behind the late 16th century "crisis"

In this chapter, the changes in the Bizcayan merchant shipbuilding will be observed over the period 1550-1618, a crucial turning point for the economy and military history affecting Basque and Spanish viewpoints. In this transitory moment, after the mid-16th century, many economic activities had to readapt or came to an end. The Northern route to Flanders was forbidden for trade due to the new regulations from the King, as the relationships with England were worsening and the war of Flanders had started (Grafe, 2002: 535). The Southern Mediterranean routes were blocked due to the risk to trade in Mediterranean waters that had many pirates allied with the Ottoman empire (Alberdi, 2012: 435). The cessation of the traffic to the east Mediterranean routes for the iron trade, affected drastically the amount of ships sailing in the Bizcayan shore (Enriquez and Sesmero, 2000: 705), and these were later substituted by other destinations such as the Newfoundland, Galician and Irish fisheries (Alberdi Lonbide, 2012: 432). All of these changes risked the activities of many ship owners and merchants whose investments were rooted in a variety of trading routes and fisheries, mainly the Indias route, Atlantic fisheries for whaling and cod fishing in Newfoundland, shipbuilding and Northern trading routes and Southern trading routes with the Cantabrian, Andalusia, France and England (Odriozola, 1998: 101), but also with the Mediterranean trade (Enriquez and Sesmero, 2000: 705).

Particularly with regards to the Bizcayan and Guipuzcoan Provinces in Spain, the Atlantic fisheries, the transportation of wool to Flanders and trading routes with the Mediterranean were all affected by political, economic, military and climatic factors from the 1560s onwards (Alberdi, 2012: 435). The period known as the "little ice age" changed the migration season of the right whale that affected its hunting season (Hansen, 2010: 237; Truchuelo, 2003: 43; Gonzalez Dios, 2017: 216).

The majority of the Spanish trading routes with America and the Spanish Armadas sourced a vast amount of their ships from the *naos* built and involved in this Northern network. In fact, according to Pierre Chaunu, up to 80% of the ships that travelled the Indias route until the 1580s were from this Northern Basque and Cantabrian area (Chaunu *et alii*, 1972: 256-257). Later authors, such as Grafe, have reaffirmed these numbers regarding the participation of Bizcayan ships (Grafe, 2011: 90).

In this changing period, Barros also had to deal with the complaints from the local entrepreneurs that suffered from the confiscation and underpaid services in the royal armadas, fees that stagnated for decades. But also, he had to deal with the loans that were given in the area, that had to be paid off by the Monarchy, as promised, with high interests due to the economic shortfalls that the monarchy would experience from time to time, ending in a bankruptcy, caused by the expenses in wars and European conflicts (Enríquez and Sesmero, 2000: 686). Despite the measures to protect and promote local shipbuilding industries and trading networks, the superintendent still did not understand how to solve some of the problems of the local interests and social groups, but rather imposed the interests of the Monarchy over these provinces. Some local entrepreneurs indeed benefitted from serving the Monarchy but others opted to stick to their old businesses in the traditional trading routes and Atlantic fisheries, beyond the control of the monarchy.

These changes in the economic, political, military, climatic and commercial panorama conditioned in a way how social groups interacted with one another in the Bizcayan area. Namely the Bizcayan investors keen to promote the Atlantic fisheries and "private" trading routes and those that promoted the Indias route, Monarchic monopolistic trade and service to the King's Armadas. The evidence of a social clash of interest was already pointed out by Alberdi and Wing (Alberdi, 2012: 441; Wing, 2013: 128). From this conflict of interests, those who adhered to the merchant-fishing entrepreneurship and those bonded to the service to the

Spanish King, Indias trading routes and Armadas fought over the use of the resources (Wing, 2013: 118), or in other words, for the use of the forests and timbers.

The sudden rising demands for the shipbuilding of galleons for the Armadas, clashed with the typically dominant use of the forest by the charcoal and local shipbuilding industries. Barros mentioned the mountains in Bizcay and Guipuzcoa, which were filled with forests used for their own industries, as well as in *Las cuatro villas* or Cantabria nowadays. However, Galicia and Asturias did not have such forests. These forests that were abundant in the Basque area, used mainly for the iron industry, but the trees for charcoal could not be used for building *naos*, unless they had curved branches. Aragón has described how timber production and forest use change from a majority of *Jarales* (forest where low cuts in trees) trees in the early 16th century, to a predominance on the shore of guided pollard trees for shipbuilding by the mid-17th century (Aragón, 2001:40-42). In Spanish terms, these trees were called *trasmochos*, similar to a common pollard tree, but with guided branches managed to take shapes ideal for shipbuilding.

However, alternatives to this problem were suggested, such as the introduction of pollard forests, by Martin Perez de Arbelaiz, in order to fulfil the needs of the shipbuilding and the charcoal industries (Alberdi, 2012: 441). Despite this, the competition for the timber resources, and the rising prices for it, became a major problem for Bizcayan investors. Due to the intervention of the Spanish Kingdom, which started to control the forests for the shipbuilding for their own endeavours, to the detriment of private trading and fishing, a shipbuilding clash began.

3.9 The interests of the Bizcayan proto- "Bourgeoisie"

The alignment of "local" interests and "national" left aside other groups of interests and gave preference to some groups above the interests of other ones, raising again questions about hierarchy, social structure and discrimination. There had always been a division of interests in the use of forests, for example, pig farmers, charcoal producers, industrial and domestic fuel consumers, builders and even local shipbuilding industries, all had conflicting interests with the Spanish Monarchy, as well as between each other (Wing, 2012: 124). By the late 16th century, The Spanish monarchy controlled the majority of the forests, yet had to keep a balance between the different social groups in order to maintain order (Aragón, 2001: 39; Wing, 2009: 27; 2012: 116). The interests in the Atlantic fisheries and European trade were left aside, as an example of how the Spanish "Nation-state" was built during the early modern age at the expense of other regions. By using the resources of other regions, a minority benefited from these relationships from which they made some profit.

The imposition of the Monarchic interests over Bizcayan shipping constantly disrupted the local economic cycle due to the confiscations and attempts to establish a shipbuilding standard over the existing tradition (Enriquez and Sesmero, 2000: 689). Even Cristobal de Barros himself mentioned the negative effect of the confiscations of ships that obstructed the ordinary trade flow along the Northern shores and also the salaries of the owners of the *naos* that were often left unpaid so that those who suffered what was basically confiscation were discouraged from building or investing in shipbuilding due to the high risks and negative pressure on their businesses (Enriquez and Sesmero, 2000: 689). Another factor for the decrease in shipbuilding was that *naos* used to be sold because building them was very profitable in the Bizcayan area and other Mediterranean areas would buy them. However, in 1567, a royal law forbids to sell ships outside of the country, therefore this affected the rhythm of shipbuilding (Enriquez and Sesmero, 2000: 689).


Figure 3.1 Juan Martínez de Recalde, from Bilbao. One of the Basques that worked together with the Spanish Monarchy and even took part in major battles, such as the Spanish Armada 1588.

Paradoxically, the imposition of the Monarchic interests after the 1562 over the Bizcayan shipbuilding became a hindrance for the Spanish Economy and led to the failure of their objectives to consolidate Spain as a maritime power. Spanish shipping was dependent on the supply of private ships, even until the late 16th century, coming mainly from private entrepreneurships such as the Bizcayan Newfoundland fisheries. These confiscations harmed those dependent on a more cooperative entrepreneurship, rather than other social individuals linked to the highest spheres of influence in Spanish shipping (Azpiazu, 2008: 90-91). For example, *Juan Martínez de Recalde*, from Bilbao (Figure 3.2. on the left), could be identified as one of those influential people in the Basque provinces that aligned with the King's service, and who was furthermore, admiral of the Bizcayan squadron in the Armada 1588 (Martin and Parker, 1988: 9-10). In 1563, *Recalde* was given 20,000 ducados in order to negotiate with private shipbuilders the construction of ships for the King's Armadas (Casado Soto, 1988, 278).

Even though some of the shipbuilders were reluctant (Alberdi, 2012: 455) to build the vessels in a different way to service the King, some had already started developing an interest towards the Imperial trade with Indias and the service in the royal *Armadas* of Spain since the 1560s. Many people in the Bizcayan area adhered to the King's project to build ships larger than 300 tons but smaller than 600 tons (Barkham, 1984: 104). 60 contracts were signed amongst the local investors to be built in the Bizcayan shore of 300 tons *naos* or bigger. There is an account and, in this document, the payments to individual investors in shipbuilding are specified from Cristobal de Barros[14]. The superintendent was a central figure in this document, as he oversaw who received the funds for building ships and who was trusted by the king in the endeavour to promote the construction of ships bigger than 300 tons.

Large *naos* were not ideal for merchant activity and the trading cycle. The *memorial* in which it was specified that large *naos* took longer to load with cargo and obstructed the normal rate of trade, whereas smaller *naos* enabled a better flow of the exchange of goods, more frequent trips and subsequent availability of sailors[15].

In this speech, Cristobal de Barros mentions the Consuls from the University of Bilbao, that were more inclined to use smaller vessels, as they were much more profitable and more frequent, since they did not have to wait as long as to load a 300-ton *nao or navios*[16]. Also, it was mentioned that smaller ships were loaded faster as they could get closer to the harbour in shallower water. Other inconveniences caused by large *naos* were because they travelled less often by year, due to the time it took to load the big ships. Moreover, it was also pointed out that the loss was greater with the insurers if a big *nao* was lost.

Other disadvantages more related to particular economic activities were evidenced by Barros. For example, that there used to be 200 wool loads (*Sacas*) in the channel of Bilbao,

[14] AGS, CMC, leg 1EP, 1572- 15 "*El tanteo de la cuenta que Cristobal de Barros de los empréstitos para fabrica de navios"*
[15] (Duro, 1972: II-444) *"Memorial al Rey don felipe II pidiendo revision de las leyes que favorecian la construccion de naos gruesas, por ser contrarias a la navegación en general*"
[16]AMN, MS 31, sección Navarrete, doc 28, pp. 96v "*Discurso presentado al rey sobre el importante objeto de que hubiese navíos útiles para la guerra, trato y comercio…"*

and that only 40 were loaded now, as they were loaded in such big *naos*[17]. From 1566 the wool trade with Flanders decreased for the Spanish side, particularly after the disaster of Middleburg in 1574, when all the wool cargo of the whole trading fleet was lost with the resulting bankruptcy of the merchants from Burgos (Azpiazu, 2016: 59). According to Cristobal de Barros in the year 1567the wool route with Flanders changed and the freights to transport this wool were loaded in Saint Jean de Luz on the French Basque side rather than the Spanish harbours. The wool trade also carried on through Navarre and the Pyrenees as mentioned again in another source (Enriquez, Sesmero, 2000: 689).

> *"1569: En aquel tiempo se solian haçer muy grandes cargazones de lanas en esta costa para Flandes, que sustentaban gran numero de naos, las cuales an çesado por aber creçido el trato de los paños en España y tanbien porque las sacas de Nabarra y Aragon que solian embarcar en esta costa se cargan en San Juan de Lus, por cuya caussa se cargan aora tan pocas que quatro naos haçiendo los viajes que podrian los nabegaran"* in Archivo Historico Nacional, sección Cámara de Castilla, serie Patronato Real, reg. 15651, Leg. 1. (Enriquez and Sesmero, 2000: 689)
>
> *"1569: In those times there used to be large wool loads in this coast to Flanders, that supported a great number of naos, which have ceased because the cloth trade increased and also because the wool fleece from Nabarre and Aragon that use to embark in this shore are loaded in Saint Joan de Lus, for which reason very few naos are loaded as just four are the ones for the journeys that could be navigated" Translation by the author.*

Esteban de Garibay, a nobleman from the Basque Provinces in the 16th century, mentioned one of the reasons for these trading routes to move to Saint Jean de Luz was to avoid the *diezmo* or tax on woollen products, from Castile through Navarre and Aragon (Enriquez and Sesmero, 2000: 689, 705). Saint Jean de Luz was not a very large harbour during the 16th century, until 15 years earlier than 1569, were suddenly more than a hundred ships of great quality were gathered in this harbour (Enriquez and Sesmero, 2000: 706). Barros continued saying that this was because the trade was forbidden with Flanders and England[18]. He went further and pointed that these ships in San Juan de Luz, are the ones which used to be in San Sebastian, Pasajes and Guipuzcoa, and were a threat as they had grown in number. For that reason, he wanted to forbid the trade to France. The wool trade dropped in Bilbao

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[17] AMN, MS 31, sección Navarrete, doc 28, pp. 96v: "*Discurso presentado al rey sobre el importante objeto de que hubiese navíos útiles para la guerra, trato y comercio…"*

[18] AMN, MS 31, sección Navarrete, doc 28, pp. 100: "*Discurso presentado al rey sobre el importante objeto de que hubiese navíos útiles para la guerra, trato y comercio…"*

from 20000 to 4000 sacks of wool, perhaps due to a change on the interest of the investors, the fact that the wool used to go to Italy and after that changed to Flanders[19].

Larger *naos* needed longer time to be loaded, for that reason the cargo rotted sometimes, damaging the quality of the wool, since a 600-ton *nao*, needed 10 days more than a 300 one to be loaded[20]. However, other factors affected the time a ship took to be loaded and unloaded, such as differences in the interests of owners and loaders. Despite these factors, sometimes bigger ships were freighted and loaded before smaller ones.

Another great problem caused by the bigger size of the vessels occurred in the Newfoundland fisheries. The fact that larger *naos* needed more time to be loaded, meant the crews had to stay over longer periods to fill the *naos* either with whale oil or codfish, furs from Amerindians or whatever goods they loaded it with. Extending the fishing campaign, put themselves in risk of being trapped by the winter and the ice. In fact, this happened in a very dramatic way in 1577, when 500 sailors were trapped in the harbours with their ships and died from the cold winter and ice, with no planned supplies or food to stay over the winter (Huxley, 1987: 101).

Captain Diego Marroqin de Miono, from the *Junta* of Samano, officially complained to Cristobal de Barros, representing the captains and owners of *naos* from the *Señorio de Vizcaya*, *Provincia de Guipuzcoa* y *Cuatro villas*. The main point was the higher costs for the construction of ships that rose from 3 to 4 thousand ducats to 6 to 7 thousand ducats in 53 years, but also the salaries of sailors, carpenters and food supplies. Therefore, the costs and investment in constructing ships was less profitable and this was one of the factors why fewer ships were built in the aforementioned provinces[21].

Despite the issues raised by Bizcayan ship owners, the superintendent insisted that *naos* of 400, 500, 600, 700 tons and bigger would be better for military purposes. In fact, he criticised *naos* of 240 tons, which were used by merchants. The aim for the crown is to

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[19] AMN, MS 31, sección Navarrete, doc 28, pp. 100-101v: "*Discurso presentado al rey sobre el importante objeto de que hubiese navíos útiles para la guerra, trato y comercio…"*

[20] AMN, MS 31, sección Navarrete, doc 28, pp. 101v: "*Discurso presentado al rey sobre el importante objeto de que hubiese navíos útiles para la guerra, trato y comercio…"*

[21] AMN, MS 31, sección Navarrete, doc 28, pp 106: "*Discurso presentado al rey sobre el importante objeto de que hubiese navíos útiles para la guerra, trato y comercio…"*

maintain and have an accessible merchant fleet formed by big *naos* used for trading activities that could be quickly set up to defend the coast from the enemy[22]. Clearly the agenda of the superintendent had a military priority, as he mentioned as well not to insure corsair *naos*, unless were against Turkish or Moors.

There is no doubt that by the 1570s Barros has the belief that bigger ships were better for defending cargo and for military purposes. However, the battle of the Gravelines and the failure of the Spanish Armada in 1588, will prove that there were other essential elements to take into account in an evolving maritime warfare. The Spanish tactics were still a medieval way of fighting, based on high castles and boarding. Using artillery and gunshots had not a central role in warfare in Spanish tactics, whereas English man-of-wars had incorporated manoeuvres, sailing speed and artillery fire to their warfare tactics (Martin and Parker, 2011, pp. 67-79).

As a paradox, without trade, the construction of big *naos* would collapse, and could not build any more, but the merchant activity based in the construction of big *naos* had problems competing with smaller vessels, such as the Dutch (Phillips, 1986: 22). Despite Barros being aware of a possible collapse of the activity, he foresaw the collapse of Spain's own maritime economy, even though he was ignoring the interests of private owners of *naos*, resulting in the decline of that fishing and merchant social group in the Spanish area.

3.10 Competition of foreign vessels: Dutch shipping

The rise of the Dutch economy by the end of the 16th century was influenced and accelerated by the fall of the Bizcayan merchant and fishing fleet. Bizcayan shipping was gradually affected by strong competition of shipbuilders from other parts, such as the Dutch and English as mentioned in a record in a *memorial* written to King Philip II:

> *"Toda esta potencia naual de las partes septentrionales ha tenido su principio de la nuestra ruyna, y particularmente dende que a las naos de Olanda y Gelanda, les dio*

[22] AMN, MS 31, sección Navarrete, doc 28, pp. 108: "*Discurso presentado al rey sobre el importante objeto de que hubiese navíos útiles para la guerra, trato y comercio…"*

priuilegio de naturaleza, y dende que este mismo priuilegio se extendio a los ingleses, año 1523" (Duro, 1972: II, 445)

"All this maritime power from all northern parts had its beginning in our ruin, particularly since the naos from Olanda and Gelanda were given the privilege nature and since this same privilege was extended to the English, year 1523" Translation by the author.

From 1523 the Bizcayan investors started to encounter problems with foreign merchants, from Portuguese, Flemish and English ships who were given permission to load their freights in Spain (Enriquez and Sesmero, 2000: 689).

The Spanish superintendent believed that only by supporting trading networks could these *naos* be maintained by profiting from transporting activities. Despite his understanding, there were severe causes that brought down the local trading quantities. The main one was this *pragmatica* in 1523, or law by which all foreign vessels that previously had a secondary role in Spanish harbours to load cargo over local privileged merchants, gained a privileged position that allowed Flemish, English, Portuguese and Genovese to trade as equal competitors in Spanish waters[23]. However, the competition of foreign vessels, with lower costs, lower salary, less amount of cargo and fewer crew but prepared to work in cases local people sometimes would not, resulted in locals not freighting ships which were mainly done by foreigners[24].

Therefore, the superintendent suggested that "*no foreigner loads their ship in this country*" as it was the ruin of the economy and the Kings interests. Although Barros mentions that promoting trade will enrich local people, he emphasises the fact that by such initiative there will be many and good *naos* in different places that will be useful and strong to defend the coasts and to fight as well.

Despite these efforts from the monarchy to fight the competition of foreign vessels, the Dutch shipping filled a gap left by the depletion of the economic capacity of the Bizcayan merchants. They replaced the Bizcayan merchants and their ships in the northern trading

[23] AMN, MS 31, sección Navarrete, doc 28, pp 90: "*Discurso presentado al rey sobre el importante objeto de que hubiese navíos útiles para la guerra, trato y comercio…"*
[24] AMN, MS 31, sección Navarrete, doc 28, pp. 92: "*Discurso presentado al rey sobre el importante objeto de que hubiese navíos útiles para la guerra, trato y comercio…"*

routes to Flanders, briefly, the Indias route from Seville (1590-1594) (Rodríguez, 2016: 12), and the *Armadas* for the King of Spain in the *Armada del mar Oceano* from 1575 onwards. Some of these ships were from Dunkirk, a Spanish possession during the 16th and early 17th century. The crews of these ships were from a variety of origins namely Flanders, Biscay, Galicia and Guipuzcoa[25]. As a result of this decline, there were gaps left in the Basque maritime economy, especially in the trading routes and fishing industries, that were taken up by Dutch shipping in the 1590s (Rodríguez, 2016: 10-11). English and French merchants also took advantage of this situation (Casado Soto, 1988: 116).

Barros thought another way of promoting this trading activities was to open trading relationships with other countries, such as the salt trade that was carried out from the island of Ibiza and sent to Italy, Genova and Ragusa in their ships. Barros thought it would be a good idea to open up trading activities with the Viceroys of Sicily, Naples and Ibiza and ask them for permission to load salt for trading[26].

Further evidence in later periods suggests that by the mid-17th century, Dutch ships were cheaper to buy and produce than Basque ships (Goyenetche, 1998: 157). However, Gomez-Centurion suggests that the high costs of Bizcayan ships compared to the Dutch ones led to the reluctance of the Bizcayan and other Iberian shipbuilders to invest in shipbuilding (Gomez-Centurion, 1988: 26-27). Dutch ships appear to have had a flourishing moment at the end of the 16th century as an innovative and economic alternative that prompted Spain to hire Dutch ships for the defence of their Imperial possessions and trading routes.

3.11 The Basque whaling and cod fishing crisis:

The English boycott of Basque Whale oil

At the end of the 16th century the state of the four Villas suffered an economic decline. Spanish historiography has claimed that the crisis of the Basque fishing, decline of the Spanish

[25] *España. Ministerio de Educación, Cultura y Deporte. Archivo General de Simancas. CMC,2ª,LEG,66.*; *Libro de Asientos de los Baxeles de Dunquerke y gente mareante que en ellos sirve y lo que a quenta de sus sueldos han recivibo año de 1575.*

[26] AMN, MS 31, sección Navarrete, doc 28, pp. 105v: "*Discurso presentado al rey sobre el importante objeto de que hubiese navíos útiles para la guerra, trato y comercio…"*

shipbuilding, but also the increasing wars, depletion of sailors from the coast on the service in the Armadas, and general decline of the fishing and trading enterprises by the late 16th century were indicative of a decline in the state of the art of Spanish shipbuilding.

However, the impact of the whaling and cod-fishing crisis upon the private shipbuilding industry should also be considered as a major factor of the Bizcayan shipping decline in the Spanish area, though not in the French one. The English knew that a large majority of the Spanish ships that were confiscated for war were coming from the Newfoundland fisheries. Sir Walter Raleigh, knew of the roots of the maritime labour and sailors for Spain and prepared an operation to weaken them. Here the majority of the ships from the Basque area were engaged in the cod fishing and whaling activities, and here were the majority of the sailors that were used for the Spanish navy (Duro, 1972: II, 391). The English knew this as they had done their own survey in 1578 and visited Newfoundland where there were 20 to 30 whaling and 100 cod fishing "Spanish" ships, according to an English man named Anthony Parkhurst (Ménard, 2008: 168).

Together with other communities, such as the English, French, and Spanish (The majority of which were mainly Basque from both the French and Spanish side) the fisheries kept 8000 sailors actively working in such industries, with peaks of 350 ships a year, from many countries, this being greater that the number travelling to the Indias at the late 16th century (Azpiazu, 2008: 16). Other authors mention forty ships during the best years of the 16th century, 20/25 for cod fish and 15/20 for whaling, with an overall size of 9500 tons and 2000-2500 sailors all together (Barkham, 2000: 57). The crown of Spain did not want wood to be wasted for other than their own purposes, and when this wood was used for the fisheries or trading routes as it was for the Newfoundland fisheries during the 16th century (Enriquez and Sesmero, 2000: 688), it was considered a problem, in case there was a sudden need for those ships. In 1572, Cristóbal de Barros stated:

> "*...el camino de terranoba es muy largo y en aquel viaje se detienen mucho tiempo y queriendose su magestad serbir de las naos que andubiesen en aquella carrera no seria posible ofreciendose repentina necesidad*" A.H.N., Consejos Suprimidos, L. 15651 (Alberdi, 2012: 436)

> "*... the path to newfoundland is very long and, in that journey, they stop for a long time and if your majesty will want to use the naos that were in that journey it would not be possible if a sudden need would rise...*" Translation by the author.

By 1572 the Burgos insurer's bankruptcy had left a gradual uncertainty to risk in the investments for the Atlantic fisheries (Loewen and Delmas, 2012: 224). However, it was between the sailing campaigns of 1578 and decade of the1580s when the depletion of the Basque whaling industry suffered a dramatic collapse. In 1578 there were 30 whaling ships going to the Strait of Belle Ille in Newfoundland (Loewen and Delmas, 2012: 224), but after the boycott from the English harbours in 1579 (Loewen and Delmas, 2012: 224) their "*backward linkage economy"* mentioned by Grafe, abruptly collapsed (Grafe, 2011: 84). By 1579 there was no whaling season, because of the English boycott in 1578 impeded any profits with which Bizcayan investrors would fund the following year's whaling campaign (Loewen and Delmas, 2012: 225). After those losses, there were only 13 whaling voyages for the whole decade of 1580s (Barkham, 2000: 66). Apparently, the whaling season restarted in 1582, but the Admiralty of San Sebastian refused passes to Terranova and instead directed them to the Indies route (Loewen and Delmas, 2012: 225). In 1585, at the same time Drake attacked Galicia and Portugal, Raleigh did the same in the Newfoundland fisheries (Duro, 1972: II, 393). The sudden attack resulted in 600 Basque and Cantabrian sailors being kept captive in Portsmouth, some ended up being sold in Algeria as slaves.

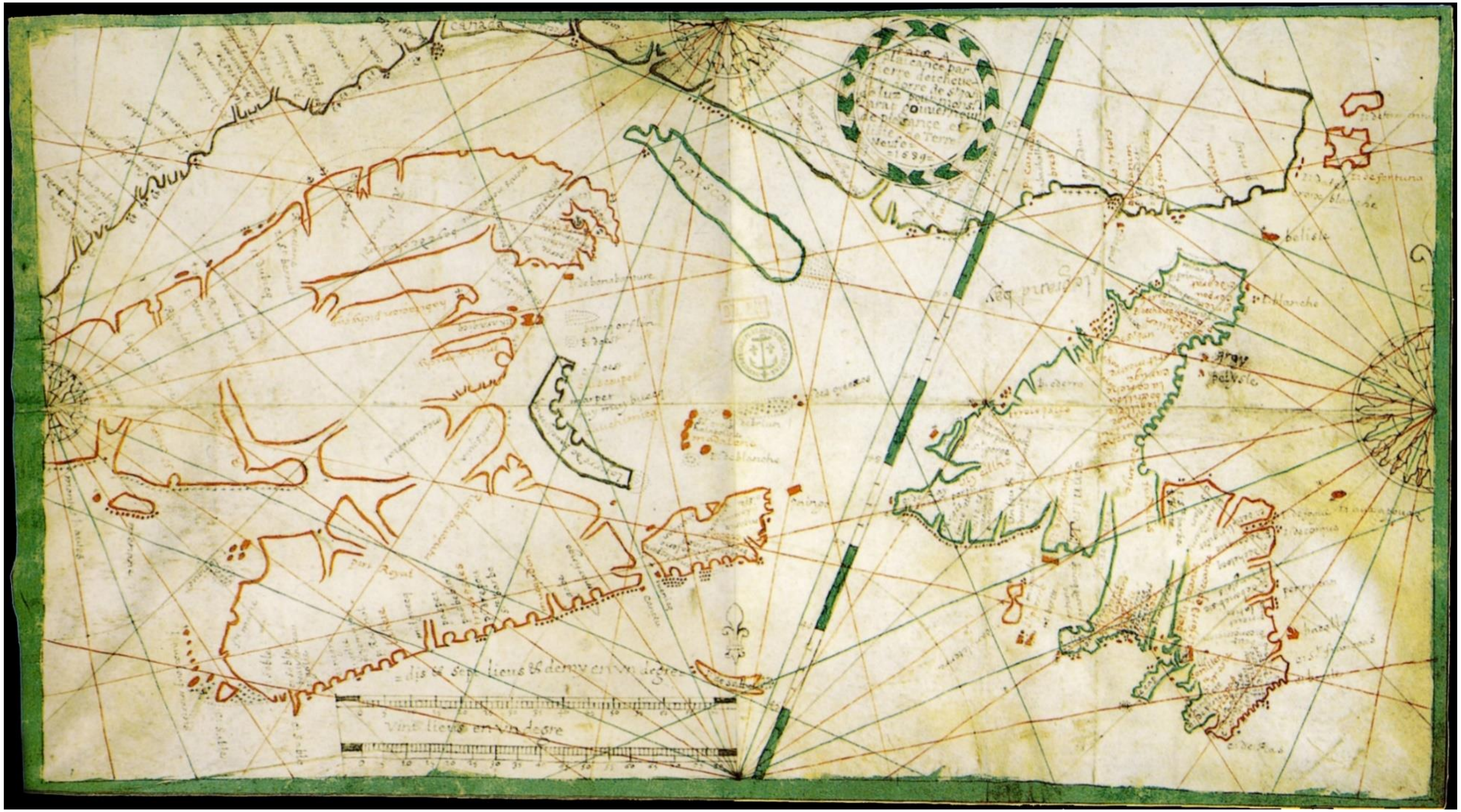


Figure 3.2 Chart of Newfoundland 1689. The Saint Lawrence estuary and Plaisance. Made by the Basque cartographer Pierre Detcheverry for the governor Antoine Parat.

3.12 The little ice age: Major climatic changes at the end of the 16th century

Another factor that affected this Basque whaling economy was the climate change at the end of the 16th century. This has been called the “little ice age” (Aragón and Echeberria (Ed.), 2017: 216). Apparently, a sudden drop of the temperatures forced the whales to migrate to different areas and attracted more of them to Galicia (Hansen, 2010: 237). Some of these ships that used to go to Newfoundland went back to the old fisheries in the nearby seas, such as Galicia or Asturias (Azpiazu, 2000: 84).

This sudden shift in temperatures made the whale species of Newfoundland migrate later on during the year in winter. The north Atlantic right whale (Eubalaena Glacialis) or *Ballena franca*, known by the Basques, used to migrate before winter arrived. There was an increase of the Krill and microorganisms that the whales use to nourish on, making them stay until later during the winter, when these flora and fauna would flourish (Trutxuelo, 2003: 43). The migration period of whales started later and the whole Basque journeys were affected, as they had to spend the winter to hunt them, forcing them to stay in the harsh and tough winters in Newfoundland. Also, the depletion of this whale species and the hundreds of whales that were massacred in every whaling season forced whalers from different countries to find alternative whale species (Balaena mysticetus) and northern fisheries to carry on with their economic system (Eguiluz, 2013: 81).

3.13 French Basques and Spanish Basques: transnational economy beyond borders

As a result of these changes, the interdependence between French and Spanish Basques got stronger as the Spanish Basques lost the capability to freight their own ships and supplies because of the Spanish pressure upon private shipbuilding companies and voyages. Especially in the 1600s more funds and ships passed beyond the border to the French side to go on the whaling voyages (Azpiazu, 2000: 80). In 1567, in the *memorial* mentioned before, Cristobal de Barros had prohibited shipbuilders from Bizcay and Guipuzcoa moving to France to build *naos*. In this sense Barros was worried that their enemies would have shipbuilders and also that their navy was getting larger and better in quality (Enriquez and Sesmero, 2000: 689). The situation reached an extreme at the end of the 16th century, especially for the Province of Guipuzcoa, were the migration to Labort on the other side of the French border became a solution (Truchuelo, 2007: 174). Moreover, a *memorial* was sent to the Council of War, in chapter 26 it says:

> *"... por no hauer en el dicho puerto del Pasaje y demás villas y lugares de la frontera trato y comercio libremente están despoblados, sin gente, sin marineros, sin naos y las fuerças y pujanza que solía hauer en los tiempos passados en la dicha frontera, por no hauer la dicha libertad franqueza agora como entonces se ha trocado y pasado a la frontera de Francia, vecina y enemiga de la dicha frontera de Vuestra Majestad, porque se hallan al presente en Bayona, San Juan de Lus, Çubiburu, Mearriz, Azcayn, Hurnia y en otros lugares de la frontera de Francia dozientas y más naos y tres y quatro mill hombres de mar y guerra que solía hauer en la frontera de Vuestra Majestad*"

> *"...because there is no free trade and exchange with the border in the harbour of Pasaje and the rest of villages and places, they are abandoned, without people, without sailors, without naos and the strength that used to be in past times in such border, because there is no freedom now as there used to be, they have passed to the neighbouring French enemy border and changed from your majesty's border, because at the moment there are in Bayonne, San Juan de Lus, Çubiburu, Mearriz, Azcayn, Hurnia and in other places in the French frontier more than two hundred naos and three to four thousand men of sea and war that used to be in your Majesty's border"*[27] Translation by the author

But also, there is more evidence of this migration of capital and people from those whaling and cod-fishing journeys for the French Basque side for the late 16th century:

> *"A well-organized group of whalers and traders, headed by the Hoyarsabal brothers of Saint-Jean-de-Luz, set up stations in the St. Lawrence estuary as soon as 1581"* (Loewen and Delmas, 2012: 234)

> *"In 1586 the Basque Micgueto de Hoyarsabal's ship, the Marie from Saint-Vincent went to Newfoundland to fish cod, whales, and other fish, and to Canada to trade and negotiate with the savages for furs and other merchandise"* (Turgeon, 2004: 109)

[27] AGS, GyM, Leg 84, nº64: *"Memorial send to the Council of war (Chapter 26)* In: Truchuelo, 2007: 174".

In broad terms, the evidence shows that thousands of Spanish Basques migrated to France and carried on with the Newfoundland whaling. The mercantile shipbuilding continued in France with the trading and fishing vessels (Eguiluz, 2014: 10). Alongside this decline, the end of the Basque monopoly on the whaling industry occurred, which was directly related to the gradual rise of the English, Dutch and Danish whaling industries. These competitors started by hiring Basque whale hunters, adopted and used their skills then dismissed them once they had learned the necessary expertise (Alberdi, 2012, 331).

Figure 3.3 Dutch Bay Whaling in the Arctic Artist/Maker: Wieringen, Cornelis Claesz van Date: ca. 1620

Figure 3.4 Detail from the Cornelis Claesz van Wieringen painting, Dutch Bay Whaling in the Arctic, 1620, showing experienced Basque whalemen, harpooner and boat-header, training the Dutch to hunt whales. Wieringen, Cornelis Claesz van Date: ca. 1620.

3.14 The influence of Bizcayan shipbuilding in France

Such strains upon the Bizcayan shipbuilding area accelerated the collapse of the private investors in the Spanish side and shipbuilding industry, that quantitatively declined in the Spanish side. The Spanish monarchy did not understand this, that by securing the interests of local economies, they could benefit from that, rather than imposing their interests, as Cristobal the Barros was obsessed with his agenda of building bigger ships, but could not see the problems that were about to harm themselves by the strains they put over their own source of ships.

Many Basque merchants found alternative ways of continuing with their own trading activities out of the exploitation from the Spanish Monarchy, in France. Although nationalist Spanish historiography has disregarded this historical fact, there is a whole historical research line to study the changes of the Bizcayan shipbuilding culture, part of a wider transnational network of influences. Despite the rise of the whaling and cod fishing activities was in decline by the late 16th century both in the Spanish side, but also in the harbours of the French side, joint efforts were already a reality by the late 16th century, where Basque investors from both sides of the border participated in the combined efforts towards the Newfoundland voyages (Goyhenetche, 2001: 165). However, it is generally known that the decline of the whaling and cod fishing was evident, even for the French side (Turgeon, 2000: 166) for the harbours where ships used to depart, such as Saint-Jean-de-Luz, Ciboure, started to even be set from la Rochele and Bourdeaux (Turgeon, 2000: 166).

The growth of the whaling and cod fishing voyages in the 17th century, however, shows a prosperous picture of a badly stigmatised 17th century, of what has been part of the Basque whaling and cod fishing enterprise (Turgeon, 2000: 171). Voyages to Newfoundland recovered numbers of the so called "golden age" of whaling and cod fishing (Barkham, 2000). Even, the late 17th century decades surpassed the ideal numbers of the 1560-1580 period (Barkham, 2000: 62).

From 1619 to 1629 from 16 annual ships, went up to 34 by 1629 in Saint-Jean-de-Luz. By the period 1664-1700, numbers of ships from Bayonne, Saint-Jean-de-Luz, Ciboure and Hendaye varied from 26/20 by 1664, the first one referring to the cod fishing vessels, whereas the second was to refer to the number of whaling vessels, and up to 19/39, by 1672 (Turgeon, 2000: 173). The fishing voyages maintained in the French side an average of 40 or more ships that travelled to Newfoundland by the late decades of the 17th century. A rebirth of the industry of whaling and cod fishing in the 17th century in Newfoundland is a potential target for archaeological studies

3.15 Implications of the changes at the end of the 16th century. (1580s-1618): Economic alternatives for the Bizcayan investors

These changes at the end of the 16th century created some new opportunities and problems for this maritime community, rooted in a mercantile activity reflected in the shipbuilding of the area. In this economic crisis, a new shipbuilding flourished adapted to the opportunities of the expanding Spanish Kingdom. However, it cannot be forgotten that the old elite rooted in these fishing activities found their way and adapted as well to the late 16th and early 17th century by freighting their ships from southern France into Greenland, the Svalbard, Jan Mayen, Norwegian and Icelandic fisheries became new destinations for the early 17th century for the Bizcayan merchant elite (Koivukari, 2013: 1-18, Alberdi, 2012: 122). However, the regulations for the ships built for the Indias routes and Armadas were very strict compared to the shipbuilding for other destinations. This is one of the reasons why perhaps many of those whaling and cod fishing Guipuzcoan investors freighted their ships departing from the French Labort from the late 16th century onwards (Alberdi, 2012: 284).

As a result of these challenges, sailors and funding changed direction and moved to the French Basque side, where kings' confiscations were fewer. This symbiotic dependence was becoming deeper during the end of the 16th century, while Spanish Basques needed sailors to complete the crews for the fisheries and these sailors, coming from the French side, became more and more essential for the functioning of these voyages. The symbiotic functioning of this economy was also a result of the specialization that was going on, between both sides. As the Spanish Basques were becoming experts in the whaling industry, French Basques did so in cod fishing (Alberdi, 2012).

From 1600 to 1610 new fisheries were discovered and exploited. Newfoundland remained more related to the cod fishing, even though some whalers still went there, but mainly, the Basque whalers travelled to the North to Svalbard, Spitzbergen, Jan Mayen, Greenland, Iceland and Norway (Koivukari, 2013; Romanovsky, 199: 233). As an exotic destination, Brazil was also shortly visited on this first decade of the 17th century; this opportunity was a result of the conquest of Portugal and the integration of the empire to Spanish control until 1668. At the same time, “old” fisheries became interesting again, such as Galicia, Asturias, and the Cantabrian Sea in general (Alberdi and Aragon, 2006: 101).

The hunt of other whale species in winter prolonging their stay through the winter, hunting seals, walruses, trading with Amerindians and their fur and combining cod fishing voyages with whaling ones kept the fisheries and the freighting alive for the 17th century (Huxley and Barkham, 1996: 377). Many of these trading activities moved to the other side of the French border to the French Basque area and continued with the fisheries and trade as part of a cross border culture (Loewen and Delmas, 2012: 214).

The relationship between the French and Spanish Basque communities went through stages in which sometimes they would be at war and other times they would mutually benefit from trading activities. In fact, some publications have emphasised these commercial connections (Orella, 2006), that paved the way for a cultural exchange. Although these commercial relationships settled with the “*treaties of good correspondence*” or “*tratados de buena correspondencia*” after the mid-17th century, previous centuries of trade, despite conflict, connected these two areas of the Bay of Biscay (Alberdi, 2002: 135).

As the wars still continued, Basque seafarers sailed in vessels under the French flag, so that English and Dutch whalers controlling the northern fisheries would not attack them. The use of the French flag, in order to avoid conflict with Dutch and English vessels was still used on the 18th century, when they controlled the northern fisheries. This way, Spanish Basque vessels travelled north and could make profits from the new fisheries (Eguiluz, 2014: 10-11, non-published).

3.16 Conclusions

According to the Monarchic view, Bizcayan shipbuilding suffered a "crisis" in the Spanish area. However, the continuation of the shipbuilding industry on the French side of the border contradicts this idea of a decline. The evidence of intense periods of shipbuilding, especially after the losses of the Spanish Armada 1588, during the 1590s contradict the idea of a "shipbuilding crisis". In short, it seems the Spanish Monarchy used the concept of a crisis of the shipbuilding industries to gain control the Bizcayan shipbuilding and timber supplies, crucial to sustain the spine of their empire.

The Bizcayan cross-border economy was extended, beyond the space considered as part of the classic Spanish perspective, limited by national borders, which historically does not include evidence from the French side of the network. The transnational interaction of the Bizcayan area, was clearly playing a role across the border whenever this was beneficial, despite conflicts occurring between the two sides. The two sides of the Pyrenees sometimes fought each other, as in 1558 (Truchuelo García, 2007: 172), completely blocking any trading activities, but other times restarting those trading relationships with intensity in a continued way (Alberdi, 2002: 135).

The migration to the French area gave the impression of a shipbuilding crisis for the Spanish side, whereas the industry just continued on the other side of the border, keeping alive the merchant interests of the Bizcayan investors interested in the Atlantic fisheries and European trade.

To sum up, some aspects need to be emphasised in order to understand the changes during the 16th century affecting Bizcayan shipbuilding in the late 16th century. The division of interests and competition for timber resources, confiscation of ships by the King, the imposition of the interests of the King over the local shipbuilding industries, the wood shortage and increasing wood prices, the competition from other countries, the crisis of the whaling and cod-fishing industry in the Newfoundland fisheries and the changes in the traditional trading routes have to be understood in order to explain the complex variety of factors affecting shipbuilding in the Bizcayan area in the late 16th century. As a result of these factors, most of the Bizcayan investors interested in the Atlantic fisheries and European trading routes migrated with labour to France to continue with their trading and fishing voyages.

4 The Iberian Bizcayan shipbuilding tradition as a network: An archaeological vision (c.1550)

4.1 Introduction

Shipbuilding traditions have been defined by cluster of attributes related to places. This association of a space to a set of attributes has been limited to a region. Despite this, the "Iberian" attributes seem to be also common in other places. The technology that was used in the 16th century in Spain and Portugal, particularly following the Bizcayan tradition was a combination of elements that was inspired from previous periods and different regions.

However, an important point is that the set of attributes that influenced other regions were not exact copies of the mother culture. In other words, in this chapter the idea of a cultural continuity of the same ship will be put into question. The inspired culture does not repeat in the same way. If they are not the "same" objects in the same region, then the tradition we speak of is not completely homogeneous. These Iberian vessels were but the remnants of a broader technological exchange, a larger picture of a cultural influence going from south to north in Europe during the late 15th and early 16th centuries. This technological hybridization crossed the Mediterranean in the 14th century and reached the Cantabric sea by the 15th century (Pujol I Hamelink, 2018). Around the 1420-1430s the clinker ships started to disappear in the Mediterranean, replaced by carvel constructed vessels (Pujol I Hamelink, 2018).

The intention of this chapter is to show how an interconnected shipbuilding tradition can change, but also how diverse it is in forms. In other words, that the process of acquisition and integration of "foreign" elements, is part of the natural process of shipbuilding traditions, similar to what Adams mentioned as the push and pull of traditional and innovative agents within a society (Adams, 2013: 194). In this case, it is demonstrated with the example of the Bizcayan tradition through archaeological material. Although these being rather generalist statements about shipbuilding culture, in this chapter we will concentrate on the archaeological remains which Oertling baptised as the Atlantic tradition, later on labelled as Iberian-Atlantic (Oertling, 1989; Oertling, 2004). Within that Peninsular shipbuilding tradition, in this chapter it would be important to point out that the Bizcayan sub-tradition, brother or shall we say sister to the Portuguese one, both belonged clearly to this broader shipbuilding family of Iberian construction techniques. We will point that the Bizcayan tradition had enough differences to be distinguished from the Portuguese tradition, contradicting the idea of a completely coherent Iberian set, which is the main idea of this chapter. Not only Iberian shipbuilding was not homogeneous, but even further, the Bizcayan tradition was a shipbuilding regional craft, a cluster of local adaptations, of a broader trend of carvel technique, more common with the Iberian traditions. Also, the idea of a Spanish shipbuilding for the 16th century, needs revision and it is a rather anachronic concept for representing the cultural reality of the archaeological record and historical finds of the Bizcayan shipbuilding, as not even this regional tradition had a coherent unique set of forms.

This chapter deals with one of the main problems encountered when attempting to identify the Iberian Bizcayan tradition; an elusive clear-cut cultural boundary of technological "attributes". This is elusive because some of the "attributes" are not only found in the Bizcayan area but also in other traditions and clusters. Both elusive in terms of defining a clear limit in time, but also unclear in terms of a defined space, that seems not neat, but rather "messy" and more complex than it seemed initially. Here the use of the hybridization as a theoretical background to explain the nature of Bizcayan ships, seem to be useful to illustrate how complex, varied and heterogeneous it was. Ships built in the Basque shore were unique in their cluster of attributes, but some of their individual traits were identified both in southern and northern traditions in Europe.

However, even when we attempt to show how this tradition looked like, this construction of the idea of concept of an entity that persists through time and space, is a construct, created both by archaeologists and historians. There is a presumption in the idea of a national/ethnic coherent shipbuilding tradition regarding these ships identified as Iberian that continues “identically” through time and space. This singular conceptual model becomes problematic when describing the variety of shipwreck forms. For this reason, a heterogeneous tradition is proposed as a concept for understanding the Bizcayan tradition.

Considering the state of each shipwreck, one is aware of the different nature of the remains and preservation of these, as some are more complete and better preserved than others. So, the claims made in this chapter ought to take this point into consideration, as we speak of the remains we found, but we cannot make claims, nor assumptions about those that got lost. For this reason, it is understood that this is a particular constrain to this analysis, but still should not stop the research about those elements that were preserved.

Ships are rather paradoxical, because they are not the same ship as the one built in the shipyard, or the one that sunk. Ships have no permanent essence. In other words, this chapter will be looking at those “essences” that have been identified as being representative of Iberian shipbuilding, in this case, we will claim that those remains of the Bizcayan part of the Iberian Peninsula, are different from those that belong to the Portuguese brothers. This will be done in order to deconstruct the idea of a cultural “continuity” as an entity, such as a continuous tradition of the construction of the “same” ship in Iberia. Despite Hasslöf mentioned much earlier the concept of a living tradition in literature, (Hasslöf, 1963: 164), one believes that he made a point about the idea of living traditions, as he mentions:

> *“Living tradition affords comparative data of the greatest interest, since the bearers can answer questions, not only just by word, but can, by manual demonstrations of tools and operations, give account of how they proceed according to their custom of working in building ships in various fashions. Hence, in using this sort of source-material the student, by means of personal observation and questioning, may have the chance for argument and exchange of views which may prompt him to reconsider his own accustomed way of thinking, even to the point of making him start again and switch over to another track possibly offering better prospects of being able to understand and explain the mute concrete documents.” (Hasslöf, 1963: 164)*

> *“If this state of affairs is allowed to continue, we will soon find ourselves bereft of all chance to secure, from these primary documents, the completing, checking, and verification of the testimony of mute objects and narrative sources, in the form of living tradition, stray notes, didactic instructions, pictures, and literature without which our knowledge of marine culture and its history would be neither vivid nor reliable” (Hasslöf, 1963: 177)*

4.2 Iberian Atlantic vessels and their architectural signatures

In the following lines, an overview of the archaeological studies on Iberian shipwrecks and their archaeological contribution will be considered. Although the notion of a shipbuilding "tradition" has been discussed in Chapter 2, the analysis will be extended here related to particular ship remains. Notwithstanding the implications of understanding a tradition as a "*technological continuity and conservatism*" (Hocker, 2004: 8), this idea will be deconstructed in the following paragraphs, proposing that there is no coherent cultural tradition for the Iberian case, that stands without contradictions as a singular conceptual set of characteristics. There is some danger in missing the details of each case, by attempting to understand all the cases under one model, and Maarleveld himself warned archaeologists about this, expressing that ships were very complex artefacts, and that these should not be attempted to be interpreted all at once in the same way (Maarleveld, 1995: 6).

In 1989 Oertling created the concept of an Atlantic vessel (Oertling, 1998). This was directly related to the Iberian ship studies. Other publications, such as Steffy in 1994 joined the discussion on the notion of an Iberian tradition (Steffy, 1994). The terms "Ibero-Mediterranean" as well as the classical "Iberian" term were used to group the ship typologies to be identified with these ships (Loewen, 1998a). Loewen was the first to use the term Biscayan ship (Loewen, 1998b). He also claimed a shared technology that was used to make barrels in the 16th century in what he called the western Atlantic space. That space included the Western French coast, Southern England and Northern Spanish area, the Bizcayan area in this case, therefore, implying a transnational cultural influence (Loewen, 1999: 242). Castro continued the study of Iberian ships, with substantial contributions to the shipwreck studies, as well as to the characteristics to look for in these findings, particularly with his deep insights into ship design and construction (Castro, 2008; Castro et alii, 2017a; 2017b).

Later compilations of archaeological remains of early modern shipwrecks collected traits relating to European ships, including the so-called Iberian ones (Castro et alii, 2018). Following Oertling's proposal, a variety of ships are included in this table that will be taken into account throughout the chapter.

Name	*Found in:*
Rye A	*United Kingdom*
Studland Bay	*United Kingdom*
Ria Aveiro A	*Portugal*
Corpo Santo	*Portugal*
Nossa Senhora dos Mártires	*Portugal*
Cais de Sodre	*Portugal*
Angra D	*Azores (Portugal)*
Angra B	*Azores (Portugal)*
St. John Bahamas Wreck	*Caribbean*
Western Ledge Reef	*Caribbean*
Emmanuel Point	*Florida, United States*
Molasses Reef Wreck	*Caribbean*
Highborn Cay	*Caribbean*
San Esteban	*Texas, United States*
Orio IV	*Basque Country (Spain)*
Red Bay (24M)	*Canada*
27M	*Canada*
28M	*Canada*

Table 4.1 Iberian shipwrecks table. Some of these are Bizcayan ships, whereas others cannot be denied to be of a Portuguese origin. In some cases, the origin is not known or is unclear.

This chapter will be an approach to the problematic definition of what an Iberian ship is, particularly a Bizcayan ship. Following traditional archaeological approaches, the comparison of "*architectural signatures*" of a tradition, inspired by Eric Rieth, and the idea of Iberian-Atlantic vessels proposed by Oertling, will combined by following the concept of the twelve characteristics, later shortened to eleven (Oertling, 1989; 2001; 2004; Rieth, 1995). According to the theoretical concept borrowed from Rieth, a variety of shipwrecks that shared architectural signatures, could be considered as part of the same shipbuilding tradition. In his own words:

« L'identification de telles « signatures architecturales » permet ultérieurement de formuler des questions d'ordre historique comme, par exemple, celles relatives aux

éventuels contacts, échanges ou influences entre ces deux traditions de construction navale médiévale à clin » (Rieth, 1995 : 179)

"The identification of such "architectural signatures" makes it possible to formulate historical questions later such as, for example, those relating to possible contacts, exchanges or influences between these two traditions of medieval naval shipbuilding" Translation by the author.

Further inspiration from Castro (Castro, 2008; Castro et alii, 2019) have been combined together. Some preliminary work was done in the hypothesis which compared Bizcayan to the Portuguese shipbuilding tradition, that preceded the methods to be applied and expanded on in this chapter. Oertling could not discern a Portuguese or Spanish ship based solely on the architectural signatures (Oertling, 2001: 237). In these chapter it is also the intention to claim that those ships were Bizcayan, as there was no "Spanish" coherent shipbuilding tradition by the early 16th century.

4.3 A Bizcayan shipbuilding tradition?

The concept of a Bizcayan shipbuilding tradition will be proposed in the following lines, by following traditional indicative "architectural signatures". A variety of elements seem repeated, not necessarily in the exact same dimension or shape. The Bizcayan cluster by the mid-16th century was characterized for large ocean-going ships by some different elements:

1. *The use of beech keels, also found in other places.*
2. *"T" shaped keel scantlings for the keel, also found in the Nordic tradition.*
3. *The use of both treenails and iron nails.*
4. *The use of fillers planks and a sill (Albaola), a shared attribute with Portuguese shipbuilding, and Mediterranean examples.*
5. *A notched keelson mast step structures reinforced with buttresses crossed by the pump hole (With its variations).*

These will be proposed to be indicative "attributes" considered as a cluster of the Iberian-Bizcayan tradition of the 16th century. In other words, there are some regional elements that in combination have a regional pattern related to the Bizcayan shipbuilding tradition. Other elements to be taken into account are explored in Chapters 5 and 6, to do with proportional ratios and measurements, but also the relationship of these ratios to the length of the keel. The use of tree species, as well as ballast, pottery, tar, manufactured artefacts, weaponry, cannon shot, rigging and other elements can be, together with the technological-cultural remains of a ship, indicative of the cultural traces of a ship. The elements may also tell us the story regarding the acquisition of objects in that particular ship, of a very complex and unique network of elements that can be found in a shipwreck.

These however, need further corroboration from dendrochronological and dendroprovenance techniques in order to spatially locate within a time span these technological remains. Some of these elements can be traced back in time, whereas others are not possible. Cultural-technological clusters of information alone do not allow us individually to ascertain the place of construction of a ship and its cultural attribution, whereas further analysis with other methods can help refine the spatial and temporal adscription of the ship's cultural context.

4.4 A European Atlantic family?

In the following analysis, I would like the reader to consider the remains we are about to see as the siblings of a really large family. Some of these examples will be very similar, whereas others will not. However, at all times, the framework under which we study these remains is that they are all related to each other, to a greater or a lesser extent, each with their own identity, even within that larger family that we may call "*European Atlantic*". This is because of the influence of trade and exposure to other ships which inevitably allows contact and meetings to happen.

Perhaps the names we use, such as Bizcayan, might not be able to encapsulate properly the distinctions we will find throughout the analysis of a vast amount of wrecks. However, I think it is important to emphasise in this work that we are not advocating a concept of a shipbuilding tradition in terms of precisely defining the inside and outside of this tradition, but rather that the emphasis of this thesis is in the relationships, the contacts and the bonds, whether minor or major, within a major sphere of cultural adscription.

Therefore, as an archaeologist, do not try to look for an absolute coherence of a shipbuilding tradition, but rather, just notice that the aim of this section is to realise how the scenario in which ships were made reflected that of a broad context and relationships. A much more trans-national exchange than we perhaps believed, a meeting of different people and techniques, and the integration of these, and exchange and acquisition over a short period of time, that due to the networks in which shipbuilding traditions were involved, drastically shifted in a very broad sense.

In this section, we will attempt to emphasise how these Iberian-Bizcayan examples, were in fact the ripples emanating from a broader transnational cultural interaction. An interaction of Mediterranean inspiration which, while the ripples of this tradition of techniques travelled and expanded towards the West and North of Europe, hybridized with each region's necessities, activities and ordinary life in general. Each community took what was necessary and built their ships in resonance with these rather "new" techniques, those of a different construction from previous "Plank first" stages. In fact, the Iberian-Bizcayan tradition as we can see it through the remains of the 16th, mirrors the necessities and uses that each region made of a renaissance opportunity that spread throughout Europe, bringing a carvel "frame first" alternative of construction. This brought new horizons to those communities that were capable of building ships to cross the Atlantic.

A shipbuilding tradition, had different constructions, inspired by neighbours and examples from other ships. But no two ships were ever identical. If we were to seek out the exact measurements of a Bizcayan ship or the exact shape of a Bizcayan attribute, we would not be able to find it. Here lies the paradox of a heterogeneous tradition, because this tradition is to be found in all of those varied examples. One would not be able to find a particular model of a shape or form with some sort of coherence copied in all ships. This is the paradox of the Bizcayan shipbuilding tradition.

Period	Name	Preassembled Central frames	Sternpost scarfed to keel knee	Single stern deadwood knee	Y-timbers tabbed to deadwood	Keelson notched over floors	Mast step in keelson	Butresses and stringers	Ceiling/filler planks (Escoperadas)	Rigging Chain assemblies	Flat Transom
1400	*Corpo Santo*	*?*	*Y*	*Y*	*Y*	*?*	*?*	*?*	*?*	*N*	*N*
1400	*Ria Aveiro A*	*Y*	*Y*	*Y*	*N*	*Y*	*Y*	*Y*	*N*	*N*	*N*
1500	*Cais de Sodre*	*Y*	*?*	*?*	*?*	*Y*	*?*	*Y*	*?*	*?*	*?*
1500	*Cattewater*	*Y*	*?*	*?*	*?*	*Y*	*Y*	*Y*	*Y*	*?*	*N*
1510	*Highborn Cay*	*Y*	*?*	*?*	*?*	*Y*	*Y*	*Y*	*Y*	*Y*	*?*
1510	*Molasses reef wreck*	*Y*	*?*	*?*	*?*	*?*	*?*	*?*	*Y*	*Y*	*?*
1525	*Studland bay*	*Y*	*Y*	*Y*	*N*	*?*	*?*	*?*	*?/Y*	*Y*	*Y*
1554	*San Esteban*	*?*	*Y*	*Y*	*Y*	*?*	*?*	*?*	*?*	*Y*	*Y*
1550	*Rye A*	*?*	*?*	*?*	*?*	*Y*	*Y*	*Y*	*Y*	*?*	*?*
1550	*Angra B*	*Y*	*?*	*?*	*?*	*Y*	*?*	*?/Y*	*Y/Y*	*?*	*?*
1559	*Emmanuel Point*	*Y*	*N*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y/?*	*?*	*N*
1560	*27M*	*Y*	*?*	*?*	*?*	*Y*	*Y*	*Y/?*	*Y/Y*	*?*	*?*
1560	*Orio IV*	*Y*	*?*	*?*	*?*	*Y*	*Y*	*N/Y*	*Y*	*?*	*?*
1560	*29M*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y/Y*	*?*	*?*	*?*
1564	*St. John Bahamas Wreck*	*?*	*?*	*?*	*N*	*?*	*?*	*?*	*?*	*Y*	*?*
1565	*Red Bay (24M)*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*
1580	*Western Ledge Reef*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y/?*	*?*	*Y*
1600	*Yarmouth Roads wreck*	*?*	*?*	*?*	*?*	*?*	*?*	*?*	*Y*	*?*	*?*
1600	*Angra D*	*Y*	*?*	*?*	*Y*	*Y*	*Y*	*Y*	*Y*	*?*	*Y*
1606	*Nossa Senhora dos Mártires*	*Y*	*?*	*?*	*?*	*Y*	*?*	*?*	*?*	*N*	*?*

Table 4.2 Iberian Atlantic Ships Table. This table was started by Oertling in 1989. Some shipwrecks were discovered that belong to the Iberian tradition. The attributes of Iberian Bizcayan ships are also considered in this table.

4.5 The Medieval emergence of a mercantile elite in the Bizcayan area

Basques became very involved in transporting activities from Medieval times and during the 16th century, developing a very strong connection with the Mediterranean and Northern seas (Arizaga, 2003: 51). From a maritime trading perspective, the north of the Spanish Kingdom was the trading centre for northern and southern European routes, but also a source of ships to be confiscated for the Kings service, which did not own its own war fleet. The merchants of these northern shores were articulated around institutions and local networks, such as the so called "*Hermandad de las Marismas*", (*Brotherhood of the Marshes*) also called "*Hermandad de las villas de la marina de Castilla*", founded in 1296 (González Mínguez, 2000: 22; Angulo Morales, 2004: 187). This was a medieval and early modern administrative entity that since the 13th century had grouped the Northern coastal villages in Castile (belonging nowadays to the province of Cantabria). The institution included the villages of *San Vicente de la Barquera, Santander, Laredo* and *Castro Urdiales*. At the end of the 15th century this entity was integrated in the *Corregimiento de las Cuatro Villas*, a juridical institution established by the Catholic Kings in 1496 and in 1514 the province changed the name to the *Corregimiento de las Tres Villas de la Costa*. These coastal villages and what nowadays are the Basque Country and Cantabria belonged then to the Castilian Crown were part of this "Brotherhood of the Marshes" that bonded many coastal Basque and Cantabrian villages (Añibarro, 2013: 55).

They formed a strong maritime power and their economic relevance that stopped the expansion of the Hanseatic League in the Iberian Peninsula. From the 1450s this brotherhood dealt with 40% of all the commercial activity generated in the Iberian Cantabrian Sea. During the War of the Roses, 1455-1487, trade was affected and perhaps some of the Basque ships could have been captured. Many peace treaties were signed between England and the Basque provinces, even with Bayonne, and the Hanseatic league during the 14th and 15th centuries (Tena, 2003: 133).

By the late Medieval period, the northern shipyards were already active and flourishing, due to the exportation of Iron (Tena García, 2003: 131). Iberian wool was exported to the Northern communities, such as France, England and Flanders, a traditional merchant activity well established in the later Medieval period, but already operating in the 16th century (Grafe, 2005: 49-52). During the 15th century, Basque Iron had an expanding 15th century, that tended towards a further development of the trading routes linking with places such as London, Bristol, Dieppe, Rouen and Bruges (Lema, 2004: 317). The intensity of Basque trade with English harbours varied in intensity, but was continued from the 13th century (1260-80). Basques traded mainly iron, wine and dye with the English, in exchange of clothes. By 1490 there were more than sixty Basque ships trading in English harbours, from Chester to Hull (Childs, 2003: 55).

Thus, the Northern eastern shore of the peninsula engaged in trading activity from the 14th century onwards in the flourishing economic stage of the Mediterranean, but while also participating with their ships in the war against the Genoese, together with the Catalans and against the Turks (Ferrer, 2003: 127). During the 14th and 15th centuries the traditional coastal trading routes expanded and these northern Basque ships reached and competed with Genoese, Pisano and Catalan merchant ships, in the Mediterranean, protected by the privileged position they had within the Castilian trading networks, in contrast to foreign vessels that did not enjoy priority (Fernández, 1989: 36). However, the predominance of Genoese ships was obvious when ships were hired to fight for the Castilian crown. In these years, Bilbao was a buoyant trading city, promoted by local authorities, that fostered a growing supply network for the shipyards and ship fitters (Fernández, 1989: 37).

The shipbuilding of this time was beginning a process of gradual change, that will lead us to the 16th century Bizcayan tradition. But prior to that, we will have a look at the archaeological context of ships from the 15th century of the Basque and Portuguese region in order to introduce the clinker period that preceded the carvel shipbuilding cluster we are about to see. After the 15th century, the remains of the early modern period will illustrate the concept of a heterogeneous Iberian Bizcayan tradition.

4.6 *The previous 15th century "Clinker" techniques preceding the 16th century Iberian-Bizcayan ships*

The process of technological mixture that we will see through the evidence of the 16th century that allows us to speak of a "Bizcayan" cluster, and distinguish it from the "Portuguese" one, is not a process that occurred suddenly on the 16th century. This was indeed a long mixture that was ignited throughout the medieval period across the different trading routes that preceeded the 16th century Bizcayan tradition. *Marcel Pujol i Hamelink* refers to this speaking of Bizcayan or Basque ships as early as the 14th century getting mixed up with Mediterranean technology, and vice versa:

> *"Fins a l'inici del segle xiv el gran vaixell mediterrani dedicat al comerç era la nau (del llatí navis), que duia com a sistema de propulsió a vela dos arbres a vela llatina, i com a sistema de direcció el doble timó lateral. En aquell moment van començar a arribar embarcacions biscaïnes, amb una tecnologia naval pròpia, l'habitual de l'Atlàntic, en què el buc era tinglat, tenien un sol arbre a vela quadra i un sol timó, el de roda. A més, a aquestes embarcacions atlàntiques se les coneixia com a coques (del germànic kogge). Per tant, durant unes dècades hi van conviure dos tipus de grans vaixells mercants, fins que es va començar a produir la hibridació de les coques atlàntiques i les naus mediterrànies."*(Pujol i Hamelink, 2018: 12)

> *"Until the beginning of the 14th century the great mediterranean ship that was dedicated to trade was the nave (From the latin, navis), that carried as a propulsion system two masts of lateen sails, and as a directional system of a double side rudder. In that moment bizcayan ships started to arrive, with their own technology, typical of the Atlantic, in which the ship was clinker built, had a single mast with a square sail and a single rudder, in the middle. Furthermore, these atlantic ships were known as "coques"(from the germanic kogge). Therefore, during some decades, there was a coexistence of merchant ships, until a hibridization started to occur between the atlantic "coques" and the mediterranean naus"Translation from the author.*

4.7 *15th century remains associated with the Basque region*

4.7.1 *The Newport ship*

If there is any 15th century ship that could be more clearly identified with the Basque region than any others, those would be the Newport and the *Urbieta* vessels. The Newport ship was discovered in 2002 in the city of Newport or Casnewyd, the remains of perhaps one of the largest and best-preserved clinker medieval ships. It was found during the construction works of an arts centre on the right bank of the river Usk (Nayling and Jones, 2013).

The ship was thought to be dated to a relative date such as 1447. A French coin in the keel scarf seems to give a clear proof of the origin of the ship and date, as the coin was struck in 1446, therefore the ship must have been built later, given this relative *post quem* date. Dendrochronological analysis dated the British timbers of the ship to a felling date of AD 1468. Although no absolute results could be made from the dendrochronological analysis, associated remains helped to date this vessel as being built in the first half of the 15th century (Nayling and Susperregui, 2014: 290).

The dendrochronological samples from its framing and planking elements have been crucial to determine the origin of the timbers which, according to the main hypothesis, were associated to an Iberian context in origin (Nayling and Jones, 2013: 22; Tanner, 2013: 1; Nayling and Susperregui, 2014: 289-291). The Newport ship seemed to have revealed evidence of diverse stages of the life of the vessel, in which different origins of wood were used in its hull such as the repairs from oaks that were not from the Iberian Peninsula, but rather those that corresponded with the tree ring pattern from British oaks (Nayling, 2013: 12). The ship was refurbished and repaired in 1459, and possibly in 1467 and 1468 as well with new British

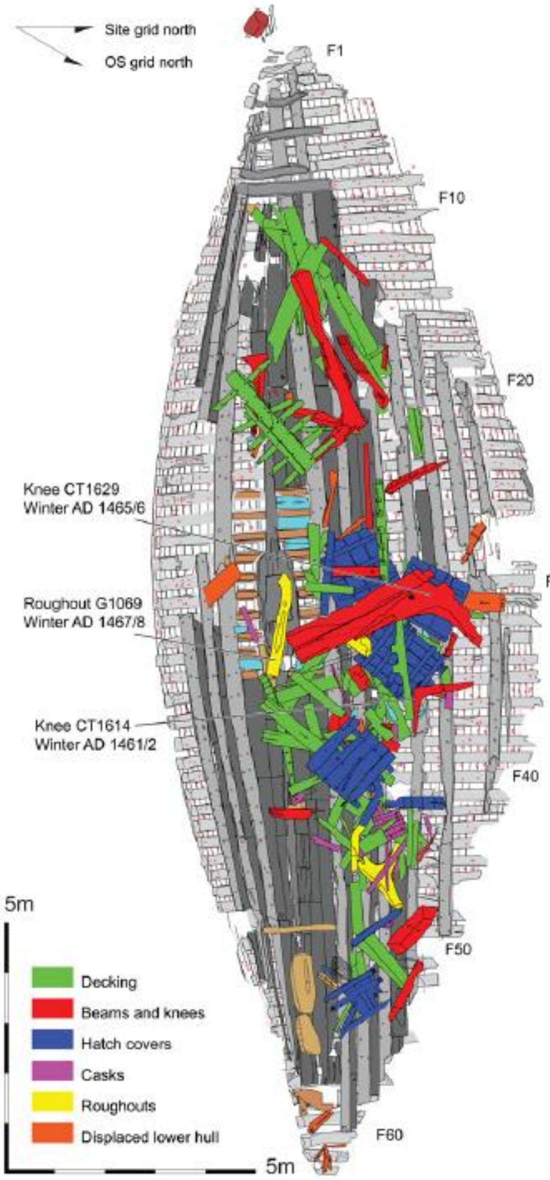
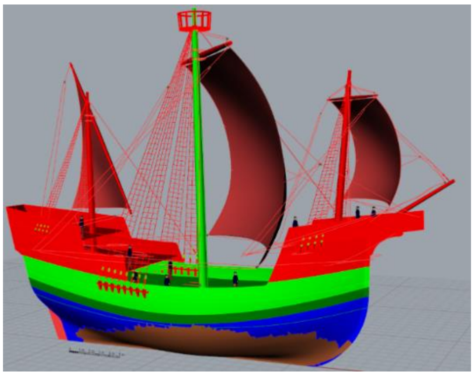


Figure 4.1(Picture above) Timbers lying within the ship, colour coded by major categories (Nigel Nayling) (Nayling and Jones, 2013: 10)

timber. The links to Portuguese territory, through coinage and pottery remains, suggesting either trade with this area, or that the ship was captured from the Portuguese. In that case it could have been either built and sold in the Basque area, or timber could have been sold in Portugal and built there. Cork oak, as well was typical of the Portuguese coast, and western prickly junipers, observed in the samples, that grew in south west Portugal. For this reason, it seems plausible to think the ship used to travel to the Portuguese coast for trade (Nayling and Jones, 2013: 34-37).

The Newport ship used a planking first construction system, typical to clinker-built vessels. The space between frames averaged around 37mm. The ship's keel had a trapezoidal shape, with a garboard on each side of it, made completely of one piece of a beech tree. The mast step structure together with the braces or buttresses. Buttresses found in the Newport ship were built touching the stringer (Nayling and Jones, 2013: 4).

The hull of the Newport ship was unusually well preserved, allowing the archaeologists to observe the remains of the beams of the ship's deck. This clinker-built vessel, was made from radially split planks. Planking was 170mm-256mm wide and 1280mm-4510mm long. On average, planks were from 11mm thick, to 33mm on their thicker side. The planks matched with the Basque oaks had a range of 100-140 tree rings per plank, whereas the repairs matching British chronologies had 209 years. Iron nails and wooden treenails were combined in the fastening of the planks. Framing elements were 211mm moulded and 256mm sided in average. An average of 105 years gave the impression that framing elements were coming from, that did not match with the planks and had a higher average ring width, perhaps indicating that they derived from different woodlands. The biggest deck knee that was found in the Newport ship



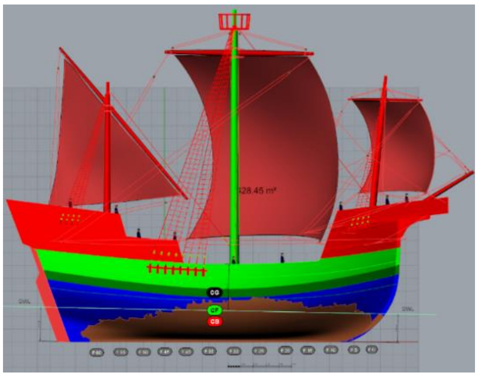


Figure 4.2 (Picture above on the left and right) 3D reconstruction of the Newport ship (3D Drawing of Pat Tanner (Tanner, 2013: 8)

together with the beam of the ship allowed to estimate the height from the top of the floor timber, to the top of the deck beam. This model was based in the height proposed in the first hypothetical reconstruction of the Newport, which has now been updated to a second reconstruction with higher castles in the picture (Tanner, 2013: 8).

Figure 4.3 (Picture above) Depiction of a whaling ship in a portolan, made by a Catalan called Mecia de Viladestes in 1413. This could be a Basque ship, as Basques where the only whalers in Europe in the 15th century.

4.7.2 Urbieta

In 1998, underneath four meters of earth, the discovery of an ancient vessel was made in the western riverbank of the *Gernika* estuary, in the Basque area (Spain). It is to these days, the oldest ship ever found in the Basque Country. The ship was uncovered during the construction works to re-channel the river Oka (Rieth and Izaguirre, 2004). The vessel dated to the 1450 AD-1460 cal AD according to the carbon date analysis (Rieth, 2006: 603).

The remains of the old vessel showed a double end boat, with very thin planking of 20mm. The overall length of the ship was most likely of 8.45m, as there were five meters of keel preserved. It was a clinker-built vessel and it preserved floors, futtocks, planking and stringers.

Some of the scantlings were noted, for example, floors were 117.5mm moulded and 135mm sided. The futtocks were 100 to 140 moulded to 60 to 145 sided. The space between the frames was 350mm to 480mm. The dimensions of the keel were 140 moulded to 100mm sided on the scantling (Rieth, 2006). This vessel, had much in common with what has been thought to be its contemporary vessel, the Newport ship, found in Wales. Particularly, the keel

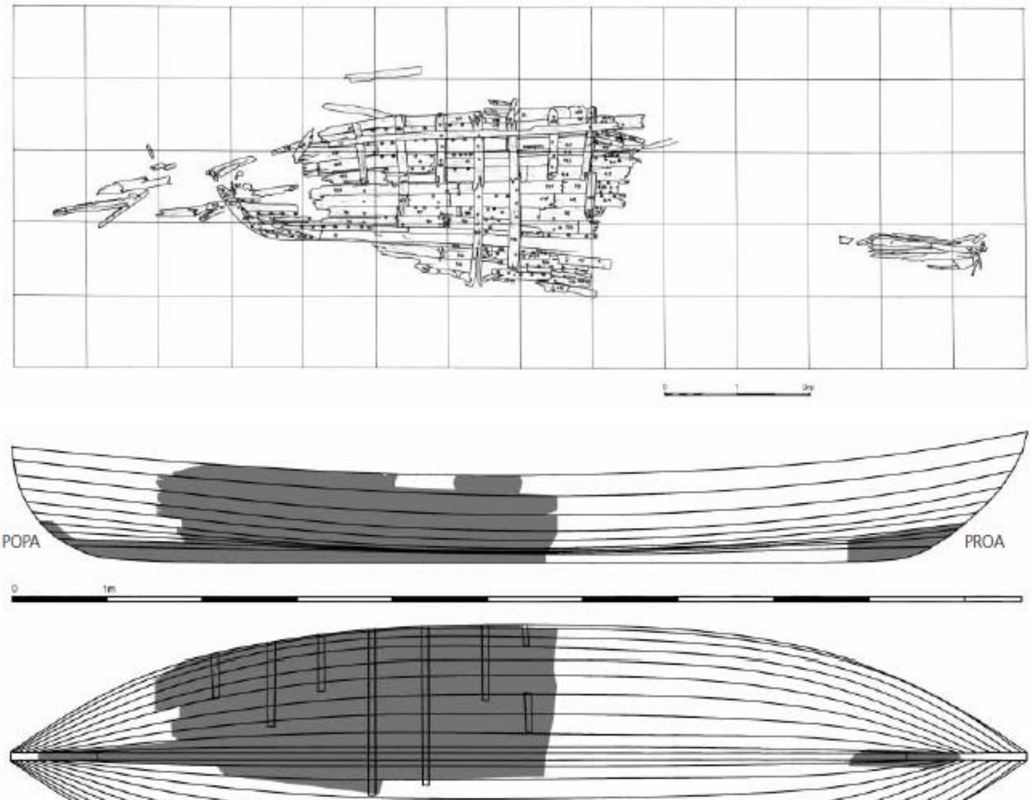


Figure 4.4 Planimetry of the Urbieta ship (After M.Izaguirre). (Picture underneath) Conjectural reconstruction of the Urbieta (E.Rieth and Marc Ginistry) (Rieth and Izaguirre, 2004: 147).

made of beech seemed to be a repetitive element of the area, supported once again by this vessel.

4.7.3 Barceloneta I

During the year 2008, an archaeological intervention in Barcelona discovered the old remains of the harbour of the city, from the late 15th century. The date 1410 was ascertained as being the closest and most probable date, between both extreme dates and also taking into account the analysis of the moss found in the ship, that dated with a radiocarbon analysis to 1395-1440 cal. A.D. date (Soberon, et alii, 2012: 419). After a, the Barceloneta I was given a calibrated date for the period 1310-1440 A.D (Soberon et alii, 2012: 419).

During the reconstruction works of the old train station, the remains of an old ship were also found during this archaeological intervention (Pujol, Soberón, Dominguez, Llergo, Riera and Brugues, 2017).

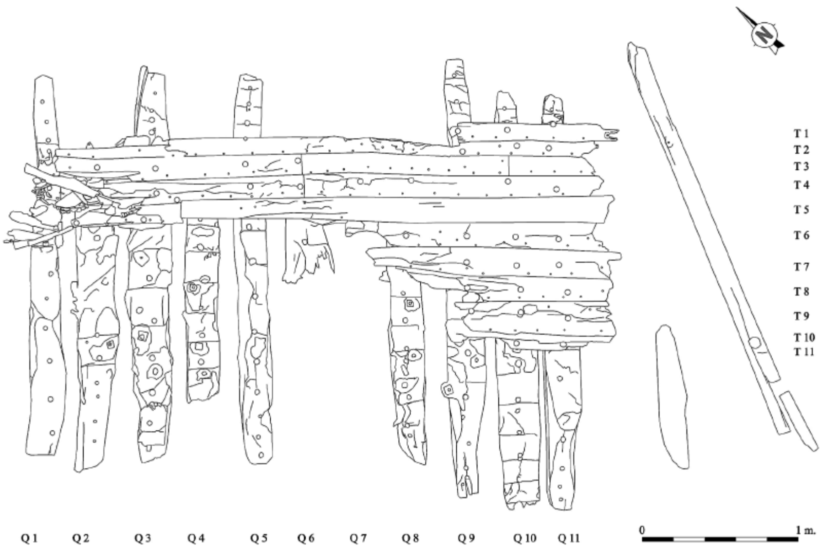


Figure 4.5 The remains of the Barceloneta I are represented in the site plan (After Soberon, et alii, 2012).

The remains of a clinker-built ship were found, 4.2m long and 2.77 wide, corresponding to the preserved ten frames left from the ship, and eleven planks. A small separated portion of the keel was found as well as a small plank some 30m from the wreck. Most of the wreck was oaken, except the keel which was beech. Its planking was clinker built and was 20mm thick. Planks were radially split. The framing was staggered as in most clinker vessels, being between 180-190mm and 220-230mm. The room between frames was of 80mm to 170mm (Soberon, et alii, 2012: 415).

4.7.4 Cavalaire-Sur-Mer

Between 1993-1996 the study of the Cavalaire was made, directed by Delhaye. The wreck was initially given a preliminary date of the second half of the 15th century due to the style of the cannon found on the site (Loewen, Delhaye and Thirion, 2006: 99). A larch sample, matched the tree-ring reference chronology of Savoie in the French Alps, giving a felling post quem date of 1479 (Loewen, Delhaye and Thirion, 2006: 99). Ceramics found in the site were also Ligurian and Provençal, confirming the initial date for the second half of the 15th century.

Field operations dismantled partial remains 18 meters long of a larger vessel. The surviving portside was mostly preserved from bow to stern. The ship was a combination of clinker and carvel planking, of 55mm for the carvel and 15mm for the clinker. The carvel planking was used below the waterline, whereas the clinker was used above it.

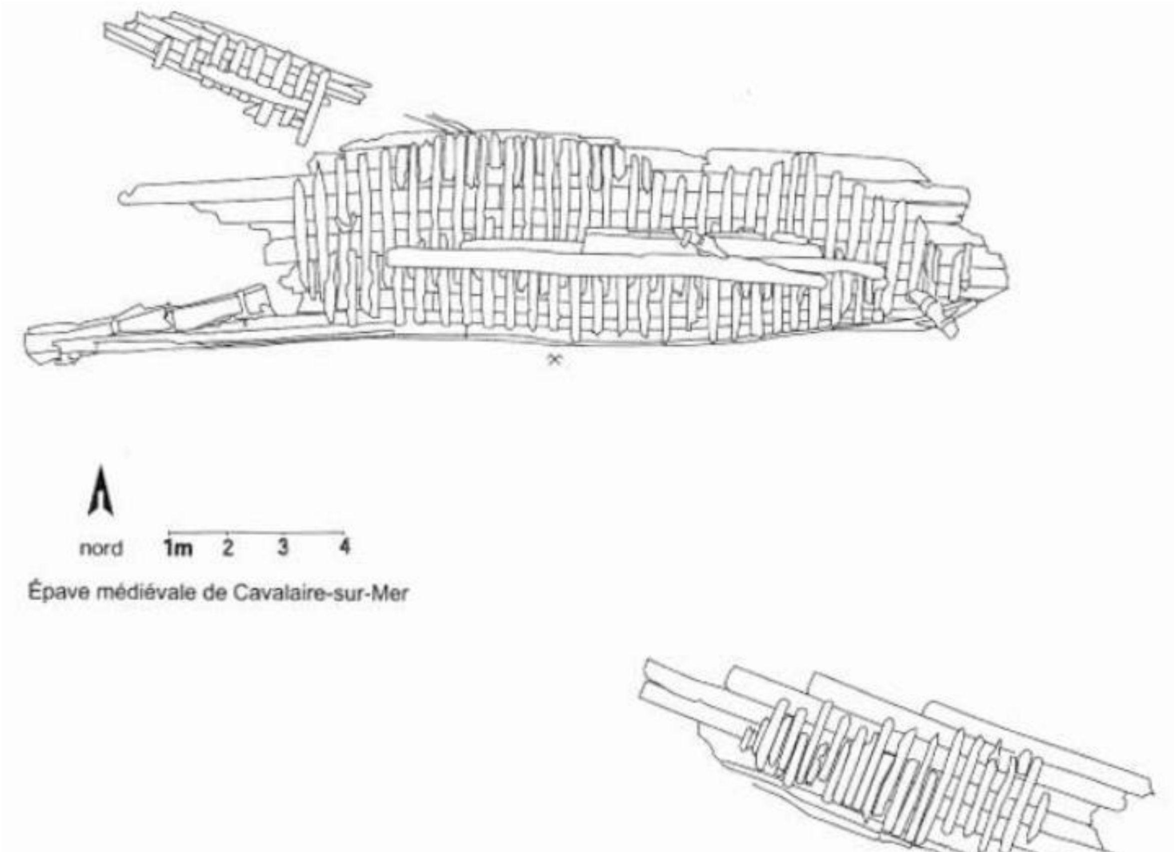


Figure 4.6 Site plan of the Cavalaire-sur-mer (Marion Delhaye) (Loewen, Delhaye and Thirion 2006)

4.8 Portuguese 15th century remains:

4.8.1 Aveiro A

Discovered in 1992, the remains of a small ship were found in the lower tide of the Ria de Aveiro, Portugal, reported by local fisherman (Castro, 2017b: 201). The ship was found almost buried in sediment of mud and sand, together with some ceramics (Alves et alii, 2001b: 12).

Radiocarbon dating analysis from four samples dated the ship to the middle of the 15th century. The c14 was 1434-1448cal AD, 1424-1469 cal AD and 1441 cal AD (Alves et alii, 2001b: 317).

The remains of the ship were extended over 10.4m long with a maximum width of 2.5m. Half of the bottom of the hull was found, including the keel, floor timbers, planking mostly on the starboard side and remains of the first futtocks joined to the floors.

Amongst these it has preassembled central frames, the sternpost scarfed to stern heel, a single stern deadwood knee, similar to the Corpo Santo; the keelson notched over floors, the mast step integrated in keelson, buttresses and stringers included (Alves et alii, 2001b).

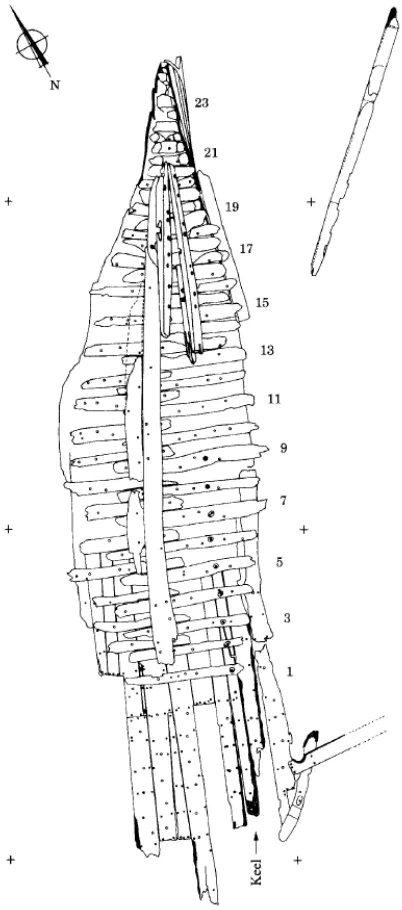


Figure 4.7 The remains of the Aveiro A shipwreck site (Picture above) (Drawing by M. Aleluia) (Alves et alii, 2001b).

Figure 4.8 Buttresses attached to the floors (Picture above) (Alves et alii, 2001b).

Other recorded details worth highlighting was the ship's planking of 50mm to 55mm thick and carvel made; its fastening was made out of iron nails and treenails; floors were 120-130 moulded and 100-190 sided; the futtocks were 120 moulded, to 120 sided and the room between frames was 280-380mm; keel scantlings were 105moulded to 120mm sided (Alves et alii, 2001b). Given the massive cargo of ceramics found in a pile, the ship was very likely to have been of Portuguese origin, similar to the Corpo Santo, despite the identity of the ship not being known for sure (Castro, 2017b).

4.8.2 Corpo Santo

The Corpo Santo wreck was found in 1996, during excavations in Corpo Santo Square, in Lisbon, Portugal, where the new subway line was planned to be built in one of the ventilation shafts (Alves et alii, 2001a). It was found at the previous depth of the banks of the Tagus river. Found at one meter from the sea level and 4.5m below the present surface.

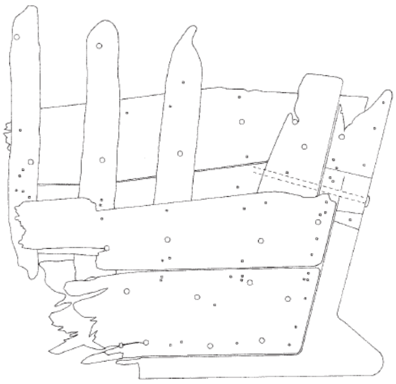


Figure 4.9 Remains of the Corpo Santo shipwreck (Above). (Drawings by Miguel Aleluia) (Alves et alii, 2001a).

According to the radiocarbon dates from a wooden sample from the wreck, the Corpo Santo was considered to be built around the 1400 hundreds or before (1 sigma: 1302-1401 cal. AD; sigma 2: 1292-1412 cal AD) (Alves et alii, 2001a: 405). Sediment layers above the ship had ceramics of 15th and 16th century, coherent with the radio carbon dates (Alves et alii, 2001a: 405).

The remains of the ship showed the stern part of the ship, including the stern Y-frames, the stern knee and stern heel, as well as some planks and fasteners. The stern heel and knee were particularly similar to that of the Portuguese treatise written by Lavanha. but also similar to that found in Aveiro A as well (Lavanha, 1608-1616: 45; Alves et alii, 2001: 407). The ship is very likely to have been built in Portugal, although its identity remains unknown (Castro, 2017b: 200).

A variety of details were recorded. Planking thickness of the ship that were 40mm thick, and carvel built. The fastening was made out of iron nails and treenails. The room between frames varied from 150mm to 160mm, and this was at the stern of the ship. The scantling of the keel, with the garboards carved, had a rectangular bottom and was able to be estimated due to the stern knee's shape (Alves, et alii. 2001a).

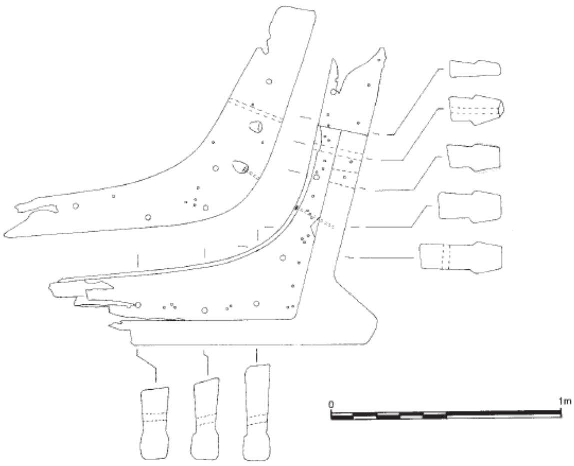


Figure 4.10 Remains of the Corpo Santo shipwreck. Scantlings of the stern knee (Drawings by Miguel Aleluia) (Alves et alii, 2001a).

4.9 16th century Iberian Bizcayan and Iberian-Portuguese traditions

The interplay between regions becomes more and more obvious as we get further into the 16th century. The claims for a national or ethnic tradition will be considered here, due to the interdependent influence of regions during the 16th century, and therefore, the use of the network approach is attempting to address these interconnected issues of shipbuilding characteristics, related to identifying "attributes" unique to particular regions. Oertling already commented (Oertling, 2004: 133) that it is more or less impossible to specify the origin of a ship just by looking at the shipbuilding features, as the boundaries between Spanish and Portuguese shipwrights were not clear in the archaeological record. It would not be completely wrong to say that the remains of what we are seeing which are named Iberian, could be the fruits of a far wider and more complex change occurring in the Iberian traditions, e.g. the Portuguese and the Bizcayan.

Some of the "attributes" considered to have a Bizcayan attribution have been found in these shipwrecks that are analysed in the following paragraphs. The keel species, mast step structure and notched keelson, as well as the pump hole through this, could be "different" attributes found in the ships of the Bizcayan tradition. However, other elements, such as the combined fastening elements, such as treenails and iron nails, are considered to be of a European Atlantic adscription, but perhaps not just "Bizcayan" as they are indeed found elsewhere. But it is common to find similar techniques in regional traditions that link them to a broader scenario of a cultural exchange and adscription.

In this sense, it is not contradictory to say that the nature of a shipbuilding tradition is towards variety, in fact in the Bizcayan case study a variety of forms inform about its nature. However, the reason why it is be important to consider Portuguese and Bizcayan shipbuilders as being related is simply the fact that their building methods of futtocks, dovetail joints, ribbands and a few moulds, were shared concepts in the whole peninsula.

Patrice Pomey makes a great transitionary distinction between the shipbuilding construction stages, that "*based in large shipyards of the modern era, with the development of line drawings and line calculations, prior to the conception of the ship, and the previous one, the so called traditional shipbuilding, (he continues), probably more ancient in shipbuilding, as much as one can understand today, the conceptual phase may be very elemental and may only amount to the simple global idea of the ship based on some fundamental dimensions and proportional ratios*" (Pomey, 2004: 27).

4.9.1 The Red Bay vessel

The Red Bay vessel was the result of a cooperation between historians and maritime archaeologists. In the 1970s while she was studying Basque maritime history, historian Shelma Huxley came across a lawsuit that mentioned a ship sunk in Canadian waters. After finding the place on a map she contacted Parks Canada asking them to go and search for a wreck in Red Bay, nowadays Labrador. In 1978 they found the wreck which was very well preserved for a 16th century ship.

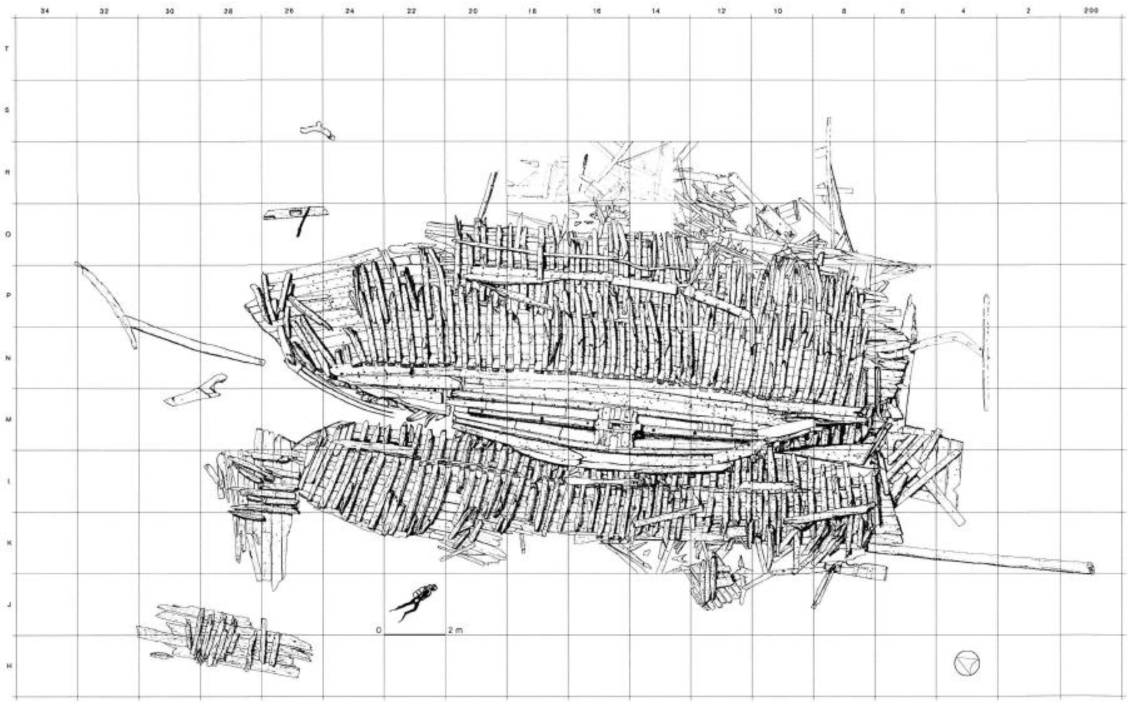


Figure 4.11 Planimetry of the Red Bay vessel (24M) (After, Bradley, 2007: V-111)

The Red Bay vessel was built upon preassembled central frames, it had a sternpost scarfed to the keel knee, and a single stern deadwood knee, to which Y timbers were tabbed to. The vessel had a keelson notched over floors, a mast step in the keelson, a pump hole through the keelson, buttresses and stringers, ceiling planks and filler planks or *escoperadas*, rigging chain assemblies and a flat transom. Thus, according to the Iberian concept, and the Iberian Bizcayan concept, the Red Bay vessel covered every single characteristic of the list, having eleven of them, being the only ship to be 100% similar to the characteristics, indicating that

Oertling used Red Bay as a model for the rest of the ships in the Iberian category, and the Iberian Bizcayan tradition.

The planking of the Red Bay was an average of 40mm, and it was carvel built, having a tangential conversion. The fastening used both iron nails and treenails. Framing was based upon the floating futtocks system, with an average spacing between frames of between 353mm to 428mm varying along the ship, from bow to stern. The ship had floors with scantlings of 190mm-200mm, both moulded and sided. The futtocks were 160mm-200mm moulded and 160mm-190mm sided. The keel's cross section was "T" shaped and made out of beech. Its dimensions were 150mm moulded to 270mm-290mm sided. The remains of the wreck were so extensive that it was possible to see the trees and curvature of the futtocks that were used to create San Juan.

4.9.2 Emmanuel Point I, Emmanuel Point II and Emmanuel Point III

In 1992, a small ballast pile was found in Florida, while conducting an archaeological survey in Pensacola Bay. The ship was thought to be related, due to the similarities of its construction, with contemporaries or ships of similar characteristics. That led to the assumption it was a 16th century find, together with the historical research carried out, that provided a historical narrative of a Spanish wreckage (Smith et alii, 1995). Later on, other shipwrecks were found sunk from the same fleet during the disaster of a hurricane, belonging to the fleet of Tristán de Luna y Arellano, such as the Emmanuel Point II (Smith (ed), 2018). In June 2016 another shipwreck of Luna's fleet was found, named Emmanuel Point III. The similar assembly of the midship structure were reminiscent of other Iberian ships (Bendig, 2019: 513). Some later studies on the Emmanuel point I hull structure were accomplished after initial publications (Collis, 2008).

These vessels had preassembled central frames, a single stern deadwood knee, Y frames tabbed to deadwood, keelson notched over floors, mast step in keelson, buttresses and stringers, ceiling planks and a pump hole through the keelson (Smith et alii, 1995; Smith et alii, 1998).

It was carvel built; the tangentially converted planks were 50mm-80mm thick. The floors frames were 180mm-250mm moulded to 180mm-200mm sided, and futtocks were 70mm-90mm moulded and 100mm-300mm sided. The space between frames was 320mm-440mm. The keel's side dimensions were 220mm-200mm. This vessel fulfilled two thirds of the criteria of the concept of an Iberian ship, with some of those indicative of Bizcayan ships.

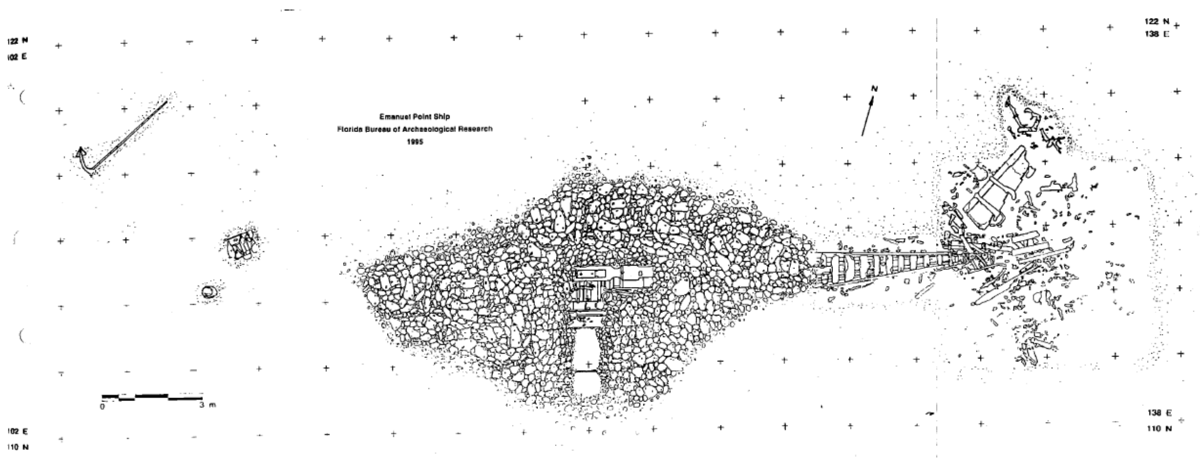


Figure 4.12 Emmanuel Point I, site plan (After Smith, 1995)

Figure 4.13 Emmanuel Point II, site Plan (After Bendig, 2016: 282).

4.9.3 Orio IV

This vessel was found in 1991, during some dredging works in the Oria estuary in the Basque Country, Spain (Izaguirre, 2003). Together with the Orio IV vessel, the Orio I, Orio II and Orio V vessels were found. It is worth briefly mentioning that Orio II was dated mid-15th to the mid-16th century due to the iron ingots found. The leather shoe found on the site, was similar to that of the Red Bay excavations, dating to the 1560s-1570s. The construction similarities with Red Bay also might be indicative of a similar context for the 16th century (Izaguirre, 2003).

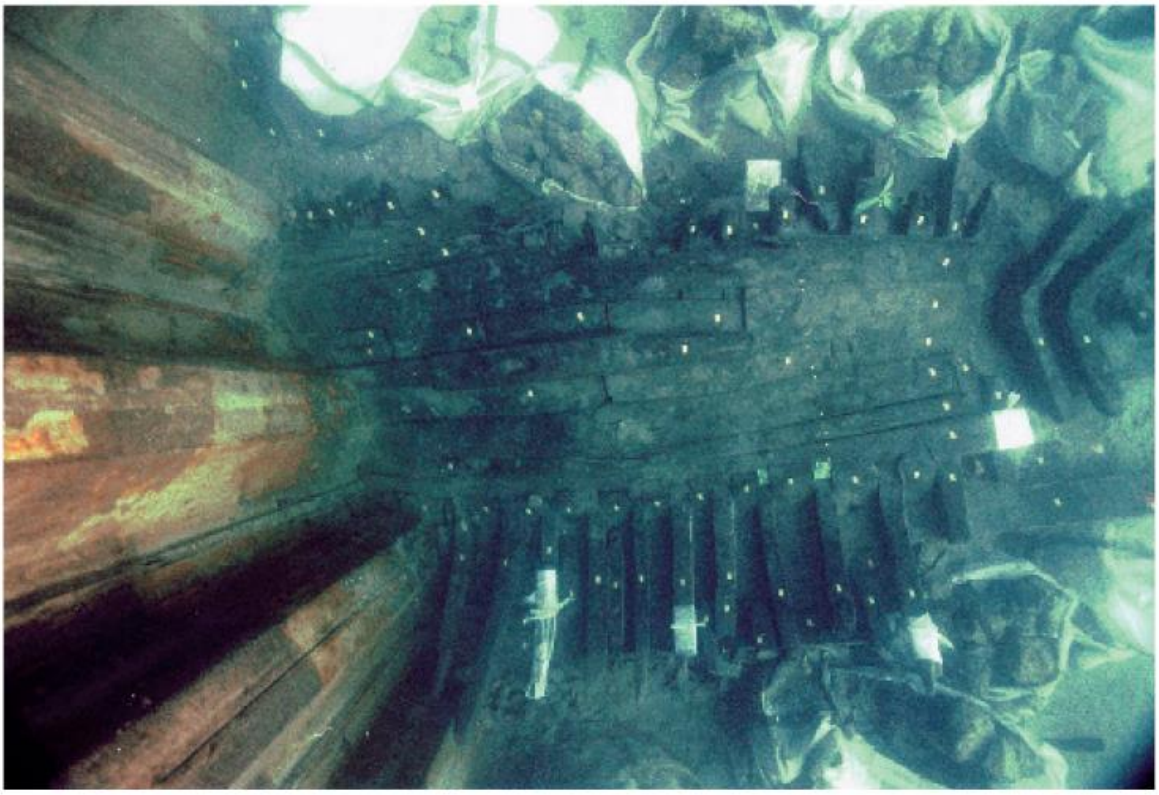


Figure 4.14 The Orio IV ship's view from above in situ (Benito Domínguez, 2004: 37)

The ship remains were 7.4m long and 5m at its maximum width. However, only Orio IV could be included in this classification, due to its large wooden remains. Its preassembled central frames, keelson notched over floors, mast step in keelson, stringers, ceiling planks and filler planks, as well as the sill or *Albaola* were the signs of the maker of this construction. The thickness of the planks was 30mm. It was a carvel vessel contemporary to the Red Bay, 1560s. The fastening of the ship was made out of iron nails. The ship had a "T" shaped keel, similar to Angra B and the Red Bay ship. Following Oertlings approach, four and a half of the features found in the wreck were similar to the Iberian ship concept. This ship belonged to the Bizcayan shipbuilding tradition.

4.9.4   Highborn Cay

During the 1960s, in the Exuma islands, Bahamas, sports divers discovered and also salvaged the remains of an old vessel. By 1986, the Institute of Nautical Archaeology conducted some limited excavations, despite a lot of the small artefacts having been recovered (Oertling, 1989a). This wreck consisted of a large central pile of ballast stones, underneath which, the remains of the ship were still protected from the degradation of other more exposed sides of the vessel. The wreck was in the north of Highborn Cay, in Highborn Cut, at a depth of 7.3m of water. Most of the area consisted of occasional coral and mainly a few centimetres of sand. The current is strong in the area, making it difficult to work at the bottom for divers (Oertling, 1989a). This wreck was lately revisited, excavated and dendrochronologically analysed, showing evidence of similarities for Iberian shipbuilding, particularly with the mast step structure (Budsberg, Bendig, Meide and Turner, 2016; Bendig, 2018; Nayling, 2018; Franca, Budsberg and Dempsey; Budsberg, 2018), also a Bizcayan characteristic.

The initial date of the ship was considered to be from the 16th century. Wrought iron ordnance, lead ammunition and simple hardware, gave a relative date of the wreck for the 16th century (Smith et alii, 1985: 64).

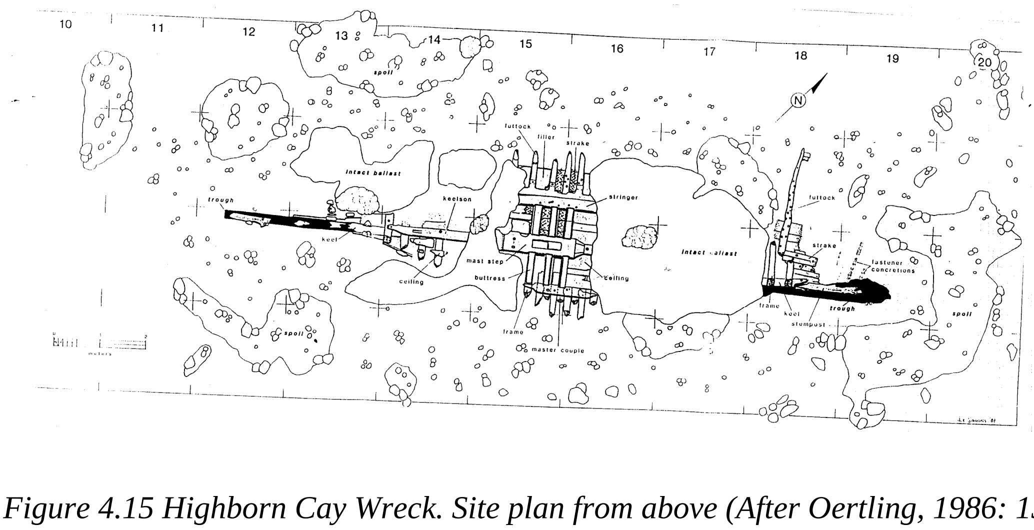


Figure 4.15 Highborn Cay Wreck. Site plan from above (After Oertling, 1986: 13)

This vessel had preassembled central frames, keelson notched over the floors, mast step in keelson, buttresses and stringers, ceiling and filler planks or *escoperadas*. Rigging chain assemblies were also found in this wreck. Thus, this vessel from 1510 had six out of the eleven characteristics of the Iberian ship defined by Oertling.

The planking thickness was 60mm, made out of carvel planks, with iron and wooden treenails. Framing floors were 175mm moulded and 165mm sided and similarly with the futtocks. Highborn cay had a Sill or Albaola, and the space between frames was 400mm. The keel dimensions were 210 moulded, 150mm-165mm sided (Oertling, 1989a).

4.9.5 Cais de Sodre

In 1995 during excavation works for a new underground station in Lisbon, Portugal, the remains of a ship were found at a depth of 6.5m below the ground surface. The find location was thought to be where the ancient river bed used to be (Castro et alii, 2011).

According to the initial samples taken, the ship gave a radiocarbon date relative to the second half of the 15th century or beginning of the 16th century (Rodrigues, et alii, 2001: 351). Later samples pointed towards a similar time period, some taken in 1995 dating cal 1424-1516 AD and 1590-1622 AD, the others from 2010 dating 1520-1580 cal AD and 1420-1490 cal AD (Castro et alii, 2011: 329).

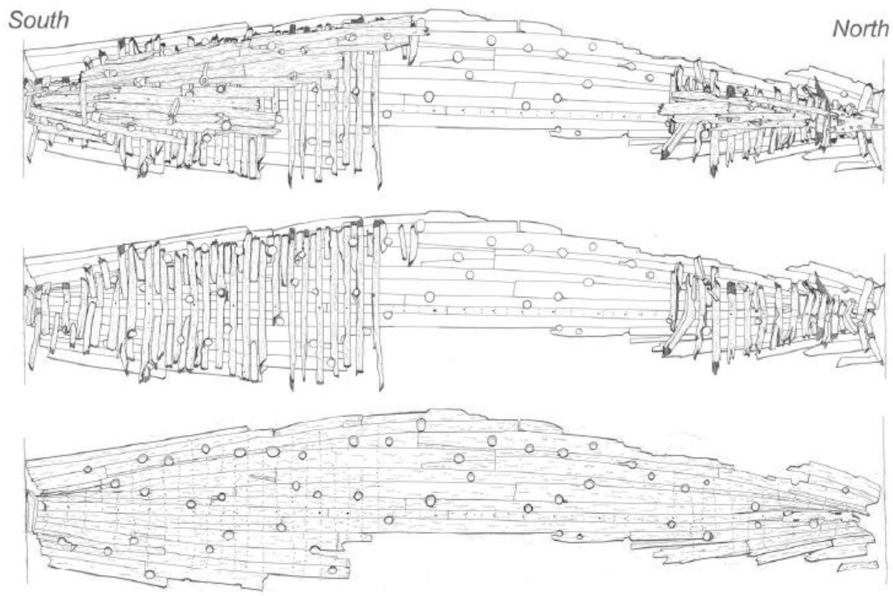


Figure 4.16(Drawings by F. Castro and K. Yamafune 2010) Hull plan drawings of the Cais de Sodre wreck. (Castro et alii, 2011)

The Cais de Sodre ship preserved 37 frames, an apron, part of the keelson, stringers, ceiling planks, a breast hook, a mast-step buttress, and almost 24m of keel. This ship fulfilled three of the main Iberian characteristics by Oertling, having a third of the characteristics similar to the conception of an Iberian ship, in this case the Portuguese tradition. One of the main characteristics being to have preassembled central frames, keelson notched over floors and buttresses and stringers. The plank thickness of this ship was between 70mm and 80mm, and it had a carvel-built hull.

Fastening was only made out of iron nails. Framing scantlings of floors were between 270mm and 470mm moulded and 170 and 240 sided. The ship was built following the construction principle of floating futtocks, and the room between frames was around 90mm to 430mm. The keel shape was rectangular, and its scantling was 270mm moulded by 250mm sided (Castro, et alii, 2011; Nicolardi and Castro, 2017).

4.9.6 Cattewater

In 1973 during some dredging works by an air-sea rescue craft in the river Plym, some unfamiliar timbers were brought up (Redknap, 1984: 7). The wreck was identified to be from the early 16th century, probably c. 1530. Found near Plymouth in what used to be the Medieval anchorage sheltered from all but south-western winds (Redknap, 1984: 3).

The date for the wreck was thought to be c. A.D. 1500-1550. The calibrated c14 was 1420-1600 AD (Har-3310). Dendrochronological matches of the samples taken from the keelson showed a match with two places, dating in the outer rings of 1454-1457, but three samples were inacceptable when looked at (Redknap, 1984: 39). Construction characteristics of

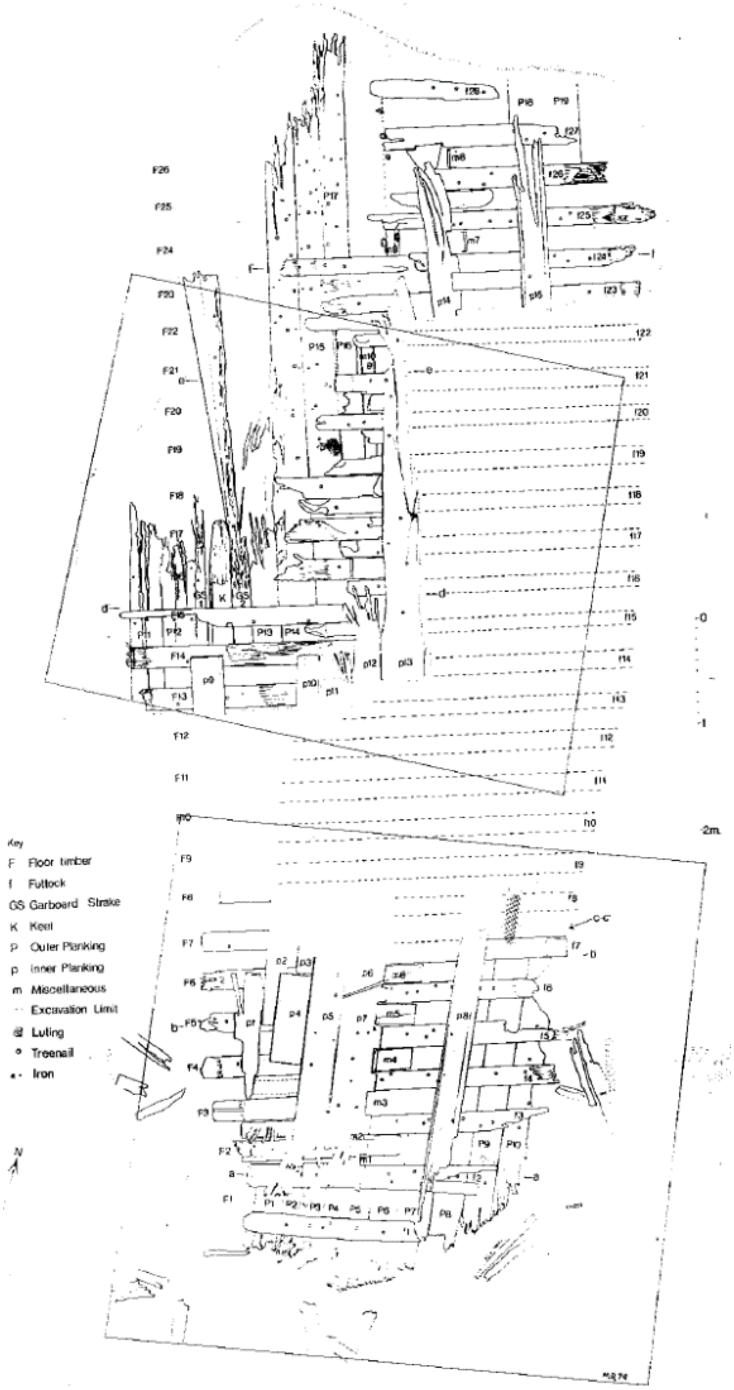


Figure 4.17(Picture above) Site plan of the Cattewater wreck's structure (After Redknap, 1984: 17)

similar ships, Rye "A" and Mary Rose are both early 16th century. The ship is carvel built, with no refit signs from clinker. Artillery of the ship would be from the early 16th century as well. Pottery is similar to material from London, dated 1495-1530. Finally, a leather purse, was of a Tudor pattern, dating to the late 15th century, and other leather finds give a date ranging from 1490-1530 (Redknap, 1984: 39). Cattewater had preassembled central frames, keelson notched over floors, mast step in keelson, buttresses and stringers and ceiling and filler planks or *escoperadas*. This vessel had nearly half of the aforementioned Iberian characteristics, therefore it can be considered a Bizcayan ship. Apart from the characteristics defined by Oertling, the ship also had a sill or Albaola, a watertight longitudinal reinforcement in the interior of the ship above the waterway or *trancanil*. Added to these features, Cattewater planks were between 60mm and 70mm thick, it was carvel built in the hull, and planks were tangentially converted. It had both treenails and iron nails. Its framing on the floors was between 200mm-270mm moulded and 180mm-220mm sided. Futtocks were built from 140mm to 198mm moulded and 140mm-230mm sided. Its framing was floating futtocks and they were spaced on average at 370mm. The keel shape of the ship was that of a vase, with carved garboards, and the dimensions of the keel were 345mm moulded by 290mm-300mm sided, made out of oak. Its keelson had a hole to accommodate the pump (Redknap, 1984). Later work in the Cattewater have created an archive (Read and Overton, 2014) and given some new dates, dating back to the 1500s.

4.9.7 Studland bay

In 1984, divers found the ship while investigating a "snagging net" outside Poole harbour, in Dorset, England. From 1984 until 1992 it was surveyed and excavated in a long project combining the effort of many institutions and volunteers (Thomsen, 2000). The vessel was roughly dated, through the use of pottery and leather shoes, to within a wide range, from the late 15th century up to the middle of the 16th century.

Its preassembled central frames were noticed to be significantly of an Iberian origin, the sternpost scarfed to keel knee, a single stern deadwood knee, filling planks of *escoperadas*, chain rigging assemblies and a flat transom as well. Ballast of the ship was apparently of an

Iberian origin, in particular, the Basque area (Thomsen, 2000: 81). The pottery of the ship was later ascribed to be of Sevillian origin (Gutiérrez, 2003).

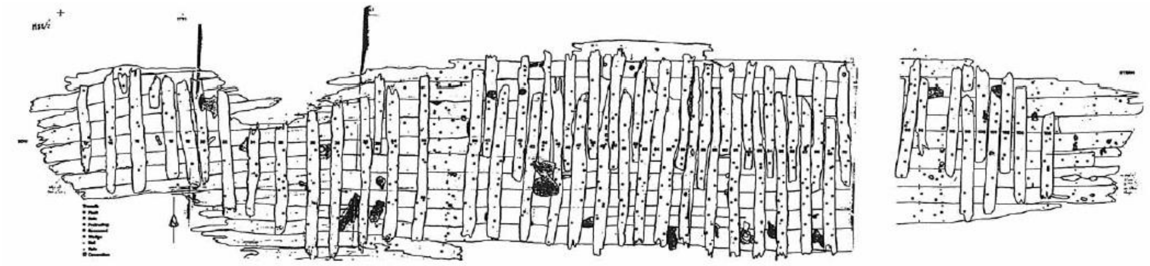


Figure 4.18 Studland Bay wreck area. 1988 Plan (After Thomsen, 2000)

Planking was 60mm thick, built in carvel, with tangential cross sections, iron nails and tree nails, floors of 220mm by 170mm and also futtocks at 170mm and 190mm. The Keel had this peculiar form of a roughly trapezoidal shape, that crops up in a variety of wrecks. Its sided dimensions were 210mm by 270mm (Thomsen: 2000).

4.9.8 Western Ledge Reef

In 1988 archaeologists and students from one of the programs of East Carolina University found the remains of an ancient vessel. Between 1989 and 1990 the site was excavated. By 1991 the remains were lifted from the site, and left safely in Bermuda Maritime Museum (Watts, 1993). The remains of this site were lately revisited and some reconstruction and reanalysis was carried out (Bojakowski, 2011; 2012). The vessel revealed, shared construction characteristics with those of Padre Island, in Texas, Molasses reef, Highborn Cay, Plymouth and Red Bay, all of them known to be from the 16th century.

This ship had preassembled central frames, sternpost scarfed to keel knee, single stern deadwood knee, Y-timbers tabbed to deadwood, keelson notched over floors, mast step in keelson, buttresses and stringers, ceiling planks and a flat transom. That is to say, it had 8.5 of the characteristics, thus fulfilling three quarters of the criteria of an Iberian ship (Watts, 1993). It can be argued it belongs to the Bizcayan tradition.

Also, the planking thickness of this ship was 35mm-40mm, and it was carvel built, with tangentially converted planks. Fastening was made out of treenails and iron nails. The framing of the floors was 180mm moulded and 160mm sided. The keel was "vase" like in shape. This ship was thought to be from around the 1580s (Watts, 1993).

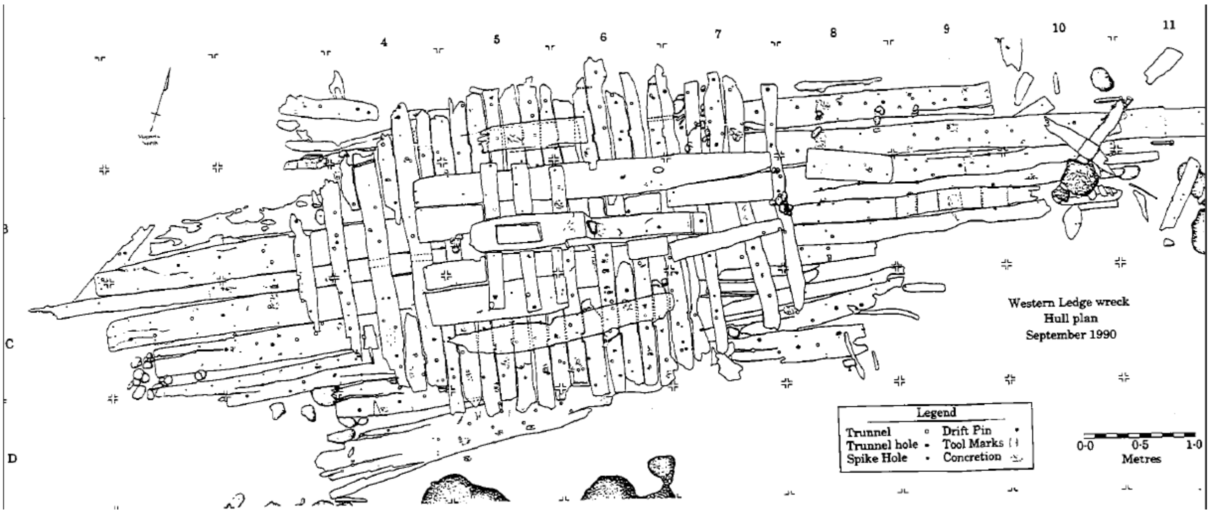


Figure 4.19(Picture above) Western Ledge wreck. (1990) (After Watts, 1993).

4.9.9 Rye A

In 1963 two old vessels were discovered in Rye during the excavations for the new drainage system of the town. Named Rye A and Rye B, A was linked to the Iberian tradition. A tentative date of the 16th century would fit with the time when the silting of the Rye area occurred.

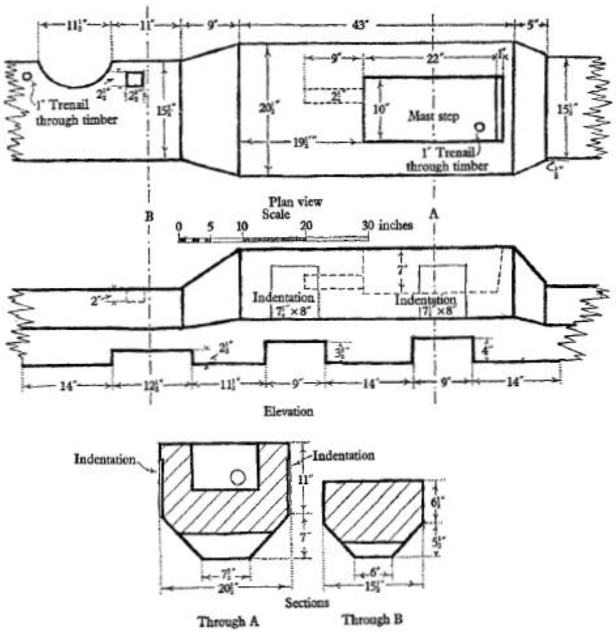


Figure 4.20(Picture on the right) The Rye A ship's keelson mast step structure (After Lovegrove, 1964).

The remains of the vessel included the keelson notched over floors, the mast step in the keelson, buttresses and stringers, ceiling and filler planks or *escoperadas.* Plank thickness was between 76.2mm and 38.1mm. Carvel built, with composite fastening, such as treenails and iron nails. Floors were 279.4mm-78mm moulded and 228.6mm-177.8mm sided. This shipwreck contains the pump hole through the keelson. Having four of the eleven features, in theory it has a third of the Iberian characteristics (Lovegrove, 1964), and could be considered Bizcayan.

4.9.10 Yarmouth Roads wreck

During an archaeological survey of the seabed off Yarmouth, a wreck was found, identified possibly as the *Santa Lucia* a Spanish shipwreck in 1567 (Yarmouth site Report: 2015). The site was considered a 16th-17th century ship, as had been previously considered (Watson and Gale, 1990). The Yarmouth Roads ship was 32 meters in length. This vessel was carvel built. It had a sill or *albaola*, as read in the reports, which would include the *escoperadas* or filling planks (Tomalin, Cross and Motkin, 1988; Watson and Gale, 1990; Yarmouth site reports, 2010). It is attributed as being an Iberian-Bizcayan and therefore the Yarmouth Roads ship is considered to belong to the north of Spain.

4.9.11 Molasses reef wreck

In the Islands of Turks and Caicos, north of the Hispaniola, a shipwreck was found by treasure hunters, which was claimed without any proof to be the *Pinta*. Treasure hunters had been savaging the wreck since at least 1972 (Castro, 2017b: 203). Only when archaeologists intervened in 1982 did the study of the wreck properly begin (Keith et alii, 1984). Due to the ballast the ship was associated from the start with early European navigations, with Lisbon, in Portugal (Lamb et alii, 1989: 291).

Ceramic remains found in the site were characteristic of the early 16th century. Ceramic remains were similar to the ceramics found in a monastery of a similar period, dating 1508-1514 in the Dominican Republic (Keith et alii, 1984: 57). *Versos* of the Molasses wreck were similar to those found in mid-16th century sites (1554 Padre Island Fleet).

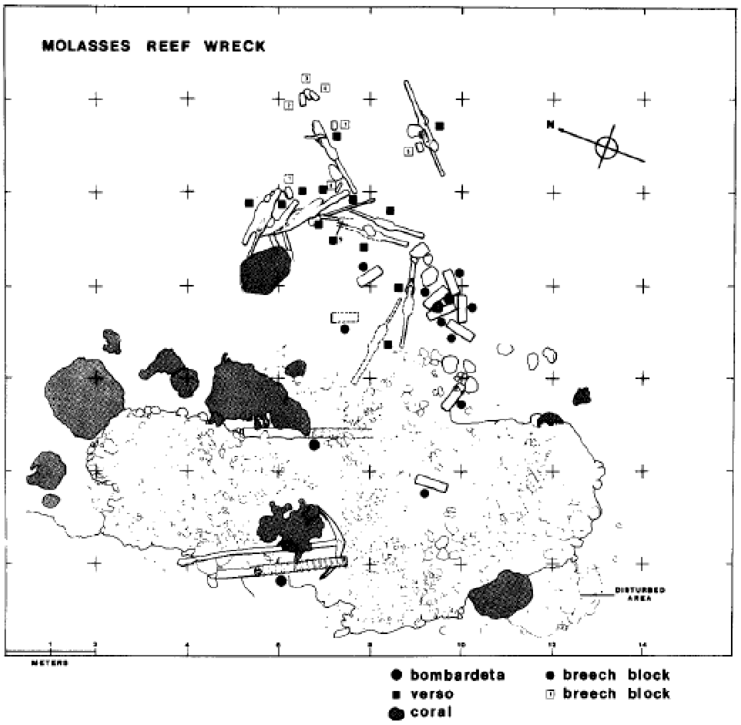


Figure 4.21 Molasses Reef Wreck (1980), site plan including cannons and anchor of the ship scattered due to the use of dynamite from the treasure hunters (Keith et alii, 1984: 48)

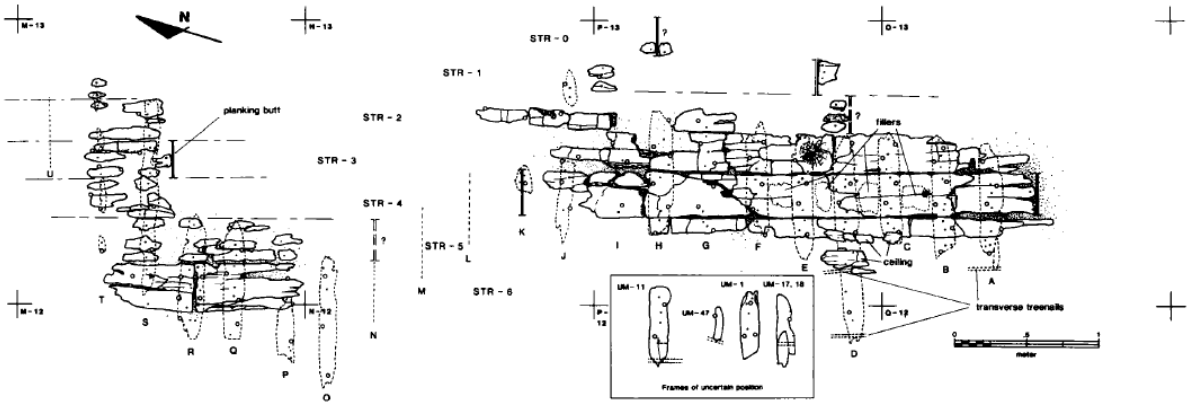


Figure 4.22 Molasses reef wreck. Reconstructed remains with fragments (Oertling's drawing) (Oertling, 1989).

The ship was made out of preassembled central frames. It had ceiling filler planks or *escoperadas* and rigging chain assembly. A third of the characteristics of the wreck were similar to those of the Iberian concept. It was a carvel ship, made out of 50mm to 60mm planks, with a floating futtocks system. The floors of this ship were 70mm-180mm moulded and 140mm-170mm. The space between the frames was 325mm (Oertling, 1989b: 233).

4.9.12 27M

In 1983 the 27M was discovered after spotting the ballast stone and wood during a survey (James Ringer, 2007: I-201). The 27M is a large ship, similar to the Red Bay vessel in construction. It was not excavated, but rather partially surveyed. From the observations made, this ship had similarly preassembled central frames, keelson notched to the floors, mast step in the keelson, buttresses, ceiling planks and filler planks, to that of the 24M. This vessel covered three features, except the stringers. Therefore, from the eleven features it had nearly four, having one third of similar features to the Red Bay vessel (James Ringer, 2007: I-201). It could be argued that this ship belonged to the Bizcayan tradition.

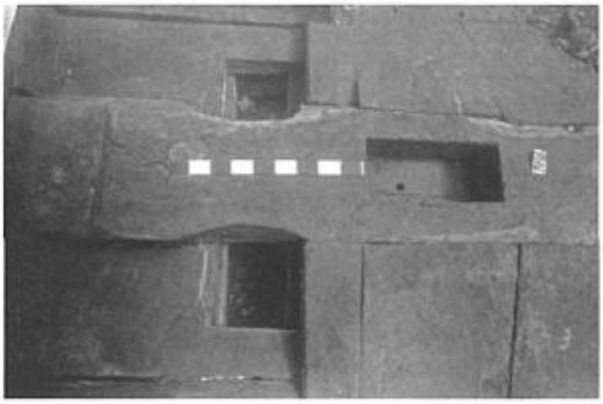


Figure 4.23 the square pump holes and joined mast step-keelson structure of the 27M (After James Ringer, 2007: I-205).

4.9.13 Angra B

This shipwreck Angra B was found in the 1996 campaign in the Azores. It was a carvel built vessel, and was found together with a major pile of ballast, 15mx15m (Crisman, 1999). The wreck was at a depth of 5m SW and consisted of a preserved area of 16m long x 8m wide (Bettencourt, 2013: 247). Due to the characteristics and their similarities to other wrecks, the ship was thought to belong to the Iberian tradition, belonging

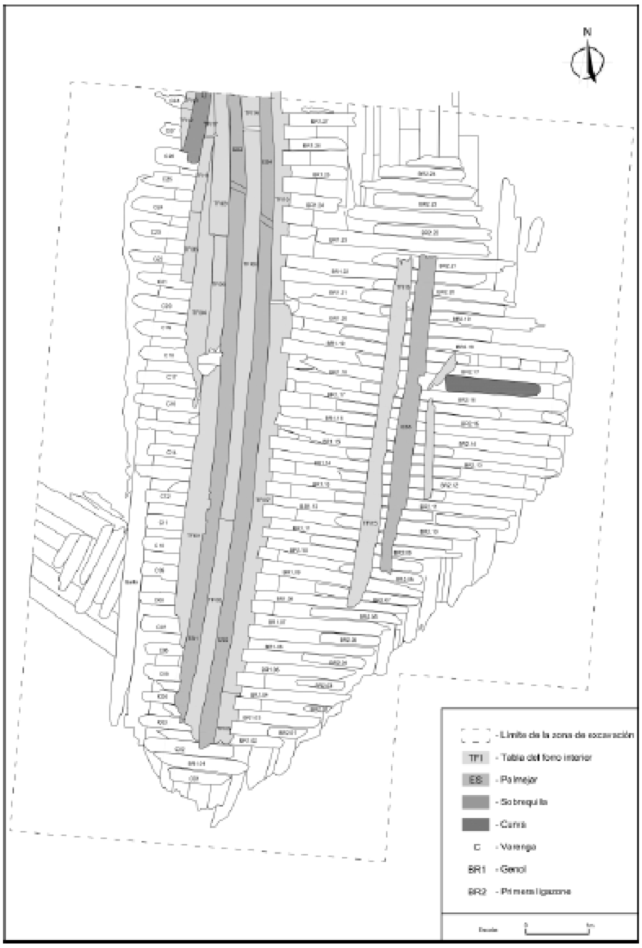


Figure 4.24(Picture on the right) Angra B site plan (After Bettencourt, 2013)

to the 16th century Bizcayan ships (Bettencourt, 2013: 252).

The ship had preassembled central frames, keelson notched over floors, stringers, ceiling and filler planks, as well as the sill or *Albaola*. This wreck is similar in a third of its features to the preconceived Iberian concept cited by Oertling, following 3.5 of the selected features. The planking on this vessel was 50mm to 55mm thick, and carvel built with tangential planks. The fastenings in this wreck were both treenails and iron nails. The framing on this ship was 210mm moulded 190mm-250mm sided in the floors, and 170mm-220mm moulded and 144mm-220mm sided in the futtocks. The system used to hold the frames together was that of floating futtocks. This shipwreck, however, has a "T" shaped keel, similar to Orio IV and the Red Bay vessel, and the scantling of this keel was 150mm moulded 270mm-290mm sided (Bettencourt and Carvalho, 2009; Bettencourt, 2013).

4.9.14 29M

Another Basque or Bizcayan vessel was also discovered in Red Bay, similar in construction to her probable sibling, the 24M or the presumed San Juan vessel. This vessel was

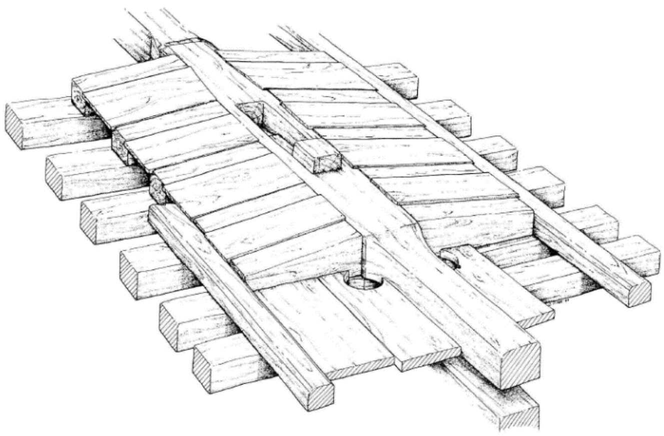


Figure 4.26 The mast step-keelson structure of the 29M, drawing of the main mast step structure (James Ringer, 2007: I-209)

Figure 4.25(Above) The mast step-keelson structure of the 29M (James Ringer, 2007: I-209)

found in 3m of water. The overall remains were 24m x 8m, it lay near a fresh water stream, which could have helped to preserve the wreck in the excellent condition it was found (James Ringer, 2007: I-207). The only way the wreck was associated to the 16th century finds of Red Bay, was due to its similarity of construction towards other so called "Iberian" ships, as well as the particular characteristics defined by Oertling. The 29M had preassembled central frames, a sternpost scarfed to keel knee, single stern deadwood knee, Y-timbers tabbed to deadwood, keelson notched over floors, a sill or *albaola* mast step in keelson, and buttresses and stringers. The planking thickness was 60mm, the fastening was made out of iron nails and treenails. The framing of the floors was 200mm moulded and 160mm-190mm sided. Keel dimensions were 200mm sided. This vessel therefore fulfilled two thirds of the Iberian description criteria (James Ringer, 2007: I-207).

More inconsistent variations, of repetitive ideas, represented in diverse dimensions can be found in the 27M and 29M vessels found in Red Bay. These two ships had also buttresses and the mast step structure integrated to the keelson. However, they were different in shapes, scantlings and dimensions in general, as can be observed in the use of two pumps instead of one, square fitting holes and alternatively round ones to the pump holes, as well as different mast step arrangements (James Ringer, 2007: I-205-209-211).

Many of the keelsons were notched over the floors, and had a mast step included, as well as the pump hole carved through it, such as in Rye A, San Juan, Angra D., Western Ledge, Aveiro A, Emmanuel Point, Highborn Cay and Cattewater (Iberian Atlantic ships Table 4.2). The assemblage of the mast step looked as if it was the same in many of these ships, but when looking at the details, the buttresses differ, is not exactly the same the mast step and the keelson has slight variations, for example the 24M, 27M and 29M (James Ringer, 2007: I-201-212).

Although the mast step structure was very different in the Mary Rose vessel, its arrangement could have been conceptually similar to those called Iberian (Marsden, 2007: 83), therefore, again, proving that the spatial frame of the Iberian context is not limited, and can be extended beyond the Iberian Peninsula, as was said with the Bizcayan shipbuilding. It was possible that hired Basque shipbuilders learned from Venetian and Genovese shipwrights while observing the construction of the English built Mary Rose, and then brought these experiences to the Bizcayan shore and applied them to their vessels. Or it could have been the other way around. Or simply one does not know in which direction ideas transferred from one place to another, or they travelled through traditions and adapted to the needs of each region.

4.9.15 Angra D

In 1996, prior to the construction of a yachting harbour in Terceira, Azores, a pre-disturbance survey was made (Garcia and Monteiro, 2001). Angra D was found in this context under 1m-2m of sediments at 7m of depth underwater. Wooden samples and radiocarbon dating confirmed that the ships dated back to the last quarter of the 15th century and beginning of the 16th century. The wreck consisted of a ballast mound, together with a well-preserved hull, extensive in its remains of 35m of length and 9m of maximum width. Radiocarbon dates pointed to the loss of the ship being around the turn of the 15th century (Garcia and Monteiro, 2001).

The ship had preassembled central frames, Y-timbers tabbed to deadwood, keelson over the floors, mast step in keelson, buttresses and stringers, ceiling planks and filler planks and a flat transom. This vessel had 7/11 features of the Iberian set (Fraga and Bettencourt, 2017: 445). This could be said to be a Bizcayan ship. The planking thickness was between 50 and 80mm, tangentially converted and carvel built. It had iron nails and treenails. Floors and futtocks were 190mm moulded and 150mm-250mm sided. Space between frames was 220mm on average. The keel dimensions were 300mm moulded and 450mm sided (Garcia and Monteiro, 2001).

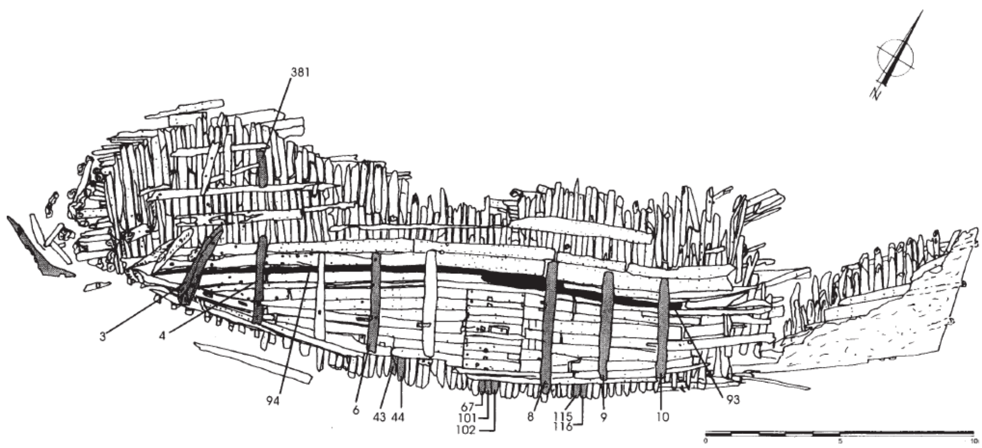


Figure 4.27 Angra D, site plan (After Garcia and Monteiro, 2001)

4.9.16 San Esteban

In 1972, the 1554 wreck site identified as the San Esteban, began with a detailed magnetometer survey. In 1973, during excavations at the site, the remains of the San Esteban wreck were recovered. This was the remaining stern part of one of the four Spanish *naos* of the New Spain Fleet of 1554, three out of those four being lost in a storm (Rosloff, Arnold III, 1984).

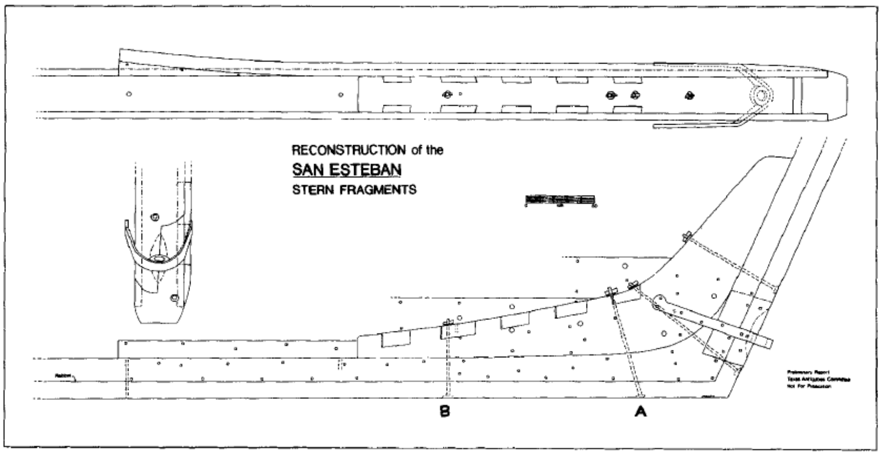


Figure 4.28 The Stern knee and stern heel on top joined from the San Esteban wreck (Rosloff and Arnold III, 1984: 289)

With the sternpost scarfed to the keen knee, single stern deadwood knee and Y-Timbers tabbed to deadwood, this 1554 vessel had the chain rigging assembly as well as a flat transom. The thickness of the planks for the vessel were 100mm, carvel built and tangentially converted, the fastening of the ship was made out of oak treenails and iron nails.

Floor timbers were 210 by 250 sided, the space between frames was 420-440, with a keel shape of a vase form line type. The keel was 270mm and 310 mm sided (Rosloff, Arnold III, 1984). The ship reflects half of the characteristics within the concept of a Bizcayan ship.

4.9.17 St. John Bahamas Wreck

In 1991, in the context of a major archaeological survey, the remains of an unfamiliar vessel were found and later excavated in subsequent excavations (1991-1995) (Malcom, 1996). The St. John Bahamas was a wreck on the western edge of the little Bahama bank. The wreck was under 5m seawater under a "featureless" seabed. St. John Bahamas had one of the largest artefact collections of that time, including weapons which, by their appearance, belonged to the second half of the 16th century, along with artillery, clay pipes and pottery, all of them pointing towards the second half of the 16th century (Malcom et alii, 1996).

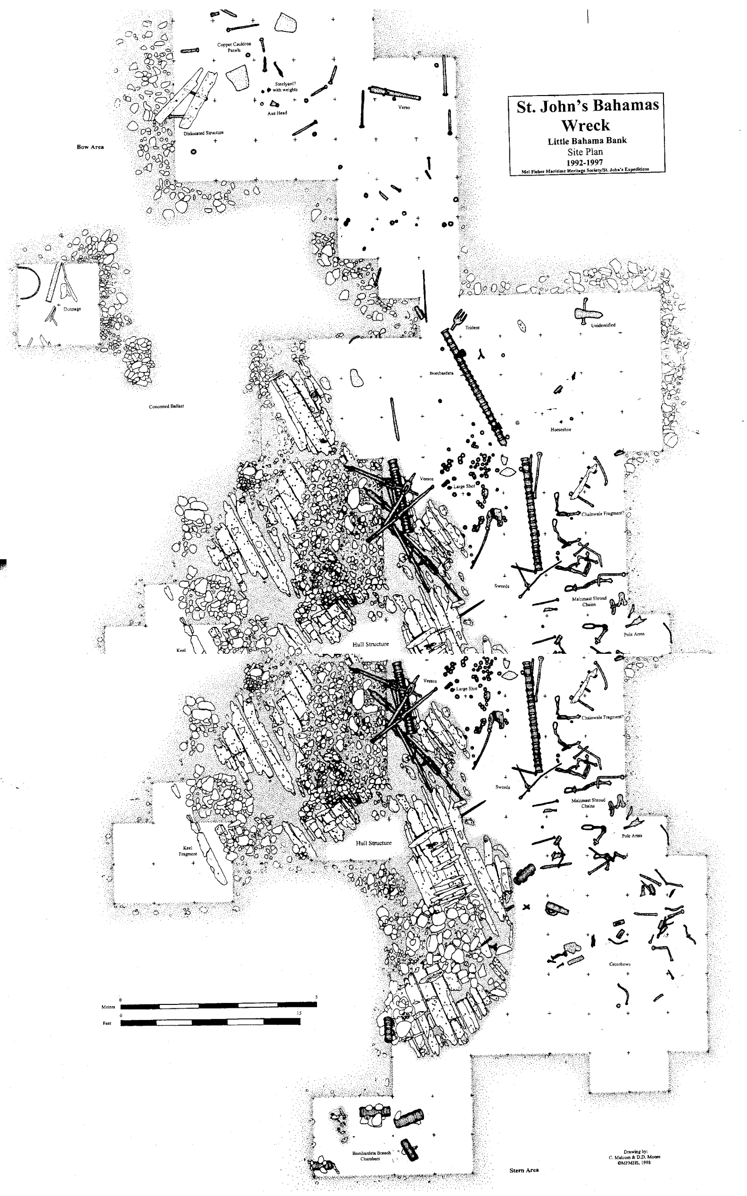


Figure 4.29 St. John Bahamas Wreck site plan (After Malcom et alii, 1996)

This Caribbean wreck had some remaining chain assembles, showing a carvel planking structure, too eroded to obtain precise measurement of the original structure when built (Malcom et alii, 1996). Its carvel planks were tangentially converted and were 58mm thick. Floors were 153mm moulded, 200mm sided, the same as futtocks. Space between frames was 480mm. The keel of the ship was "vase" shaped, with two garboards carved with its correspondent bevel or inclination and a rectangular bottom. The dimensions for the keel were 270mm moulded to 250mm sided. This ship had only one of the features in common out of the eleven aforementioned. Thus the St. John Bahamas, thought to be from around 1564, complied with less than a tenth of the features of the Bizcayan concept.

4.9.18 Nossa Senhora dos Mártires

In 1993-1994 the *Museu Nacional de Arqueologia*, made some surveys in the area of the Tagus river. Amongst the sites found, here particularly the remains initially catalogued as the SJB2 contained Chinese Porcelain from the Wan-Li period (1573-1620). Together with the Chinese porcelain, a large quantity of peppercorns was found. One historically documented wreck, named Nossa Senhora dos Mártires, was lost in that same place in 1606, on the return trip from India, loaded with pepper and other goods (Castro, 2001). The preserved wreck was 12m long and had a maximum of 7m width. The keel, eleven frames, twenty-six strakes of planking and a possible apron were found.

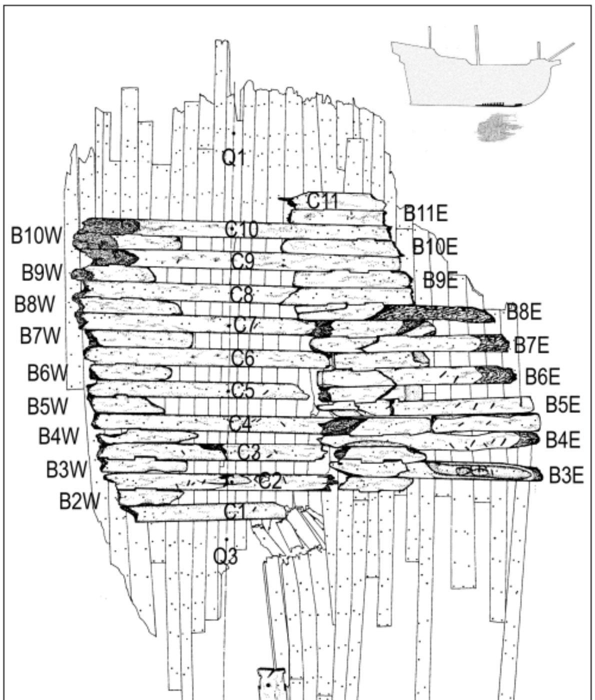


Figure 4.30 The site plan of the SJB2 (Pepper wreck) (After Castro, 2005: 90)

The Pepper wreck, was built from preassembled central frames and it had the keelson notched over the floors. According to this, that is 2/11 characteristics, complying with nearly a fifth of the Iberian concept.

The Pepper wreck had also 110mm of planking thickness and it was carvel built with tangentially converted planks. Its fastening, however, was made solely out of iron nails. The framing of the ship was 180mm-240mm moulded and 230mm-260mm sided for the floors, whereas it was 240mm-260mm moulded and 180mm-270mm sided for the futtocks. The space between frames was between

430mm-500mm. The keel was rectangular and bevelled in the garboard. The keel sided dimension was 250mm and it was made out of *Quercus suber* or cork (Castro, 2005).

4.10 Discussion: Influences beyond the Bizcayan space

The sill, filler planks, ceiling planks, and stringers are elements that have appeared repeatedly in these wrecks, with variations but seeming to point to a commonality, adapted into each ship. Some of these vessels contained the preserved transom end of the ship, showing changes from double ended symmetric Medieval hulls, to the flat transom ones, more typical of the transatlantic ships, found in Red Bay, Angra D, Western Ledge, Studland Bay and San Esteban (Iberian Atlantic Ships Table 4.2). Similar to Bizcayan ships, the stern post of the Red Bay sternpost knee, was also found in a Swedish ship, called the Kravel (Adams, 2013: 82).

Floor timbers ranged greatly in their scantlings, between 12cm-27.94cm moulded, and 10cm-26cm sided. Every scantling is slightly different. But even within the same ship, the scantlings vary from bow to stern, and from the floors to the 3rd or 4th futtocks (Loewen, 2007: III-58-59). However, Aveiro A has a scantling of 12-13cm moulded, 10-19cm sided, showing a lighter framing variety. Futtocks have a lighter dimension than frames as can generally be observed. However, scantlings do not show the evidence of a Bizcayan standard, but rather individual varieties of each area. The space between frames as well does not follow a golden number or sequence, but rather it varies from ship to ship but even within the same ship, frames vary in distance from bow to stern, for example as was recorded in the San Juan (Loewen, 2007: III-59).

Not all shipwrecks preserve their keel. Also, not all of them have the same scantling. Some have a “vase” or “mushroom” shape, which could also be called “trapezoid” in shape, others were rectangular, such as the Cais de Sodre, and others had a T shape, like the Orio IV, the Angra D and the San Juan. Keels with a trapezoid-base similar shape are not only found in the 24M vessel, or Red Bay. “T” shaped scantlings of keels were identified by Ole Crumlin Pedersen as being typical of Scandinavian shipbuilding (Cattrysse, 2013: 50). This confirms that what we might consider as an architectural signature for a space and time, in fact, might be originally from somewhere else, and not just from the space we define. Keels also vary in scantlings, and the tree species of the keel was recorded, from Cattewater, which was oaken, *Nossa Senhora dos Martires*, which was *Quercus Suber*, and from Red Bay which was beech. Keels made of beech tree are thought to be representatives of the Bizcayan cluster. The keel in the Red Bay is representative of the techniques used in shipbuilding in Bizcayan ships, based on a floating "futtocks system", part of a wider Iberian and Mediterranean concept, and for that reason not purely a "frame first" technique (Loewen, 2007: III-280). Ribbands were used to guide the shape of the hull, but the measurements, positioning and reconstruction of different structural parts were done. Having said this, a long beech tree was used to carve the keel. The keel was unique in shape, at least in the Red Bay example (Loewen, 1998b: 193). This piece combined the elevation of the garboard plank and also the narrowing and widening of the floors and Y frames. The keel combined the attached garboard to facilitate the positioning of the first plank into it.

4.10.1 Planking

From 3cm in Orio IV, to a majority ranging between 5 and 6, to the latter ones, with 11, such as the Pepper wreck towards the early 17th century, planking varied even from the garboard strake attached to the keel rabbet, to the higher planks of the ship. The width of planks varied from 14cm at the waterline up to 5cm at the castles. It has been presumed that the planking conversion was tangential, due to the use of saws and the increased dimensions of planking, however, in many cases this could not be proved through the literature. Interestingly, the tree rings have not been recorded in this first stage of the archaeological works of Iberian wrecks, since this was not still popular in the 1980s, when it was first used in 1983 by Thomas Oertling (La Roche, 2007: V-75). In the Red Bay vessel there was a planking average of 80 years. These questions come mainly from the shipbuilding contracts that included specifications on planking, mainly from the work of Michael Barkham, and the documents published in the Red Bay volumes (Barkham, 2007: V-21-42). Analysis of wooden sizes for structural parts through time show that comparing the dimensions of planks from the mid-16th century, from San Juan (Grenier et alii., 2007: III-103, V-11) and Cattewater (Redknap, 1984:

34) show how the planking thickness increased in the late 16th century in large ships in the Iberian context, what we could describe as the Bizcayan tradition.

A variety of sources, both supported by historical and archaeological finds show how there is a planking thickness standard used, at least in the Basque area, particularly for the period 1550-1618. The tree rings for every plank seem to be diverse as well. The Red Bay vessel averaged between 99-156 rings, from the 20 sections they took from different structural elements, including (Waddell, 2007: V-77). This system was mentioned beforehand by the Red Bay Project (Grenier, 2007: III-104). Contracts show a system based on thicknesses by *codos*, which as the reader might already be familiar with were equal to 57,47cm (Casado Soto, 1988: 62), roughly depending in which village the metric system was from. These documents ranged from wooden material expenses, to contracts for shipbuilding and Ordinances. In all of these, there is a repetition of a similar timber standard, However, there are differences according to the context where these planks appeared. The Red Bay project carried out a similar analysis, including earlier planking for the mid-16th century based in contracts from *naos* (Barkham, 2007: V-11).

4.10.2 Framing

The construction of this vessel started with the master frame on top of the keel, after the stem and stern posts were laid. The keel of the Red Bay was beech made, so that was the species of the tree used for the reconstruction as well. Only the "*madeiras da conta*" or "*maderas de cuenta*" were dovetail joined frames, on top of this keel (Loewen, 2007: III-61). Considering the Red Bay was a carvel-built vessel, this vessel was an intermediate ship between the plank first and the frame first construction stages, by the use of guiding ribbands to shape the hulls curvature (Loewen, 2007: III-315). The "*maderas de cuenta*" were dove tail joined preassembled timbers, laid before the rest of the frames amidships. The stem and stern ends were put at each of the extremities of the keel, towards the bow and the stern of the ship.

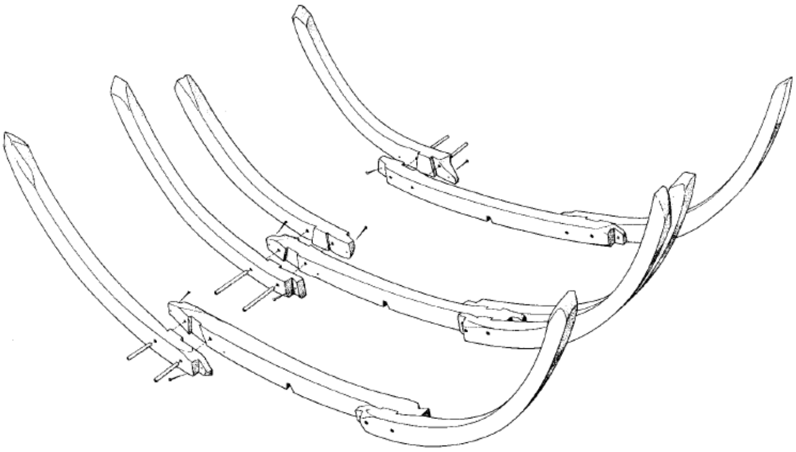


Figure 4.31 Dovetail joined floor and first futtock frames (After, Grenier, 2001: 277)

The rest of the floor frames and joinery with the first futtocks was supported on longitudinal reinforcements both internally (Stringers) and externally. Fastened to the hull planking and ceiling, as well as the wales on the outside, the frames were hold together. The first futtocks and second futtocks were joined to the decks and wales, guided by ribbands that helped determining their outward shape (Loewen, 1994: 15; Castro, 2008: 74). This construction system was named "floating futtocks" by the Canadian archaeologists (Loewen, 1998a: 250). Once the middle frames at the bottom were laid and joined to the first futtocks, those battens laid towards the extremities of the ship, (e.g. the stem post and stern post) were used as references while defining the shape of the hull with each frame.

According to Lucien Basch, "*old clinker builders …claimed never to have used drawings or moulds…" in another ship example, it is mentioned "it was built by eye, even moulds were hardly ever used, …The author immediately informed us, however, that some had been used, indeed, five, one for the central section, two fore and aft, one for the stem-post and one for the stern post"*(Basch, 1972: 34-35). It was fascinating how after laying some of these second futtocks while one was in the shipyard and then checking the curvature, the most experienced shipbuilder in the shipyard, and perhaps one of the last ones in the Basque region of traditional wooden shipbuilding, checked the curvature of the hull. He did not used any other device than his eye, and this is even more precise than other tools than we think, that could be used afterwards to find a smooth hull. By closing one of his eyes, he would look with the other, and without any measurement, his shipbuilder's instinct would tell him whether it was right or not. The fascinating element of this was not only the fact that an extremely old technique had still been used traditionally in the Basque area, but also, that this man represented some of the elements that we are attempting to express in this thesis. He carried, on his own, some knowledge, techniques and methods of construction that had been perfected, changed and adapted until the late 20th century, and he himself was a living agent of this tradition. Some of these experiences are hard to tell whether it was exactly like that or not, whether in the 16th century, Bizcayan shipwrights would use the eye to find the perfect curvature. But the humility and modesty that this man would perform such technique amazed me to the degree that one might not be completely sure, but he could be one of the last descendants of the old craft. This "by eye" technique was also documented by other archaeologists from northern traditions in the Dutch region or within the ship Viking construction, together with the use of some measuring aids to mark certain measurements of the ship, such as the width, or the depth (Basch, 1972: 35; McGrail, 2006: 13).

4.10.3 "Hauling down" the futtock

The during the assemblage of the second futtocks in this shipyard I worked in, the use of the "*hauling down*" technique was often performed. This could be described as adjusting the shape of the futtock (Loewen, 2007: III-4). This term comes from English texts, and was one of these techniques shared among other regions, similar to a wide range of the renaissance shipbuilding (Loewen, 2007: III-4). Each futtock had to be carefully laid and measured in order to maintain the ideal shape of the hull, by constantly adjusting the rising and narrowing of the hull. This was a very illustrative process of how the hull's shape was constantly been checked and shaped to the shipwright's conception. But also, this method showed commonality amongst distant traditions, such as the English, Bizcayan and Portuguese one, sharing a common problem while narrowing and rising the futtocks.

4.10.4 Mast step structure

The Contarina I shipwreck found in the area of Venetia and the Emilia Romagna region, was a Venetian ship from around the 1300s (Martin, 2001: 151). This ship had stringers, a mast step integrated to the keelson, and this mast step was guarded by six buttresses, different in shape, but worth remembering that this feature was not Bizcayan in origin but rather was prior to the so-called Iberian ships. Another example of a galley with six central buttresses surrounding the integrated mast step to a keelson, was found in the Pasascossola galley, a 14th century vessel found in San Marco in Boccalama, Venice (Castro et alii, 2019: 30). Therefore, the feature of the buttresses, was not unique to the Iberian Bizcayan craft.

Some of these elements however, can be found in ships were their cultural adscription is unclear. From a technological viewpoint, it also seems that the technological characteristics of 16th century shipbuilding, travelled far, therefore to define the space of a tradition is rather problematic due to the influence a tradition might emanate during its existence in other areas. An example of this can be clearly seen with the use of the carvel-built system, and the use of preassembled frames, dovetail joints and "frame first" construction techniques, that were originally from the Mediterranean. The Gresham ship had dovetail joints; however, they are straight and more square than trapezoidal in shape (Auer and Firth, 2007: 231; Castro et alii, 2018; 5).

The use of preassembled frames, joined with dovetail joints, was considered one of the Iberian characteristics. Many of these shipwrecks seem to have more complex joinery, with preassembled frames, joined sometimes with dovetails and others with semi-rectangular scarfs. Their joinery varies in sizes and dimensions, but according to Steffy, there must have had some benefit, considering the extra hard work that it would have taken to carve the joints (Steffy, 1994).

However, ships found in the harbour of Copenhagen, dating to the 16th century, showed evidence of these attributes (Lemée, 2006: VI-275-280). This posed the question, of whether this was a Bizcayan ship, or if it actually showed influences of Danish techniques. Nevertheless, the use of this joinery was clear in one of the wrecks found, particularly the B&W 7, named as a "skeleton-built" vessel. The evidence of filler planks, another of the Bizcayan ship characteristics, was found in this same wreck, but not joined to a notched sill to which they are attached in other examples found, such as Red Bay or Cattewater, instead they were simply laid at the end of the stringer, filling the gaps between frames (Lemée, 2006: VI-276). The author of the book proposed that the vessel was probably built by Basque, Spanish and

Portuguese shipwrights. However, there are differences in the filler planks found in this vessel and those found in Red Bay for example. Also with regards to the cross section of the ship and the use of dovetail joints, it seems the proposed reconstruction of the ship was a lot more flat in the midship area of the preassembled frames, than it would have been in other ships of the so called Bizcayan tradition, see for example the proposed reconstruction of the master frame of the Red Bay vessel (Loewen, 2007: III-212). Lemée mentions a probable Iberian link to the ship, but he also refers to regional local variations found in the vessel. In other words, that some elements of hybridization between Danish and Iberian characteristics could be potentially explanatory of this vessel. For example, the influence of Iberian Atlantic carvel vessels in northern Europe (Adams, 2013: 98). All these aspects, therefore, throw more light upon a critical aspect of transfer of technology. Was it a Bizcayan ship or not?

Evidence of Iberian shipwrights in northern vessels has been further studied, in the Mary Rose Project for example. In fact, there have been similarities pointed out in the construction of the Mary Rose vessel and Iberian shipbuilders (Adams, 2013: 74). But more interestingly, there is a particular find in the Mary Rose excavation, which is a wooden handle of an adze, presumably not of an English origin, but rather, it was suggested, of Bizcayan origin. In fact, although the metal part of the adze was not found on the site, a fitting find in this type of wooden handle was suggested from evidence from another find in London. The fitting piece suggested that could be perfectly used, had a marking of the maker in the metal iron piece. This mark, is very similar to those of 16th century axes made of Iron from the Basque country. Considering that the Basque area was a significant exporter of Iron to other parts of Europe, it would not be too strange to find a tool made out of Iron cast in the Basque area in an English built vessel. Another possibility, was that the owner of the adze was from the Iberian Peninsula, in this case the Bizcayan area. This possibility of exchange and mobility of labour is not unlikely, considering the fleet of Henry VIII was built by Genovese and Venetian shipwrights (Myers, 1987: 49), therefore, the idea of hiring Bizcayan shipbuilders to construct a ship in England is more than likely.

4.10.5 Early Bizcayan ship design by the 1560s

Although two clear moments in the history of shipbuilding technology were defined, in other words the "plank first" construction and the "frame first" construction (Pomey, Kahanov and Rieth, 2012: 235-237; Hocker and Ward, 2004: 6), there are examples from the Bizcayan tradition that do not necessarily fit these categories. The Red Bay vessel is a clear example between these two concepts (Loewen, 2007: III-316). In terms of shipbuilding methods, the ship was showing a growing renaissance influence in ship construction that was happening along the shores of the Iberian and Atlantic sea, influenced by Mediterranean techniques. This has been previously proposed by various authors (Loewen, 2007: III-315-317; Castro, 2008: 63).

It should not be surprising any exchange and contact, as previously it happened the other way around, when the north inspired the south, or the Atlantic influenced the Mediterranean. For example, during the 13th to 14th centuries when pirates from the Basque area, sailed with cogs to the Mediterranean and people started to copy them (Adams, 2013: 69). Although the Mediterranean and Atlantic spaces have been clearly defined (Pomey and Rieth, 2005: 40), the binary Atlantic/Mediterranean shipbuilding traditions are more like the two sides of the same coin, than apparently distinctively separated areas and shipbuilding processes. Questioning the apparently solid nature of this predefined border between the Atlantic and Mediterranean, leaves a complex cultural highway opened, between the two big European shores, that directly point out to the mixture, or hybridization, in the difficulty of clarifying "*a clear-cut cultural tradition*" (Westerdahl, 1994: 265).

The needs and activities of Bizcayan and Mediterranean shipbuilding were both different, and therefore, their ships were a means to an end adapted to their endeavours, as brilliantly explained by Cano, as we will see later on in chapter 6 (Cano, 1611: 44). Some of this ship design concepts could have been clearly acquired from the Mediterranean. In the same way there was an obvious influence from the Mediterranean shipbuilding in the renaissance, it is clear than in that travel in space, techniques adapted.

The Red Bay ship, for example, was prepared to cover diverse needs, such as carrying massive amounts of cargo between 900 to 1000 whale oil casks, anchor for a long period in

Buytres (Red Bay) and very particularly to navigate through the cold waters of Labrador and the Atlantic (Grenier, 2007: I-4). The design of the Red Bay vessel was very likely influenced in its construction by southern shipbuilding. Portuguese had already adopted pre-designed frames in their ship construction methods by the 16th century (Castro, 2007: 149). Bizcayan shipwrights, therefore, shared with the Portuguese brothers, and other traditions that used the preassembled frame system, also known as the "*Madeiras da conta*" in Portuguese terminology.

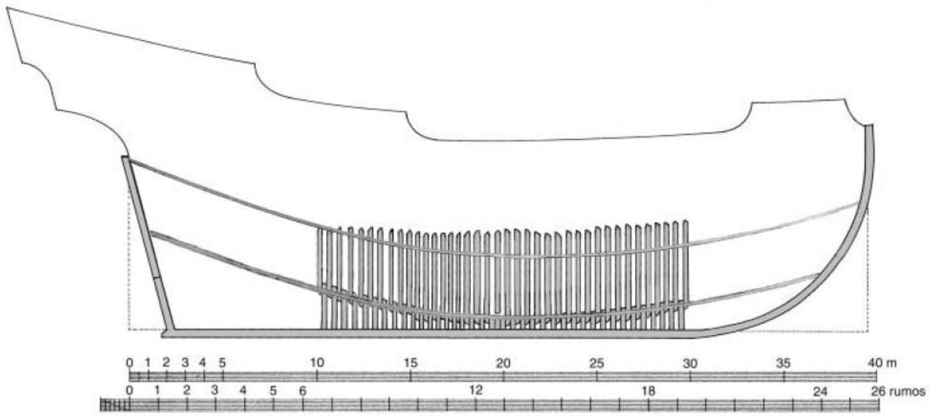


Figure 4.32Ribbands and pre-designed frames. A characteristic, considered an Iberian signature, used in Portugal and the Bizcayan tradition (After Filipe Castro, 2007: 149).

4.10.6 Fasteners

As historian and archaeologist Brad Loewen pointed out, the combination of iron nails and oaken treenails used for the planking of the Red Bay was a common Bizcayan element (Loewen, 1998: 193). This is true for many of the ships studied in chapter 4 were presumed Bizcayan//Iberian ships were compared. Most of them have used both treenails and iron nails as fasteners (Iberian Atlantic ships table 4.2, see page 100).

In order to see contemporary examples of other areas, ships such as the Mary Rose used treenails in their fastening, (Marsden, 2009: 77-80), whereas in other cases, closer to the Mediterranean, such as the Portuguese coast, used solely iron nails, for example Cais de Sodre and *Nossa Senhora dos Mártires* both found in Portugal (Castro et alii, 2011; Castro, 2005:

136). Therefore, if only Portuguese shipwrecks seem to be using just iron nails, at least the Cais de Sodre and the Nossa Senhora dos Mártires, rather than a combination of treenails and iron nails, this might be more characteristic in their region. Again, the ranges for the iron nails vary from 0.3cm for the Cais de Sodre, with a majority ranging between 1cm-1.2cm-1.5cm and at the other extreme 4cm with the Pepper wreck (Iberian-Atlantic ships Table 4.2).

4.11 The future for Maritime Archaeology? A dendrochronological view through the Ribadeo wreck, Yarmouth Roads wreck and Red Bay vessel

Although we can see similarities and compare features, there is a spatial designation to these wooden remains that is unknown. It is known that technology is not fixed to a particular space but rather can travel and be adapted and modified to other spaces and contexts. In this sense, the future of dendrochronological approaches here could be essential as a research line to give a closer spatial-temporal context to ship remains. The combination of dendrochronology and the study of shipbuilding has gained popularity fairly recently by the use of dendroprovenance and due to the disparity of recording methods the general overarching analysis over a large sample of shipwrecks has been very problematic. The application of dendrochronological practices in Iberian shipwrecks could potentially be used as it has been in other archaeological periods and cultures:

> "*Early examples of successful application include the dating of the Bremen cog to AD 1378-1379…During the early 1990s tree-ring results were presented for the first time for a number of ship finds which had been excavated many years before. One of the iconic ship finds from Roskilde Fjord, Skuldelev 2, was not only dated precisely to AD 1042 but shown to be constructed from oak derived from Ireland, an early instance of dendro-provenancing…Developments in methods to identify the source of timber employed in ship construction drawing on the increased geographical availability of historic tree-ring data have been applied successfully in sourcing timber for the planking of the Karschau Ship from Schleswig-Holstein to the area around Odense, a medieval town on the island of Funen, Denmark in the AD 1140s*"(Nayling, 2009: 67-68)

Due to the discovery of the Skuldelev II and the finding of its Irish timber origin, dendroprovenance was further used in other archaeological sites. Dendroprovenance became more of a reliable technique, and further proof of this was the work of Aoife Daly (Daly, 2007), in which northern European tree-ring sequences were used for oak in order to date and spatially locate timber remains. Further work on timber sampling applied to shipbuilding received attention and guidance for dendroprovenance, with particular regard to Iberian ships (Rich, Nayling, Momber and Crespo Solana, 2017). Some recent work has established some general guidance for sampling shipwrecks in a correct manner, furthering the use of dendroprovenance in maritime archaeology (Domínguez, Rich, Haneca and Nayling, 2019).

Some examples related to Iberian shipbuilding, in this case the Red Bay vessel, Ribadeo wreck and the Yarmouth roads wreck. In all three dendrochronological sampling and analysis was used to find the provenance of the wood. None of the three studies gave absolute dates about the origin of the timbers and year they were felled. However, the experience provided a deeper understanding of dendrochronological dating methods, especially related to these Iberian wrecks from the 16th century.

In case of the Red Bay vessel, 35 samples were taken, but also another two from 27M and five from 28M (La Roche, 2007: V-76). The first attempt failed to work due to technical problems with computers. Several other attempts covered 11 samples, that did not provide match to European chronologies. Another campaign was carried out in 1992 with 47 samples, some of these having between 99 and 156 rings (La Roche, 2007: V-77).

The Red Bay Project found something that the ForSEAdiscovery project had to face as well, the pruning effect in the ring growth pattern. In the analysis of the timbers, they found out that there was a drop in the last 20 to 30 years due to the felling of the branches of trees. A tentative dating was carried out, matching the Sainte-Anne river region (Gaspé peninsula). It matched with the 24M dating to 1568 for the felling of the trees. In order to conclusively date the wreck, in 1990 the Project built a master chronology from Basque oaks. However, none of these attempts resulted in conclusive dating's for the wreck. In their results, the Red Bay project points to the possibility of a variety of origins for the timbers of the ship used for the construction. They also believed the trees under study were affected by human influence in their growth, not matching with natural tree growth of the area. It was claimed that the growth pattern might have been incompatible in those manipulated trees. They also believed that their failure was due to the use of different species to establish a master chronology with a disparity of tree species. However, the table that shows tree species being related to structural elements was one of the outputs (La Roche, 2007: 71-73), as well as providing a deeper experience of sampling in the Basque area.

In case of the Ribadeo, there were similar problems during the first campaign in 2012, and later in 2015 (Dominguez and García, 2015). The disparity of the origin of timbers, due to the discovery of historical records clarified future research with the shipwreck[28] (Eguiluz et alii., forthcoming). 19 samples were taken, from at least 3 identifiable tree species, such as oak, fir and pine, and a range of 13-195 rings overall, including sapwood rings in many of them. Some of the results of the 2015 sampling campaign were the high intra-site growth variability, indicative of a variety of origins for the timbers, as the historical source pointed out, from Calabria, Istria, forests of Naples, Monte Gargano and Albania (Dominguez and Garcia, 2015).

Finally, the Yarmouth Roads shipwreck was dendrochronologically studied from the samples taken from the 2015 sampling campaigns, where 3 samples were retrieved from the wreck (MAT, 2015 YR report), and subsequently 25 were sampled later in the 2016 field sampling campaign (MAT, 2016 YR report). The report for the 2015 sampling campaign was not conclusive and raised the issue of insufficient tree rings that could not be dated with confidence against other chronologies (Dominguez and Garcia, 2015). All samples were Quercus subg. After the 2016 campaign the initial hypothesis remains as a potential Mediterranean or Iberian origin, however, it still cannot be dated due to no general Iberian oak chronology, something which the project ***ForSEAdiscovery*** had been working for.

4.12 Conclusions

In this search to find the Bizcayan unique attributes, a porous boundary was found, mixed between Portuguese, Spanish, English and even some other northern shipbuilding examples from the Mediterranean and the Northern traditions. Just by looking at the technological attributes preserved in archaeology, there is no clear individual element that can be used

[28] AMN, Navarrette, Ms 396, art 5, n 53, fols 225-226 "*Relación de la fabrica de doze Galeones de Guerra de la esquadra Illirica de Pedro de Ivella y estefano Dolisti …*"

separated to distinguish one from another in the archaeological remains. Rather a combination of these archaeological characteristics, but also combined with dendrochronology, dendroprovenance and historical proportions and ratios, could shed some light in the cultural traces of the Iberian Bizcayan and other ship traditions. Oertling did refer to this set of features as a "fairly consistent" concept. After describing some of the characteristics found in these ships, only Red Bay seems to adhere completely to the concept. None of the rest of the ships in this category fulfilled all of the characteristics. Partly because the hull was not completely preserved in many of the shipwrecks, and it is possible that these overall observations could have been different with more preserved remains. Two aspects arise from looking at all of these wrecks.

First, that by following the criteria of a degree of shipbuilding features, or gradient, many other ships from other areas fit within this category. In fact, to a certain degree, clusters of shipbuilding patterns could be observed, but there are also, overlapping features between different traditions and areas, and common features can be traced from distant areas. Just by looking at the shipbuilding tradition technologically is not giving a clear-cut spatial reference. This gives us some hope that future research lines could be looking at the influence that English shipbuilding received from Portuguese, Venetian, Genovese and Bizcayan shipbuilding. At the same time, the influence that the Bizcayan shipbuilders had over Barcelona (In the Atarazana real for the construction of Galleys, by 1562), Galicia in the early 17th century with *Agustin de Ojeda* and the mixture of technique that spread into the south of France are some of the future lines of research of the hybridization of the Bizcayan techniques with other traditions, and the influence other traditions had over Bizcayan ships. Here the use of strontium in oaken ship remains, dendrochronology and dendroprovenance could work together to study the technological spread, and shipbuilding areas, as well as well as to see technological acquisition over time of techniques in relation to different traditions.

In fact, one of the main observations is that all ships adhere to the proposed Iberian concept in a certain "degree of similarity and difference". Therefore, it seems plausible to use the word "degree of characteristics" as no ship apart from the reference model ship, Red Bay, adhered 100% to the concept.

Given that, in archaeological theory, comparative studies have been concept driven, in this case it will be proposed to maintain a loose concept criterion, with an open comparison for a degree of similarity between different "traditions" or sets of characteristics. To a certain extent, by looking at the forms, all shipbuilding clusters of features or traditions, have a degree of similarities and differences. Instead of rigid conceptions of cultural boundaries between shipbuilding traditions, a certain degree of comparison of similarities and also differences between traditions is taken into account.

Second, that no two ships seem to have exactly the same scantlings, characteristics, period or region of origin. It is not possible to find a set of characteristics that covers all the ships, but also that the idea of a shipbuilding homogeneous coherence is more an ideal than a reality.

The influential area of the Iberian traditions extended through time and through the globe, originating from previous traditions and continued into others (Parada Mejuto, 2004: 227). In the case of Atlantic ships, more particularly of shipwrecks from the 16th century, presumably Portuguese and Spanish, the latter consisting of mainly Basque ships up to the 1580s (Chaunu *et alii*, 1955-1959: 256-257). What one tries to point out is that concepts give a fixed idea of the nature of this culture but due to the immense diversity and inconsistency between shipwrecks and historical information, archaeologists may be trapped trying to find a single overarching concept to explain all contexts of what might not be initially conceived in this way:

> "*In effect, first futtock 4 has a mortise instead of the usual tenon, a situation that also occurs in the Cais do Sodre shipwreck. Here the respective floor has a tenon, similarly contrary to the norm. No explanation has yet been found for this break in the functional pattern. No explanation based on constraint imposed by the raw material available appears completely satisfactory*." (Alves, Rieth and Ricardi, 2001: 25)

However, future studies of Iberian shipbuilding and Iberian Bizcayan shipbuilding could potentially involve dendroprovenance and shipbuilding comparisons in order to look at the relationships between ships from different areas. Thus, historical and archaeological data, as well as wood sciences, could be compared and contrasted and in this way maritime archaeology could gain an understanding of the networks within which the construction of these ships occurred.

5 A historical view of the Bizcayan tradition. 1550-1588

5.1 Introduction

This chapter is a historical view of the concept of the Iberian Bizcayan tradition, through the evidence of historical sources, showing evidence about the influence on ship design into the ship types that were used in the Bizcayan tradition. Particularly, this chapter will be dealing with the idea of a heterogeneous Bizcayan tradition, seen through the concepts of "ship types", conventions that were changing at the time, reflecting also a drift in technology, as well as a social clash of different groups of interest. When it comes to the Basque region, we could say the main ocean-going ship was the merchant nao by the 1550s.

The spatial notion of an "Iberian" ship, but specifically of a "Bizcayan" ship as a shipbuilding tradition with radical differences, is observed through the view of hybridity, particularly as against the Portuguese family, close sibling in the Iberian family, and of the Bizcayan shipbuilding. The technological usage of what has been considered as only being of the Iberian Peninsula, in this case the Bizcayan tradition, is considered within a broader scenario of transnational interdependence. With regards to this point, the consideration of the migration of shipbuilders from the Bizcayan tradition to other regions, particularly to the South of France, is taken into account in defining the space and spread of influence of a "Bizcayan tradition", not considered by mainstream concepts of "Spanish" shipbuilding applied to this area.

This chapter describes the Bizcayan tradition through historical datasets of ship measurements and proportions. Instead of a homogeneous "Bizcayan" model, there was a rather heterogeneous tradition at the time. A single overarching concept of a tradition cannot cover all the variety within the Bizcayan region. This variety of forms within the same tradition was not accidental, but rather the mirror of a conflict of interests in the Basque region. Like the two poles of the same tradition, in this chapter it is argued that the Bizcayan tradition was formed by two conflicting mentalities of shipbuilding, that of a social group interested in war ships that could carry cargo from the Americas and that of the social group of the bourgeoisie, interested only in cargo carrying vessels, not war ones. When studying the larger craft, we distinguish two concepts that were applied to shipbuilding, mercantile cargo-carrying vessels, and war and cargo carrying ones. This have been related to historical ship types, such as galleons for the first one and *naos* for the latter. But neither of the two words seem to correlate to a unified convention of a ship type, but rather, the historical evidence shows that the terminology referring to these apparently distinctive ship types, is really imprecise. Whereas, we could argue, the function of a ships form, could be considered to be a little more consistent, when analysing ship dimensions and forms.

5.2 The Bizcayan tradition by the 1550's: A mercantile oriented shipbuilding

When we refer to Spanish shipbuilding during the 16th century, although it is correct to refer to these ships, in a political sense, in terms of their cultural origins, there is, in fact, a wide variety that formed the "Spanish" fleets. During the entire period between 1520 and 1590 ships built in the regions of Bizcay (Chaunu *et alii*, 1972: 256-257), Cantabria and Guipuzcoa were mostly used for the Indias routes and Armadas between Spain and America and for the protection of these fleets. In 1582 the Duke of *Medina Sidonia* himself declared:

"*las naos vizcaínas son la fuerza de estos reinos*" (Azpiazu, 2016)

"*Bizcayan naos are the strength of these kingdoms*" Translation by the author.

From 1550 to 1639, Bizcayan shipyards, particularly on the Guipuzcoan coast were at their peak during the 16th and 17th centuries (Odriozola Oyarbide, 1998: 101). In the 16th century Basques were the first Europeans that we know of to be involved in whale hunting in Newfoundland, (Proulx, 2007: I-42). According to Huxley, the funds for shipbuilding did not always come from trading activities. They were directly linked and sourced from the production of iron, and its manufacture, smiths, carpenters and *maestres de naos* (Similar to the English *ships' captains*) (Huxley, 1987). Their investments were put into the construction of what they called *naos* in the historical documents of the time.

At that time shipbuilding was conditioned by the flux of economic trade and fishing, which was stronger during peace times. These routes and fisheries flourished during times of peace between the wars the kingdom was involved in, such as the Spanish-French wars in the mid-16th century, during the periods 1551-1556 and 1556-1559 (Barkham, 2000: 57-62). The Spanish king confiscated Bizcayan merchant and fishing ships to gather a fleet for military manoeuvres. However, these confiscations were at the expense of the trading and fishing activity, constantly hampered and hindered by the sudden necessity of the King and the imposition of his interests over those of the Bizcayan merchants (Azkarate, 2008: 84-85).

Despite these facts, the participation in the Carrera de Indias and Armadas brought opportunities for the local economy linked to the sea in later belligerent decades (Alberdi, 2012: 443). Under the kingdom of Phillip II, Bizcayan seafarers developed strong relationships and coordinated annual voyages to the newfoundland cod fisheries and Labrador whaling activity in larger numbers during the middle of the 16th century, than to the increasing Indias routes (Azkarate, 2008: 15-16). This area of the Atlantic was still at its peak by the late 16th century, even referred to as a golden age for Basque whaling which enjoyed a monopoly of the whaling activity in Europe (1560-1580) (Barkham, 2000: 62).

5.3 The militarization of the Iberian Bizcayan tradition, 1550-1588

The Spanish Monarchy was dependent on merchant and fishing economic activities as, in the 1560s, they were not yet able to sustain their own permanent navy through the expenditure of the monarchy. Instead, they depended on private shipbuilding and the confiscation of these vessels when war and conflict broke out. For this reason, the interests of the monarchy, more linked to military activities to protect their empire and trading routes, began to impose over the construction of merchant vessels, especially after the beginning of the war of Flanders and once the English corsairs had started to attack the Indias fleet (Stradling, 1992: 27).

The period 1550 towards 1588 is a period of adaptation and experimentation of a Mediterranean maritime power that expanded across the Atlantic Ocean (Thompson, 1991: 84). In this period, successive battlefields in the Mediterranean, such as Lepanto, or in the Atlantic, such as the Battle of the Azores, English piracy and the Dutch revolt in Flanders, forced Spain to face a severe crisis with regard to how it approached the maintenance of its Atlantic possessions (Stradling, 1992: 27). The strategic centre of gravity of the Spanish economic resources was rooted in the Indias silver route. By 1572 the Dutch revolt and English piracy in the Caribbean accelerated the need for the monarchy to create a large permanent navy for the Atlantic for the first time in order to press the Dutch through the sea (Duro, 1972: II-197-209, 375-386; Alberdi, 2012: 426). In fact, although some of the changes that were seen as necessary in the dimensions of the vessels were aimed at improving their sailing qualities in the late 16th century, in order to manoeuvre for war, their shallower hulls were also intended to be suitable to operate in the Flemish shallow coasts, and the Sanlucar sand bar as well, in the entrance to the Guadalquivir estuary in Seville (Stradling, 1992: 28; Serrano Mangas, 1998: 225-226).

However, the previously dominant mercantile shipbuilding was challenged during the decade of the 1560s. The king imposed his interests, through local agents in the Basque area, and external agents on the shipbuilding activity in the area, accelerating a previously existent conflict of interests in 1563 (Alberdi, 2012: 441). The reason to interfere in the shipbuilding activity was just to defend and secure the monarchy's interests in the economic activity, by appropriating the right over the usage of timber in order to use it to build the ships that were considered ideal in shape, according to the people that defended and were part of the king's group of interests. The Bizcayan area, therefore, was important in the strategy of Phillip II to maintain the Spanish Empire. The clearest demonstration of this intrusion was the imposition of new regulations and officers interfering with local jurisdictions, (As mentioned in Chapter 3) such as the Juntas or local Councils in Bizcaya and Guipuzcoa and the imposition of the Superintendent of forests and plantations regulating the timber resources of the area, Cristobal de Barros. There were not many political entities in 16th century Guipuzcoa, on the one side there were the Juntas or local councils, created by the provincial Brotherhood, an institution that had been gaining power since the 15th century, and on the other side was the power of local noblemen, or who in Spanish historiography are known literally as the "elder relatives" or "*Parientes Mayores"* (Aragón and Echeberria, (Coords.), 2017: 224). This old "noblemen's traditional elite" clashed against a rising power of a growing "Bourgeoisie" with economic strength and entrepreneurship in the Atlantic and Mediterranean economic opportunities. According to Priotti, the forefront created by the "*Parientes Mayores*", old households of lineages of the medieval nobleman, found a way of channelling their political influence in the area (Priotti, 2012: 71), by serving the king's interests in a quest for economic growth and social status that was lost mostly in the 15th century. These households were both in Bizcay and Guipuzcoa, known as the "*Butron-Mujica*", "*Recalde*", "*Idiáquez*" and "Manrique-Lara" (Priotti, 2012: 71). These families started to understand their potential role as an agent of influence and took advantage of it.

This created a long-lasting conflict of interests, reflecting a variety of motives behind shipbuilding (Valdez Bubnov, 2011: 68). As the political tensions and wars increased on the part of the Spanish Monarchy, the interest to build militarized vessels was imposed in a more organised structure with royal shipyards and contracts with the King, known as *asientos* (Valdez-Bubnov, 2009: 79). According to Thompson, during Phillip II's period, 53 out of 60-70 ships were directly supervised by the crown's administration, between 1589-1598 (Thompson, 1981: 235). Between the period 1604 and 1607 there were at least 72 *asientos* delivered (Thompson, 1981: 240), and 64 between 1617 and 1623, with only six ships being directly built by the king in this last period (Thompson, 1981: 245). This meant that the monarchy relied on other private investors of different origins to manufacture their ships, such as Bizcayan, Genovese, Ragusan, Flemish and English shipbuilders.

In the royal shipyards, there was more direct control over the shipbuilding process, where the construction was supervised and measured at the end by an *arqueamiento* or gauging of the ships volume in tons, not in weight. The *arqueamiento* was a traditional formula, by which the volume of the cargo of the ship was calculated in a specific way, described by Cristobal de

Barros[29]. By this formula, different parts of the ship were measured such as the length, depth and width of the ship in order to find the carrying capacity of the ship (Casado Soto, 1988: 73). The *arqueo* of ships were mostly carried out by the superintendent Cristobal de Barros, although, in his absence, other people could be assigned to fill the role, as the area from Guipuzcoa to Galicia[30] was too large to be covered by one person.

By 1569, Cristobal de Barros noted thirty-two contracts, with private shipbuilders, funded by the royal budgets to build ships larger than 300 tons (Enriquez and Sesmero, 2000: 693). In this list many captains that were serving the King's army were taking responsibility of building these ships, five of them built in the year 1563, eight in 1564, two in 1566, seven in the year 1567 and the rest were built between 1563 and 1569 at an unspecified date. All of them were 300 tons minimum, some of them reaching 700 tons, which was a very large ship for merchant and fishing villages at the time, but were also seen in the coast, however this was not the average ship size. In contrast to the number of ships built with the King's funding, local private shipbuilding doubled the number of the ships built by 1569, with sixty-six ships in total. Amongst the ships mentioned, there seems to be a common problem for the Spanish servant Cristobal de Barros, who denounces the ships built in France by Bizcayan shipbuilders, that hamper the maritime power of Spain by building fine and high-quality ships for the French king's fleet (Enriquez and Sesmero, 2000: 691). The insistence of Barros both to forbid Bizcayan shipbuilders selling their ships to other nation's shipowners, as well as the worry over the growing French merchant fleet over the last decade seems to be a topic that has not had the attention one thinks it deserved.

The implication of Basque shipbuilders that moved into France to build *naos* is rather extraordinary, but also something we should take into account when studying the Iberian Bizcayan tradition, especially from an archaeological, historical and dendrochronological way. It seemed that the sudden intrusion of the agents of the King into the northern shipyards and

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[29] AGS, GyM, Leg. 96. nº 63: "*20 Enero, 1580. La copia de la lección que me dio Cristóbal de Barros de la formula de los arqueamientos*"

[30] AGS, GyM, Leg. 71. nº 227: "1567: *Juan de Peñalosa nuestro criado saved que pos que que inporta a nuestro servicio y a bien de nuestros súbditos que haya numero de navíos en la mar de los Reynos entre otras cosas que concedimos par hacer bien y bien mandad a los dueños de los navíos en lla orden que cerca dello dimos…*"

forests had caused a local resistance from the merchant Bourgeoisie that responded to the needs of an elite that did not constitute a state or nation, but beyond the hindrances experienced under Spanish domain, found its own way out of from the problems they had in the Basque French shore, in Labord. This is an understated matter in the study of the Iberian ships that needs to be taken into account, both for history and archaeology, but specifically because of the implications of the changes in supplies for the construction of Bizcayan *naos* in Labord. The possible illegal trade of timber across the border, from Guipuzcoa, for which one cannot find prove of it, but it is likely to have happened due to the insistence of the authorities to forbid this type of illegal trade across the border, it is something that dendrochronology studies of Iberian Bizcayan ships should take into account. Moreover, the cultural implications of the migration of Bizcayan shipbuilders to France opens the gate for more cultural hybridization of the Bizcayan *naos*, with local and French shipbuilding techniques, that were likely to happen. The high quality of the Basque craft could have also spread due to the use of the technique, in centres as important as Bordeaux, where the redistribution of merchant gods was of a very high importance. These matters must be taken into account, even if they are just a feasible hypothesis that would need further evidence to be proved. But the possibility of cultural mixture of the French shipbuilding with the Bizcayan techniques is very likely to have happened and their ships to have prompted a change in the conventions of the Southern harbours of Labord.

The evidence of the migration of both funds and technique to the French Labort has been studied in history and there is much evidence of the cross-border voyages that were organised through the harbours of the South of France, with the funds of the bourgeoisie residing in the Spanish side. Esteban de Garibay, another Guipuzcoan famous agent, wrote in a report to the King of Spain that the coast of Southern France had less than ten ships a decade before (1569) and that in the last 15 years more than 100 ships were built in these French shipyards, through which the Castilian fleece trade continued, avoiding the taxes of the King, through the trade across the Pyrenees of Navarre and Aragon, to be embarked in San Juan de Luz (Enriquez and Sesmero, 2000: 705). The Newfoundland fisheries were as well developed from the same coast, and supplies were organised around these harbours, which became a new alternative for the Bizcayan bourgeoisie by the late 16th century.

The cultural mixture, however, seems normal and very natural, as the fleet of what is registered by Barros as Spanish ships, were in many cases formed by ships that were built in

England, France and Flanders. Most of the vessels were bought in France whereas some "*urcas*" were bought to Flemish shipbuilders and only one ship was bought to an Englishman (Enriquez and Sesmero: 694).

The agents that invested in the construction of *naos* on their own, or the group of interests we identify with the local rising bourgeoisie, were the entrepreneurial people on the sea of the Bizcayan area, more interested in their merchant activities. These people were not as powerful in most cases, as the linage of the "*Parientes Mayores*" however, economically, they were able to invest with enough capital into the shipbuilding activity that kept their economic trading loop going. Their projects to build *naos* sometimes involved just one individual, that run with all costs, however, it was also common for two and even three to gather their funds to build one ship. Few of these agents were very wealthy, but some exceptionally rich owners sometimes could afford the costs of the construction of many large ocean-going *naos* (Enriquez and Sesmero: 694). In a way, we could say there were people that owned their own small fleet.

Some of the people that invested in private shipyards without the king's funds were Captains, as Oquendo (San Sebastian), Sancho de Arquiza (Hondarribia), El mayor Villaviciosa (Pasajes de Fuenterrabia, Lezo); but others were plain entrepreneurs. The following list is complete in a published article (Enriquez and Sesmero, 2000), due to its bulky length, some of the inverstors will be mentioned but out of the sixty-six ship constructions or acquisitions that were noted by Cristobal de Barros in Guipuzcoa, Bizcaya Asturias and Galicia. Sometimes the same entrepreneur bought or built more than one vessel:

Guipuzcoa; *Tomas de Landarruguista (Hondarribia); Juan de Evora, Juan de Esquioz, Juanes de Villaviciosa, (Pasajes de Fuenterrabia, Lezo); Martín de Zuaznabar, Juan Martinez de Isasti, Lope de Uranzo (Renteria); Juanes de Portu, Miguel de Urbieta, Diego de Barrionuevo, Marquez de Orzayn (San Sebastian); Juanes de Illumbe, Domingo de Echaniz, Nicolas de Segura, Cristobal de Iturriaga (Orio); Baltasar de Orio, Pedro de Artiaga, Juan Lopez de Oquina (Zumaya); Domingo de Sorazu, Martin Lopez de Isasi, Juan Perez de Arriola, Santorun de Reten, Asencio de Alzola, Domingo de Garate, Juan de Arriola, Domingo Lopez de Isasi (Deva); Jacome de Ibaseta, Juan Perez de Echanoz, Juan Martinez de Amilibia, Domingo de Azterrica (Motrico);* ***Bizcaya****: Ramos de Lizona, Rodrigo del Puerto (Ondarroa); Garcia de Oribe, Juan de Oribe (Lequeitio); Gonzalo de*

Landaverde, Martin Ochoa de Echevarri, Maese Domingo de Busturia, Lope de Lusarra, Pedro de Bilbao la Vieja (Bilbao); El Mozo Coscojales, Pedro de Santurce, Juan de Basori, Juan de la Llosa, Ochoa de Larrea, Juan de Montaño, Ochoa de la sierra, Ochoa de capitillo (Portugalete); Ponce de Rada (Musquiz); ***Asturias;*** *Alfonso de Ponte (Aviles); and* ***Galicia;*** *Pedro de Maseda (Vivero).* (Enriquez and Sesmero, 2000: 694-695).

By the year 1572 another 60 private contracts were funded by the King's project to help building ships larger than 300 tons in the Basque coast[31]. These funds were acquired again via Cristobal de Barros, to private investors in the coast. It can be observed that the first decade for this royal funding in shipbuilding took place at a much slower pace. Gradually local investors were more interested, as we can see by 1572, compared to Barro's account in 1569. This way Barros acted as the king's representative or personal medium by which the Basque provinces and the crown were directly connected.

As an intermediate agent, between the king and the region's elites, Barros acted as a channel for those that showed loyalty and offered their service to the king's endeavour by building larger ships than 300 tons (Alberdi, 2012: 429). The funding was given to Cristobal de Barros who distributed it across the region. Through contracts and the compromise to build these ships according to the required size, and measurements, the shipbuilding contracts were established as a means of regulating the relationship of the king with the local investors, via his agents. Failure to complete these contracts was punished, and a relative date of the completion of the ship was agreed at the end of these contracts. Problems with wood supplies and delays over the construction of these could justify a delayed launching of the ship. However, Cristobal de Barros supervised and measured these ships in order to make sure that the requirements signed in the contracts were met. Changing the measurements of the ship and size was not allowed, as this would imply that more wood than stipulated would be required, for which the funds initially given by the superintendent were usually just enough to build the ship as specified on the contract.

Barros eventually became the man who controlled the northern shipyards, from Galicia to Guipuzcoa. His influence was immense and clashed with the interests of local merchant

[31] AGS, CMC, leg 1EP, 1572-15 "*El tanteo de la cuenta de Cristobal de Barros de los empréstitos para fabrica de navíos"*

investors, as mentioned before, following a preconceived idea of a shipbuilding crisis that justified the intervention and measures to solve the situation (Alberdi, 2012: 425). Initially not everyone saw benefit in receiving funds to serve the king through Seville and the Indies trade, or the defence of the Northern route in the "*Armada del Mar Océano*", the escorting fleet that travelled to Flanders.

Some of the agents that invested in this royal shipbuilding must be mentioned, as the network of loyal servants with king of Spain was developing. Priotti mentions the network of agents and families through which the "*Parientes mayores*" fought the "*urban bourgeoisie*". In Bizcay, the household of *Butron-Mujica* was a powerful family that had an immense influence and ownership of the economic activities of the area, such as the forges and iron, shipbuilding, vast land and mills (Priotti, 2012: 72). The main concern of this linage was the construction of ships and weaponry to supply themselves with military resources. This way, the charcoal industry was becoming more and more interesting for this linage, for the production of iron weapons, as well as nails used in shipbuilding, becoming a strategic resource. This family of *Butron-Mujica* married one of their sons with the *Idiáquez* family from Guipuzcoa.

Bonding their economic wealth to another influential family such as *Idiáquez*, that already had joined the influential families of Lili and *Zuazola* via marriage, these servants of the king were the scribes of the Habsburgs, as well as captains in the war of Flanders, such as Juan de *Idiáquez*, counsellor of war and secretary of state of Phillipe II (Priotti, 2012: 74). The family of Juan de *Idiáquez* had also developed bonds of marriage with *Juan Martinez de Recalde*, future vice-admiral of the Spanish Armada 1588 (Priotti, 2012: 77). This way, these "*Parientes Mayores*" became directly the link between the crown and the provinces of the Basque region, so essential for the King's interests in shipbuilding and the colonial trade of the Indies in Seville. These elite that bonded to the king through their service and merits that they received became a privileged elite in the Basque provinces (Priotti, 2012: 76). The local bourgeoisie could not match this influence that the noblemen acquired and reinforced through the centuries. However, the contest and resistance from this local oligarchy and their merchant interests was constantly hampering the political interests of Phillipe II, that was reliant on their private shipbuilding to sustain their Armadas in case of a campaign or invasion.

The agency of local contractors was weakened by this privileged lobby, or group of pressure of the political-military interests of the monarchic oligarchy (Priotti, 2012: 70). The urban bourgeoisie had some strength due to their maritime endeavour, as they were trading and connected regularly with economic resources that gave them some influence in the Basque area. Particularly the iron industry, dependant on the commercial capital, benefited from the trading circuits, exportation and profits of this type of goods, giving this power to the urban bourgeoisies as against the "*Parientes Mayores*" or traditional noblemen households. Through the *verlagssystem*, or capital that was in control of the merchant group of interests (Priotti, 2012: 70), their strength in the industrial network of the iron put at risk the political domination that the old elite of the traditional noblemen had experienced previously.

Ironically, the politics that marginalised the merchant guild and the interests of this commercial oligarchy, were the unmet needs that caused a migration of funds and labour that weakened the Spanish fleet king Phillip II was dependent on. Due to the privileged position and role that the noblemen's households acquired, families such as *Idiáquez* developed a strong bond with the crown (Aragón Ruano and Echeverria, 2017: 221). The Spanish modern vassalage of the new growing fiscal-military nation (Glete, 2002) built up on merits and the loyal service that was paid both in economic means and social status as well. The development of the structures and positions, such as the role of the "Superintendent" became remarkably influential in the Basque area, and breached the power fight the bourgeoisie and the noblemen households had in favour of the latter ones. This caused that only those families that gave service to the king, received privileged positions in the new growing Spanish administration under the Habsburg monarchs. Both in Bizcaya and Guipuzcoa, the growing maritime administrative roles, such as the Superintendents of forests and plantations (Goodman, 1997: 262) were shared only after Cristobal the Barros became *proveedor* in 1592.

5.4 Galleys and Galleons: The Influence from the Mediterranean in Bizcayan naos

The use of galleys was quite limited for the early 16th century, despite it being common in earlier Medieval times (Casado Soto, 2003: 537-538). However, in the context of the expansion during the reign of the Catholic Kings against the Kingdom of Granada, the use of galleys was restricted, whereas *naos* were used in larger numbers (Casado Soto, 2003: 538). Despite this initial stage of the 16th century, the expansion of the Ottoman Empire was perceived as a threat to Christianity, and Spain took the lead in this Mediterranean warfare to restrict Ottoman influence to the minimum. In these conflicts, galleys had a crucial role and were the main force for naval combat (Casado Soto, 2003: 542).

During these decades of war Spain saw that galleys could be used in a military context as an efficient vessel for warfare. However, their use was massively concentrated in Mediterranean waters with different conditions to the Atlantic ones. The conflicts with the Ottomans led to the battle of Lepanto, in 1571, that brought a period of domination for the Spanish power against the Mediterranean influence of the Ottomans (Casado Soto, 2003: 547; Salvador Esteban, 2008: 231; Valdéz-Bubnov, 2011: 66). After a peace treaty with the Turks in 1578 (Salvador Esteban, 2008: 231), Spain was able to concentrate its focus on other issues relating to the Empire, such as the Atlantic threats.

The use of these galleys however, was not the same as for the trading routes of the Atlantic, so their Armadas had to adapt to a different kind of scenario. At the beginning of the defensive convoy galleys were used to protect the Silver Route in the early 1560s, but were later dismissed by 1568 (Díaz, 2014: 665). However, elements from the galley were implemented with the round ship, combined in a different vessel used for the Atlantic navigations (Valdéz Bubnov, 2011: 51).

As pointed out in Chapter two, the study of ship types has still not borne conclusive results, regarding what was specifically a galleon or a *nao* in terms of a particular shape or set of dimensions. Neither historians nor archaeologists have been able to resolve this matter. In fact, there is some controversy or different views as to what constitutes each type. Neither historical nor even contemporary sources have been consistent with the use of these terms. So at least we can affirm that terminology is rather imprecise. The name galleon and other ship types have been discussed previously by other researchers, and the terminological confusion has been mentioned both in historical and archaeological terms. However, these names have separated a reality of shipbuilding, of traditions and influences within an arbitrary generic concept of ship types, as of a static matter, as many authors have defined these ship types to particular shapes and dimensions (Serrano Mangas, 1985; Casado Soto, 1988: 119-153; Barkham, 1998; Casado Soto, 2003; Loewen, 2007: III- 14-16).

Although there is an awareness of change in shipbuilding, the use of the words galleon or *nao* have been used as if they were clearly distinctive, although sometimes they have been highlighted as an unclear use of the terminology. Despite there are existing commonalities between ships, there are no unique features that make any clear distinction between what has been called a *nao* and what has been called a galleon. This is the view we will take in this matter, despite other academic work defends the clear distinction (Grenier et alii, 2007). In fact, people from the 16th century and 17th century would use the words *war nao* and *merchant nao* to distinguish between them (Cano, 1611), but also would use both to refer to the same vessel (Barkham, 1998). However, each ship was a unique creation if examined in detail and their aspect changed during their use. Despite ships changing with time, terminology inherited from the literature and historical sources, would not register these changes and the same term would still be used. For example, the term *nau* was used in Catalan to refer to a Mediterranean ship (Pujol, 2017: 284). Even though this problem has been identified, the use of the differing terminology has still to be resolved.

Therefore, the infinite details of each ship were simplified by words such as, *navio, nao, carrack* or *galleon* mainly through the influence of the study of historical sources. It should be said that some historians are aware of this and recognize that for example the word galleon was a generic term and did not refer to a particular set of features (Valdez Bubnov, 2011: 58). Other historians have tried to solve the problem of ship types and opted to define them in terms of features. This approach was taken by archaeologists, inspired by the stories of these galleons and caravels. Archaeology inherited these stories of Spanish galleons and Portuguese caravels, and looked for them in the remains hailing from this period. However, these terms did not represent the changes that were occurring during the 16th and 17th centuries. Therefore, this was and still has been very confusing when applying the terms to match particular shipwrecks and historic finds.

However, even if we are aware of this, one of the first questions that still might be asked after observing a shipwreck or a document describing a ship might be: Is that a *nao* or a *galleon*? This is a classic question in archaeology and history (Loewen, 2007: III-14). Here is where the reliability of the linguistic terms become very relative because of the multiple interests and people that used them in the historical accounts, some of them carpenters, others shipwrights, scribes and investors; "*For example, the Terranova whaler La Trinidad of Getaria was recorded both as a nao and as a galleon on 8 October 1565. ADP, Fondo del consulado del mar y universidad de mercaderes, 95, fols. 268v, 270r, 270v, 271 r*" (Loewen, 2007: III-21)

Instead of talking about the galleons, as if they were made by exact measurements, it would be more realistic to talk about galleons, *naos* and other ships, as they were not consistent in shape or dimensions, neither static, as they changed during the early modern age. A typical example of this change would be a repair, or refitting of the hull, as well as replacement of masts, spars, sails, and other elements of a ship that needed to be maintained. Some described the galleon in terms of a ship without a large forecastle, slimmer lines (Kirsch, 1990: 6). Even some have described galleons as a trend in the development in naval architecture, without any specific standard, but different from carracks (Kirsch, 1990). Phillips also argues for a national adaptation of the concept of a galleon, quite rightly claiming that each of these would adapt to their needs, home ports, sailing itineraries, requirements for trade and defence (Phillips, 1994: 99). The same author claimed that there were some basic forms for a galleon to be recognised as such in a generic way. She described "striking similarities" across nations such as Venice, Portugal, Spain and England (Phillips, 1994: 100). Some of the characteristics of these "galleons", according to her, included a beak below the bowsprit, a low forecastle with a higher stern castle, two full decks for artillery, square sails and a lateen for the mizzen mast, despite rigging seemed not to follow rigid definitions (Phillips, 1994: 114), a heavily constructed hull to withstand cannon shots and a length to beam ratios ranging from 3.2:1 to 4:1 (Phillips, 1994: 114). However, the same author admits the confusion over the terminological distinctions, that seem to be common to the identification of a so-called galleon.

5.5 Where did the term galleon come from?

Historically, the story of galleons has been already studied, based on a linguistic argument, sourced from historical data. According to Casado Soto, the word galleon itself was already being used in the 13th century by many people in different ways such as *galeró* in Catalan, *galeâo* in Portuguese, or *galleoni* in Italian (Casado Soto, 2003: 38). According to Barkham and Casado Soto ships with a low draft and oars were also named as galleons, similar to pinnaces for example, during the late 15th and early 16th century (Casado Soto, 2003: 39; Barkham, 1998: 202). In the Basque area, a *galleon* in the early 16th century was a small oared vessel similar to a *chalupa* or *pinaza* (Barkham, 1998: 202). But also, at the same time a vessel between 40 and 180 Bizcayan tons was called a galleon, according to a report from 1534, listing ships from the Guipuzcoan coast (Barkham, 1998: 201). In the same report seven ships, between 100 and 900 tons, were named as galleons. According to José Luis Casado Soto, the larger vessels named galleons, of 900, 630 and 450 tons, were used for the eastern navigations into the Mediterranean, whereas the smaller ones were used for the Northern trade with Flanders and the fisheries in Ireland and African coasts (Casado Soto, 2003: 39). All were called galleons, although there were significant differences in the tonnage, from five of those with an average of 143 tons, to up to 900 tons.

In fact, none of these words have a clear meaning and what, in one place was called galleon, in others referred to a different shape of ship. For example, in the 15th century in the Bizcayan harbours there were many rowing boats of a small size that were called galleons however, according to José Luis Casado Soto, the same name was used in Venice but to name bigger military ships (Casado Soto, 2003: 38).

Michael Barkham shows the ambivalence of the word *nao* or galleon when he refers to the ship as *nao/galleon* (Barkham, 1998). Even when describing an illustration and trying to define the term to name the boat, the same author uses the word galleon, *chalupa* and *pinaza*, as it is not clear whether the image corresponds to one or other of these historical terms (Barkham, 1998: 203). But more clearly, there is no consistency at all between the use of the historical terms and the actual shape or form of the vessels, which vary so much from time to time, and the use of the same words in various contexts does not reflect those changes.

Just to further illustrate this, the use of galleons in an example from 1533 was used for the whale hunt (Barkham, 1998: 203). Even the French neighbours used the term *gallions* to name their whaling boats used in their voyages to Galicia, in 1545 (Barkham, 1998: 204). Michael Barkham tries to discern what could be the feature to distinguish a *galeón* from a chalupa, something perhaps to do with the carvel or clinker planking of the vessel. However, he does not reach a clear conclusion on the terminological distinction, based on differences in shapes. To this date, there is no conclusive answer to this matter. No example of a ship is consistent with its contemporaries, although they may have a degree of coherence, but also reveal a variety of designs and shapes. These have been mistakenly linked by terms thought to be related to shapes and features that were consistent.

Even when Casado Soto is talking about coherent features to distinguish *naos* from merchant galleons from the period 1545-1551, he finds that he is basing this distinction just from the different words used in an account referring to different ships (Casado Soto, 2003: 40-41). However, he goes further and suggests a difference in the cargo capacity of *naos* and galleons, stating that merchant galleons could carry 40% less wool compared to the *naos*. Another aspect was the tonnage, that was higher for the ships from Cantabria than the ones from Vizcaya, particularly Bilbao, that had to deal with the sand bar at the entrance of the harbour. But after the first sample of ships from the period 1545-1551, Casado Soto finds a contradiction with another sample of ships from Seville from 1552, showing evidence of a different tonnage ranging from 250 tons to 400 tons, with an average of 300 tons (Casado Soto, 2003: 41). The author argues that the larger size of ships was because they were travelling to the Mediterranean routes. Another account from 1553, reveals evidence from 46 merchant galleons, from between *Fuenterrabía* and *Santander* with an average tonnage of 146 tons (Casado Soto, 2003: 41-42). However, when the actual tonnage of some of the ships is clarified, it is not clear whether there is any typology as there were new merchant galleons of 100 and 400 tons and older ones of 300 and 150. When the average size of vessels is shown there is a coherent abstraction of a feature, but when they are observed individually, it is not known.

Casado Soto mentions some more examples, this time the galleons built by *el Viejo* or Alvaro de Bazán the Elder. Built between 1540 and 1550, there were some new ships built in the Northern Iberian shipyards, named "*galeones y galeazas de la nueva invención*" or "The newly invented galleons and galeazas (A type of galley)". In 1540 *Alvaro de Bazán* built two *galeazas* of 800 tons and 1200 tons, as well as two galleons together measuring 1300 tons. Apparently, these ships had a low draft as well as oars. The *galeazas* carried two decks of oars, whereas galleons had only one that would be moved upwards or downwards depending on the cargo loaded.

Fernando Oliveira seems to be one observer that makes some sense, when he wrote around 1560-1580 "*The names of species, or manners of ships and boats, of one type or another, are almost incomprehensible; as much because there are so many of them, as because there have been many changes over time, and from place to place. The same species of ship or boat will have one name in Spain, another in France, and another in Italy. In Spain they call naos what in Italy are called carracks, and in Germany hulks*" from *Libro da Fabrica das naus* c. 1580. (Phillips, 1986: 39). According to Castro, on the same quote from Padre Oliveira: "*Once again turning to the accounts of Oliveira, it is not evident in his writings that he found these small and medium-sized merchant craft fundamentally different. In fact, he appears to have been more inclined to create a Rosetta Stone, as it were, of ship terminology. In his 1580 writings, he states that the ships that the Spanish and Portuguese called naos, the Italian called carracas, and the German called urcas* ***were equivalent***" (Castro, 2008: 76).

5.6 Old and new vessels: The Red Bay and Santiago de Galicia

In an attempt to illustrate, not just linguistically but also through reconstructions, proportions and measurements, it would be relevant to see the terminological debate of an unclear general distinction between *naos* and galleons, with a specific example of a Bizcayan *nao*, the red bay vessel, and an ideal galleon part of the Spanish *Armada del Mar Oceano*, the *Santiago de Galicia*. The intention of this section is to increase the depth of analysis via different perspectives of ship design and dimensions that can give us some light by illustrating the process of the militarization of the Spanish merchant navy, from an original Bizcayan merchant tradition. The objective therefore is to distinguish, if not the concept of the merchant *nao*/war galleon, at least to describe the function that each forms and ratios allowed to happen, and problems that brought.

The *Santiago de Galicia* ship, is a clear example of a galleon. The *Santiago* was a Spanish galleon from Phillip II, built by Italian shipbuilders in *Castelamare di Stabia*, nearby Naples, and had a Ragusan (Croatian) captain, combined English, Basque and Ragusan shipbuilding designs, likely a mixture of these. It was made from oak from Napoli, Monte Gargano and Albania, it had masts from Istria and Calabria, fastening from Venice, Genova and Cataluña; mineral for the pitch from Velona and Albania, rigging from Napoli, sails from Savoy, moors from Bizkaia, Venice and Genova, artillery from Napoli and Genova, copper from Germany, tin from Norway and weaponry from Milan (Eguiluz et alii., 2020). This Italian ship was used by the Spanish monarchy and its dimensions and shape show both cross influences, as well as the wider sphere of influence of the Iberian shipbuilding, "mixed" or hybridized with Italian one.

The *Santiago de Galicia* could be said to be the ideal result that the Spanish Monarchy was seeking in shipbuilding terms. This ship was an enormous battle ship, with high castles both at the bow and stern, artillery decks and large dimensions and tonnage, something that as we mentioned before, it was one of the ideals for Cristobal de Barros. The *Santiago* was a shallower ship, despite its dimensions, compared to the merchant ships of the mid-16th century, in this case the Red Bay vessel. For that reason, this ship can be considered a fully-fledged transitioned vessel from what the monarchic group of interests were looking for by the 1590s standards of shipbuilding. By looking at the dimensions of the *Santiago de Galicia,* one can only realise the different size of the vessels, the first one being a giant in the sea, compared to the tiny Red Bay. The keel of the ship is also long, as well as the length of the ship itself (See figure 5.1 below of the main dimensions of the two ships). The Red Bay was barely 200-280 tons, whereas the Santiago de Galicia was 1090 tons.

The function of each ship perhaps could give us a hint of their purpose, considering the Red Bay was a whaling ship, and the Santiago was built to carry heavy artillery. The planking thickness was wider in the galleon, in order to sustain both the reverberation of the artillery, as well as the artillery fire of other ships. The frames were much more robust in the galleon as well, compared to the cross sections of the Red Bay. Both were designed to carry heavy loads, either cargo or artillery but the Red Bay was more ideal for the merchant guild, as the smaller cargo capacity of the vessel facilitated the flow of trade and movement of sailors across harbours, as well as it caused less damage in case the ship was lost. Larger ships supposed a bigger risk for both the investors and insurers (Enriquez and Sesmero, 2000). The Red Bay had a lower buoyancy centre, whereas the Santiago de Galicia had it higher, considering their depth to beam ratio; 0.85 (RB) as against 0.66. (SDG) This meant that during storms, the nao was better suited for the side waves, whereas the Santiago de Galicia would move more sideways, having a shallower draft. The galleon was a longer ship, allowing its length to cross the waves forward during storms, whereas the *nao* would pitch with its prow, according to Cano's descriptions (Cano, 1611).

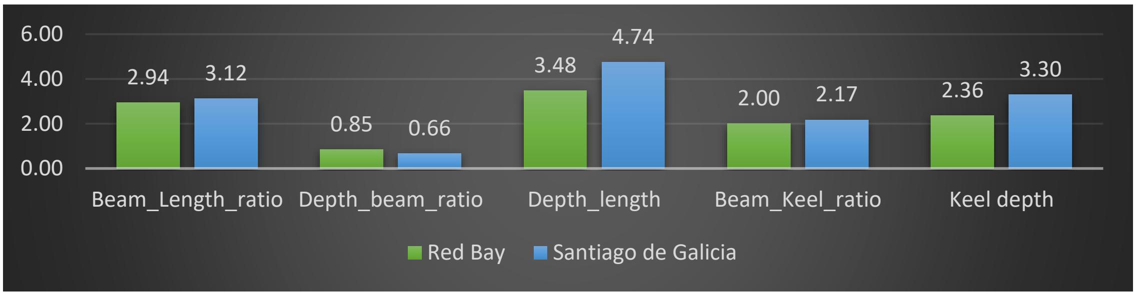

Figure 5.1Comparison of different ratios between the Red Bay and Santiago de Galicia

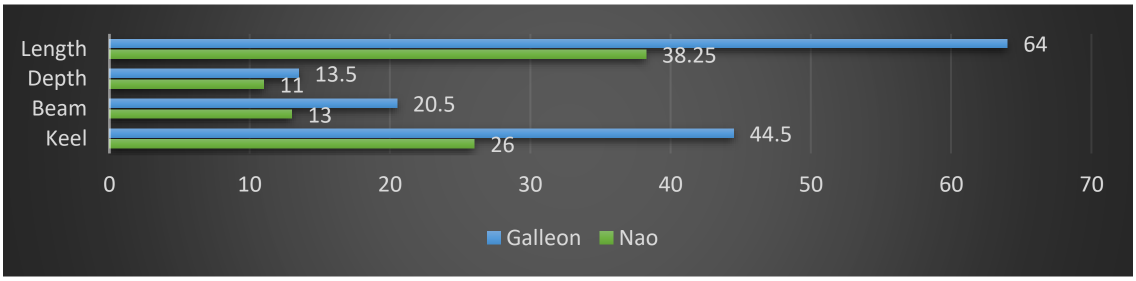

Figure 5.2 Is that a galleon or a nao? Comparison between main dimensions of the Red Bay (Considered a Nao) and the Santiago de Galicia (Considered a Galleon).

Figure 5.3 Reconstruction of the Santiago de Galicia galleon, (Drawing by the author at the background) as against the reconstruction of the complete hull of the 24M vessel (In blue), considered a nao, made by Parks Canada. Both reconstructions are made at the same scale and following their proportions. This was one of the possibilities the upperworks of the 24M could have been built like (Grenier et alii, 2007: III-220).

Figure 5.4 The drawing of the galleon was based on a Mediterranean Carrack, According to Casado Soto (Casado Soto, 2003: 62). The Portuguese Galleon in the "Sala de las Batallas" from the battle of Azores, 1583 (Left), was based on a drawing from Peter Bruegel the elder made 40 years prior to the fresco (Right),based on a stylized carrack from the mediterranean. The fresco on the left was made by Italian painters around 1590, in the Monasterio de San Lorenzo del Escorial.

To finish with this section on types of ship, it would be clarifying to end with a brilliant quote, again, from *Padre Oliveira*, paraphrased here, who seemed to know very confidently that "*ships were ships, however you call them, made for carrying cargo or for war, and built* *to meet those purposes*" (Barros, 2018: 22). He also said, that the construction of ships, was more relevant than the names given to them (Barros, 2018: 22). This work could not agree more with those words from *Padre Oliveira*.

5.7 The influence of the monarchic interests: An endless search for the perfect Monarchic military-cargo vessel

The search for the Spanish vessel that would meet the needs for trade and war in a single design was underscored by a difficult interplay of tensions. This was a hybrid, and ended up more like a concept of an armed merchantmen. It seems that Spanish shipwrights were always in a struggle to combine two opposite activities in one vessel, therefore neither achieving a fully militarized vessel, nor a completely cargo carrying hull. In this search for the desired design, the Indias routes and Newfoundland fisheries became an academy for shipbuilders, sailors and shipwrights, in a constant move towards those imminent needs that Spain faced during the 16th and 17th centuries.

In this quest, there seems to be a shifting paradigm on the concept of the ideal vessel. The *nao* ship type was the perfect ship for the interests of the Bizcayan bourgeoisie by 1560, however, the imposition of the privileged "*Parientes Mayores*" that defended the king's Indias trade and military interests wanted a ship type that was not common in the Bizcayan tradition until that point; the Atlantic war ship. The clash of interests, as well as the shifting conventions of what constituted an ideal ship, reflected a rather divided Spanish shipbuilding, that mirrored a clash of interests and the coexistence of war and merchant ship designs, that gradually shifted towards military-cargo vessels, that we could call war *naos*, galleons sometimes or even also found as *navios* by the time of the *ordenanzas* 1618.

The following lines are an attempt to show the lack of consensus that existed even amongst those of the same social group, that had different understandings about what was more ideal. The lack of consistency and diversity of suggestions, shows how culturally speaking, the Bizcayan shipbuilding was not a homogeneous tradition, but included both the merchant ships and the war ships, as if they were the two poles of the same range of forms. In one end, we would have the rounder vessels, more suitable for trade, and on the other end, we would find the ideal fine lines of a galleon of the end of the 16th century. This chapter is also aiming to show the change of the convention of what a war ship was, and therefore the ship types, as they were conceived, were conceptually being changed and understood.

In other words, the idea of what the ideal ship for the Bizcayan tradition was, changed, and the old *naos* were being replaced by vessels that could serve the king's enterprise. This monarchic influence, will hybridize with the previous merchant tradition's ship types, resulting in a mixture of a war and merchant vessel, combining the features of galley's and *naos*.

5.7.1 Escalante's proposition

Many experts in shipbuilding expressed their concept of what an "ideal" ship was according to their interests, in order to serve the Spanish fleets. One of them was the very famous account of *Johan Escalante de Mendoza,* born around 1534, sibling of a noblemen's family in *Noriega* and *Concha de Colombres*, in the dioceses of *Oviedo*, nowadays Asturias. Since his youth he had navigated in *naos* linked to his uncle´s business in Seville, *Alvaro de Colombre* (Escalante, 1575: 9). In 1575 *Escalante de Mendoza* wrote a book based on his experience as a pilot and in a classical dialogue structure, described ideal shipbuilding features of a *nao* and which were the most skilled shipbuilding traditions in Europe. In his dialogue he argued the reasons behind a good sailing ship and how to properly build them according to his understanding.

In a beautiful quote, Escalante writes in his dialogue a summary of shipbuilding cultures at the time:

> "*Yo entiendo, señor que el tiempo y la necesidad de cada nacion les ha enseñado y va enseñando a cada uno aquello que a su propósito y uso conviene, y que esto mesmo es lo que cada uno de por sí tiene inventado, como la evidencia y experiencia lo va mostrando…*" (Escalante, 1575: 458)

> "*According to my understanding, sir, the time and necessity of each nation has taught them and goes on teaching them each of those things for their purpose and use of them that are convenient to them, and that same thing is what each one has invented as the evidence and experience shows…*" Translation by the author.

In other words, Escalante expressed that each tradition adapted their shipbuilding to their immediate needs and circumstances. Despite having written this book and talked on ship proportions Escalante de Mendoza mentioned that different views can be seen in this matter of ship proportions and he said that those aiming to make more profit would build larger *naos* made with a different shape and gauge (*Gálibo*) to sail with a heavier load and less costs, of course affecting the sailing capacities of the vessel. In 1575 Escalante described the ideal proportional ratio as 2:5:7 (Grenier et Alii, 2007: III-5). Whereas at the same time northern Bizcayan shipbuilders were following a closer ratio to the 1:2:3 proportion sequence. This is one of the points were the mixture of ship design from the south mixed with the northern tradition.

In this source, the ideal materials for the ship to be built were mentioned. From the moment the keel was laid, if it was to be a good keel it needed to be made of oak (Escalante, 1575: 451); he mentioned that the wood needed to be cut in the second quarter of a waning moon, when the leaves and fruits have fallen from the trees. Other tree species should be used, such as *Caxigo* oak for the planking, that could be found in Andalusia (*Quercus Canariensis*); knees and third futtocks needed to be made of holm oak (*Quercus ilex*) or *roble bravo* (*Quercus robur*); the rudder should be made of oaken beams, previously dried for at least a year; the upperworks needed to be made of pine from *Utrera*; Tar should be from Bizcay, made of whale oil; Caulking material should be made of hemp (Escalante, 1575: 452).

Escalante advised against using treenails if they were travelling westwards or southwards, *"…unlike they do in Flanders, France and England…"* he mentioned. Masts and yards should be made of Pine from Flanders, which we know were either Scandinavian or Baltic, but he mentioned especially the use of pine named by the Flemish "*Prusa*", which has been mentioned in other sources before as a common Iberian source for masts (Phillips, 1986: 80). Topsails should be as light as possible. The best rigging was made from hemp from Calatayud, made from tarred threads before being padded and twisted. Sails were the thinner the better, robust and compacted with the best canvas made of *Olonas* (A type of cord material made from bark fibre) from *Pontavid* and after these, the best ones were those from *Villa do Conde* in Portugal (Escalante, 1575: 453).

In the dialogue, when it came to the actual dimensions and ratio between the measurements of the ship, Escalante de Mendoza had an ideal proportional system described as it follows:

> "…*for each five keel codos* (Casado Soto,1988: 58-73) *there were 2.2 breadth codos*" Translation by the author (Escalante, 1575: 456).

Codos were the most commonly used measurement in the 16th century Spain, although not consistent throughout the Peninsula. One *codo* was the equivalent to 0.57cm nowadays according to José Luis Casado Soto (Casado Soto, 1988: 67). However, the actual equivalence slightly varied from one town to another. The ratio would be 0.44 in this case. If the ship was two *codos* wide in the runs, which were the frames at the end of the pre-designed central frames, it should be five *codo* of depth at that point. For each two keel codos, it should have two more on the rake. For each five keel codos, it should have seven of length (Ratio 1.4) (Escalante, 1575: 457).

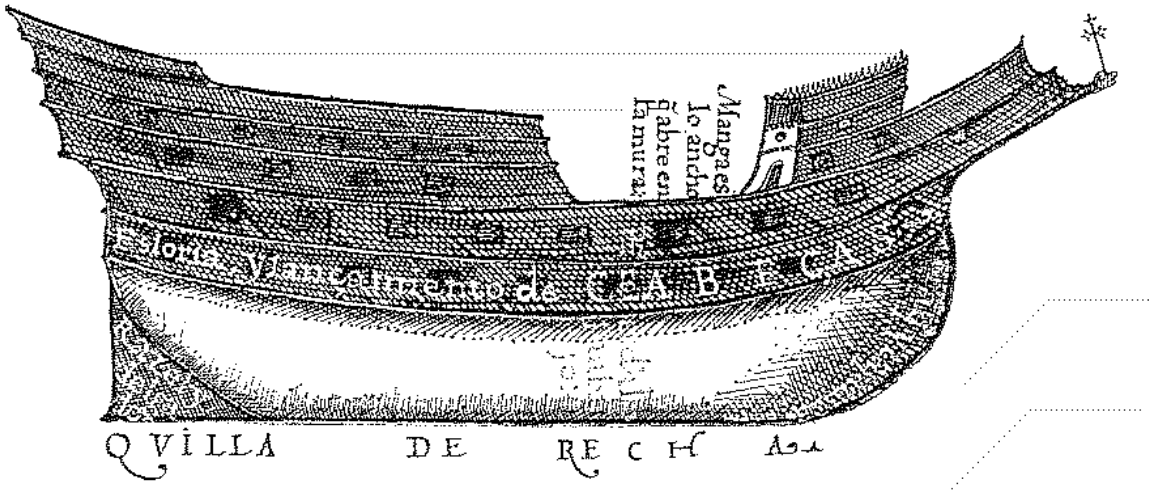

Figure 5.51575 Nao, (After Escalante de mendoza, 1575),

It is interesting to notice that by the year 1575 the keel-beam ratio was used as a reference point to achieve correct proportions in these vessels built by Pero Menendez de Avilés. By 1581, the use of the Keel-beam ratio as a reference seems to be coexisting with another one. A different proportional ratio is used, based on the relationship between the length of the ship and the depth and beam. In the Basque area, they were using the keel beam ratio as a reference proportional value to build their *naos* as shown in private contracts[32], were the length is not

[32] The 25 contracts to build *naos* were found by Michael Barkham and referenced in his 1984 article "The multi-purpose *nao*":
AHPG, Partido Azpeitia, 3299, f. 44, 27 September 1573.

even mentioned in some cases (Barkham, 1984: 105). However, not even this is consistent through documentary evidence, as the length is specified as well on many occasions.

Escalante said he had heard in his long years as a pilot, many discussions on which of the two different shipbuilding genres of vessels, some round and with lateen sails, and *Mareaje firme*, others with decks, were better to sail. Along these lines, he describes:

> "*…por lo qual las naos redondas y con velas redondas y Puente es la major invención de todas para lo tocante a la navegación y al resistir y librarse de la mar por la facilidad y aparejo que tienen para ser fuertes y que el agua no repare dentro; pero no son tan competentes para de armada, ni sirven ni pueden servir bien en las pesquerías*…" (Escalante, 1575: 459-460)

> *"… for that reason, round naos and with round sails and decked were the best invention of all to sail and resist the bad weather with ease and strong rigging, but also so that the water would not get inside, however they were not as competent for Armadas, neither for the fisheries…*" Translation from the author.

Different areas were naming the size of their vessels after the goods that they were trading with, in this way in the Levant, to measure the size of a *nao* they use wheat *salmas*; in Flanders and France they use barrels, wool sacks, salt units (Salt volume measure, in old Spanish; *cahíces*). He continues to say "*…In Spain we have used tonnage, which comes from measuring*

AHPG, Partido Azpeitia, 3227, f.15, 14 May 1590.
AHPG, Partido Azpeitia, 1899, f.. cxx, 25 April, 1568.
AHPG, Partido Azpeitia, 3321, f. 116, 13 March 1593.
AHPG, Partido Azpeitia, 3298, f. 498, 19 May 1566.
AHPG, Partido Azpeitia, 3324, f. 116, 17 May 1596.
AHPG, Partido Azpeitia, San Sebastián, 420, 6 April 1600.
ARChV, pleitos civiles, La Puerta, fen. 242-2.
AHPG, Partido Azpeitia, 3300. F. 15, 27 1573.
AHPG, Partido Azpeitia, San Sebastián, 2710, f. 58, 10 October 1583.
AHPG, Partido Azpeitia, 3312, f. 186, 25 July 1584.
AHPG, Partido Azpeitia, San Sebastián, 2711, f. 28, 18 February, 1591.
AGS, C. y J. de Hacienda, 90-312.
AHPG, Partido Azpeitia, 3318, f.43v. 6 March 1490.
AHPG, Partido Vergara, 2583, f. 45. 28 April 1574.
Archivo Municipal de Zumaya, libro 208.
AHPG, Partido Azpeitia, 3303, f. 119, 27 October, 1576.
AHPG, Partido Azpeitia, 3313, f. 114, 5 April, 1585.
AHPG, Partido Azpeitia, 3312, f. 111. 7 April 1574.
AGS, C. y J. de Hacienda, 90-312.
AHPG, Partido San Sebastián, 2709, 3 Junio 1601.
AHPG, Partido San Sebastián, 2710, 35, 5 May 1585.
AHPG, Partido San Sebastián, 1804, 27 Julio 1578.
AHPG, Partido San Sebastián, 1803, f. 46, 16 September, 1577.
ARChV, Pleitos Civiles, Zarandona y Balboa, fen., 167-852, f. 591.

and naming the ships from Bizcayan sailors, from certain barrels that they use to load and trade with". However, the Bizcayan tonnage was not the same as the southern tonnage, 12 Bizcayan tons were the equivalent of 10 Andalusian tons (Casado Soto, 1988: 70).

When talking about the dimensions of masts and spars, Escalante de Mendoza gives his view on this as well. According to his understanding, from the bilge to the weather deck, counting this distance, the main mast should be threefold that distance. One third of the mast would be inside the ship and the other two outside, from the mast step. The same proportion with all the rest of the masts, such as mizzen mast, bowsprit and foremast. The yards however, were differently designed and proportioned. The main yard was double the length of the beam, the foreyard was a third less than the main yard, the sprit yard should be half of the foreyard or a third of the main yard; the mizzen yard should be as long as the sprit yard and no more than that. The mast tops should be a third of the size of the masts they are in and the yards of the mast tops should be a third in length of their larger yards (Escalante, 1575: 463).

5.7.2 Menendez de Avilés's Galleons

The late decades of the 16th century coincide with an important debate in the Spanish Crown related to the new way of organising the armadas and Indies fleets. In this context, the Spanish crown encouraged experts in shipbuilding so as to secure the interests of the Monarchy and the Indias routes, based in Seville. Thus, the project of *Pero Menéndez de Avilés* emerged along with what he proposed as the so called "Galley-like galleons".

Menéndez de *Avilés* (1519-1574) was a military man and seaman in Spain, but also governor of the Indias after reconquering Florida in 1565 and founding the city of Saint Austin. He became "*adelantado*" in Florida, a high rank in the administration of the territory, and he was also Governor in Cuba. In 1570 the Royal Armada of the Indias trade or *Armada Real de la Guarda de la Carrera de Indias* was formed, led by Menéndez de *Avilés*, aiming to defend the fleets coming from Seville and returning from the Indias. However, the design of the Indias fleet model has been attributed to *Menéndez de Avilés* (Caballos, 2006). The concept of "Galley-like galleons" was an experiment, of a galleon, which was a galley adapted to the Atlantic.

By 1575, *Rodrigo Vargas* wrote a memorandum regarding the ships built by *Pero Menendez,* designed for the guard of the Indias. In this memorandum, he specified the benefits and faults in this ships that were galleons made in a similar way to galleys[33]. The measurements of these vessels were clearly stated in the document. These vessels were more or less 200 tons. Keel 35 *codos*, breadth 12.5 *codos*, and depth 4 *codos*. With only two decks, these vessels were good on the sail. Built in the shipyards in Biscay, they were called the "*the newly invented galley-like galleons*", as they were an experiment to combine oars and sails at the same time. However, the experiment failed as the first deck where the oars were placed were too close to the draft line, and therefore the gun ports could not be used. Also, these vessels were too low to fight corsairs and were like rowing boats close to *naos*, therefore easy to board by corsairs.

One of the conclusions of the report from *Rodrigo Vargas,* was that because of the small size of the vessels they could be easily dominated, the report specifies that the minimum size of the vessels should be of 300 tons, he says:

> "… *Y asi convenia que los Navios que se hubiesen de fabricar para andar en corso y guardia de la Indias, y para que pudiesen ofender y server en otros efectos fuesen de porte de trescientas toneladas, largos de quilla, que tengan buena manga, y poco puntal, y buenas entradas a proa, y buenos raseles de popa, y no de menos porte, y la capitana y Almiranta de cien toneladas mas, porque estos tales saldrán grandes Navios de Vela y de gobierno del timón, fabricándolos con mucha fortificación serán capaces asi para alojar todas las provisiones y municiones necesarias para toda su gente de mar y guerra que llevaren, y asimismo sufrir el artillería necesaria, conforme a su porte*…"

> *"… And so it would be convenient that the vessels that would have to be built to guard the Indias and as corsairs, and so they could offend and serve, they should be of 300 tons, long in keel, a good breadth and small depth, good entries in the bow and good runs in the stern, and the captain and Admiral flagships should be of one hundred tons more, these vessels will be great at sail and to govern their wheel, built with lots of fortifications, they will be able to carry all provisions and necessary ammunitions, for all the sailors and fighting men they would carry, equally to suffer the necessary artillery, in accordance to their size…"*[34] Translation by the author.

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[33] AMN, Sección Navarrete, Manuscrito 31, doc 38: 129r-131v: "*Discurso mui precioso de Rodrigo de Vargas, sobre los Galeones agalerados de la nueva invención que fabricó el Adelantado Pero Menendez para la Guardia de las Indias, sus dimensiones de quilla, manga y las faltas que tuvieron para el intento que se hicieron, proponiendo otra nueva manera para la construcción de los que se hubiesen de hacer en lo sucesivo para andar en corso y guardia de las Indias y otros efectos que se ofreciesen*"

[34] AMN, Sección Navarrete, Manuscrito 31, doc 38: 130r: "*Discurso mui precioso de Rodrigo de Vargas, sobre los Galeones agalerados de la nueva invención…"*

Although they insisted in the construction of vessels of 300 tons and bigger ones in 1575, in fact, since the Royal Law of 1563, the Monarchy was already supporting the construction of *naos* bigger than 300 tons (Alberdi, 2012: 436). Indeed, it is not surprising when one can look at a chronological overview of the minimum and Maximum tonnage that was required to join the Indias route according to the royal ordinances (Fernandez Gonzalez, 2000: 43):

-9th August 1544: Minimum 100 tons.
-13th February 1552: Minimum 100 tons.
-5th May 1557: Maximum 400 tons.
-4th October 1562 and 1567: 120 tons minimum.
-11th March 1587: Minimum 300tons.
-19th March 1609: Minimum 200 tons.
-1618: Maximum 624.
-1620: Maximum 400.
-1628: Maximum 500.

However, local authorities and members of the elite in the Bizcayan area complained about the effects that many of the shipbuilding policies were having on the shipbuilding sector and asked for a reduction in the tonnage of the ships that were entitled to be helped through the economic aid of the Monarchy, from 300 tons down to 200 tons (Alberdi, 2012: 439). One of the justifications for this law was the increasing presence of pirates and corsairs, from *La Rochelle*, England and *Fregelingas*[35]. The routes with Northern Europe were infested by corsairs and therefore, in order to protect the vessels and the cargo, larger *naos* were more capable of defending themselves in a fight against other vessels.

5.7.3 Cristobal de Barros's report, Santander, March 1581

"*Primer informe de Cristóbal de Barros y la Junta de Santander sobre los galeones que mandaba construir Felipe II*"[36]

[35] AMN, Sección Navarrete, Manuscrito 31, doc 38: 130v: "*Discurso mui precioso de Rodrigo de Vargas, sobre los Galeones agalerados de la nueva invención…"*

[36] AGS, GYM, leg. 111. nº 166: "*Santander, 19-21 de marzo de 1581: Primer informe de Cristóbal de Barros y la Junta de Santander sobre los galeones que mandaba construir Felipe II*. In Casado, 1988: 307-314"

“First report from Cristóbal de Barros and the Junta de Santander, regarding the galleons that the King ordered to build” Translation by the author.

This document written by Barros, included a memorandum regarding the measurements of the proposed galleons by Pero Menéndez. Also, this document mentioned the errors in the construction of these galleons, particularly the fact that their gun ports were too low to open while navigating, but also that they should be made longer in the keel and length as they were too short.

It was in the town of Santander, North of Spain, nowadays the province of Cantabria but in those times Castile, that in 1581, the dimensions of the galleons of Pero Menendez de Avilés were shown to the King in a document[37]. These documents were discussed by the Junta de Santander, an entity responsible for the northern shipyards and the design of the galleons for the King.

In 1581, galleons that were previously designed by Pero Menendez were criticized for many faults, and therefore their designs were changed. Twelve galleons were proposed as an initial fleet, and changes in the tonnage of the ships to increase their size were suggested.

The keel of these galleons was 30 *codos*, the beam 12 or less than 13 *codos*, length 44 *codos*, depth 7.5 *codos*. The orlop deck was 4 *codos* high, and at 3 *codos* higher the weather deck was built. The upperworks were three codos from the weather deck to the top of the bow castle and stern castle (Casado Soto, 1988: 307). These vessels had the following ratios and tonnage:

B-K R	B-L R	D-L R	D-B R	Tons
2.31	3.38	5.87	0.58	416

Table 5.1 Pero Menendez’s galleons. The ratios according to the Beam Keel, Depth, Length and tonnage are shown.

The keel is still considered when assessing the overall proportions of these vessels. It was not until 1581 that the keel length was specified in a list from the records collected according to Casado Soto’s research (Casado Soto, 1988: 207-221). The tonnage of these ships is

[37] AGS, GYM, leg. 111. nº 166, “*Santander, 19-21 de marzo de 1581: Primer informe de Cristóbal*… In Casado, 1988: 300”

considerably large. The large size of vessels was a problematic element for merchant activities but in fact provided offensive and defensive benefits for war. Therefore, the designs of these vessels were clearly to serve the Spanish King and Armada, as well as to navigate to the Indias routes and thus being able to defend the cargo was an important matter. It was considered that some of the models of the proposed galleons were inappropriate or invalid for the activities they had to perform.

This initial design of the vessels was too weak for the use of artillery, as they did not have knees in the beams, neither ledges, that would reinforce the structure of the war *naos* or galleons as they were called but also because the planks were too thin and green (Casado Soto, 1988: 308). Their first deck was too low to store supplies for the voyages to the Indias. Moreover, in case of sudden gunshot that might open a waterway in the hull it would be difficult to stop the water coming in as there was no space to move the goods. The ships had a very low draft and the artillery could not be used while navigating. These galleons, which were 230-240 tons, were too small for the Indias routes, as they might encounter and have to capture bigger ships (Casado Soto, 1988: 310).

A new design was planned and, after this experimental shipbuilding, the galleons of Pero Menendez were redesigned. Their measurements were as follows; 38 to 37 *codos* on the keel, 5.75 *codos* up to the orlop deck, and another 3.75 *codos* up to the weather deck. The height of the first deck had to be 9 *codos* and a 1/12, or 9 long *codos*. 3.25 *codos* more up to the upperworks and 12 *codos* from the bottom of the bilge.

Planks should be dried ones, and some greenwood could be used for specific parts. The planks should be thick and with good fasteners, but the sails should be bigger as well, as the size of the vessels would be bigger, the masts and yards needed to be longer and brought from pine from Flanders or Lisbon. These galleons will be of 345 tons if used for trading purposes but if they were for war they should be 416 (Casado Soto, 1988: 311).

A model for bigger galleons was proposed[38]. The Sevillian measurements were converted to the northern measurement standards and therefore the *Capitana y Almiranta* flagships of 550

[38] AMN, Sección Navarrete, t.22, 322v pp: De Santander 21 de Marzo de 1581.

tons were given the following dimensions, with suggestions for changes in the dimensions "*it should be 56 codos to keep the proportion with the keel and beam*":

Beam	Keel	Length	Rake	Depth
16	*35*	*53.5*	*9*	*7.5*

B-K R	B-L R	D-L R	D-B R
2.19	*3.33(Length 53.30)*	*4.85 (Length 53.30)*	*0.69*
2.19	*3.50(Length 56)*	*5.09 (Length 56)*	*0.69*

Table 5.2 and Table 5.3 Measurements (Table at the top) and ratios (Table at the bottom) of Pero de Menendez's proposal

The upper structures were 11 *codos* high but the first row of beams where at the height of 4 *codos*, without ceiling, and the weather deck was at the height of 7.5 *codos* (3.5 *codos* from the first beam row). There should be room enough for 5 *pipas* height to fit five of these Sevillian ceramic containers.

The smaller galleons[39] were of 420 tons. They had 34 *codos* on the keel, measured with the northern *codo*, and not the one from Seville that was two *codos* smaller. The beam was 15 *codos* wide, and the depth was 9.5 *codos*, at which height the ships were 52 *codos* long. Deck planking at the lowest deck was at 6 *codos* of height. From here there were a further 3.5 *codos* to the weather deck, where 4 *botas* could be stored (A type of storage unit).

[39] AMN, Sección Navarrete, t.22, 289-301pp…

5.7.4 Alvaro de Bazan's Galizabras

B-K R	B-L R	D-L R	D-B R
4.00	*4.88*	*12.32*	*0.40*

Table 5.4 Ratios of Alvaro de Bazan's Galizabras. Beam, Keel, Length and Depth are shown. (B, K, L, D).

In 1584 when two *Galizabras*, were being built in Lisbon, a cross between a galley and a *zabra*. Although these ships were never finished, their measurements were specified in a *relación* or report[40]. The constructive model is explained in the document titled: "*Relación de las medidas y portes que tenían las dos Galizabras que Don Alonso de Bazán había empezado a hacer en Lisboa con expresión de su costo*"[41].

The keel was 48 *codos.* The length was 58.5 *codos*. The beam was 12 *codos*. The depth was 4.75 *codos*. They had 20 rows for each side. They carried 20 pieces of artillery and each one of them weighed 200 tons. However, Don Alonso de Bazán, thought they were too big for an oared boat and thought they needed to be upgraded to *galeoncetes* or small galleons and built them up to a size of 400 tons.

Although these boats are clearly inspired by Mediterranean galleys, in an attempt to introduce them into the Atlantic they were combined with the *zabra* a small rigged and oared boat.

[41]AMN, Sección Navarrete, t. 22, 389r-389v: "*Relación de las medidas y portes que tenían las dos Galizabras que Don Alonso de Bazán había empezado a hacer en Lisboa con expresión de su costo*"

5.7.5 Palacio's 400 tons Nao

In 1587 García de Palacios wrote his "Instrucción náutica". Garcia de Palacio's account of shipbuilding is one of the most detailed ones from 16th century sources. In the treaty *Instrucción nautica*, Palacio describes how to build a *nao* of 400 tons. In this extensively detailed text, the ideal measurements according to García de Palacios vessel have a keel 34 *codos* long, beam 16 *codos,* and depth of 11.5 *codos* on the weather deck that goes up to 14.5 on the bowcastle. The first deck was at the height of 4.5, which was the height of 3 *pipas* or recipients for storage, sometimes made of ceramic and other times made of wood, used to carry liquid goods, such as wine or olive oil. The second deck was 3 *codos* higher than the first beams from the bottom, at 7 *codos*, and lastly the weather deck was 3 *codos* higher. If the ship was to have a mesh, it would be at the height of 14.5 *codos*.

B-K R	*B-L R*	*D-L R*	*D-B R*
2.13	*3.21*	*4.46*	*0.72*

Table 5.5 Palacio's 400 ton's nao. (Bottom right) Main proportions, Beam, Keel, Length, Depth ratios.

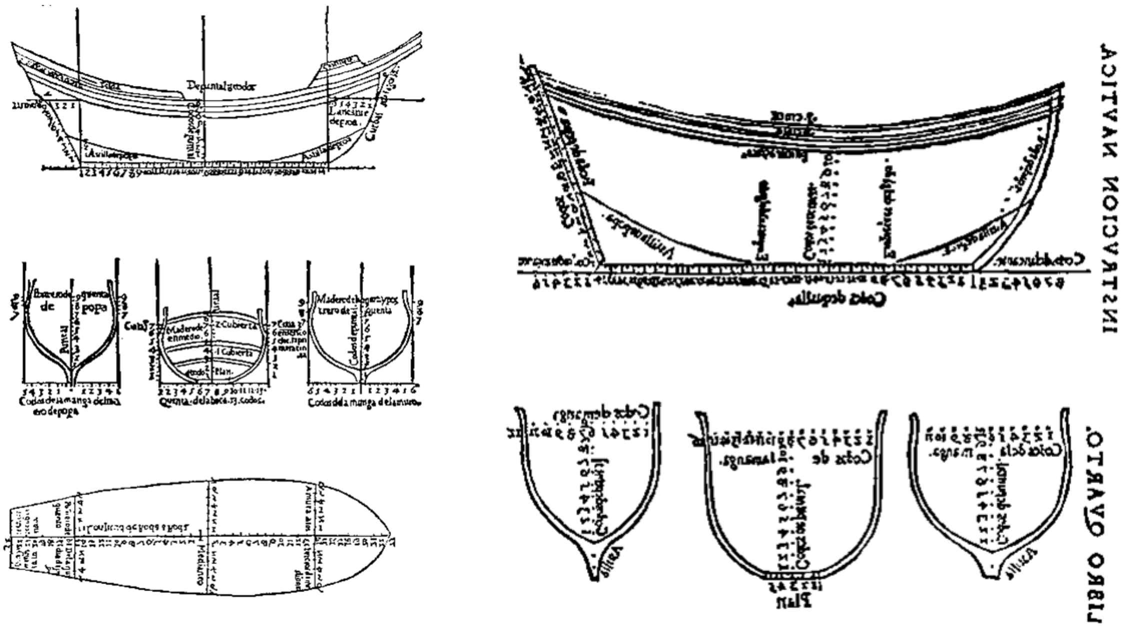

Figure 5.6: (Left to right), 1) 150tons Galeoncete, García de Palacio (1587), 2) 400tons Nao, García de Palacio (1587)

According to García de Palacio, the right proportions of a ship were 3/2/1 three times for the keel, two for the beam and one for the depth. These ratios were not strictly followed by the ship, but gave some guidance when building the ship.

5.8 The Bizcayan Tradition: A historical perspective

To simplify and describe a large sample of ships is an abstraction that encaptures some regional elements, by loosing some idividual details. By synthesising the measurements from ships both those called *naos* and galleons, some general regional trends of the Bizcayan shipbuilding can be made. Compared to some contemporary vessels from other regions, Bizcayan ships had overall a deeper hold, than for example the Portuguese vessels that navigated in the Spanish Armada (See Portuguese Galleons table, 7.3 in appendix). On average, Portuguese ships, seemed to have been designed by a ratio. It is remarkable that all of the ships from this Portuguese sample are exactly the same ratio in the great Armada's examples. This is a proof that Portuguese shipbuilders were perhaps already defining and controlling the shape of the ship to precise levels, that were perhaps not as precise in other places, for example Bizcayan merchant ships (See Bizcayan *Naos* table, 7.1 in the appendix).

Figure 5.7: Portuguese galleon, (Left, Centre). Portuguese Armada at Socotra (1541). Depicted by João de Castro. Expedition to Suez, Egypt.

In the two tables below the datasets have been synthesised in order to take the maximum and minimum measurements as well as ratios found in the Bizcayan shipbuilding tradition. Therefore, in this table, the tradition is represented in a range of measurements, as there were many different sizes of vessels. However, proportionally speaking, despite the different dimensions of ships, the ratios of these were quite consistent (See Bizcayan *naos* table (1545-1601, in the appendix, proportional ratios of beam length and depth beam). Although the keel beam ratio was an very important one, in many cases the keel's length was not registered, as in arqueamientos sometimes the keel was not needed to calculate the volume of the ship. However, the keel's potential use for future research in maritime archaeology can be an interesting feature of the time.

Together with other elements, the use of the keel to calculate the beam and length of the ship, was a legitimate way of calculating the proportions of a ship by following the rule 1:2:3 as mentioned before (Cano, 1611: 14-15; Barkham, 1984: 113). For this reason, but mainly considering that archaeologically ships normally do not preserve the beam, not to mention the whole length, except extraordinary Baltic preservation. For the majority of the Bizcayan ships, found in the Caribbean and other locations, the keel is sometimes fully preserved, for example in the case of the Red Bay vessel (Grenier et alii, 2007). By using historical documents, that recorded the keel's complete length, maritime archaeologists that work in sites with a fully preserved keel could potentially "date" their ship, or corroborate the context of the ship, by comparing the length of their keel, with historically recorded ones. Keels, in the case of the Bizcayan tradition, do change, and by the end of the 16^{th} century are longer than those early 16^{th} century smaller vessels. In other words, longer keels could potentially mean, in case of being an Iberian/Bizcayan ship, a more modern vessel from the early modern age. Whereas shorter keels, remind us of the first half of the 16^{th} century and before, for example the Red Bay vessel has a 26 *codos* keel, much shorter than Bizcayan galleons, with keels ranging 30 to 35 *codos* of length that went to the Spanish Armada (See Bizcayan Galleons table).

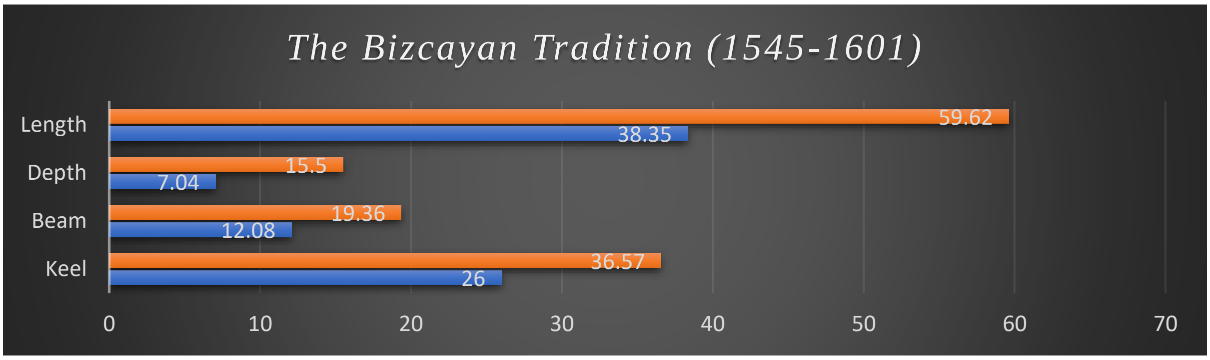

Figure 5.8 The Bizcayan Tradition (1545-1601). Length, depth, beam, keel (Max and min.).

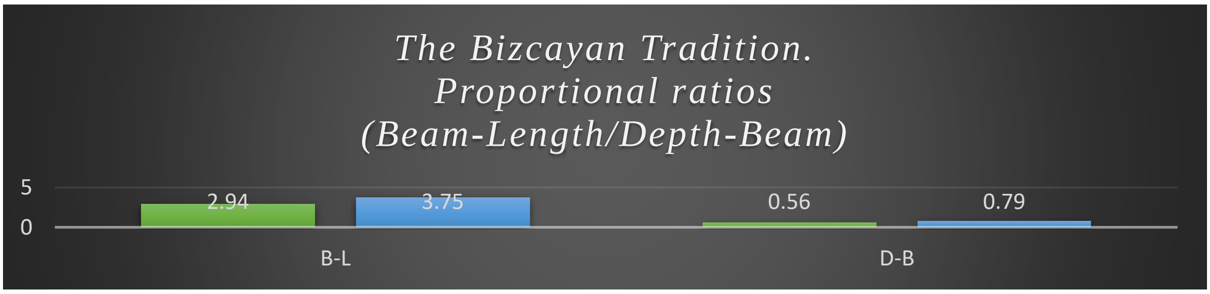

Figure 5.9 The Bizcayan Tradition. Proportional ratios. Left to right, Beam Length and Depth Beam.

Bizcayan ships do seem to have similarities with those ships from nearby traditions. For example, it would be difficult to distinguish a Bizcayan ship from a Mediterranean one (See Mediterranean Galleons and *Naos* 7.6 in the appendix). Their ratios were considerably similar, both for the beam to length ratio, as well as for the depth to beam one (Mediterranean Galleons and *Naos* 7.6, again). German *Urcas* from the Spanish armada, despite been considerably further than the Mediterranean, seem to have closer ratios than those of the Flemish tradition (See tables in the appendix, German *Urcas* 7.5 and Flemish *Urcas*, 7.4). A Flemish *urca* however had the deepest depth to beam ratio, of 0.81.

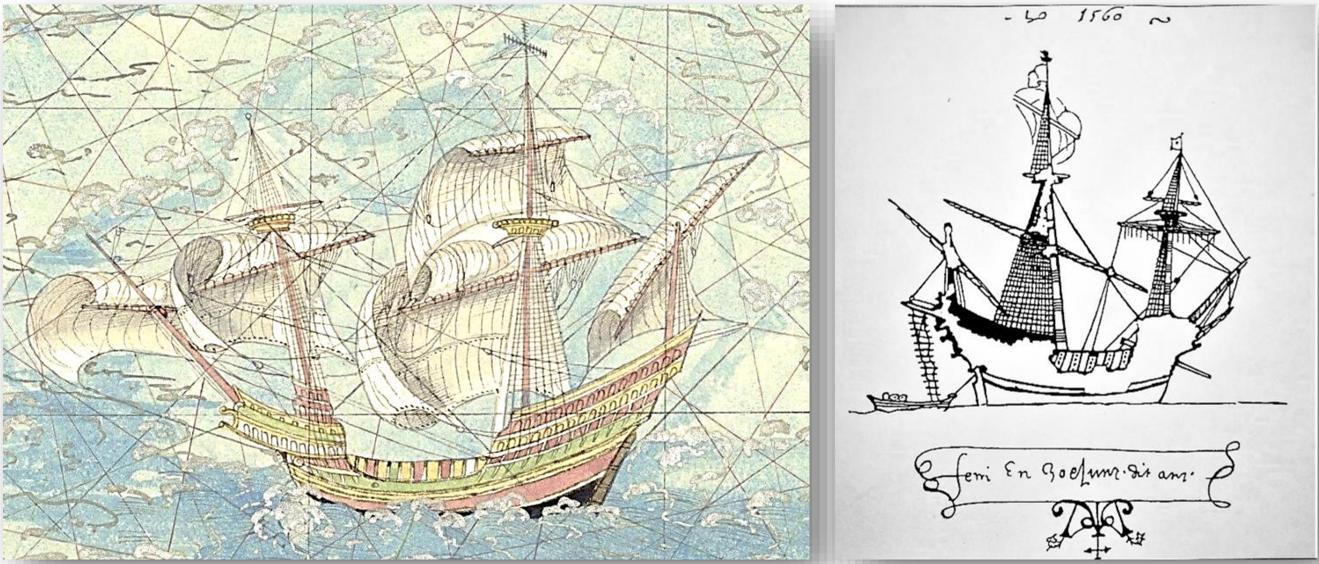

Figure 5.10 (Left to right) 1) Might be a galleon (top left) (Peter Kirsch, 1990: 6) Guillaume Le Testu (1555), 2) 1560 Cantabric Nao in Valencia (Topt right) (Casado Soto, 2003: 40)

Figure 5.11 The Aganduru nao, from Orio (Above) (circa 1560) (Photo credit: Joseba Burdain Santos)

5.9 Conclusions

Bizcayan merchant shipbuilding was influenced by the monarchic interests of both supported by local agents of the Bizcayan elite, known as "*Parientes Mayores*". This influence, could be considered an influence from the "South" that hybridized with the Bizcayan tradition.

The interests of sustaining a fleet to supply and maintain the communication of the Spanish Empire with its colonies and the essential trade with the Indias and Seville became an axis for the Hispanic monarchy of Phillip the II, that left aside the interests of those northern merchants interested in other trading and fishing routes. The attempts to modify the merchant tradition's designs towards longer and shallower vessels were the means by which the Monarchy was trying to impose upon a very deeply rooted tradition of cargo vessels. The Sevillian connection however, did gain influence over the final decades of the 16th century. Due to the limited construction of warships, the use of merchant ships was still essential in order to complete the fleets to protect the Spanish interests. The use of confiscated ships, not only from within Spain, but from other regions as well, was still necessary to compensate the incapacity of a young nation to organise sophisticated networks of supplies. The capacity to influence over the construction of ships and impose the interests of a central elite over the local ones was still a struggle for the Spanish monarchy by the late 16th century.

The range of sizes for the Bizcayan tradition are proof that the early modern age was still, culturally speaking, a "heterogeneous" period, were a centralized culture, at least in the Spanish Monarchy, had not succeeded in dominating the shipbuilding industry to fully impose its interests. The strength of the merchant guild was keenly felt during this period. A clear evidence of this, is that the majority of the vessels used for war by the King, were of a merchant origin. The Spanish Monarchy still had too much dependence on local elites and contractors to be able to get a sufficient supply of ships.

The differences between contemporary shipbuilding traditions were not exactly "radical". In a way, they were all mirroring each other. Although some ratios can be useful when distinguishing certain ships, it is also important to consider that the mixed influences and exchange of inspiration in this period may have limited the differences. In other words, through copying or observation, differences between shipbuilding traditions could be assimilated or “reduced”. These interactions are difficult to be measured, but there is a level of relationship, that allows contacts to be able to contribute both inspiration and exchange of technology. For this reason, it would be relevant when studying a regional tradition to also look at neighbouring traditions in order to examine these crossed influences that might be shared between traditions. In other words, that the spatial elements of what we consider to be a regional tradition could be related to other areas with similarities in terms of shipbuilding shapes and dimensions.

6 The Iberian Bizcayan Transition: The Influence of Northern and Southern Galleons 1588-1650

6.1 Introduction

In this chapter the influences received in the Bizcayan tradition during the 1588-1650 period are analysed. In this case, the change of power and centres of technological influences during the 17th century became obvious. The economic power of Holland, England and the northern seas became the centres of a dynamic Atlantic economy, together with France in a minor way. In this same period, the Iberian powers declined in their influence as pioneers in trans-oceanic trade (Glete, 2000: 131). This chapter will have a look at the change of the centres of influence and the effect on ship design over the Bizcayan tradition of English, Dutch and designs from Dunkirk in the north, as well as Portugal from the south.

This chapter discusses the transition of predominantly from a tradition of the proportions suitable for merchant vessels, to a shift in ship design and proportions to suit a rather armed-merchantmen, or cargo and war vessel. I will examine the problems caused by the imposition of the interests of the Spanish monarchic interests, supported by the "*Parientes mayores*" or local noblemen, which supported the monarchic Armadas and Indias trading routes. The effects of the impositions clashed with those agents who were more interested in a mercantile shipbuilding.

This militarization process was channelled through the acquisition and establishment of a permanent national fleet and the imposition of several shipbuilding laws or *Ordenanzas,* that did not succeed as expected. Many Atlantic monarchies established their influential structures of power and service during the end of the 16th and early 17th century. Therefore, what we see in the Bizcayan area, was eventually going to happen in other Monarchies, such as, France. Despite not being a Monarchy, the development of the Dutch Republic as a powerful maritime nation was of a crucial relevance to the political crisis of Spain, and the end of the Iberian maritime technology as an influential centre. The Dutch, it will be argued, replaced Spain as an influential centre, together with other powers, such as the English. The English and the Dutch took control over the trade between northern and southern Europe, but also damaged the Iberian power in Asia, by taking control of it. The rise of Northern European powers, and the decline of the Southern ones and the Levant, gradually were transforming Europe (Glete, 2000: 187). All of this affected the Bizcayan shipbuilding transition, that changed in its conventions towards shallower and longer hulls, compared to the previous ship designs of the 16th century.

6.2 The Spanish efforts to build a permanent Armada

The word navy or *armada* might not be representative of the nature of a 15th century military fleet, as there was no permanent Armada in the Iberian kingdoms (Calderón, 2006). During the medieval times the tradition of the Spanish Monarchy was to temporarily hire and dismantle fleets for individual campaigns, confiscated mainly from private merchant ships (Casado Soto, 1988: 28-53). However, some ships were purposely built for war and those were of major interest for the king. This tendency continued during the 16th century with the Habsburg Monarchies (Casado Soto, 1988: 38-52).

By the end of the 16th century, the Spanish Monarchy became aware that following the English practice, the best way of having a great armada in times of war was to have a good armada in peace times (Parker, 1996: 102). The origins of a need for a permanent military entity in Spain were affected by the increasing demands of the interests of the Spanish Monarchy in the Atlantic. Particularly influenced by the disaster of the 1588 Spanish Armada, the Spanish Monarchy established a permanent Armada, called the *Armada del Mar Oceano,* to protect their interests in the European Atlantic (Thompson, 1991: 85). The Spanish navy was not centralized, or homogeneous, but rather "*a fragmented conjunction of navies that had no common leadership*" (Crespo Solana, forthcoming). Using the *asientos*, as explained in Chapter One, the Armadas were systematically organised to the required resources. However, as a result of this lack of centralization, Spanish history is full of similar cases such as the "*Invincible*" and "*Trafalgar*" (Crespo Solana, forthcoming).

From this small area of forests from the Basque Provinces 70% to 80% of the Spanish ships were built from 1500 until 1580. The overexploitation of this limited area forced the Monarchy to find new sources of timber in the peninsula, and beyond, such as in Naples and Cuba. Therefore, in a gradual shift, the Monarchy began to invest in the construction of their own ships through contracts with people in their confidence in a variety of areas, in their shipyards controlled by their agents and following their interests and instruction, such as *Zorroza* in Bizcay, *Pasaje* in Guipuzcoa, *Ribadeo* and *Coruña* in Galicia, *Castelamare di Stabia* and *Vietri de Salerno* in Naples, *Ragusa* in Venice, *Seixal* in Lisbon (Or *Cijal* as it was written in Spanish).

According to Lourdes Odriozola after the disaster of the Armada and the 1590s, private shipyards that had been previously in use were now concentrated in a few more intensive shipyards, in the Oria estuary and *Pasajes*. In Guipuzcoa the majority of harbours had some shipbuilding activity on a minor or major scale, except Guetaria (Odriozola, 1998: 93). The shipyards of Deva, Motrico and Zumaia were the main shipyards in Guipuzcoa until the last third of the 16th century.

These Royal shipyards, were regulated by Asientos or contracts with the King and shipbuilders specifying the relationship and parameters in which the ship was to be built by the supervision of the *Superintendente de Fabricas y Montes*, or supervisor of shipyards and mountains, Cristobal de Barros. This was initially the way it was promoted in the North of Spain, before 1580, when there were still no Royal shipyards, but the supervision of Cristobal de Barros was already very active over the private shipyards in which the ships were being built for Indias or the Armadas. His main function was to measure the size of the galleon after it was built, in order to see if it was fulfilling the requirements stipulated in the contract. The construction of galleons had priority over other shipbuilding activities for diverse purposes. Galleons required more wood than *naos* depending on their tonnage. The confiscation of wood for the construction of galleons was regulated by monarchic agents, as in 1581 in order to meet the demand for wood for the construction of 8 galleons (Martinez, 2015: 63).

However, from 1580 until 1610 the percentage of Bizcayan ships within the Spanish fleet fell from 80% to 50% (Casado Soto, 1988: 27). This change reflects a shift in the origins of Spanish shipbuilding and therefore a critical reference point for archaeologists, historians and dendrochronologists studying Iberian and particularly Bizcayan ships in this case, because the Spanish fleet now no longer relied on vessels sourced from Iberian timber or Bizcayan shipping, but rather other sources and ships from different places, such as Naples, Venice , Ragusa, the Netherlands (Rodríguez, 2016: 11), Germany, France, England, Portugal (Casado Soto, 1988: 209-221), Cuba (Serrano, 1998: 233) even confiscating Scottish ships as well .

6.3 New supply areas and shipyards

The Spanish Monarchy applied a strict policy by the late 16th century, attempting to pursue the full construction, funding and preparation of galleons, in order to control the timbers used for the construction of ships of the North of the Iberian Peninsula. By setting up royal shipyards, the superintendency of Cristobal de Barros set up an unprecedent network of timber management, shipyards and other supply materials by expanding timber supply networks along the north of Spain. This was all meant to respond to the growing demand of ships of the Spanish Empire by the late 16th century, but also to the development of a maritime system to sustain a permanent navy for the Spanish monarchy.

In the period from the end of the 16th to the early 17th century, Bizcayan shipbuilding was sourced from a network of different origins of materials, some of their masts being imported from Prussia (Phillips, 1986: 80), Riga, Norway and Scotland. However, even though the northern pine supplies continued, the oak supplies were not enough for the large demand of timber by the 1580s in Spain. For this reason, new resources were found to the west of the Basque region, in Cantabria, in *Guarnizo* and *Colindres* in the 1580s (Casado Soto, 1988: 366) and also Ribadeo from 1588, in Galicia, but also from Asturias. These royal shipyards were combined with others in Ragusa and Naples. But especially the Neapolitan shipyard seems to have been working with the Monarchy since the 1590s as it was still building galleons in 1603. Nonetheless, these new shipyards were not private but royal and they became a way of promoting and controlling the shipbuilding of galleons for the interests of the King and local elite. But also, the new Royal shipyards that were set up along the northern Iberian shore were also strategically placed in areas where large amounts of raw timber supplies were illegally exported and also because ships built in Spain were often sold to other countries.

Figure 6.1(Picture above) Shipyards for the King's ship and timber control: In blue, from right to left, Shipyards used to build ships for the king in Pasajes, Santurce in Bilbao, Colindres and Guarnizo, Ribadeo, Coruña and Seixal or Cijal South in Lisbon. These would be the Atlantic shipyards in which galleons were built by the year 1605.

Therefore, the functions of these Royal shipyards could be seen as many; First to build Galleons for the Armadas and Indias trade with the proportions and measurements that were established as "ideal". Second to establish shipbuilding centres under the control of the Royal shipbuilders to secure the availability of timber for the construction of galleons and control the resources of that area and to sustain a permanent maritime force to defend the Kingdom. Third, from a mercantile perspective, to make sure the resources of Spain and its timbers did not fell into enemy's hands or were used for foreign shipping activities, or wasted in mercantile ship designs, as they were a strategic resource for the control of the Spanish maritime power.

6.4 1588, a turning point in Bizcayan shipbuilding for its militarization

1588 has been considered a key moment for the Spanish Monarchy in extending its power from the Mediterranean towards the Atlantic (Thompson, 1991: 70). The Spanish Armada did not fully adapt to an Atlantic mode of warfare and thus continued with the Mediterranean techniques of warfare (Rodríguez, Salgado and Adams, 1991: 84). The monarchic group of interests, along with the defence of the Indias routes and Armadas was behind this reformation.

Figure 6.2 Battle of the Great Spanish Armada in 1588, painted by Cornelis Claesz. van Wieringen. Rijksmuseum.

After 1588, it was clear that the system that had worked until then was no longer capable of maintaining the struggle with other European powers, such as the English, and therefore required reformation. The Armada of 1588, consisted of merchant ships and a few military ones, but not a purely military fleet (Thompson (Ed.), 1992: IX- 82). A majority of the ships were initially built for trading or fishing purposes, such as the *urcas*, *naos*, *zabras* and *pataches*. After the loss of ships in the Great Armada 1588 campaign, Spain reinforced its shipbuilding activity in the 1590s to recover its defensive and offensive navy (Valdéz-Bubnov, 2009: 76; 2011: 72; Alberdi, 2012: 424).

The imposition of the military interests conflicted strongly with the interests of merchant entrepreneurs in the Basque area (Alberdi, 2012, 441). Some people changed their focus of interest towards the armadas and Indias trading routes leaving the whaling and trading routes. For example, Barkham mentions a brother of Bidazábal (c.1568-1618), who was from old Bilbao and organized a whaling journey in 1603, but by 1619 he was serving in the royal fleet (Barkham, 1990: 242). The merchant elite seemed still strong and cohesively organised, for example, proposing to the king, via Martín de Jauregui, the design of the ships to be used. The proposal was resembling a merchant fleet, more than a military one (Table 6.8 in the Appendix) (Tellechea, 2003).

Sailing performance became an important element for the shipbuilding technique of the galleons for the Indias and the *Armada del Mar Oceano* in the late 16th century in order to escape from pirates and fight with more manoeuvrability[42]. The transportation of artillery, shallower hulls, longer keels and length became the new features of a "good" vessel for the late 16th century according to the interests of those that wanted to defend the Indias trade and to provide a capable Armada. Somehow, the old merchant *naos* were not as useful for war as they had been in previous times. But in fact, the confrontation with other kind of a concept of warships created a change in the concept of a ship type, particularly the new designs of the English men-of-war and not the heavier and deeper hulls of Spanish ships, mainly sourced from the Bizcayan region, but also not as modern as the Portuguese design of galleons, clearly more manoeuvrable than the naos from the Bizcayan region.

For these reasons, the failure to invade England in 1588 was a shock that caused both the monarchy and shipbuilders to reflect. The monarchy wanted the old shipbuilding of *naos* to change and to develop a fleet capable of defending the Spanish trading routes from their enemies, mainly England and the Dutch Republic. *Naos* had been shown to be old-fashioned and out dated in sea battles in the 1588 campaign, both with regard to the speed and artillery of the English men-of-wars. The English ships were fighting with different warfare techniques and faster sailing ships with shallower holds (Myers, 1987, 109). Ironically, the later constructions would be inspired by the English ships and applied in Spanish ships[43].

[42]AGS, GYM, leg. 111. nº 166, "*Santander, 19-21 de marzo de 1581: Primer informe de Cristóbal*… In Casado, 1988: 302"
[43] AMN, Navarrete, Ms 396, art 5, n 53, fols 225-226 "*Relación de la fabrica de doze Galeones de Guerra de la esquadra Illirica de Pedro de Ivella y estefano Dolisti …*"

6.5 Inspiration for new Galleons: Influence of English Shipwrights

The English design was very likely proposed by Don Alonso de Bazán, brother of the Marquis of Santa Cruz, Álvaro de Bazán. Bazán fought the English in the 1588 campaign. He had to join the second Armada that strengthened the great Armada in the invasion of England. After the defeat of the Armada, he was transferred to the infantry army, to prepare the defence from an English counter-attack against La Coruña and Lisbon. In 1589 after the failure of the so called "Britain's counter-Armada", led by Francis Drake, Alonso de Bazán pursued the English in La Coruña and Lisbon, sinking captain Minshaw's ship which was lost in battle. His major military success was in the battle of Flores, the 9th September 1591, when leading a fifty-five-ship fleet, he defeated and dispersed another English fleet of twenty-two ships, led by English admiral Thomas Howard, I Count of Suffolk, which had been involved in an ambush to attack and capture the Indias fleet[44].

At the end of the 16th century Spain was, as other maritime European monarchies such as England, in an experimental stage (Myers, 1987: 74). In this militarization process of their shipbuilding both Spanish and English monarchies were looking for the ideal man-of-war design to use in battle. Many contemporary discussions took place in those times both in the Spanish and the English side (Myers, 1987: 74). This was no coincidence, as the militarization of the fleet was a direct response to the maritime threats to the merchant routes and intended to defend the economic interests of each kingdom. In the case of England, the control and threat were mainly enforced by the use of corsairs and pirates that were hired by the queen of England

[44] *AMN. MS. 2518, doc. 52, Collection "González-Aller". In journal Historia Naval, nº51, 1995.*

against the Spanish maritime strength, due to which the need for a Northern fleet to defend the route to Flanders emerged (Stradling, 1992: 27).

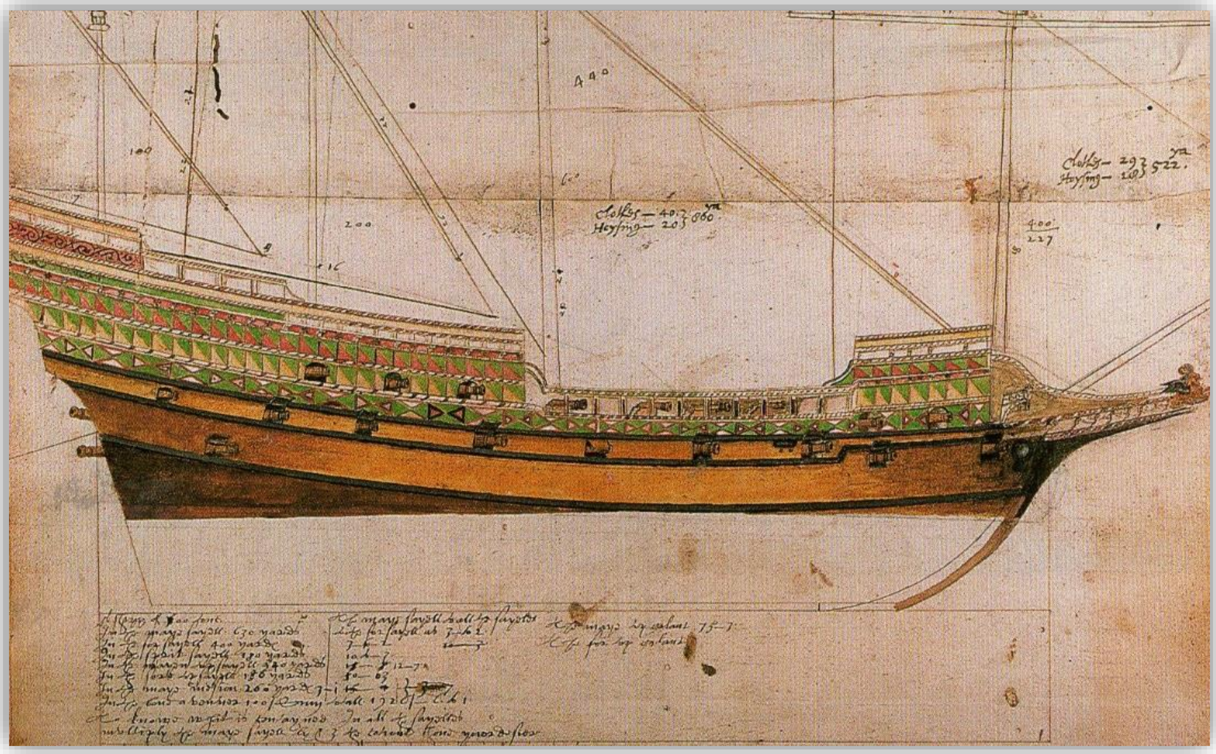

Figure 6.3 Matthew Baker, English Galleon's designs, from "Fragments of English Shipwrightry" (1586) From the Pepsyan Library. Matthew Baker designed very pioneering ships for the Elizabethan fleet, Such as Vanguard in 1575. Its lines and manoeuvrability were like nothing before, although it only had 500 tons, it was heavily armed.

To contrast these ships with some of the Elizabethan men-of-war Mark D. Myers studied them and their ratios. In his book some data is shown in which only ratios for the keel to beam and depth to beam proportions were given (Myers, 1987: 109). In the following table we can see a number of vessels from the English fleet around the year 1586-1590. These designs, particularly the depth to beam ratio, made these English examples much shallower vessels, than contemporary Bizcayan galleons. It seemed that the confrontation against some of these vessels in the Spanish Armada 1588 created a shift of paradigm in the way Spanish warships were conceived. These pioneering designs will change the naval warfare of the early modern period, and the old heavy and deep holds of *naos* will become archaic.

Table 6.1 Table of English ship ratios. All of these measurements were taken from Mark D. Myers for the keel, beam and depth ratios (Myers, 1987: 109).

Name of the ship	*Year*	*Tonnage*	*Keel/Beam*	*Depth/Beam*
Vanguard	*1586*	*449*	*3.38*	*0.41*
Rainbow	*1586*	*348*	*3.13*	*0.38*
Tremontana	*1586*	*138*	*2.61*	*0.44*
Ark Royal	*1587*	*540*	*2.78*	*0.42*
Merhonour	*1590*	*291*	*2.97*	*0.46*
Garland	*1590*	*516*	*2.88*	*0.47*
Defiance	*1590*	*417*	*2.88*	*0.47*
Average		***386***	***2.95***	***0.43***

The proportional ratios in this sample of English galleons shows different proportions, since English galleons are much shallower and with much longer keels than the ships we are about to see built by Neapolitan, Ragusan and Venetian shipbuilders of 1593. However, it seems that the Spanish were trying to make their ships shallower and longer in their keels as well according to the clearly more advanced design for war of the English.

6.6 Bizcayan, English and Ragusan influence in the 1590s

Examples of the mixture of the Bizcayan region with other traditions was clear by 1593 when a fleet of twelve galleons was constructed for the king of Spain, between Ragusa and Naples. These galleons were described as following the design of Ragusan, English and Bizcayan ships[45]. The attempts to replicate the shallower hulls were made in Naples, a harbour not very suitable for deep hulls, as pointed out by historian Koldo Trápaga (Eguiluz et alii, forthcoming):

[45] AMN, Navarrette, Ms 396, art 5, n 53, fols 225-226 "*Relación de la fabrica de doze Galeones de Guerra de la esquadra Illirica de Pedro de Ivella y estefano Dolisti …*"

"They aimed to construct two light galleons in Naples 'according to the measurements and features of the English", and the rest in Castellammare di Stabia, located around 30 kilometres south of Naples"[46]

In this document, galleons built in Ragusa, Naples and Venice were shown. Their tonnage range spanned from 700 and up to 1200 tons. Their beam to keel ratio ranged from 2.13 up to 2.50. Their depth to beam ratio ranged from 0.53 to 0.73. There were four galleons with 900 tons that had similar proportions, but not the same measurements. They all had a 40 *codos* keel, 18-19 *codos* beam, 10 *codos* beam and 56-57 *codos* length, but none are exactly the same.

However, the ratios from these twelve galleons did not really match with any of the proportions mentioned for contemporary English man-of-war table of ratios. But simply because they are meant to resemble English, Ragusan and Bizcayan ships some of their proportions do match Bizcayan ratios and perhaps builders were trying to experiment with the shallower hulls and longer keels of the English men-of-war. Despite the Bizcayan tradition being different in the average ratios used, their ratios were more similar to the English ones of the late 16th century. During the early 17th century, the Bizcayan ratios were more similar to the shallower hulls of the English tradition (See the table below, Depth to beam ratio Bizcayan-English).

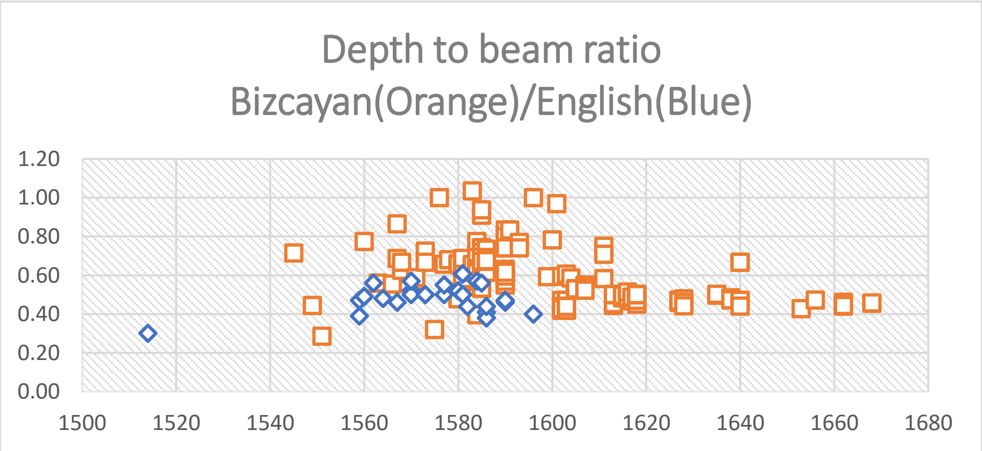

Figure 6.4 Depth to Beam ratio comparison between Bizcayan and English ships. (Sourced from the Appendix tables).

[46]AGS, GYM, leg. 303, doc. 12: In, Eguiluz et alii, forthcoming.

6.7 Evidences of cross-cultural influences in Bizcayan ships in the 1600s: Fluits, Dunkirk and the northern Dutch influence

Spain had confiscated a great number of the ships they used in their Armadas, both for the Indias and the Oceanic fleet until 1588. Between 1584 and 1590 Bizcayan shipyards experienced some of the most intensive years in terms of shipbuilding numbers, contradicting the commonly held idea of a shipbuilding crisis in Spain at the end of the 16th century (Alberdi, 2012: 424). Apart from building their own galleons, the Spanish Monarchy bought and signed contracts with other areas to supply their armadas. This was also the case for other regions such as Portugal. In the 1580s Portugal belonged to Spain, after which it experienced an increase in its shipbuilding activity, especially in Lisbon. For example, 12 galleons were built in 1589, mentioned in a letter by Luis Cesar[47]. Porto also experienced a growth in ship construction after the establishment of the Habsburgs in Portugal.

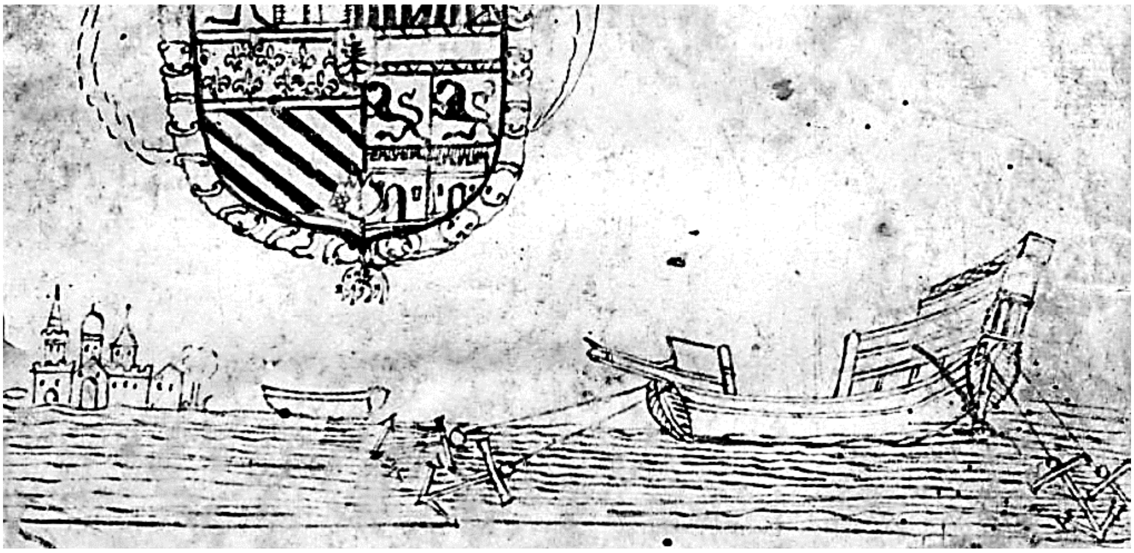

Figure 6.5 A ship from Dunkirk in a drawing from 1575[48]

Evidence in the early 1600s show that Dutch shipbuilding became a reference for Bizcayan shipbuilders as well as Spanish shipbuilding, particularly Dunkirk. Moreover, there are some

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[47] AGS, GyM, Leg. 264., n. 19: "*Las medidas de los 12 galeones que se an deazer*"

[48] *España. Ministerio de Educación, Cultura y Deporte. Archivo General de Simancas. CMC,2ª,LEG,66.*; *Libro de Asientos de los Baxeles de Dunquerke y gente mareante que en ellos sirve y lo que a quenta de sus sueldos han recivibo año de 1575.*

authors that point to the decline in Basque shipbuilding as being a result of competition from cheaper Dutch ships (Gomez-Centurion, 1988: 26-27). Dutch ships were an ideal shape for shipwrights looking for a good sailing warship in the early 1600[49]. By the late 17th century, according to a Venetian merchant, a majority of the fleet of galleons that sailed to the Indies were Dutch (Duro, V, 1973: 88). There are hints of these influences at the beginning of the 17th century as some *asientos or Royal shipbuilding contracts s*how. More precisely, a shipbuilding style from Dunkirk seemed to have become an ideal design for shipbuilding contractors under the service of the monarchy for constructing warships such as galleons[50].

According to A.B. Hoving, the Dutch had already invented a "*crazy and unusual shipbuilding*" by 1595 (Hoving, 1997: 25). Apparently, the Dutch shipbuilders invented in 1595, *Fluits,* which were radically different from previous designs in relation to their beam-length ratio. Hoving argues that their ratios of 1 to 4 were quite different compared to contemporary ships from other traditions (Hoving, 1997: 25). For these northern shipbuilders in the Dutch Republic, the length should be ideally four times the beam and the depth should be ten times the length of the ship (Van Duivenvoorde, 2015: 224). Later evidences of ships show proportions similar to what was identified by A.B. Hoving.

Figure 6.6 Dutch Galleon (right), by Hendrick Cornelisz Vroom,Rijksmuseum, Ámsterdam.

In 1626 the Batavia ship was built in Amsterdam. The original dimensions of the shipbuilders specified in the contract were given in *feets*, a measurement used in Amsterdam,

[49] AGMM, 6665.485, libro de registros, rollo 5, vol. 19, pp. 2-12. "*Asiento con el general Vertendona*" pp.71-77. "*Asiento con el capitán Martín del Hoyo sobre la fábrica de dos galeones*" pp.77-82. "*Asiento hecho con Martín de Gurpide sobre la fábrica de seis galeones*"

[50]AGMM, Tomo 19, 6665.217, Libro de registros, rollo 5, vol. 18, 107r-118ª

being 28.31cm for each *codo* from Bizcay. The ship measured 79.47 *codos* in length, 17.87 in beam and 9.56 in depth. Its beam to length ratio was 4.45. Its depth-beam ratio was 0.53 and its depth-length ratio was 8.31. For later examples of the Dutch examples in shipbuilding there are only a few ships to be found. In this respect, in 1628 the *Wasa* or *Vasa* was launched and had a beam to length ratio of 1 to 5.1 but its depth to beam ratio was 0.41 (Phillips, 1986: 64). These proportions were definitely different from those that Iberian Bizcayan shipwrights accustomed to use by the late 16th century, but the appearance of Dutch ships and growth of power of their Republic as against the Spanish seemed to have attracted the attention of the Monarchic agents, requesting the shapes of Dunkirk for the ships built in the Basque shore.

6.8 Bizcayan ship design and construction methods: A transition in design from merchant naos, to war naos

This section will be having a look at this shift in ship design over a longer duree of time, particularly the first half of the seventeenth century, that had earlier roots in ship design and construction. Certain proportional systems have been argued as general rules, such as the classical 1:2:3 proportional rule applied to the study of Spanish shipbuilding (Cano, 1611: 14-15; Barkham, 1984: 113). Despite these claims, when various examples of detailed measurements and shapes were compared, not even two ships were found to be equally built (See Bizcayan *Naos* Table). Similarly, criticism has been made to the generalist rules thought to exist, to very much a secret and varied craft that shipbuilding was in the 16th century, a very much inherited knowledge from parent to son, master to apprentice, as referred by Williams (Williams, 2018: 312). Williams himself is not an advocate of a static set of characteristics of an identity, as he considers that to speak of maritime history is to tell the story of an ever-transforming process, that needed to constantly adapt to new contexts after severe disasters (Williams, 2018: 323).

Some Historians have been advocates of a regional proportional rule, unique to a particular shipbuilding tradition. Regarding this, Barkham argued proportional dimensions of the 16th century *naos* (Barkham, 1984). Barkham described a coherent proportional sequence for the Bizcayan *naos* based on the old rule of one, two, and three (Barkham, 1984: 114). Those proportional references are measured from the beam (1) keel (2) and overall length (3). However, he mentions a significantly different proportion for one ship, built in Orio, during winter 1577-1578. This vessel had a beam length ratio of 3.4, whereas the majority of the 25 contracts of *naos* Barkham studied had a 3.10-3.20 beam to length ratio. According to his research Bizcayan *naos* had lower holds than contemporary English or Venetian ships (Barkham, 1984: 111).

It seems to be the case that the Bizcayan shipbuilding of the 16th century, particularly of those *naos* build for the Newfoundland fisheries, were built with particular attention to their height. It was very important to have the right height of a ship, due to the crossing of the Atlantic and the storms they had to face (Perona, 2017: 254). This gave the Bizcayan *naos* more stability sideways, as Tome Cano explains in his book (Cano, 1611). Domingo de Busturia stated in 1568 that the ideal proportions for ships was that of three times the length of the width, giving the example that a nao that was 15 *codos* wide, should be 45 long. He also mentioned that the depth had to be more than half of the breadth, for a good proportion. However, he stated that war *naos* or *navios* had to have a 3.5 or more ratio of the proportion between the length and the breadth. He mentioned as well that if there were any ships out of proportion, were those that use to travel to Newfoundland, as he mentioned they had a long journey, making their lower part narrower, so that they would be higher to be able to navigate through the difficult weather. In this way, he stated that a 16 *codos* wide *nao*, should be nine *codos* high, to the widest point, a 17 *codos* one, half a *codo* more, an 18 *codos* one, 10 *codos* high, the 19 *codos* one, 10 and a half, and the 20 *codos* one, eleven[51].

The proportions, tonnage and measurement tables will be used to explain the relationship between the theoretical concepts in shipbuilding, and the historical evidence of ships. The data is in the appendix tables, showing the measurements and proportional ratios from a variety of fleets, that were joined in the combined fleet of the Spanish Armada. The ratios were calculated in the tables from the original measurements and collected in tables that were created by José Luis Casado Soto, in his book *Los barcos Españoles y La Gran Armada de 1588*. In these tables, Casado Soto was showing Bizcayan *naos* in the Armada 1588, built between 1584-

[51] AGS, GyM, Leg. 347. Nº 23. (AGS. GA, Leg. 347, fo.23). In Perona, 2016: 253-254. From Cruz de Aprestegui.

1586[52][53], Bizcayan galleons built between 1581 and 1584, Portuguese galleons built before 1580 up to 1586 and Mediterranean[54], English, Flemish, German *naos*[55] and *urcas*[56].

In this case, something could be added to Barkham's study in 1984. Although what he compared was rightly observed, it was not always the case when looking at other ship examples. To give an example of this, by looking at the beam to depth ratio, of the 1588 datasets published by Casado Soto, contemporary ships, such as a Flemish Urca, had the deepest depth of the hold, compared to the breadth of the rest of the whole Spanish Armada 1588, of 0.81 beam to depth ratio. Of course, these studies were published after Barkham's one. Also, some English ships contemporary to Bizcayan ships had very similar ratios, in some cases, whereas in others some ships were completely different (Table 6.4, see page 197, Depth to Beam ratio B-E ships). For example, some English ships had different depth to beam ratios, compared to the Bizcayan ones of the same decade. For example, a ship built in the Bizcayan area had a 0.77 depth to beam ratio, whereas a contemporary English men-of-wars had 0.49 depth to beam ratios, during the 1560s (Table 6.4, see page 197 Depth to Beam ratio B-E ships).

Brad Loewen claims the end of this standardized system at the end of 16th century. New proportions were adopted, as well as enforced, that changed deck heights and shipbuilding rules in general changing a long process of traditional merchant and fishing oriented shipbuilding in the northern Bizcayan vessels (Loewen, 1998:199). By the late 16th century, the proportions of ships encouraged were significantly different to previous conventions. Southern influences from the monarchic interests were imposed, and therefore some different 2:5:7 proportional system, such as Escalante de Mendoza proposed in his book. But also, later shipbuilding ordinances 1607-1613-1618, claimed a complete change in terms of dimensions and

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[52] AGS, GyM leg. 221, nº 206, 21 october 1587. From Casado Soto, 1588: 220.
[53] AGS, GyM, leg 195. Nº 47 and 74. From Casado Soto, 1988: 210.
AGS, GyM, leg. 221 nº 40 and 206. From Casado Soto, 1988: 210
AGS, GyM, leg. 221, nº64, Fernandez Duro, Al. II From Casado Soto, 1988: 210.
AGS, GyM, leg 221, nº 6 Lisboa, 15 July 1587, From Casado Soto, 1988: 212.
[54] AGS, GyM, leg. 221, nº 206, Lisbon 19th October 1587. From Casado Soto, 1988: 216.
AGS, GyM, leg. 221, nº 64. Lisbon, 16 February, 1588. From Casado Soto, 1988: 216.
[55] AGS, GyM, leg. 196. Nº 72, 3 january 1587. From Casado Soto, 1588: 218.
[56] AGS, GyM, leg. 111 nº 141 and 180. From Casado Soto, 1988: 206.
AGS, GyM, leg. 142, nº 5 (From Fernandez Duro CA: 402) 195 nº 47 and 63. From Casado Soto, 1988: 206.
Chaunu et alii, III 331 and 346.
AGI, Ct, leg. 2934, s. fol, 18 diciembre 1587 a 13 febrero de 1588. From Casado Soto: 1988: 208.

proportions, (Loewen, 2007: III-16). New vessels were designed for different purposes, such as the Indias trade, and were designed in a different way compared to the old 1:2:3 proportions.

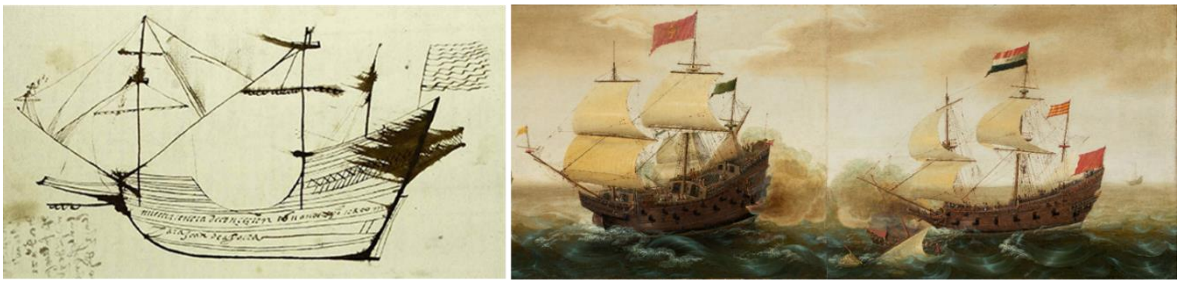

Figure 6.7 (Left to right), Bizcayan Nao from Usurbil, "Nuestra Señora de la Concepción" (1611 From the Archivo Historico Provincial de Guipuzcoa, Oñate (Casado Soto, 2003: 67). Spanish Galleon (left) firing a Dutch warship (right) Painted by the dutch Cornelis Verbeeck, (Around 1618/1620)

6.9 *A change of paradigm of a ship type: Galleons of the early 1600s.*

In the ten years from 1590 to the early 1600s, the ideal size, rather than massive galleons of 1000 tons, became smaller but with better sailing capacity than those previous bulky ships. An example of this shift in shipbuilding was the galleon *Santiago de Galicia*, initially built in *Castelamare de Stabia* in Naples in the 1590s and sunk in *Ribadeo*, *Galicia*, in November 1597. After the galleon was lost, Jacome Juan de Polo, captain of the so-called *Santiago de Galicia*, wanted to rebuild the galleon with the same tonnage. However, after they started the construction in 1605, they suddenly decided to decrease the tonnage from 1000 to 600 tons[57]. The measurements differed as well:

Year	*B-K R*	*B-L R*	*D-L R*	*D-B R*
1593	*2.17*	*2.93*	*4.44*	*0.66*
1605	*2.35*	*3.24*	*6.11*	*0.53*

Table 6.2 Comparison between the measurements of the Santiago de Galicia when it was built in 1593 and the later version in 1605 (Data from Bizcayan naos and galleons table 7.10, 1590-1668).

[57] AGS, GYM. 652, 39: *Información de la falta de madera de la obligación de Isidro Sanchez y declaración de los maestros que fabrican los 4 galeones de su majestad del capitan Jacome Juan de Polo*

Year	*Keel*	*Length*	*Beam*	*Depth*	*Tonnage*
1593	*44.5*	*60*	*20.5*	*13.5*	*1090*
1605	*40*	*55*	*17*	*9*	*600*

Table 6.3 Comparison between ratios and proportions between the Santiago the the Galicia, built in 1593 and its later predecessor in 1605. Ratios (Beam-Keel, B-K, Beam-Length, B-L, Depth-Length, D-L, Depth-Beam, D-B) show that the ship was not as deep in the hull and was longer in relation to the beam, keel and overall length[58].

Other examples influenced by ships from Dunkirk show similar changes, in their tonnage, depth of the hull and proportions, when compared to previous stages of Bizcayan shipbuilding from the late 16th century. Overall, the depth to beam ratio of Bizcayan ships decreased from the late 16th century towards the 17th century (See 6.11 in the appendix Depth to Beam ratio Bizcayan ships 1590-1668). Between 1602 and 1603 there were five galleons built in Bizcay and in 1603 there were twelve galleons built in Naples, seven in *Pasaia* and two in *Laredo*[59]. These galleons had slight differences, but they all shared a very similar proportional system, except the one in *Pasajes* that had slightly different proportions, closer to that of a merchant *nao* than the longer and shallower hull of a faster cargo carrying warship. Again, this last example, which seems to be an exception, was actually part of the same system, and that inconsistency was a representative example of the diversity and particular context in which that ship was created.

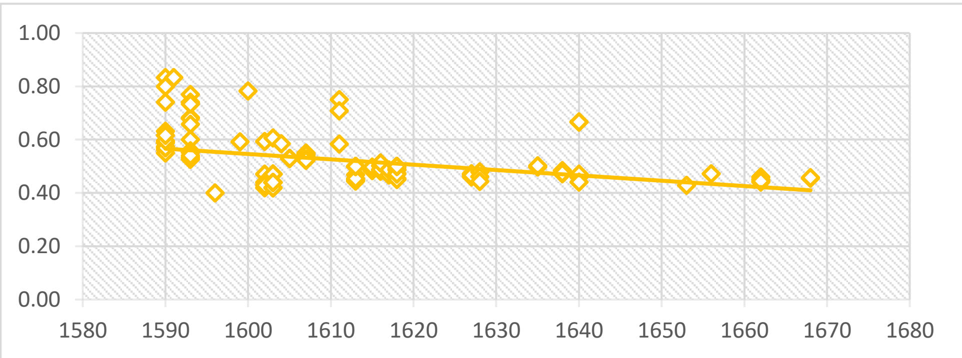

Figure 6.8 Depth to Beam ratio Bizcayan vessels 1590-1668 (Based from the Bizcayan vessels table 1590-1668 Table 25)

[58] AMN, Navarrette, Ms 396, art 5, n 53, fols 225-226 "*Relación de la fabrica de doze Galeones de Guerra de la esquadra Illirica de Pedro de Ivella y estefano Dolisti …*"
[59]AGMM, Tomo 19

Ships(x)	*Year*	*Built in*	*Tons*	*Keel*	*Beam*	*Depth*	*Length*
x2	*1602*	*Vizcaya*	*500*	*40*	*17*	*8*	*50*
x2	*1602*	*Vizcaya*	*400*	*38*	*16.5*	*7.25*	*50*
x2	*1602*	*Vizcaya*	*300*	*37*	*15.5*	*6.5*	*48*
x2	*1602*	*Vizcaya*	*200*	*35*	*14*	*6*	*41*
x3	*1603*	*Pasaje*	*400*	*38*	*16.5*	*7.25*	*50*
x3	*1603*	*Pasaje*	*300*	*37*	*15.5*	*6.5*	*48*
x6	*1603*	*Naples*	*500*	*40*	*17*	*8*	*50*
x6	*1603*	*Naples*	*400*	*38*	*16.5*	*7.25*	*50*
x2	*1603*	*Laredo*	*500*	*40*	*17*	*8*	*50*
	1603	*Pasajes*	*570*		*16.5*	*10*	*48*

Table 6.4 Dimensions of ships according to an asiento, (AGMM, Tomo 19, 1602 and 1603)

B-K R	*B-L R*	*D-L R*	*D-B R*
2.35	*2.94*	*6.25*	*0.47*
2.30	*3.03*	*6.90*	*0.44*
2.39	*3.10*	*7.38*	*0.42*
2.50	*2.93*	*6.83*	*0.43*
2.30	*3.03*	*6.90*	*0.44*
2.39	*3.10*	*7.38*	*0.42*
2.35	*2.94*	*6.25*	*0.47*
2.30	*3.03*	*6.90*	*0.44*
2.35	*2.94*	*6.25*	*0.47*
	2.91	*4.80*	*0.61*

Table 6.5 Proportions of the galleons (Beam-Keel, Beam-Length, Depth-Length, Depth-Beam) (From the asiento above mentioned[60])

These tables show no consistent proportions, but rather a range of them for the years 1602-1603 between the shipyards of *Pasaia*, *Laredo*, *Bizcaya* and Naples. However, numbers do cover a rather specific narrow range of values. Moreover, some of the ships from these distant areas, specifically the galleon built in 1602 in Bizkaia beam 17, keel 40, depth 8 and length 50 has the same dimensions as two other galleons in Laredo built in 1603 and another six built in Naples in 1603. The fact that they had the same dimensions in their corresponding contracts

[60] AGMM, tomo 19, 1602 and 1603

reveals that there is an attempt from the Spanish shipbuilding to standardize its industry according to the proportions they decided were most suitable for their journeys to the Indias and the defence of their coasts. In this case, I would argue the efforts by the Spanish monarchy to develop a suitable navy seemed to be fruitful by applying their concept of design in distant areas of their kingdom.

However, the influence from Dunkirk could be seen in the depth to length ratio, since these Bizcayan galleons were much shallower in their hull, than previous standards of the tradition. They kept a similar beam to length ratio to previous examples. Despite these influences from Dunkirk, the galleon built in *Pasajes* in 1603, has ratios closer to the Bizcayan *naos* of the 16th century than to the galleons based on Dutch shipbuilding proportions and tonnage[61]. The attempts to standardize these shipyards were not ultimately successful, but it seemed that the monarchy gradually managed to impose its interests by the construction and funding of these vessels.

6.10 Ship types, and forest management: A reconstruction of the Bizcayan traditional forestry practices

The unsolved distinction between *naos* and galleons, the difference in scantlings by the early 17th century in ship construction, and the adaptation of the forestry practices to suit those new monarchic needs, had an effect in the way timber was produced and harvested in the Bizcayan region.

The recreation of old timber harvesting practices, based in some of the records and remains of ships, is difficult to know what exactly was like. To a certain degree, the uncertainty about what the regional forest management was, or to which extent ship timbers were guided, it is not exactly clear. Regional practices were different in the Bizcayan area, particularly with regards to the use of managed trees (*trasmochos*). However, harvesting timber, pollarding trees, and seasoning as well as pruning and using similar tree species was a used in other communities outside of the Bizcayan region. Forestry management, however, seemed not had been

[61] AGMM, Tomo 19, pp. 83

completely modified when building what we distinguish as merchant and military cargo carrying ships, or *naos* and galleons. By the early 1580s, in 1582 Cristobal de Barros wrote to the king in a letter expressing the following details on forest management related to ship types:

> *"I cut in the council mountains from some of the valleys that used to be owned by the Marquis of Santillana, and in others of the surroundings of Trasmiera, a huge amount of trees with four hundred officials from Vizcaya and other parts that I gathered; there are like five thousand five hundred feet (Pies) of beautiful oaks, that have the best, healthiest and strongest wood for the purpose it is intended to be used for, with which the planking will be nearly completed that will be needed and much of the twisted and straight wood, for whatever is needed, that there is such good masts in the mountains that I feel it would be a shame to use them in such small naos, therefore I have determined to carve and build these galleons in the channel from Guarnizo..."*[62] Translation by the author.

After reading such a colourful insight into late 16th century shipbuilding, there is one sentence in particular that is especially relevant from a shipbuilding point of view. The wood that was cut already could have been used either for *naos* or galleons, with apparently no difference in the structural elements in their timbers needed to be built either. The only difference emphasised was the size of the vessels; galleons being described as larger than *naos*. The historical evidence shows here that in terms of forestry that there was no difference when it came to growing branches for specific ships. This quote from Cristobal de Barros is indeed a very interesting insight into Bizcayan 16th century forestry practices, arguably clarifying that the distinctions made, at least in this instance, were more related to the size of the vessels, galleons seemingly being larger than *naos*, and less obviously, the main difference was likely in their measurements and proportions.

6.10.1 Shipbuilding trees: Bizcayan Trasmochos and other wooden resources

Evidence of managed trees have been previously and extensively studied by Aragón Ruano, in his words: "*Ipinabarros or guided pollards and the first references to them are linked to the Deva and Urola river basins date from 1530 decade. Also, in Castille, since the fifteenth*

[62] AGS, GYM, leg. 141, nº 97: *"Santander, 3 de enero de 1582: Carta a Cristóbal de Barros al Rey informando de haber hallado astillero inmejorable en Guarnizo y una mina de madera en los montes de Cantabria, proponiendo a Fernando de la Riba Herrera como pagador y al capitán Pedro de Rada como sobrestante, y reclamando el dinero necesario"* In Casado Soto, 1988: 366.

century" (Aragón Ruano, 2013: 150). These guided trees are mentioned in some regulations for the 1560s, to be used in the provinces of Biscay, Guipuzcoa, Asturias and the four Villages, in order to get straight wood for *naos*:

> "*…son al propósito para maderas derechas, no las desmochen antes las guien y encaminen para que vayan derechos y en las que no tuvieren esta disposición en los desmochos que hicieren tengan gran atención a dexar las guías puxas para maderas tuertas con que se pueden labrar y fabricar naos y se hagan viveros donde no hubiere plantíos y paresciere a las dichas Justicias y villas que la huviere se lleven a las que no las haya"* [63].

> *"…they are for straight wood, do not coppice them, guide them beforehand and direct them so that they grow straight and when pollarding those that would not have this possibility deal with them with great attention to leave guided puxas*[64] *for twisted timbers with which naos can be carved and built and nursery should be made where there are no plantations and that the local Justices and towns should take them to where there were no plantations…"* Translation by the author.

On their way to find futtocks, frames, and knees, shipwrights had to find the timbers used sourced from trees of shapes which were ideal for the ship. Trees in the 16th century which would have been pollard trees (Trasmochos) were all of oak trees *Quercus* spp. These trees were said to be left with "*horca y pendón*" which was a straight branch on a parallel to the ground and a curved one for futtocks and frames. In 1743, the Marquis of *Rocaverde,* superintendent of the forests and ship construction, declared:

> "*…to those planted lands that had grown a little and came straight, clean up their lower branches, and guide them, and those that had a head like basil, leave them what in the Ordenanzas of his majesty is named horca y pendon, which is to leave a good branch towards a side on a straight angle towards the trunk, and the other one straight or in an angle blunt (Without a head) so that it has first futtocks, second futtocks, or floors for navios…*[65]*"* (Aragón Ruano, 2001: 41), translation by the author.

[63] AGMN, MS 376, Art 3 nº 184, page 95-98 1564 Copia *"…tanto de una Provi-… que S.M. dio pa-… el Corregidor de las quatro villas de la … del mar y Mar … de Santillana… el plantar ro-(bles) y conservación …-los y de los montes Del mismo thenor las del Principa-(do) de Asturias, Señorio de Vizcaya Provincia de Guipuzcoa*"

[64] Puxas or Pujas: A combed branch in the pollard tree that was left for building ships, similarly to guided branches.

[65] A.M.Se. (Archivo Municipal de Segura) C, 4, 1/2., A.M.F., C, 5, II, 10/1. "*Visita de Superintendentes 14 de Diciembre de 1743*", from Aragón Ruano, 2001: 41.

Subsequently, lumberjacks had to follow the same path, since all useful trees were marked and finally cut. Oak was the main component of the vessel's hull. It is important to point out that different structural components required different grains that were growing in multiple shapes of branches. For this reason, shipwrights were very selective with the timber sources in order to find the best available choice from among the vast woodland resources of the Basque Provinces. Straight grains would be used for planking and long structural parts, whereas futtocks, floors and all combed timbers were found in branchy guided pollard trees that provided many combed futtocks per oak (Loewen, 2007: III-270-271).

Figure 6.10. An oaken "trasmocho" with orca y pendón in the Basque region (Top Left). (Picture by the author). Similar examples can be found in beech pollard trees (After, Aragón Ruano, 2001: 42). Reconstruction of Bizcayan forests: Harvesting a V-frame on the left, a second futtock and a standing knee on the right (Top Right) (Drawing by the author).

Originally in the 16th century timbers were carried through rivers, sometimes using cargo ships but often by roads as well, where they were carried by oxen carriages (Aragon Ruano, 2001: 116). Timber was softer when it was green but changed its shape while it got dryer and became more stable.

However, all of these factors were intrinsically related (Delhaye and Loewen, 2006: 104). There have been claims for a Basque regional forestry tradition pointing to the interdependence between the activities of the shipyards and the forests (Grenier, Loewen and Proulx, 1994; Loewen, 1998: 197; Delhaye and Loewen, 2006: 103; Grenier et Alii, 2007: III-267-274). Managed trees (*Trasmochos*) were trees modified by humans by intentionally cutting them at certain moments of the year to guide the branches of the trees and produce timbers in particular curvatures or without knots, by cutting the sprouts of branches. This technique was very common in the Bizcayan area, in the North of the Iberian Peninsula. However, to claim a systematic tradition from the scarce evidence, is still limited, and we would need further evidence in order to claim for more general claims over the Bizcayan tradition.

The use of guided pollard trees, although similar in technique to the use of *trasmochos*, it was not the same. Pollarding has been a common technique in other areas of Europe as well for centuries, such as in the area of Suffolk, in England, where it is still used today (Deakin, 2007: 7-8). This is well represented by Spanish historical sources from the time, when they clearly talked about *árboles Bravos* (These were not-guided wild trees) and *Trasmochos* (Guided pollard trees) (Aragón, 2001: 59). Both the *naos* and galleons that were built in the Spanish crown, did not differed in the timbers and the shapes of these that were harvested in the forests. All ships were therefore sourced from these guided trees. After the *árboles bravos* were cut, which were natural trees without any pruning, they were called coppiced trees, used for firewood and many other uses such as building roofs (Aragón, 2013: 31). From these two forest types, identified to exist in the Bizcayan region, most pieces for shipbuilding were obtained.

However, it was these predominantly oak forests in the Basque area which were used for the hull structure. Other parts that were not made from oak and were obtained from other wooden species, such as fir, spruce, chestnut, beech used for keels in repeated occasions and many others that have been found in some contemporary Bizcayan ships (San Claudio et alii, 2014: 218-219; Waddell, 2007: V, 71-73). Not to mention masts, ballast, tar, rigging, sails, fastening nails, treenails, anchors, coopers, artillery, pottery, food, and other elements that are also part and representative of the multiple cultures from a variety of areas that coincided in the constructions of these ships.

However, masts and the upperworks are sometimes found in northern seas, such as the Baltic, where low temperatures render the water uninhabitable for sea worms. For example, in the case of the shipwrecks of *Svärdet, Dalarö* and *Mars*, the preservation is outstanding in comparison with other contemporary vessels in other regions of Europe (After Adams, 2013: 99-102). Dendrochronologically, it is mainly through the oaken structure of the hull that Iberian ships have been researched. However, it has also been found that the upperworks of Bizcayan ships and masts were made of pine (Fernández González, 1992: 11). These pines at least for the early 17th century, were said to be imported to "Flanders" and then brought to Spain as mentioned in the *ordenanzas* 1607, 1613 and 1618[66], that we will be talking about in this chapter.

Other light wood species were used as well for the upperworks. The study of pines and their use in Iberian ships is itself, another field of spatial and cultural research for future studies in dendrochronology, history and archaeology. From the records of the Red Bay vessel, built in 1563 according to the main hypothesis in the Bizcayan area, different tree species were used for the upper structures, some of which were maritime pine, spruce, larch, birch, fir and white pine (Grenier et alii, 2007: V-73). For the late 16th century, the importation of masts and yards from the Baltic through Flanders was a relatively common source for northern Iberian ships (Hormaechea, Rivera and Derqui, 2012: 272, 293.

For example, a particular feature of the ship could be some of the species, such as *pinus strobus,* a white pine (Waddell, 2007: V-73) found on the Red Bay, that perhaps was a repair or additional beam sourced from North American white pine, as the origin of the tree species was able to be interpreted. However, the timbers of the hull are most likely of a Basque origin from local supplies, but definitely of European oak species (*Quercus* spp) (Waddell, 2007: V-71). Deciduous oak, however, cannot be discriminated according to the timber protocols to define for Iberian ships (Rich, Nayling, Momber and Crespo Solana, 2017; Domínguez, Rich, Haneca, Daly and Nayling, 2019). However, the dendroprovenance results did not match the local wood chronologies for oak in Europe for the Red Bay vessel's wood study (La Roche, 2007: V-77), perhaps due to a lack of chronologies for the Basque area in those times, in 1993. Despite these, the timbers of the hull were most likely deciduous oak species. In 1998 the Arkeolan Foundation started dendrochronological work in the Basque Country. (Waddell, 2007: V-71).

However, in the case of the masts only some pieces for the spars were found, these being made of white oak There is evidence that masts were brought from Flanders, although the origin of these conifers was not Flanders, but rather the Baltic provinces in the early 17th century (Phillips, 1986: 80). For Archaeology and dendrochronology, it is important to be

[66] AGI, Indiferente, 2595. Recopilación de las Leyes de Indias, de 1680, Libro IX Título XXVIII, in Hormaechea, Rivera and Derqui, 2012: 246, 272, 293"

aware of changes in the local timber supply areas, that have been generally studied both for the local networks (Grenier et alii, 2007: III, 267-272) and transnational ones.

6.10.2 Forestry and Asientos: The forestry involved in the construction of a 500ton galleon, from 1603.

In the following lines I would like to show the timber requirements to build a galleon of 500 tons in the year 1603 in Ribadeo, Galicia. This document was part of an *asiento* or royal contract with *Isidro Sanchez de la Mota*[67][68]. The costs of the wood are specified in *maravedis*, but our interest here was to show the wood parts of a galleon of 1603 and the way these were pre-manufactured before they got to the shipyard. The wood was cut on the waning moon of October. The 500tons galleon, had very likely the same dimensions as some of the same size that were built in Bizcay in 1602 by Martin de Bertendona, as previously mentioned. The construction was supervised by a Bizcayan shipwright, and the example for a 500 tons vessel, had the following measurements: 40 *codos* keel, 17 *codos* beam, 8 *codos* depth and 50 *codos* length.

The wood had to be approved after being chopped by *Agustín de Ojeda*, an important agent of the king in Galicia, originally a shipwright from Gipuzkoa. During the period 1593 and 1598, he built many ships in *Rentería* and Bilbao. Specifically, a total of 29 galleons were built in Gipuzkoa and one in Bizcay. King Phillip III named him superintendent of the forest management and shipyards of Guipuzcoa, but previously he spent some time in Galicia, supervising the new construction of galleons in Ribadeo[69]:

[67] AGMM, Tomo 19, 6665.516, Libro de registros, rollo 5, vol. 19, hoja 102-105, "*Asiento con Isidro Sanchez de la Mota sobre la entrega de madera y tabla, 11/10/1603*"
[68] My sincere gratitude to Koldo Trápaga, Jose Luis Tomás-Gasch and Ana Rita Trindade for providing these insightful asientos about timber production.
[69]Odriozola Oyarbide, L. Real Academia de la historia. Biografías. http://dbe.rah.es/biografias/72037/agustin-de-ojeda. Checked on the 23/01/2021.

Madera para un galeón de 500 toneladas	*Wood for a 500 tons galleon*
76 codos de quilla, zapato, codaste y carlinga [76 codos]	*76 codos of keel, stern knee, stern post and mast step*
30 codos de branque	*30 codos of Stem*
400 codos de orenga y pie de genol	*400 codos of floor timbers and first futtocks*
600 codos de pique y bustardas	*600 codos of V frames and breast hooks*
2.500 codos de liernas y durmientes y trancaniles	*2500 codos of inwales, beam shelfs and waterways*
7.500 codos de genoles redondos, espaldones (?) y rebecones y pies de garita	*7500 codos of second futtocks or bowed ones, reverse futtocks and "toed" futtocks*
1500 codos de baos y cintas	*1500 codos of beams and wales*
1000 codos de latas	*1000 codos of ledges*
700 codos de puntales y llaves	*700 codos of stanchions and standing knees*
1800 codos de madera común y escoras	*1800 codos of common wood and heeled(?) wood*
Trescientos corvatones, los 150 de la suerte mayor, y los cientos medianos y cincuenta menores	*300 knees, 150 large ones, 100 medium ones and 50 minor ones*
50 bularcama	*50 riders*
1600 codos de tabla de a 5 en codo	*1600 codos planks 5 en codo*
3.500 codos de a seis en codo	*3500 codos planks 6 en codo*
(f. 102 v) 2.800 codos de a siete	*2800 codos planks 7 en codo*
3.100 de a ocho	*3100 codos planks 8 en codo*
2.000 codos de a 12	*2000 codos planks 12 en codo*

Table 6.6 Table on the wood required to build a 500tons galleon, supervised by Agustin de Ojeda in the year 1603[70].

It is not by surprise that the early seventeenth century standardization of shipbuilding regulations, coincide with a period of rather strict harvest of specific timber for the production of war ships. In this galleons list, one can see the number of pieces that were needed and the

[70] This document is related to the Asiento mentioned above, from *Isidro Sanchez de la Mota*, on a separate page, *(f. 268v) Relación de los precios y codos de madera y tabla que lleva un galeón de 500 toneladas, y otro de 400 toneladas y otro de 300 en esta manera*

system of planking used, applied to the construction of ships for the *Armada del Mar Oceano* and the Indies route. The planking and the frames were the most numerous timbers, in all of their variety. The construction of these vessels, therefore, was a priority for a monarchy eager to control a rather limited resource, such as the oak forests, and difficult to produce in the trees, requiring some years to be properly formed.

The economic cost of the asientos and direct control in the shipyards was effective and created the designs that were adequate for the interests of the king, but their use of resources and costs was large, and difficult to sustain for Spain. Despite there was some peace treaty with the Dutch and the English during the early 17th century, the imminent danger of a European war seemed plausible against the protestant enemies, and Spain used the peace time to regain its strength to prepare for another war time. These threats and the involvement of the state authorities helped justify the participation in local forest matters, but the motivations behind state forestry varied over time (Wing, 2013: 117). Madrid was forced to find an equilibrium between the tensions inside of its borders, and its own interests, as Wing said:

> *"…the struggle to balance local and imperial interests revealed the limits of state power but confirmed that early modern Spanish society was capable of conserving forests to keep Spain afloat…"* (Wing, 2013: 118)

6.11 The 1607, 1613 and 1618 Spanish Ordenanzas: The imposition of the king's interests for war

The first two decades of the 17th century brought a dramatic imposition over the Northern shipyards of the Iberian Peninsula in the form of a series of regulations for the Indias trade. By the early 17th century, in 1607, 1613 and 1618 the *ordenanzas* were written (Hormaechea, Rivera and Derqui, 2012: 293-294). These laws made in 1607, 1613 and 1618 were just part of the same process of imposition of the interests of the Monarchic enterprises over the Iberian Bizcayan shipbuilding that had started earlier in the 1560s. The *ordenanzas* were a series of subsequent shipbuilding legislations that attempted to work as a mechanism of control of the private shipbuilding sector. Despite the Spanish ordenanzas were the first attempt to homogenize and standardize shipbuilding in a Spanish scale, finally they failed to be implemented in a thorough manner.

These regulations were slightly modified over these eleven years. As a paradox, the people that were looking for an ideal standard to impose over the shipyards in the Iberian Peninsula did not maintain a solid homogeneous proposition, as their standard gradually changed over the three regulations. However, the *ordenanzas* did have many things in common, and their real purpose was to militarize the construction cargo carrying ships to be used in the Armadas and Indias route, in order to protect the convoys from pirates and to carry silver and goods to Seville. It could be said that these *ordenanzas* were an attempt to make the ideal vessels a reality by using the force of law. Also, these three *ordenanzas* show that the standards by which the Indias route were run in terms of shipbuilding had failed to succeed by the standards of the mercantile private shipbuilders. In other words, the fact that three subsequent regulations were released over the period of eleven years, is prove that either the Spanish efforts to standardize private mercantile ships (That were at hand to be confiscated) were unsuccessful or that the context in which these regulations were created, was a context of threat and stress for a rather desperate Spanish Monarchy, willing to take advantage and use all its tools at hand to defend their monarchic interests reflected in particular designs of shipbuilding (Rodriguez Mendoza, 2008).

Despite these efforts, and the specifications in these texts, the confrontation of the mercantile bourgeoisie against these new proportions and measurements were quite strong. These conflicts of interests were not unique to the north. After 1613, still in 1614 merchants trading in the Indias route in Seville, were not compliant with the 1613 *Ordenanzas*. In a memorandum to the king after local investors and merchants from the *Universidad de Mareantes que navegaban en la Carrera de Indias*, or the University of Seafarer's that navigated in the Indias route, saw their entrepreneurship in danger and pleaded to the King not to confiscate their ships, as those were very poor years when no single man could invest in a *nao* on his own[71]. Difficulties over the risk of investing on the construction of a ship seemed

[71]AMN, Navarrete, Manuscrito 33, Doc. 11: "*Memorial dirigido al Rey por la Universidad de los Mareantes que navegaban en la Carrera en las Indias, de Sevilla, pretendiendo, que por estar todas las naos que andaban en ella con defectos de los prohibidos por las nuebas ordenanzas mandase S.M. dar tiempo competente para consumurlas; que por que de lo contrario quedaría destruido todo el comercio, y arruinado tanto numero de vasallos*"

clear by these early 17th century, and the coercion of the monarchy could not have been stronger in this period.

B-K R	*B-L R*	*D-L R*	*D-B R*
3	*3.6*	*7.2*	*0.5*
2.91	*3.55*	*7.09*	*0.5*
2.83	*3.46*	*6.92*	*0.5*
2.81	*3.46*	*6.92*	*0.5*
2.71	*3.43*	*6.86*	*0.5*
2.67	*3.37*	*6.73*	*0.5*
2.63	*3.31*	*6.63*	*0.5*
2.59	*3.29*	*7.00*	*0.47*
2.56	*3.28*	*6.56*	*0.5*
2.53	*3.58*	*7.16*	*0.5*
2.45	*3.15*	*6.30*	*0.5*
2.43	*3.14*	*6.29*	*0.5*
2.41	*3.09*	*6.18*	*0.5*

Table 6.7 Ratios from the different vessel sizes in the Ordenanzas 1618. (Hormaechea, Rivera and Derqui, 2012: 246, 272, 293)

The imposition of these proportions definitely differed with the proportions of previous Bizcayan merchant *naos* (Odriozola, 1998: 97), shorter in their keels and length and deeper in their hulls. However, the new *ordenanzas* clarified the way ships had to be made for the monarchic service. Compared to Bizcayan *naos* from the 16th century, the proportions suggested by the 1618 *ordenanzas* were for longer vessels with shallower hulls, although they kept a similar beam width.

6.11.1 Portuguese and other influences in the Spanish Ordenanzas

In the Ordenanzas 1613 (Hormaechea, Rivera and Derqui, 2012: 270) and 1618 (Hormaechea, Rivera and Derqui, 2012: 292) the channels used to tie the hawsers from the masts were specified to be made on the Portuguese way. Also, some linguistic references in Spanish shipbuilding for ship design come from Portuguese concepts, such as *punto de escoa* in Spanish that means the turn of the bilge point, or sirmark (Adams, 2013: 130). This comes from the word *escoa* in Portuguese which is translated as stringer and that turn of the bilge line was placed in the same place as this stringer. More mixture occurred at the time when the influence of the Portuguese was clear, for example in 1605 is specified in written sources that the keels of 8 galleons should be built with the width and depth of Portuguese keels[72]. Also, the masts of these galleons were made on the Portuguese way and not in the Flemish one[73].

In a way, the Spanish *Ordenanzas* 1618 were a little bit what worked best from different traditions, applied in one text and mixing techniques of ship construction, as well as finding inspiration from various shipbuilding centres or traditions. The Flemish clinker style was also said to be used, when building the upperworks *...”* (Odriozola Oyarbide, 1997: 465). Techniques from the English shipbuilders were copied, as for example, when making the riding bitts; *“La vita ha de ser a la Inglesa, fortificada con sus corbatones, …*” (Odriozola Oyarbide, 1997: 463). *“The riding bitts should be made in the English way with its corresponding knees”* Translation from the author.

6.11.2 Changes in the scantlings of planking by the late 16th and early 17th century

The ordenanzas did not limited their specifications to ship design and measurements, but many of the aspects of the construction of a ship. Amongst these, a system of planking thickness was specified at certain heights of the ship, according to the size of each vessel. The hull was more robust and the upperworks lighter, Planking was thick in the mid-16th century and early 17th century, compared to the early 16th century. Many factors could have affected this, but there were at least two clear ones, the effect of the artillery in ships, both for being more resistant under fire and shooting, the other one was the sea worm and the need for a more robust hull, which was watertight and safe from *teredo navalis*, a common problem for those ships venturing into the Caribbean and the Indies routes.

Scantlings of frames and futtocks were not specified in the ordenanzas, but surely these would have been appropriately suited to each size of a vessel. In order to understand the gradual

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72 AGS, GYM, 652, 1605 6 julio: “*Asiento de martín de hoyo, 6 galeones asiento, Pedro de Goizueta*”

73 AGS, GYM, 652, 1605 6 julio: “*Asiento de martín de hoyo, …*”

increasing thickness of planking, the incorporation of artillery appears to be a major factor. In 1581Cristobal de Barros wrote to the King:

> *"...They have to be built with a lot of strength (the galleons, referring to their structure) and why: I say that they have to be built with a lot of strength so when they can approach and run away (from other ships) can suffer a lot from the sails, that work a lot, and because their sides have to suffer lots of heavy artillery and the effect of a heavy thunder, that just this one can make a building shake on the ground with the air that brakes, as it is seen, this strength is more needed for warships depending on their size, smaller ones (specially), because it is more harmful for them than to large ones, that with the strength of their parts that they require, they withstand it better..."* Translation from the Author-

However, it is interesting to see that by looking at documents from the early 17th century the planking had become much thicker, including thicknesses of 5 by *codos* and 6 by *codos*. One of the major aspects to consider in the *Ordenanzas* in general is the standardization of the planking of ships. Compared to the mid-16th to the late 16th century *naos*/galleons, the planking specified was much thicker in the *Ordenanzas* than in previously built ships (Hormaechea, Rivera and Derqui, 2012: 293-294). This system specified the width of the planks at the height in the hull and upperworks of the ship, according to the beam width of the ship. In these *ordenanzas* it was still specified for the upperworks that pine from Flanders should be used, that was not originated in Flanders but in the Baltic region (Hormaechea, Rivera and Derqui, 2012: 272, 293). Pine planks and tree trunks were typically brought from what, in Spanish documents, was referred to as Flanders, but which in reality it was Baltic timber. Flanders was a redistribution centre of timber at the time, for this reason, the control over the Sound toll in Denmark, and the control over the trade of pine wood, made the Dutch a very successful nation by trading with the Baltic Pine with the Southern European Monarchies.

In this system, the *codo* measurement is used to specify the width of the plank. Each codo was 57,47 cm. The thickest planks were at 5 *en codo* or in other words 5 planks for each codo, then six, seven, eight, nine and ten. In relation to the early 17th century vessels, it could be said that the planking of these ships was thicker and only specified for ships beam +17, 16, 15, 14, 13, 13, 12, 11, 10, 9, and 8 (Hormaechea, Rivera and Derqui, 2012: 293-294). Also, it must be added that the specifications for the ship design was also much more detailed that the contracts for *naos* from previous times.

This planking list was shown in the three *ordenanzas* 1607, 1613 and 1618, which was defined as it follows (Hormaechea, Rivera, Derqui, 2012: II, 246, 271, 272, 293, 294): 5 *en codo* (11.4 cm), 6 *en codo* (9.5 cm), 7 *en codo* (8.1 cm), 8 en *codo* (7.1 cm), 9 en *codo* (6.3 cm), 10 *en codo* (5.7 cm), 12 *en codo* (4.7 cm) and 14 *en codo* (4 cm). This thickness standard was also applied in contracts to build ships, timber supply for repairs, construction of ships and apart from the Ordenanzas 1607, 1613 and 1618. These are some of the most significant differences from the mid-16th century vessels, to the late 16th century and early 17th century ones, clearly having evolved in the use of artillery by the early 17th century.

6.12 Thomé Cano, 1611

Thomé Cano was an experienced sailor and shipbuilder, born in the Canary Islands of Spain, in Tenerife. Having sailed for 53 years including 29 times to the Indies, in America, his reputation as an experienced captain was not disputed. His journeys taught him the secrets of sailing and all the features that a good ship needed to cross the Atlantic depending on the needs. Cano left his insightful experience, in a rather fascinating narration of how ships should behave under certain proportions and the advantages and disadvantages of different ship designs, all of this reflected in his famous book *Arte para fabricar fortificar y aparejar naos de Guerra y merchante* (Translation: *The art to build, fortify and equip the rigging of war naos and merchant ones*) (Cano, 1611). But also, Cano was one of the experts that took part in the debates over the design of the Ordenanzas 1607 (Phillips, 1994: 109). The search for an ideal vessel to suit the purposes of the Spanish Indias routes and defence of this kingdom would not be solved by 1607 and the proposed Ordinances, despite the greatest shipbuilding experts of the Iberian Peninsula, both of Spain and Portugal, took part.

Due to this experienced he understood the problems of different proportions and how these affected the sailing capacity of a ship and the shape of its hull. He distinguished two main groups of ships: the first were shallow and long keel ships, which were good for sailing, although they were more likely to be unstable under the effect of side waves. The differences on the hull for a fast ship, with a shallower hull, from a deeper hull, more suitable for transporting goods and how these affected the sailing capacity of a vessel were well illustrated in his book (Cano, 1611: 15-25). By that time, Cano was reflecting on the problems of the militarization of merchant vessels, and the inadequacy of those impositions on the merchant fleet, and the harm that was done to merchant investors and shipbuilders.

The theory mentioned in Cano´s book is an interesting synthesis of the different processes of the various shipbuilding traditions within Spain at the end of the 16th and early 17th centuries (Cano, 1611:19-21). Cano's views on the topic of ship design give a precise and technical overview on ship proportions and the functions of these. He added his knowledge to a contemporary debate that lasted many decades, which included a number of expert shipwrights from both Portuguese and Spanish lands, and from many regions in order to find out some common order and agreement on which should be the best ship for the Spanish monarchy. His main descriptions, however, distinguish two types of ships, which he called war *naos* or merchant *naos*. He specified the details of their proportions and explained why these features were significantly important, for each of those specific "functions" which he described as clearly different.

6.12.1 Cano's war and merchant naos

Cano said that war *naos* were very good vessels when sailing directly into waves, because they could catch two waves along their long keel, allowing a more stable navigation during stormy weather. The second group was defined as having a short keel and a very deep hull. These vessels were not as good because they could not catch two waves along their short keel, so they used to hit the water hard, pitching downwards with the prow of the ship. Although they were not as fast as the other vessels, these deep-hulled vessels had a more stable reaction to waves coming from the sides. Also, at the end of the book he described his ideal proportions for these two kinds of war and merchant *naos*. The war *naos* had a beam of 12 *codos* (6.84m), a keel of 36 *codos* (20.52m), the depth of the hold being 7 *codos* (3.99 m) and an overall length of 53.7 *codos* (30.60 m). These were, according to Cano, the ideal proportions for a ship whose beam width was 12 *codos* (Cano, 1611).

Some of Cano´s ideas were in line with the 1607 *Ordenanzas*, especially for the ships with a 12 *codo* beam. The measurements given for a 12 *codo* ship, (on the beam), were quite similar to his ideal proportions. The *Ordenanzas* specified a beam of 12 *codos*, depth of hold 6.5 *codos*, length 43 *codos* and keel 36 *codos*. However, according to what Cano says about measuring the depth of the hold, the old way of measuring it is not correct. He argues that the depth of the hold should be measured from the widest point of the beam. From this point, he adds another *codo* upwards to the weather deck. So probably the 6.5 *codo* depth is actually 7.5 *codos* according to the account given in the book, which specifically states that the method of measurement has changed.

6.12.2 The decadence of merchant and fishing Bizcayan ships in Spain (1611)

Many were the problems that discouraged Bizcayan investors interested in the European trading routes and Atlantic fishing from building ships inside the Spanish Kingdom, due to the risk of confiscation with which the Spanish Kingdom had been supplying their fleets during the 16th century. In Cano's opinion, the loss of the Spanish maritime power was due to the private merchant decline, and in turn, the decline in the merchant investment (Cano, 1611: 47r-47v). All of this, he said, was due to the trading freedom other countries enjoyed whereas in the Spanish case, they were more tied and limited to one annual fleet, and one single trading route to the Indias (Cano, 1611: 45v). In a brilliant text, Cano spoke about the state of the merchant private shipbuilding in the Iberian Peninsula, and the state of decadence of the Spanish Empire and puts into perspective how these problems seem to have persisted and worsened as he stated:

> "*…25 years ago, there were more than 1000 tall naos in Spain. Only in Bizcay there were 200 that went to Newfoundland in their voyages for the whale oil and cod fish and to Flanders for the wool, now there are none. In Galicia, Asturias and the Mountains, there were more than 200 Pataxes that navigated to Flanders, France, England and Andalusia, carrying goods for their trading activities, now there are none. In Portugal, there had always been more than 400 tall naos and 1500 caravels and carabelones (Big caravels), from which the King Sebastian could take and use in the futile enterprise to Africa, that he made with 830 sails, still having enough ships supplied for his navigations to India, San Thome, Brasil, Cape vert, Guinea, Terranova, and other parts, having now just a few naos. In Andalusia, we used to have more than 400 tall naos, more than 200 navigated to New Spain, and Tierra Firme, Honduras, and the Islands of Barlovento, in a fleet of 60 to seventy naos. The other 200 navigated through the Canary Islands, to Indias and its islands, and were destined to other navigations with wine cargoes and goods…*" (Cano, 1611: 44v-45v). Translation by the author.

6.13 The end of Iberian Bizcayan ships? 1618-1650

After the Spanish *ordenanzas* of 1607, 1613 and 1618 Spain became involved in escalated warfare, namely the 30 years' war, for almost the whole period (1618-1648). The war of Flanders continued and the silver route with America still required the military deployment of the Spanish Monarchy in Europe, however, the conflicts with the northern shipbuilders continued (Alberdi, 2012: 455).

The demands of the Monarchy were never fulfilled. In their wars, they lost many lives and battles, marking the beginning of the end. In the battle of *Dunas*, in 1639, the *Armada del Mar Oceano*, led by *Don Antonio de Oquendo*[74], was completely destroyed by a Dutch fleet and left stranded on the sandbanks. After the battle the northern sea route was abandoned, together with the aspiration for any maritime hegemony for Spain (Serrano. 2003: 117). In fact, the Empire was requiring the service and support of other regions to sustain its possessions, to the point that the Armadas were "*multi-national conglomerates, with squadrons and their officers from Dunkirk, Naples, Genoa, Ragusa, as well as English ships and of course Portuguese and Cantabrian squadrons*" (Elliot and García Sanz, 1990: 14).

The 1640s were years of shipbuilding decline, but according to Odriozola shipbuilding only started to recover in the 1650s. The only way of recovering the shipbuilding industry was to allow them to build their own ships, appropriate for their own journeys to Newfoundland, Andalusia and *Yslas*, with just one artillery deck to be used for war (Alberdi, 2012: 482-483).

The Spanish Armada was defeated again in 1656 by the English (Serrano, 1998: 224). The crisis of Spain as a hegemonic power was clear and its role as one of the ruling countries in Europe was vanishing. Instead, Spain concentrated on its American possessions and the connections with these lands.

Increasing dimensions of the warships by the late 17th century, and the monopoly of the monarchic interests over the American trade created an increasing problem with the sandbar of

[74] He was from Guipuzcoa and his house is still nowadays in San Sebastian.

Sanlucar de Barrameda, where many ships hit the sandbanks and perished. The conservative Sevillian elite clashed against the interests of merchants to move the *Casa de Contratación* to Cadiz, with a deeper shelter and an entrance for larger vessels (Serrano, 2003: 119-122).

In a brilliant sentence, Fernando Serrano Mangas synthesised the Spanish monarchy of the middle of the 17th century. Serrano Mangas reflected that what was happening inside the kingdom was also taking place in shipbuilding; the collision of two opposite mentalities. One represented by the conquest and the *criollos* (American elites) and *andaluces* (Andalusian) others, the other by Basques and *montañeses* (Cantabrian people) more related to trade and a more capitalist way of thinking. Serrano wrote: *"A whole world separated the two ideas that coexisted in a universal monarchy, full of contradictions"* (Translation by the author).

6.14 Conclusions

The militarization of the Indias ships had been taking place gradually in the Basque Provinces and shipyards. The clear influences from the North and specifically from Dunkirk indicated that contact with shipbuilders in Spain must have been made in order for their designs to be copied. The end of Basque trade with Flanders and their involvement in Dutch whaling expeditions was intrinsically linked to the rising influence of Dutch shipping with Spain and in the whaling activities as well as Basque decadence in the whaling activity. These events were not a coincidence, as the influence of Dutch shipping must have come from an intense contact with Dutch trading vessels.

It seems that the transnational influences and the shipbuilding changes went beyond Spain. Despite the standardization attempts imposed by the crown, the Ordenanzas did not solve deeply rooted problems of a Spanish monarchy, with a clash of interests that undermined its economic and political unity. Bizcayan shipbuilding shifted towards a better sailing fleet, participating in the Indias trade more intensly, focused on the military aspects of shipbuilding. It could be argued, the former merchant fleet, became mostly an armed merchant ship design, combining cargo capacity and sailing designs, in order to carry goods from the Indies, and defend these from the enemies of the crown.

7 Final Conclusions

7.1 A search for an unchanged identity

When this research started, the search for a set of Iberian shipbuilding characteristics was something of a personal identity search, tracing the roots of one's own ancestors. In this case it was initially thought that the study would clarify whether there was any special Basque characteristic, distinct from other regions. In those times I would identify with Basque culture, but not others, such as Portuguese or Spanish in the same way nationalism focuses on the separation of cultures. This nationalist approach affected my research to the point that I was looking for clear features with which to categorise and separate shipbuilding traditions. Such was the starting point for this research. However, this research revealed a certain level of entrenchment in terms of the denial of other cultures and a constant effort to differentiate and distinguish oneself from those that were considered "not us". All of this activity seemed to be very discriminatory, to the point that it was blinkering my research. Thanks to this thesis, those apparently solid boundaries between people, between traditions, nations, the environment and surrounding entities now seem to be our own constructs, maintained only by ourselves.

As a result of this research I find myself more identified with "those" who were initially considered as "others". Indeed, instead of identifying as an isolated Basque, appreciating only one side of the picture, I feel more connected to other traditions, even those we considered not to be ours. In the search to find what is common within a region, in this case the Bizcayan tradition, the fact that regional diversity existed was being obscured. This way of understanding culture, reached a point that the way one understood tradition changed. This means that in this thesis a tradition is not considered in a simple singular way, but rather as a paradox, it includes differences within the same category of tradition. So instead of finding distinct “Basque” or “Bizcayan” attributes, these cultures actually seemed to have more in common with other regions, as well as being different, and diverse in their tradition, not just homogeneous.

Instead, through this research it was discovered that traditions related to the Bizcayan shipbuilding were not bound by cultural borders. In other words, that shipbuilding traditions related to the Bizcayan shipbuilding were not separated, despite the spatial distance. Cultures and traditions are “open” entities and mixed with other areas culturally. This mixture does not show a clear-cut spatial region, but a connected one. In this sense, the Bizcayan shipbuilding tradition is included in a wide scenario of exchange and influence. These differences can be accepted and this certainly had an effect on the research.

By including the marginal, peripheral and “less important” narratives, interests and endeavours, in order to leave behind the inequalities, the discrimination and the separation that occurred, we can create a framework based on the inclusion of differences, as well as similarities. However, as long as we maintain these clear-cut boundaries between groups, we will think we are separated, or that there is independence from the “others”. If we do not take these differences into account, there is a risk of attempting to understand the whole panorama through the eyes of a few. And this will always lead to a periphery and centre idea of what is more and what is less important, in other words it could lead to further discrimination. Decentralizing our own perspective and expanding to a wider context of different people would be a relevant process for placing oneself culturally in a broader mixed picture, where even distant regions can participate in a broad cultural exchange.

This is not to deny the unique elements that each region possesses, something which has been clearly demonstrated, particularly with regards to the differences and peculiarities of Iberian-Portuguese shipwrightry, but also the work of Iberian-Bizcayan shipwrights. Future studies might be able to clarify the distinctive elements of Iberian-Andalusian or Iberian-Mediterranean shipwrightry. Future studies in Iberian shipbuilding could find much to discover by concentrating on the Atlantic Andalusian tradition. Cano refers to this shipbuilding as having more than 400 tall naos and from these, 200 navigated to the Indies (Cano, 1611: 45). It is known that Basques used to build ships to sell them in Seville, yet, these were a small percentage of the whole of the fleet, that was sourced from elsewhere. The discovery of ship remains, archival work, and the application of dendrochronology as well as dendroprovenance, could help find and distinguish another beautiful corner of the Iberian family of shipbuilding, that of the Andalusian entrepreneurs. This will be a future work for those with the interest to investigate.

Also, future research should aim to work in the immense volume of information in the archives, that is not known. The volume of information in some of the sections, not only in *Archivo del Museo Naval*, in Madrid, *Archivo General de Simancas*, in *Archivo de Protocolos de Guipuzcoa* but also in other archives such as *Archivo General de Indias* there is still information that has not been used Also, only a small sample of the French archives has been used, from the *Archives Municipales de Bayonne*, which gave very scarce information. In the *Archivo de Protocolos of Guipuzcoa*, for example, from approximately 3.000.000 documents in all the years they have been open archivists have only examined 400.000 documents. This gives an idea of the amount of information yet to be studied and could encourage people to find new research data in these archives.

7.2 The spread of Bizcayan shipbuilding into France(1560s)

It has been demonstrated that the old merchant interests migrated to the other side of the Spanish border, into the French Labort. Overall, the imposition of changes in ship ratios and sizes gradually escalated throughout the 16th and early 17th century towards more militarized regulations imposed upon private merchant ships so that they could be used in the Armadas. When we speak of ships built under the political domain of the Hispanic Monarchy, there are a number of social interests, linked with economic activities that undermined the “unity”.

Therefore, the idea of a national technological unity, does not apply in this case with Spain, nor in the Basque region, in which coexisting conflicts of interests still caused division and impeded a singular monodirectional “innovation”, in other words, a consensus over what constituted the ideal ship. Spain did not have any coherence in terms of the interests of its social groups. The disparity of interests was reflected in social groups of influence who struggled to become the "central" dominant group.

In this conflict, that those Basques that adhered to the Monarchic enterprise succeeded in their relations with the Spanish Crown. However, those that were more interested in the Newfoundland fisheries and northern trading routes adapted and left Spain, instead, using their investments to build ships in France. For this reason, the Bizcayan tradition was also beyond the political boundary of Spain. The geographical name, Iberian, is the right term to express a spatial context if it was built in Spain or Portugal. When it comes to the cultural and technological aspects of ships, the Iberian ships cannot be independently observed without taking into account the broader context of which they were part. In this case, the Bizcayan term is attempting to address the spread of the technique beyond the Iberian Peninsula, into France.

Although Spanish historiography has disregarded this historical fact, there is a whole historical research line which is studying the changes in the Bizcayan shipbuilding tradition that migrated into France, interpreting it as part of a wider transnational network of influences. As an alternative to the shipbuilding crisis, by taking into account the relationship of Basque investors with the enterprises in the South of France, a continuation of the Bizcayan merchant enterprise and the shipbuilding of fishing and merchant ships is perceived.

7.3 Belonging to a transnational network of interdependent traditions: The Bizcayan shipbuilding tradition

The variability and difference within a region and society, challenges homogeneous narratives of identity, instead showing an apparent contradictory reality of diverse interests, showing a paradoxical society. Thus, in a way both the similarities and differences can confirm our map of shipbuilding techniques. There was no replication of a specific for of the same tradition, but rather a continuous different expression connected to this tradition. This is a paradox. How can a different form every time, be the "same" tradition? That is why this research questions the homogeneity of the Iberian model, particularly the Bizcayan tradition.

Thus, due to a process of hybridization, it is difficult to distinguish one tradition from another, or in other words, this study of the Bizcayan tradition shows the overlap with its neighbouring related traditions, e.g. Portuguese, Spanish, Mediterranean and English ships. There were no fixed closed borders, but rather, the Bizcayan tradition was porous. Shipbuilding traditions can be considered to belong to a broad technological context, that of ***a network of interdependent traditions***.

During one hundred years (1550-1650), what has been called the Bizcayan shipbuilding tradition, dramatically changed. Therefore, the idea of a shipbuilding tradition, applied to the Bizcayan case, is paradoxical, not fully coherent, but with a clearly similar set of characteristics. Bizcayan shipbuilding was in constant adaptation during the late 16^{th} century and early 17^{th} century. In this shift, the shipbuilding tradition rooted in earlier centuries had previously developed during the medieval period. During the 16^{th} century, the Spanish Monarchy continued to accommodate the interests of an expanding elite that rooted its hegemony in Europe through complex maritime connections.

The variety of economic interests within a region, reflected in the shipbuilding of the Bizcayan tradition, were not addressed by Oertling. The Spanish intrusion with their interests, resulted in a hybrid shipbuilding between a war-oriented vessel (e.g. a war *nao*, a nave or a galleon) and merchant cargo carrier (a *nao*).

On the following pages, the changes in the concept of a ship type will be seen, particularly with regards to how the convention around the ship type design and paradigms completely changed. It could be argued that there was a dramatic change from the mid-16^{th} century, to the early 17^{th} century. The European conflicts, political hegemony and the shift of power towards the north, as well as the decline of the Southern European countries, changed the influential centres of shipbuilding in Europe. This was reflected in how ships were made, and which shipbuilding traditions each monarchy or republic respected.

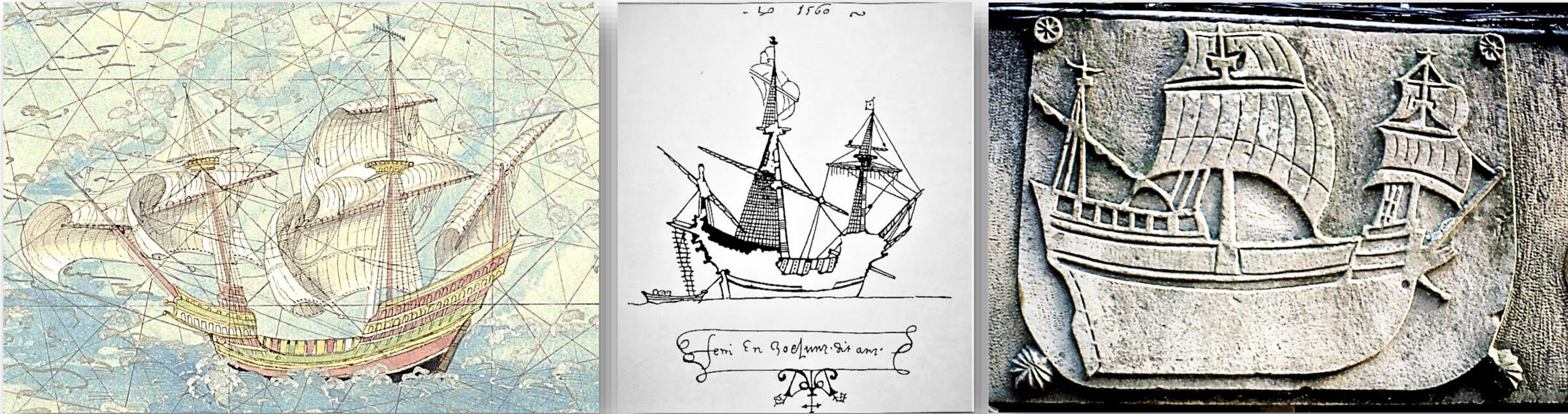

Figure 7.1: (Left to right) Left) A possible galleon (Peter Kirsch, 1990: 6) Guillaume Le Testu (1555), Middle) 1560 Cantabric Nao in Valencia (Casado Soto, 2003: 40), Right) The Aganduru nao, from Orio, (circa 1560) (Photo credit: Joseba Burdain Santos). High castles in the bow and stern, deeper hulls and shorter ships characterized the first half of the 16th century in the Bizcayan tradition. The Bizcayan bourgeoisie invested in these ships to trade with Flanders with wool, with the Mediterranean with iron and to exploit the fisheries in Newfoundland. , was not other than the continuation of the Iberian Bizcayan tradition, that kept investing in these journeys, after thousands of people from the Spanish Basque side, migrated to the French side, and continued building Bizcayan ships with cheaper wood and funded by the Bizcayan bourgeoisie, settled in the Spanish side of the Bizcayan region. They continued with their endeavours for more than a century and surely influenced French shipbuilding, but this part of the story is not known yet.

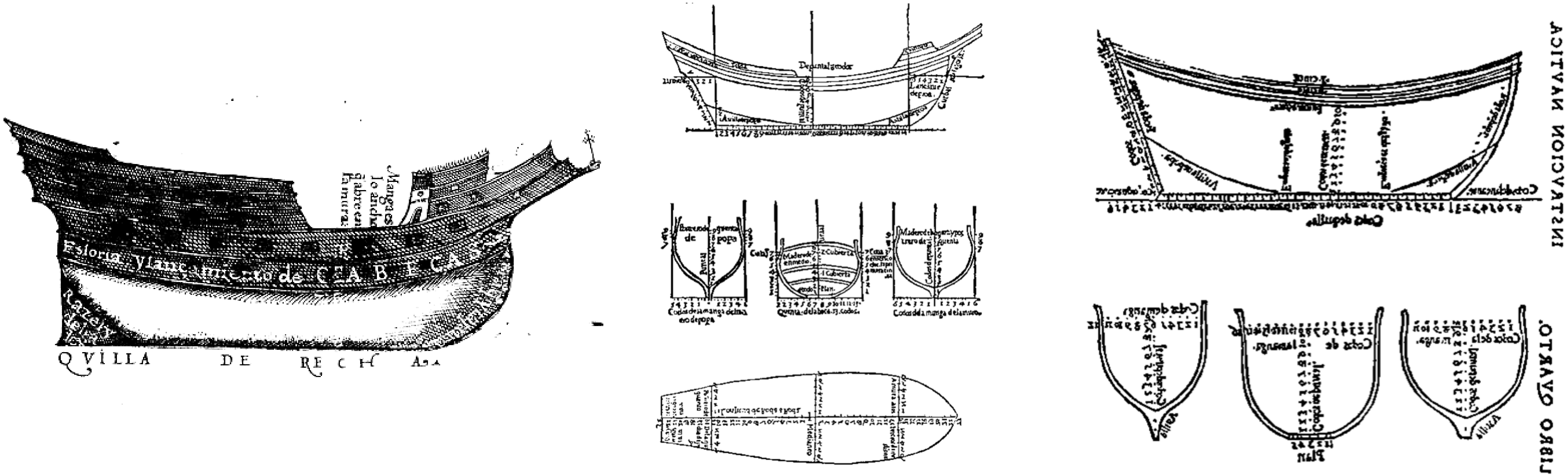

Figure 7.2: (Left to right), Left) 1575 Nao, (After Escalante de mendoza, 1575) Middle) 150 ton Galeoncete, García de Palacio (1587) Right) 400 ton Nao, García de Palacio (1587). The introduction of military interests into the merchant fleet and the development of scientific techniques to obtain shapes and conceived through experimentation and trial and error, started to develop a machinery of war that was meant to keep the Spanish Empire together. While the experts wrote about treatises, the majority of the 1588 Armada was formed by confiscated merchant naos. The clash against the English modern design, and obvious delay in the development of a military vessel, accelarated the construction of a Spanish permanent fleet. The majority of what we call Spanish Indias fleet, was sourced from timber from the Basque area, and built there, up to the1580s.

Figure 7.3 According to Casado Soto (Casado Soto, 2003: 62), the Portuguese Galleon in the "Sala de las Batallas" from the battle of Azores, 1583 (Left), was based on a drawing from Peter Bruegel the elder made 40 years prior to the fresco (Right),based on a stylized carrack from the mediterranean. The production of larger and armed merchantmen (Which could be the Spanish concept of a war nao) were not as advanced against the modern English and Dutch designs. Bizcayan shiprights started follow the influence of ship design from Dunkirk. The old whaling vessels became archaic.

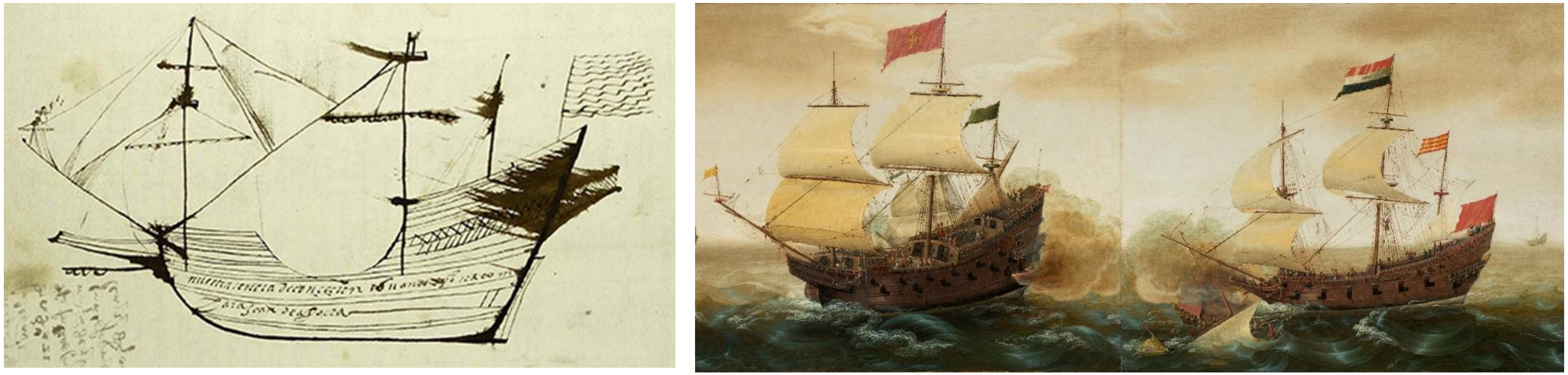

Figure 7.4 (Left to right), Bizcayan nao from Usurbil, "Nuestra Señora de la Concepción" (1611 From the Archivo Historico Provincial de Guipuzcoa, Oñate (Casado Soto, 2003: 67). Spanish Galleon (left) firing a Dutch warship (right) Painted by the Dutch Cornelis Verbeeck, (Around 1618/1620). The acquisition of designs from Dunkirk and the use of this against the Dutch seemed to be unfruitful. The constant wars, superiority of their enemy's navies and the loss of military power of Spain, led to the Battle of Dunas, 1639, when it seemed that no effort was meant to control the growing Dutch power, which would end only after the treaty of Utrecht in1648. Bizcayan shipbuilding had already fully evolved into elongated and shallow hulls, long keels and lighter vessels. This complete transition, despite successful, could not stop the imminent loss of power that the Spanish Empire suffered. This led to the concentration of all of Spain's naval efforts to develop an armed merchant convoy, or military merchant vessels to protect the colonial trade and Indies routes.

7.4 The remains of the Bizcayan Tradition: The evidence of a southern renaissance wave of technique and shipbuilding influence

This work shows the relationships and influences beyond the Bizcayan tradition, as if they were the remains of a much larger process, that of a broader spread than just a confined shipbuilding limited to the Iberian Peninsula. Definitely, the Bizcayan region and its shipbuilding tradition, was not an isolated island. In this sense, it would be good to finish with a final reflection. That of a spread of shipbuilding techniques that took different forms throughout the Mediterranean and Atlantic shores. The Portuguese and the Bizcayan traditions were the fruits of an extension from the Mediterranean of a renaissance method of building ships, that went beyond the Iberian Peninsula.

The Portuguese pioneers first, but the Basque entrepreneurs as well, developed the first trans-oceanic routes that reached Japan, Canada, South America, and the Philippines in a completely different way from previous times. Although these lands which the Basques and Portuguese explored were old trading routes for other communities, the Europeans became aware of a new possibility of trade and expansion of their capacity to reach the spices and mythical lands that were only known in legends from the Medieval period.

Thanks to the ability of regional communities, that had somehow gathered a conjunction of techniques and adapted to them to their present need, Basques developed some confidence in building *naos* and reached the fisheries from which they profited from the early days of the discovery of Newfoundland. The Portuguese however, developed as a monarchy, had a vast capacity, in comparison to Basque merchants and their limited efforts. The Portuguese built some of the, possibly, largest ships of the time, the *nau das Indias*. These ships travelled to Asia and brought new products and created a favourable exchange for Europeans, that started exploiting the idea of a colonial empire in far regions. All of this would not have been possible, without the technique of ship construction that spread gradually from the Mediterranean, and throughout the 15th century, that reached Portugal, and step by step changed all the medieval clinker construction and its tradition, to a new carvel construction, spreading from south to north.

In this spread of technique, Basques and their Bizcayan tradition of shipbuilding took part in an intense connection with the northern regions of the Iberian Peninsula, in the European Atlantic. Bizcayan ships were transporting cargo from the Mediterranean to the Northern redistribution centres in the Atlantic façade, such as Bruges or Ambers. It was an unintentional process, but little by little, the contact that the English, Dutch, Danish, Flemish, Hamburg, Normandy, Bretons and French had with the southern centres gradually occurred. This led to a shipbuilding influence by the early 16th century.

The Genovese and Venetian shipwrights, Portuguese and their "*Caravelas*", Basques and Bizcayan *naos* and even Andalusian shipping, the Ottomans, or even the large north African Arab tradition surely influenced and benefited from a cultural-technological exchange with the north of Europe and its Atlantic. And here lies the paradox. The south influenced the north, but the north did not replicate, but adapted its technology to their tradition's needs.

One would not consider those boats built in the Dutch flush mode to be of the same tradition, nor the English carvel-built ships, nor the Swedish *Vasa*. However, all these ships share a common ground. Carvel technique of construction. And despite carvel construction was differently adopted in various traditions, it is important here to point out that the ubiquity of carvel is the result of the spread of this southern northern direction of influence, like a cultural wave. The techniques we see spread in the Portuguese tradition and their caravels and *naus*, as well as what is seen in Bizcayan *naos* and galleons, despite from different regions, they shared construction techniques, and influenced the northern traditions with which they hybridized. This mixture, had been, and always was, naturally occurring, as the permeable cultural communities always learned and inspired each other, as well as adopted in their own benefit, the advantages that other groups carried with them.

The shipbuilding that emerged from this mixture was neither exactly what was coming from the Mediterranean, nor what had been used for centuries as the clinker construction. However, despite this technique being somehow influenced from the south, a transitional point occurred in the shipbuilding influences of unprecedented reach. This transitioning concept, we propose here, was a connected process, interdependent, by placing in the same spatial concepts the seemingly opposing cultures, in this case shipbuilding traditions of Bizcay, Spanish, Portuguese, English, Dutch, French and others. In this concept of transition, every stage or step of this changing process of culture, is regarded as completely connected to the previous and therefore not separated at any time from the "other" stage. In other words, the spatial "traditions" that we describe are all related and not separated in a chain of actions and influences.

Northern shipbuilding countries, at one point, such as the Dutch and the English, started influencing southern old shipbuilding centres, such as the Bizcayan tradition and their ship design, and affected Spanish shipbuilding but not so much their construction techniques. In other words, that the forms of vessels from the north, or proportions and design started to be copied by shipbuilding centres that had previously been influencing in the opposite direction.

In this shipbuilding transition of a shift of direction in the influence of design and change of paradigm of ship trends, seems relevant to relate the rise of this sudden influencing drift, with the decline of the Mediterranean kingdoms, such as Venice and Genova, but also the Iberian ones, such as the Spanish and Portuguese. At the same time, the rise of the Northern powers, such as Swedish, Dutch and English, as well as French, seemed to have affected these transnational networks, with the result being a mixture of design with the vessels from the Bizcayan shore, mirroring the contemporary designs of other areas, mixed with their own. In this transnational scenario, there was no separation from one tradition to the next, but also, distant shores influenced each other, and therefore, the context within which the Bizcayan tradition influenced other regions stretched beyond the reach of national boundaries.

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Archivo Municipal de Zumaya, libro 208.

AHPG, Partido Azpeitia, 3303, f. 119, 27 October, 1576.

AHPG, Partido Azpeitia, 3313, f. 114, 5 April, 1585.

AHPG, Partido Azpeitia, 3312, f. 111. 7 April 1574.

AGS, C. y J. de Hacienda, 90-312.

AHPG, Partido San Sebastián, 2709, 3 Junio 1601.

AHPG, Partido San Sebastián, 2710, 35, 5 May 1585.

AHPG, Partido San Sebastián, 1804, 27 Julio 1578.

AHPG, Partido San Sebastián, 1803, f. 46, 16 September, 1577.

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AGI, Indiferente, 2595. Recopilación de las Leyes de Indias, de 1680, Libro IX Título XXVIII, in Hormaechea, Rivera and Derqui, 2012: 246, 272, 293

AGI, Indiferente, 2740, fols 30-49 Real Ordenanza de 1618

AGI, Ct, leg. 2934, s. fol, 18 diciembre 1587 a 13 febrero de 1588. From Casado Soto: 1988: 208.

AGI, Patronato, leg. 260, 2, r.41.In Casado Soto, 1988: 265.

AHMC

AHMC, Actas de las Juntas del Reino, Libro 2, años 1640-1: records of certification of galleons of the squadron. From: David Goodman, 1997, Spanish Naval Power, 1585-1665. pp: 273

Appendixes

Chapter 5: Tables

IDShip Number	Year	Keel	Beam	Depth	Length	Beam Length	Depth Beam
SC020	1545	28	14	10			0.71
SC022	1551	28	14	11			0.79
SC028	1560	30	15.5	12	50	3.23	0.77
SC030	1563	26	13	11	38.25	2.94	0.56
SC032	1566	26.5	13.5	7.5			0.56
SC036	1567	29	16	13.83			
SC037	1567	31	16.75	11.5	50	2.99	
SC038	1576	30	14.75	14.75			
SC063	1568	26	13	9			0.69
SC068	1571	34	16.75		57	3.40	0.57
SC069	1571	34	17	10	54.00	3.18	0.59
SC072	1573	28	14.5	10.5			0.72
SC073	1573	24	12	8			0.67
SC074	1574	29	15				
SC078	1577	32.5	16.75	11	57	3.40	0.66
SC079	1578	32.5	17.66	12			0.68
SC039	1583	28	14.50	15			
SC083	1584		12.63	7.74	42.08	3.33	0.61
SC120	1584	30	16.5	11.5	53		0.70

SC121	*1584*	*30*	*16.5*	*11.5*	*50*	*3.03*	*0.70*
SC122	*1584*	*28*	*15.5*	*12*			*0.77*
SC129	*1584*		*16.76*	*10.41*	*52.16*	*3.11*	*0.62*
SC131	*1584*		*12.83*	*7.86*	*42.76*	*3.33*	*0.61*
SC040	*1585*	*30*	*16.5*	*15*	*53*	*3.21*	
SC041	*1585*	*30*	*16*	*15*			
SC132	*1585*	*30.5*	*16*	*11*	*51*	*3.19*	*0.69*
SC135	*1585*		*16.60*	*12.32*	*50.80*	*3.06*	*0.74*
SC136	*1585*		*16.20*	*11.17*	*49.03*	*3.03*	*0.69*
SC138	*1585*		*15.48*	*10.15*	*48.77*	*3.15*	*0.66*
SC139	*1585*		*14.50*	*9.65*	*45.39*	*3.13*	*0.67*
SC140	*1585*		*14.35*	*9.48*	*43.18*	*3.01*	*0.66*
SC141	*1585*		*16.42*	*12.20*	*49.46*	*3.01*	*0.74*
SC142	*1585*		*17.49*	*11.80*	*53.71*	*3.07*	*0.67*
SC143	*1585*		*19.09*	*12.81*	*58.83*	*3.08*	*0.67*
SC144	*1585*		*16.27*	*11.68*	*54.35*	*3.34*	*0.72*
SC145	*1585*		*18.29*	*12.69*	*54.87*	*3.00*	*0.69*
SC146	*1585*		*14.64*	*8.63*	*44.88*	*3.07*	*0.59*
SC147	*1585*		*16.09*	*10.41*	*49.46*	*3.07*	*0.65*
SC148	*1585*		*15.76*	*10.36*	*48.77*	*3.10*	*0.66*
SC150	*1585*		*17.45*	*11.72*	*53.78*	*3.08*	*0.67*
SC156	*1586*		*17.61*	*12.32*	*53.52*	*3.04*	*0.70*
SC157	*1586*		*16.84*	*11.17*	*52.16*	*3.10*	*0.66*
SC158	*1586*		*16.60*	*12.20*	*50.80*	*3.06*	*0.73*
SC159	*1586*		*17.61*	*12.20*	*53.52*	*3.04*	*0.69*
SC162	*1586*		*19.36*	*12.99*	*59.62*	*3.08*	*0.67*
SC163	*1586*		*18.83*	*12.64*	*58.00*	*3.08*	*0.67*
SC164	*1586*		*18.74*	*12.57*	*57.74*	*3.08*	*0.67*
SC165	*1586*		*17.24*	*11.56*	*53.12*	*3.08*	*0.67*

SC166	*1586*		*15.91*	*10.41*	*47.76*	*3.00*	*0.65*
SC167	*1586*		*15.33*	*9.43*	*48.27*	*3.15*	*0.62*
SC168	*1586*		*14.30*	*9.65*	*44.03*	*3.08*	*0.67*
SC169	*1586*		*12.64*	*8.49*	*38.97*	*3.08*	*0.67*
SC171	*1586*		*16.05*	*10.84*	*50.31*	*3.14*	*0.68*
SC042	*1596*	*27*	*13.5*	*13.5*			
SC043	*1601*	*31*	*16*	*15.5*	*50*	*3.13*	
55		***26-34***	***12-19.36***	***7.5-15.5***	***38.28-59.62***	***2.94-3.40***	***0.56-0.79***

Table 7.1 Table of Bizcayan Naos[75] (1545-1601).[76]

[75] Sources for the tables and graphs:
Grenier et Alii, 2007;
AHPG, 3/1779:288-, 1551;
AHPG, Partido de Azpeitia, leg. 3298, f. CCCXCV LLL-CCCCXC LX., 1566;
AGI, Patronato, leg. 260, 2, r.41. (In Casado Soto, 1988: 265);
AHPG, Partido de Azpeitia, leg. 3313, f. 114-115v, 1585;
Archivo de la Real Chancillería de Valladolid, Pleitos civiles, Balboa fenecidos, leg 167, caja 856, fols591v-592v, 1571;
AHPG, Partido de Azpeitia, leg. 3300, f. 15-15v, 1573;
AHPG, Partido de Azpeitia, leg. 3299, f. 363-369, 1573;
AHPG, Partido de San Sebastián leg. 1803 f. 46-47, 1577; In Perona, 2016: 246, from Michael Barkham;
AHPG, Partido de Azpeitia, leg. 3312, f. 111-112v, 7th April, 1584, In Perona, 2016: 245, from Michael Barkham;
Barkham, 1984: 105;
AHPG, leg. 2/3299, F:44r-45r. 27th September 1573, In Perona, 2016: 234, from Michael Barkham.;
AHPG, leg. 2/3327, 15r-16v., 4th May 1590, In Perona, 2016: 235, from Michael Barkham.;
AHPG, leg. 2/3321: 116r-116v, 13th march 1593, In Perona, 2016: 236, from Michael Barkham.;
AHPG, leg. 2/3298: F:164r-165v. 19th May 1566, In Perona, 2016: 241, from Michael Barkham.;
AHPG, leg. 2/3300, B: 15-15v, 27th May 1573, In Perona, 2016: 242, from Michael Barkham;
AHPG, leg. 2/3313:114r-115v, 5th April 1585, In Perona, 2016: 243, from Michael Barkham;

[76] It would be important to acknowledge that some of these documents were found thanks to a list of documents left in the Archivo de Protocolos de Guipuzcoa, selected by Antxon Aguirre Sorondo.

ID Ship Number	*Year*	*Keel*	*Beam*	*Depth*	*Length*	*Beam Length*	*Depth Beam*
SC064	*1568*	*30.24*	*12.08*	*7.56*	*44.35*	*3.67*	*0.63*
SC107	*1581*	*30.24*	*12.58*	*8.04*	*44.71*	*3.55*	*0.64*
SC109	*1581*	*34.28*	*14.78*	*10.02*	*54.20*	*3.67*	*0.68*
SC110	*1581*	*35.47*	*16.25*	*10.34*	*54.20*	*3.34*	*0.64*
SC108	*1581*	*35.47*	*16.25*	*9.21*			*0.57*
SC111	*1581*	*34.55*	*15.24*	*9.65*	*52.84*	*3.47*	*0.63*
SC112	*1581*	*36.57*	*16.25*	*11.17*	*56.91*	*3.50*	*0.69*
SC114	*1581*		*12.06*	*7.04*	*45.20*	*3.75*	*0.58*
SC116	*1583*		*15.24*	*9.67*	*54.87*	*3.60*	*0.63*
SC118	*1583*		*16.25*	*10.65*	*56.90*	*3.50*	*0.66*
SC123	*1584*		*15.33*	*9.71*	*55.17*	*3.60*	*0.63*
SC124	*1584*		*15.27*	*9.67*	*55.01*	*3.60*	*0.63*
SC125	*1584*		*15.27*	*9.67*	*55.01*	*3.60*	*0.63*
SC126	*1584*		*15.20*	*9.64*	*54.78*	*3.60*	*0.63*
SC127	*1584*		*15.19*	*9.62*	*54.65*	*3.60*	*0.63*
SC128	*1584*		*15.12*	*9.57*	*54.41*	*3.60*	*0.63*
SC130	*1584*		*16.76*	*10.41*	*53.43*	*3.19*	*0.62*
17		***30.24-36.57***	***12.08-16.76***	***7.04-11.17***	***44.35-56.91***	***3.19-3.75***	***0.57-0.69***

Table 7.2 Bizcayan Galleons (1568-1584).

ID Ship Number	Ship Type	Origin	Year	Beam	Depth	Length	Beam Length	Depth Beam
SC081	*Galleon*	*Portugal*	*1580*	*18.59*	*9.90*	*62.32*	*3.35*	*0.53*
SC082	*Galleon*	*Portugal*	*1580*	*16.92*	*9.02*	*56.71*	*3.35*	*0.53*
SC113	*Galleon*	*Portugal*	*1581*	*13.25*	*7.06*	*44.39*	*3.35*	*0.53*
SC117	*Galleon*	*Portugal*	*1583*	*17.15*	*9.14*	*57.47*	*3.35*	*0.53*
SC149	*Galleon*	*Portugal*	*1585*	*15.00*	*7.98*	*50.21*	*3.35*	*0.53*
SC172	*Galleon*	*Portugal*	*1586*	*19.06*	*10.15*	*63.88*	*3.35*	*0.53*
SC173	*Galleon*	*Portugal*	*1586*	*13.25*	*7.06*	*44.39*	*3.35*	*0.53*

Table 7.3 Portuguese Galleons

ID Ship Number	Ship type	Origin	Year	Beam	Depth	Length	Beam Length	Depth Beam
SC035	*Urca*	*Flemish*		*19.60*	*10.95*	*54.86*	*2.80*	*0.56*
SC054	*Urca*	*Flemish*	*1564*	*14.51*	*8.11*	*40.65*	*2.80*	*0.56*
SC055	*Urca*	*Flemish*	*1560*	*15.66*	*7.74*	*45.25*	*2.89*	*0.49*
SC056	*Urca*	*Flemish*	*1559*	*15.28*	*8.55*	*42.79*	*2.80*	*0.56*
SC057	*Urca*	*Flemish*		*13.66*	*7.64*	*38.25*	*2.80*	*0.56*
SC059	*Urca*	*Flemish*	*1561*	*15.00*	*8.35*	*42.01*	*2.80*	*0.56*
SC060	*Urca*	*Flemish*		*13.24*	*6.75*	*37.84*	*2.86*	*0.51*
SC061	*Urca*	*Flemish*		*13.12*	*6.75*	*36.01*	*2.74*	*0.51*
SC134	*Urca*	*Flemish*	*1585*	*17.61*	*14.28*	*48.77*	*2.77*	*0.81*

Table 7.4 Flemish Urcas

Ship Type	*Origin*	*Year*	*Beam*	*Depth*	*Length*	*Beam Length*	*Depth Beam*
Urca	*German*	*c.1580*	*15.84*	*12.44*	*47.65*	*3.01*	*0.79*
Urca	*German*	*1565*	*18.74*	*9.00*	*57.50*	*3.07*	*0.48*
Urca	*German*	*1567*	*17.21*	*9.55*	*53.36*	*3.10*	*0.56*
Urca	*German*	*1577*	*17.72*	*9.83*	*54.94*	*3.10*	*0.56*
Urca	*German*	*1572*	*15.49*	*8.60*	*48.00*	*3.10*	*0.56*
Urca	*German*	*1551*	*17.21*	*9.55*	*53.25*	*3.09*	*0.56*
Urca	*German*	*1586*	*16.10*	*8.95*	*49.91*	*3.10*	*0.56*
Urca	*German*	*c.1580*	*16.67*	*9.26*	*51.69*	*3.10*	*0.56*
Urca	*German*	*1586*	*16.67*	*9.26*	*51.69*	*3.10*	*0.56*
Urca	*German*	*c.1580*	*15.49*	*8.60*	*47.98*	*3.10*	*0.56*
Urca	*German*	*c.1580*	*15.09*	*8.01*	*47.51*	*3.15*	*0.53*
Urca	*German*	*1542*	*15.16*	*7.74*	*48.50*	*3.20*	*0.51*
Urca	*German*	*c.1580*	*15.93*	*8.84*	*49.37*	*3.10*	*0.56*

Table 7.5 German Urcas

ID Ship	Type	Origin of ship	Year	Beam	Depth	Length	Beam length	Depth Beam
SC023	Nao	Mediterranean	1551	15.45	8.14	46.03	2.98	0.53
SC161	Nao	Mediterranean	1580	15.36	9.99	44.03	2.87	0.65
SC175	Nao	Adriatic	1587	21.16	12.01	59.01	2.79	0.57
SC176	Nao	Adriatic	1587	18.26	10.76	51.01	2.79	0.59
SC177	Nao	Mediterranean	1587	20.78	12.60	59.73	2.87	0.61
SC178	Galleon	Tirrenic	1587	17.66	10.82	68.34	3.87	0.61
SC179	Nao	Mediterranean	1587	18.85	11.42	54.18	2.87	0.61
SC180	Nao	Mediterranean	1587	19.14	11.61	55.05	2.88	0.61
SC181	Nao	Tirrenic	1587	18.50	11.50	55.01	2.97	0.62
SC182	Nao	Tirrenic	1587	18.13	11.50	53.25	2.94	0.63
SC183	Nao	Tirrenic	1587	18.85	11.28	55.80	2.96	0.60
SC184	Nao	Adriatic	1587	17.51	11.50	48.00	2.74	0.66
SC185	Nao	Tirrenic	1587	15.99	9.99	47.51	2.97	0.62

Table 7.6 Mediterranean, galleons and naos

Type	*Origin*	*Tons*	*Year*	*Keel*	*Beam*	*Depth*	*Length*	*B-L R*	*D-B R*	*B-K R*	*K- D R*
Nao	*Bizcayan*	*200*	*1590*	*24*	*12*	*6.75*	*37*	*3.08*	*0.56*	*2.00*	*3.56*
Nao	*Bizcayan*	*300*	*1590*	*27*	*13.5*	*7.75*	*42*	*3.11*	*0.57*	*2.00*	*3.48*
Navio	*Bizcayan*	*400*	*1590*	*30*	*15*	*8.25*	*47*	*3.13*	*0.55*	*2.00*	*3.64*
Navio	*Bizcayan*	*500*	*1590*	*32*	*16*	*9.5*	*50*	*3.13*	*0.59*	*2.00*	*3.37*
Navio	*Bizcayan*	*600*	*1590*	*34*	*17*	*10*	*52*	*3.06*	*0.59*	*2.00*	*3.40*
Navio	*Bizcayan*	*700*	*1590*	*36*	*18*	*10.25*	*55*	*3.06*	*0.57*	*2.00*	*3.51*
Nave	*Bizcayan*	*800*	*1590*	*37*	*19*	*11.33*	*57.33*	*3.02*	*0.60*	*1.95*	*3.27*
Nao	*Bizcayan*	*900*	*1590*	*38*	*19*	*12*	*57*	*3.00*	*0.63*	*2.00*	*3.17*
Nao	*Bizcayan*	*1000*	*1590*	*39*	*20*	*12.33*	*60*	*3.00*	*0.62*	*1.95*	*3.16*

Table 7.7 Martín de Jauregui’s Proposal to build ships for Phillip II (1590) (Tellechea Idígoras, 2003)

Keel	Beam	Depth	Length	Length max.	Beam/Keel ratio	Depth/Beam ratio	Tonnage
47	*19.75*	*13.5*	*60*	*65.5*	*2.38*	*0.68*	*1200*
45.5	*19.5*	*13.25*	*59.5*	*65*	*2.33*	*0.68*	*1060*
38	*17.75*	*9.33*	*49.5*	*51*	*2.14*	*0.53*	*700*
39	*18.33*	*11*	*51.5*	*53.5*	*2.13*	*0.6*	*800*
44.5	*20.5*	*13.5*	*60*	*61*	*2.17*	*0.66*	*1090*
43.5	*19*	*10.5*	*58.33*	*63*	*2.29*	*0.55*	*1000*
40	*18.5*	*10.33*	*57*	*60.5*	*2.16*	*0.56*	*900*
32.5	*15*	*8*	*49.75*	*52.5*	*2.17*	*0.53*	*960*
41	*18.75*	*10*	*56.33*	*60*	*2.19*	*0.53*	*900*
42.33	*19*	*10.5*	*57.75*	*62*	*2.23*	*0.55*	*900*
37.5	*15*	*11*	*51*	*53.5*	*2.5*	*0.73*	*700*
40.75	*18.5*	*10*	*56*	*59.75*	*2.2*	*0.54*	*900*
Average							
41	*18.3*	*10.91*	*55.6*		*2.24*	*0.6*	

Table 7.8 "La escuadra Ilirica del Capitan Pedro de Ivella y Juan De Olisti". Measurements taken from document from 1593.[77]

[77] AMN, Navarrette, Ms 396, art 5, n 53, fols 225-226 "*Relación de la fabrica de doze Galeones de Guerra de la esquadra Illirica de Pedro de Ivella y estefano Dolisti …*"

Tonnage	*Keel*	*Beam*	*Depth*	*Length*	*Entries*	*Runs*	*Bow rising*	*Stern rising*	*Plan*
106.5	*30*	*10*	*5*	*36*	*1.11*	*3.33*	*4*	*2*	*5*
157	*32*	*11*	*5.5*	*39*	*1.22*	*3.66*	*4.75*	*2.25*	*5.5*
198	*34*	*12*	*6*	*41.5*	*1.33*	*4*	*5*	*2.5*	*6*
251	*36.5*	*13*	*6.5*	*45*	*1.44*	*4.33*	*6*	*3*	*6.5*
490.5	*38*	*14*	*7*	*48*	*1.33*	*4*	*7*	*3*	*7*
371.5	*40*	*15*	*7.5*	*50.5*	*1.66*	*5*	*7.25*	*3.25*	*7*
444.5	*42*	*16*	*8*	*53*	*1.77*	*5.33*	*7.75*	*3.25*	*8*
530	*44*	*17*	*8*	*56*	*1.88*	*5.66*	*8*	*4*	*8.5*
624.5	*46*	*18*	*9*	*59*	*2*	*6*		*4.25*	*9*
721.75	*48*	*19*	*9.5*	*68*	*2.11*	*6.33*	*9*	*4.5*	*9.5*
821.87	*49*	*20*	*10*	*63*	*2.22*	*6.66*	*9.5*	*4.5*	*10*
946.5	*51*	*21*	*10.5*	*66*	*2.33*	*7*	*10*	*5*	*10.5*
1074.75	*53*	*22*	*11*	*68*	*2.44*	*7.33*		*5*	*11*

Table 7.9 Tonnage and dimensions of a variety of ships specified in the 1618 Ordenanzas for shipbuilding. (Hormaechea, Rivera and Derqui, 2012: 246, 272, 293)

Year	ID Ship	Keel	Beam	Depth	Length	Beam Length	Depth Beam	Beam Keel
1590	SC198	25	12	10			0.83	2.08
1590	SC199	29	15	12	47	3.13	0.80	1.93
1590	SC200	25	13.5	10	?	?	0.74	1.85
1591	SC201	28	15	12.5	46	3.07	0.83	1.87
1593	SC202	26	13	10	?	?	0.77	2.00
1593	SC203	26	13.5	10	?	?	0.74	1.93
1593	SC204	47	19.75	13.5	60	3.04	0.68	2.38
1593	SC205	45.5	19.5	13.25	59.5	3.05	0.68	2.33
1593	SC206	38	17.75	9.33	49.5	2.79	0.53	2.14
1593	SC207	39	18.33	11	51.5	2.81	0.60	2.13
1593	SC208	44.5	20.5	13.5	60	2.93	0.66	2.17
1593	SC209	43.5	19	10.5	58.33	3.07	0.55	2.29
1593	SC210	40	18.5	10.33	57	3.08	0.56	2.16
1593	SC211	32.5	15	8	49.75	3.32	0.53	2.17
1593	SC212	41	18.75	10	56.33	3.00	0.53	2.19
1593	SC213	42.33	19	10.5	57.75	3.04	0.55	2.23
1593	SC214	37.5	15	11	51	3.40	0.73	2.50
1593	SC215	40.75	18.5	10	56	3.03	0.54	2.20
1596	SC216						0.40	3.00
1599	SC217	18	6.75	4	25	3.70	0.59	2.67
1600	SC218	28	15	11.75	47	3.13	0.78	1.87
1602	SC219	40	17	8	50	2.35	0.47	2.35
1602	SC220	38	16.5	7.25	50	2.30	0.44	2.30
1602	SC221	37	15.5	6.5	48	2.39	0.42	2.39
1602	SC222	35	14	6	41	2.50	0.43	2.50

1602	*SC223*	*20*	*8*	*4.75*	*26*	*2.50*	*0.59*	*2.50*
1603	*SC224*	*38*	*16.5*	*7.25*	*50*	*2.30*	*0.44*	*2.30*
1603	*SC225*	*38*	*16.5*	*7.25*	*50*	*2.30*	*0.44*	*2.30*
1603	*SC226*	*38*	*16.5*	*7.25*	*50*	*2.30*	*0.44*	*2.30*
1603	*SC227*	*37*	*15.5*	*6.5*	*48*	*2.39*	*0.42*	*2.39*
1603	*SC228*	*37*	*15.5*	*6.5*	*48*	*2.39*	*0.42*	*2.39*
1603	*SC229*	*37*	*15.5*	*6.5*	*48*	*2.39*	*0.42*	*2.39*
1603	*SC230*	*40*	*17*	*8*	*50*	*2.35*	*0.47*	*2.35*
1603	*SC231*	*40*	*17*	*8*	*50*	*2.35*	*0.47*	*2.35*
1603	*SC232*	*?*	*16.5*	*10*	*48*		*0.61*	
1603	*SC233*	*40*	*17*	*8*	*50*	*2.35*	*0.47*	*2.35*
1603	*SC234*	*40*	*17*	*8*	*50*	*2.35*	*0.47*	*2.35*
1603	*SC235*	*40*	*17*	*8*	*50*	*2.35*	*0.47*	*2.35*
1603	*SC236*	*40*	*17*	*8*	*50*	*2.35*	*0.47*	*2.35*
1603	*SC237*	*40*	*17*	*8*	*50*	*2.35*	*0.47*	*2.35*
1603	*SC238*	*40*	*17*	*8*	*50*	*2.35*	*0.47*	*2.35*
1603	*SC239*	*38*	*16.5*	*7.25*	*50*	*2.30*	*0.44*	*2.30*
1603	*SC240*	*38*	*16.5*	*7.25*	*50*	*2.30*	*0.44*	*2.30*
1603	*SC241*	*38*	*16.5*	*7.25*	*50*	*2.30*	*0.44*	*2.30*
1603	*SC242*	*38*	*16.5*	*7.25*	*50*	*2.30*	*0.44*	*2.30*
1603	*SC243*	*38*	*16.5*	*7.25*	*50*	*2.30*	*0.44*	*2.30*
1603	*SC244*	*38*	*16.5*	*7.25*	*50*	*2.30*	*0.44*	*2.30*
1604	*SC245*	*39*	*16.5*	*9.66*	*50.5*	*2.36*	*0.59*	*2.36*
1605	*SC246*	*40*	*17*	*9*	*55*	*2.35*	*0.53*	*2.35*
1605	*SC247*	*42*	*17*	*9*	*53*	*2.47*	*0.53*	*2.47*
1605	*SC248*	*42*	*17*	*9*	*53*	*2.47*	*0.53*	*2.47*
1605	*SC249*	*42*	*17*	*9*	*53*	*2.47*	*0.53*	*2.47*
1607	*SC250*	*29*	*10*	*5.5*	*38*	*2.90*	*0.55*	*2.90*
1607	*SC251*	*33*	*11*	*6*	*40*	*3.00*	*0.55*	*3.00*

1607	*SC252*	*36*	*12*	*6.5*	*43*	*3.00*	*0.54*	*3.00*
1607	*SC253*	*37*	*13*	*7*	*48*	*2.85*	*0.54*	*2.85*
1607	*SC254*	*39*	*14*	*7.5*	*50*	*2.79*	*0.54*	*2.79*
1607	*SC255*	*40*	*15*	*8*	*52*	*2.67*	*0.53*	*2.67*
1607	*SC256*	*42*	*16*	*8.75*	*57*	*2.63*	*0.55*	*2.63*
1607	*SC257*	*43*	*17*	*9.25*	*60*	*2.53*	*0.54*	*2.53*
1607	*SC258*	*44*	*18*	*9.5*	*62*	*2.44*	*0.53*	*2.44*
1607	*SC259*	*47*	*19*	*10*	*65*	*2.47*	*0.53*	*2.47*
1607	*SC260*	*48*	*20*	*10.5*	*69*	*2.40*	*0.53*	*2.40*
1607	*SC261*	*51*	*21*	*11*	*72*	*2.43*	*0.52*	*2.43*
1607	*SC262*	*53*	*22*	*11.5*	*75*	*2.41*	*0.52*	*2.41*
1611	*SC264*	*29.5*	*16*	*12*			*0.75*	*1.84*
1611	*SC265*	*36*	*12*	*7*	*46.5*	*3.88*	*0.58*	*3.00*
1611	*SC266*	*36*	*12*	*8.5*	*49*	*4.08*	*0.71*	*3.00*
1613	*SC267*	*28*	*8*	*3.75*	*33.75*	*4.22*	*0.47*	*3.50*
1613	*SC268*	*30*	*9*	*4*	*36*	*4.00*	*0.44*	*3.33*
1613	*SC269*	*32*	*10*	*4.5*	*38.75*	*3.88*	*0.45*	*3.20*
1613	*SC270*	*34*	*11*	*5*	*41.5*	*3.77*	*0.45*	*3.09*
1613	*SC271*	*36*	*12*	*6*	*45*	*3.75*	*0.50*	*3.00*
1613	*SC272*	*38*	*13*	*6.5*	*47.75*	*3.67*	*0.50*	*2.92*
1613	*SC273*	*40*	*14*	*7*	*50.5*	*3.61*	*0.50*	*2.86*
1613	*SC274*	*42*	*15*	*7.5*	*53.25*	*3.55*	*0.50*	*2.80*
1613	*SC275*	*44*	*16*	*8*	*56*	*3.50*	*0.50*	*2.75*
1613	*SC276*	*46*	*17*	*8.5*	*58.75*	*3.46*	*0.50*	*2.71*
1613	*SC277*	*48*	*18*	*9*	*61.5*	*3.42*	*0.50*	*2.67*
1613	*SC278*	*49*	*19*	*9.5*	*63.25*	*3.33*	*0.50*	*2.58*
1613	*SC279*	*51*	*20*	*10*	*66*	*3.30*	*0.50*	*2.55*
1613	*SC280*	*53*	*21*	*10.5*	*68.75*	*3.27*	*0.50*	*2.52*
1613	*SC281*	*54*	*22*	*11*	*70.5*	*3.20*	*0.50*	*2.45*

1615	*SC282*	*46*	*17.5*	*8.5*	*58.75*	*3.36*	*0.49*	*2.63*
1615	*SC283*	*43*	*15.5*	*7.5*	*53*	*3.42*	*0.48*	*2.77*
1615	*SC284*	*46*	*17.5*	*8.5*	*58.75*	*3.36*	*0.49*	*2.63*
1615	*SC285*	*44*	*17.85*	*8.87*	*59.12*	*3.31*	*0.50*	*2.46*
1616	*SC286*	*40.5*	*15.75*	*7.91*	*51*	*3.24*	*0.50*	*2.57*
1616	*SC287*	*46*	*18.5*	*8.91*	*60*	*3.24*	*0.48*	*2.49*
1616	*SC288*	*46*	*18.5*	*8.91*	*60*	*3.24*	*0.48*	*2.49*
1616	*SC289*	*46*	*18.25*	*8.91*	*59.5*	*3.26*	*0.49*	*2.52*
1616	*SC290*	*49*	*19*	*9.75*	*63.5*	*3.34*	*0.51*	*2.58*
1617	*SC291*	*46*	*19.5*	*9.12*	*59*	*3.03*	*0.47*	*2.36*
1617	*SC292*	*46*	*19*	*9.25*	*59*	*3.11*	*0.49*	*2.42*
1617	*SC293*	*46*	*18.66*	*9.08*	*59*	*3.16*	*0.49*	*2.47*
1618	*SC294*	*38.5*	*16.5*	*7.5*	*53*	*3.21*	*0.45*	*2.33*
1618	*SC295*	*37*	*15.5*	*7.33*	*48.5*	*3.13*	*0.47*	*2.39*
1618	*SC296*	*43*	*17*	*7.66*	*53.25*	*3.13*	*0.45*	*2.53*
1618	*SC297*	*44*	*18*	*8.83*	*58.5*	*3.25*	*0.49*	*2.44*
1618	*SC298*	*43*	*18.5*	*9*	*56.66*	*3.06*	*0.49*	*2.32*
1618	*SC299*	*28*	*9*	*4.5*	*34*	*3.78*	*0.50*	*3.11*
1618	*SC300*	*30*	*10*	*5*	*36*	*3.60*	*0.50*	*3.00*
1618	*SC301*	*32*	*11*	*5.5*	*39*	*3.55*	*0.50*	*2.91*
1618	*SC302*	*34*	*12*	*6*	*41.5*	*3.46*	*0.50*	*2.83*
1618	*SC303*	*36.5*	*13*	*6.5*	*45*	*3.46*	*0.50*	*2.81*
1618	*SC304*	*38*	*14*	*7*	*48*	*3.43*	*0.50*	*2.71*
1618	*SC305*	*40*	*15*	*7.5*	*50.5*	*3.37*	*0.50*	*2.67*
1618	*SC306*	*42*	*16*	*8*	*53*	*3.31*	*0.50*	*2.63*
1618	*SC307*	*44*	*17*	*8*	*56*	*3.29*	*0.47*	*2.59*
1618	*SC308*	*46*	*18*	*9*	*59*	*3.28*	*0.50*	*2.56*
1618	*SC309*	*48*	*19*	*9.5*	*68*	*3.58*	*0.50*	*2.53*
1618	*SC310*	*49*	*20*	*10*	*63*	*3.15*	*0.50*	*2.45*

1618	*SC311*	*51*	*21*	*10.5*	*66*	*3.14*	*0.50*	*2.43*
1618	*SC312*	*53*	*22*	*11*	*68*	*3.09*	*0.50*	*2.41*
1627	*SC314*	*44*	*18*	*8.5*	*56.75*	*3.15*	*0.47*	*2.44*
1627	*SC315*	*44*	*18*	*8.5*	*56*	*3.11*	*0.47*	*2.44*
1627	*SC316*	*42*	*17*	*8*	*53.5*	*3.15*	*0.47*	*2.47*
1627	*SC317*	*42*	*17*	*8*	*53.33*	*3.14*	*0.47*	*2.47*
1627	*SC318*	*38*	*15.2*	*7*	*49.5*	*3.26*	*0.46*	*2.50*
1627	*SC319*	*38*	*15*	*7*	*48.67*	*3.24*	*0.47*	*2.53*
1628	*SC320*	*46*	*18.08*	*8.66*	*59.75*	*3.30*	*0.48*	*2.54*
1628	*SC321*	*41.66*	*16.25*	*7.5*	*54.5*	*3.35*	*0.46*	*2.56*
1628	*SC322*	*39.16*	*14.66*	*6.5*	*50.75*	*3.46*	*0.44*	*2.67*
1628	*SC323*	*60*	*22.5*		*77*	*3.42*		*2.67*
1635	*SC324*	*51.08*	*18.5*	*9.2*	*63.5*	*3.43*	*0.50*	*2.76*
1635	*SC325*	*51.25*	*18.33*	*9.2*	*64*	*3.49*	*0.50*	*2.80*
1638	*SC326*	*50.66*	*18.16*	*8.66*	*62.75*	*3.46*	*0.48*	*2.79*
1638	*SC327*	*50.53*	*18.4*	*8.91*	*62.75*	*3.41*	*0.48*	*2.75*
1638	*SC328*	*50.6*	*18.4*	*8.75*	*62.5*	*3.40*	*0.48*	*2.75*
1638	*SC329*	*51.5*	*18.33*	*8.66*	*64.5*	*3.52*	*0.47*	*2.81*
1638	*SC330*	*51.46*	*18.75*	*8.9*			*0.47*	*2.74*
1640	*SC331*	*51.25*	*15*	*10*	*61*	*4.07*	*0.67*	*3.42*
1640	*SC332*	*51.25*	*15*	*10*	*61*	*4.07*	*0.67*	*3.42*
1640	*SC333*	*52*	*19*	*8.75*	*64*	*3.37*	*0.46*	*2.74*
1640	*SC334*	*51.5*	*18.6*	*8.75*	*64.25*	*3.45*	*0.47*	*2.77*
1640	*SC335*	*46.25*	*17*	*7.5*	*57*	*3.35*	*0.44*	*2.72*
1640	*SC336*	*51.25*	*15*	*10*	*61*	*4.07*	*0.67*	*3.42*
1653	*SC337*		*5.25*	*2.25*	*19.5*	*3.71*	*0.43*	
1656	*SC338*	*66*	*23.5*	*11.1*	*86*	*3.66*	*0.47*	*2.81*
1662	*SC339*	*56.5*	*20.1*	*9.25*	*72*	*3.58*	*0.46*	*2.81*
1662	*SC340*	*54.5*	*19.33*	*8.53*	*69.33*	*3.59*	*0.44*	*2.82*

1662	*SC341*	*52.25*	*18.33*	*8.25*	*66.5*	*3.63*	*0.45*	*2.85*
1662	*SC342*	*49*	*18.56*	*8.25*	*61.5*	*3.31*	*0.44*	*2.64*
1668	*SC343*	*57*	*19.75*	*9*	*72.5*	*3.67*	*0.46*	*2.89*
1668	*SC344*	*53.59*	*18.87*	*8.64*	*67.85*	*3.60*	*0.46*	*2.84*
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Table 7.10 Bizcayan vessels (Previous pages)1590-1668[78]

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