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REGIONAL TIMBER SUPPLY FOR SHIPBUILDING AND MAINTENANCE OF WAR FLEETS IN CADIZ: METHODS, AGENTS AND PHASES (1717-1736)[1]

Suministro regional de maderas para construcción y reparación de flotas de guerra en Cádiz: métodos, agentes y fases (1717-1736)

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ABSTRACT: In the period of 1717-1736, the southern peninsular forests became a new resource frontier at the service of the Spanish Navy, in the context of the Bourbon Reforms. The timber supply for shipbuilding and maintenance of war fleets in Cádiz was made through four methods: direct administration by commissioned services; purchase from regional middlemen merchants; articulation between contractors and direct administration; articulation with the Royal Exchequer. The rhythm of supply was the reflex of different needs and constraints in three phases: maintenance of fleets during the period of consolidation of Cádiz as a naval and commercial

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center (1717-1727); the first shipbuilding series (1728-1731); the impact of the 30's Mediterranean campaigns and the shipbuilding production of Ciprian Autran (1731-1736).

Keywords: Timber supply; Shipbuilding; Spanish Navy; Cádiz; 18th century.

RESUMEN: En el periodo de 1717-1736, las forestas del Sur peninsular se convertieron en una nueva fontera de recursos al servicio de la Armada Española, en el contexto de las Reformas Borbónicas. El suministro de madera para la construcción y reparación de flotas de guerra en Cádiz se realizó a través de cuatro métodos: administración directa por comisión de servicios; compra a intermediarios comerciales de la región; articulación entre asentistas y administración directa; articulación con la Real Hacienda. El ritmo de suministro fue el reflejo de diferentes necesidades y restricciones en tres fases: manutención de flotas durante el periodo de consolidación de Cádiz como centro naval y comercial (1717-1727); el primer programa de construcción naval (1728-1731); impacto de las campañas mediterráneas en los años 30 y las construcciones de Ciprian Autran (1731-1736).

Palabras clave: Suministro de madera; Armada Española; Construcción Naval; Cádiz; siglo XVIII.

1. INTRODUCTION

Cádiz, in 1717-1736, constitutes a spatiotemporal context at the core of the implementation of the so-called Bourbon Reforms to the Naval and commercial sectors, under the action of José Patiño y Rosales (1666-1736), first as General Intendant of Navy, President of the *Casa de la Contratación* (Board of Trade), Superintendent of the Kingdom of Seville, in 1717, and, later, as Minister of Finance, Navy and Indies, in 1726. Patiño became the prominent character of a renewed impulse to the revitalization of the Spanish Naval power and consolidation of the monopoly of the American trade, in the geo-political framework created with the Treaty of Utrecht (1713-1715), after the War of the Spanish Succession (1701-1714). As headquarters of such institutions, Cádiz turned into the operations centre and base for the administrative and infrastructural reform. The bay had already the tradition of repair and maintenance of vessels, in the Real Carenero de Puente de Suazo (Royal careening dockyard), El Puntal, El Trocadero, and La Carraca, but,

in order to become the modern Naval centre envisioned by Patiño, needed new industrial and military facilities in the form of an arsenal. The constuction of the Arsenal of La Carraca began in 1717, becoming the first of its kind in Spain. Along with the creation of the Maritime Departments, in 1726, was part of the strategy of centralization and rationalization principles that guided the Bourbon reforms, under French and English models. The Arsenal of La Carraca and the Maritime Department of Cádiz worked, not only as infrastructural and jurisdictional institutions oriented to military operations, but also as an articulated industrial and logistics complex. The Arsenal as a centre for shipbuilding and repair, as well as raw material and naval equipment storage, and the Department as the primal regional territory of such provisions, in a Mercantilist logic. The ideal was the reduction of the dependence from imports, but also from privates by increasing the role of direct administration to the detriment of the practice of *asiento* (contract) (Crespo, 1996; Crespo, 2019; Diego, 2002: 15-39; Merino, 1981: 10-27; Pérez, 2006: 35-93, 114-123, 142, 144; Pulido, 1998: 31-58, 130-189; Valdez: 2011: 127, 162-163, 198-203, 214-218; Valdez, 2018: 107, 110-112; Quintero, 2004a; Torres, 2016: 29-34, 189-209).

In terms of shipbuilding and maintenance of war fleets, Cádiz became the paradigm of direct administration, as these activities took place at the state facilities of El Puntal and La Carraca, operated by a corporation employed under its direct control (*maestranza*), funded by centrally planned annual *Consignaciones* (consignments) (Merino, 1981: 139-141, 155; Quintero, 2004a: 223-237, 311-339; Valdez, 2011: 198-203, 214-218; Valdez, 2018: 107,110-112; Torres, 2016: 115-120; 141-144, 166).

However, this ideal of State's self-sufficiency was not fully put in practice in terms of supply of raw material and naval equipment for the new Naval center, such as the case of timber (Torres, 2013: 184-185; Torres, 2016: 33, 34; Torres, 2021). Imports from the Baltic region and New England were still essential for masting elements. Complementary timber supply from Cantabria, Tortosa, or Havana, depended on contractors (*asentistas*) as intermediaries. The southern forests within the territories of the Kingdom of Seville, Kingdom of Granada, as well as Kingdom of Jaén in Andalusia, became the preferential source of raw material for a wide range of elements for hull construction, besides a very small portion of masting pieces[2] (Quintero, 2004a: 393-406; Quintero, 2004b; Quintero, 2006). The solution for its exploitation was found in the co-existence of different methods of supply, in which private agents had a preponderant role.

2. This research is centered on these types of pieces. It does not include wooden material like auxiliary structures used in shipbuilding and repair works, components of artillery pieces, finished products such as oars, tackles for rigging, or even the timber for its production. Timber for tackles was exceptionally referred in the case study of Soto de Roma.

As an absolutely strategic element for Spanish Naval Power, timber supply had a direct correlation with the main challenges of these 20 pivotal years. Its use in shipbuilding and repair activities reflected the phases of the contribution of Cádiz to the industry, as well as its role as Naval base for the operations in the Atlantic and Mediterranean spaces, in the context of the Colonial trade reform and Utrecht revisionism, and its expression in foreign and dynastic policies.

2. METHODS AND AGENTS

With the establishment of Cadiz as Naval base, Andalusia emerged as a new resource frontier at the service of warfare and the political project of the Bourbon State, becoming part of the process of internal territorialisation of the forests systematically exploited by the Spanish Naval power (Wing, 2015). The potential of the southern peninsular forests, as source of timber resources for the Spanish war fleets had been overlooked until 1717, because the traditional shipbuilding industry for the transatlantic navigation was concentrated and strongly rooted in the northern shipyards, and exploited the forests of that coast. Therefore, Andalusia had been left out of the jurisdiction of the *Superintendencia de Montes y Plantíos* (Superintendence of forests and plantations), the institution responsible for the management and conservation of such resources, from 1574 to 1748 (Martínez, 2015: 274).

With the administrative reforms that culminated in the creation of the *Secretaría de Marina* (Navy Ministry), in 1714, the new *Intendencia General de Marina* (Intendance of Navy), in 1717 and the Maritime Departments, in 1726, the southern forests that were supposed to serve the new Arsenal, based in Cádiz, fell automatically under the jurisdiction of such institutions. The nomination of Patiño as Intendent General, based in Cádiz, in January 28, 1717, had particular implications in timber supply. As an intermediary administration agent of the Navy Ministry, Patiño was in charge of the financial and logistic aspects of the construction and maintenance of war fleets. This included the management of forest resources, by the assessment and conservation of woodlands and plantations in private and royal properties near the coast, as well as the acquisition of naval equipment and shipbuilding and maintenance services, either by purchase, contract or direct administration. The April 2, 1717 Royal Decree, which established the new *Secretaría de Guerra y Marina* (War and Navy Ministry), the June 16, 1717 Royal Order (with the power of provisional Navy Ordinances), the May 1 1723 Arsenal Ordinances, as well as the January 1, 1725 Ordinances and instructions for Intendants and Navy administration officers, reinforced the competences of Naval central administration and its officers *corpus* in these matters, contributing to the increasing centralization, bureaucratization and militarization of the process. The creation of the Maritime Departments in July 15, 1726, and subdivision in maritime provinces introduced a clearer territorial dimension

to forests jurisdiction (Crespo, 2017: 91-93, 102; Diego, 2002: 22; Martínez, 2015: 203-215; Torres, 2016: 120-122).

The Navy was the military sector where the state most followed the paradigm of direct administration, by the intervention in its productive and logistics operational chains. Nevertheless, when the human, logistics and financial resources of state infrastructures and administration were insufficient, like in the case of commissioned services, the provision was handed over to privates as a practical solution to fulfill the material needs, with the supreme purpose of reinforcement of the King's authority. Thus, the supply networks of naval equipment and raw material were still dominated by privates, like *entrepreneurs* or even middlemen merchants. The *asiento* (contract) was the prevalent method to ensure the consistency of the services, in terms of quantity, quality and continuity. Aspects such as duration of the contract, price, payment amounts and methods were previously negotiated and stipulated. The advanced payments (*anticipos* or *mesadas*) were essential to guarantee the impulse and continuation of services, as the contractors (*asentistas*) could suffer from lack of liquidity, aggravated by the complex and slow payment bureaucracy, which involved the Navy Commissaries, the Treasuries of the Departments, the General Treasury, and the *Tribunal Mayor de Cuentas*, the supreme accounting office. The central origin of funds was the Royal Exchequer, but could be complemented by specific local revenue sources (Torres, 2013; Torres, 2016; Torres, 2021).

However, the Bourbon approach to the system of contracts had in the close State intervention one of its most distinctive characteristics. Not only quality control was performed upon delivery of products (Torres, 2016: 38-39), but the execution of services was also supervised by the Arsenals authorities and technical staff, in order to ensure the compliance of requirements. This was crucial in the context of the ongoing technologic shift, based on the production of series of standardized classes of war vessels, which paradigm was the 70-gun ship of the line proposed by Antonio de Gazañeta (1656-1728) in the 1720 *Proporciones más essempciales* (Gaztañeta, 1720; Valdez, 2011: 177-196, 222-228; Valdez, 2018: 111, 113).

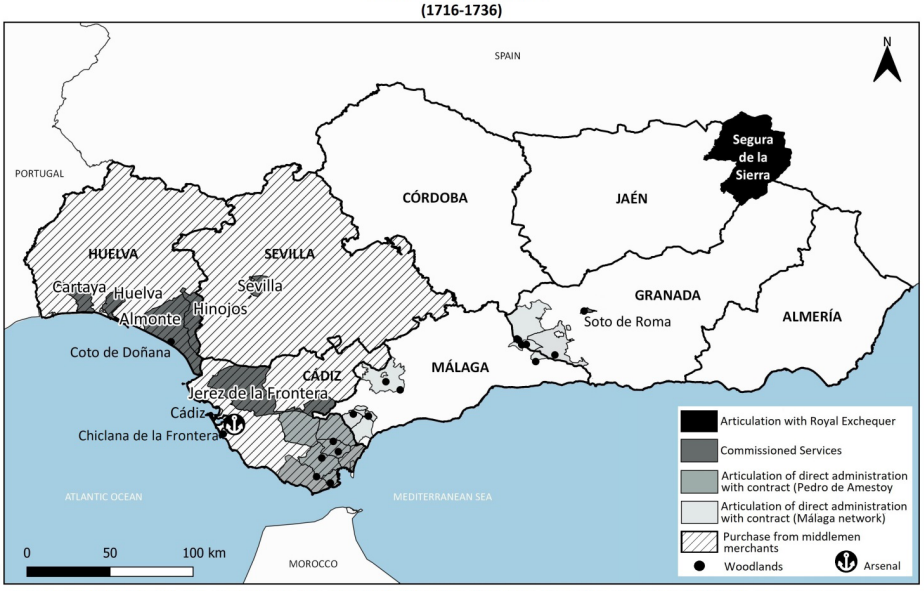
This was the general normative and practical framework, from which emanated the supply solutions to the needs of specific types of hull and some masting timber pieces, within the forests under jurisdiction of the Intendance of Navy, in Cádiz. Between 1716 and 1735, from Huelva to Sierra de Segura, direct administration and privates collaborated in the form of commissioned services, purchase from middlemen merchants, articulation of contracts with direct administration and articulation between the Navy and Royal Exchequer (Map 1[3]).

3. The author is very thankful to María José García for the instructions about the general layout of the SIG project and to Mauro Correia for the help in the creation of the original shapefiles and map design.

2.1. *Commissioned services*

Despite the scarce contribution of commissioners during this period, the earliest reference to timber supply corresponds to the service of this kind of agents, in 1716, which indicates that this practice was already in use in the traditional careening dockyards, as a sporadic resource in response to immediate needs. In this form of direct administration, the commissioners acted as representatives of the Navy for a single campaign of felling and crafting timber, or for its acquisition in regional markets. Until 1735, commission was a complementary source of main elements, such as planks, beams, futtocks or even uncrafted timber, as well as of some more specific types of elements. Considering information gaps, this method of supply provided a total of 2,805 pieces, besides 40 *palos* (timbers) and an undetermined number quantified in carloads, corresponding to the total expenditure of 190,438 *reales* and 17 *maravedíes de vellón.*

MAP 1
REGIONAL TIMBER SUPPLY
(1716-1736)



Source: AGS, SMA, 303, 304, 305, 306, 552, 559; AGS, TMC, 4058, 4059, 4063, 4066, 4069, 4070, 4071, 4077, 4079, 4080, 4084, 4087; Mapa Topográfico Nacional 1:25.000; Quintero 2004a: 393-395

2.1.1. Felling crafting and transport of timber (1716-1735)

According to information[4] identified by Quintero (2004a; 393, 491), in late 1716, the careening dockyard of Puente de Suazo was being supplied with timber from Cartaya (Huelva). The commissioner Fernando Sánchez had felled more than 200 pine and holm oak trees, for futtocks as well as an undetermined number of planks, which were transported by the chartered private vessel of Juan de Santiago, for the price of 500 *reales de vellón* each trip. In 1717, Pedro Combas advanced into Hinojos (Huelva) to fell and transport the equivalent timber to 20 carloads of futtocks and planks to a coastal shipping hub, with a total cost of 4,726 *rsv.*, of which 3,900 had been paid by that time (Quintero, 2004a: 394, 395, 492)[5]. By 1719/1720, Domingo Pérez Hevía provided 2,008 planks from 382 pine trees, for 106,633 *rsv.,* which were shipped, in 1721, from Seville to La Carraca at the cost of 17,062 *rsv.*[6]. In 1721, Manuel Guillen delivered 87 black poplar timbers from Cotos de Doñana (Almonte, Huelva), which transport cost from the shipping hub of Torre de Higuera was 540 *rsv.*[7] (Map 1). Pine (*pino* - Genus *Pinus*) and holm oak (*encina* - *Quercus ilex rotundifolia*) are native species with a widespread distribution across western Andalusia (Fernández, 1987a: 81-82; Fernández, 1987b: 161), which is registered in mid-18th century Navy maps[8].

The next case of commissioned felling, can be found in 1728-1729, when the carpenter Luis Creciente took charge of the provision of 209 pine timbers (178 futtocks and 31 beams) from Jerez de la Frontera (Cádiz), for the final price of 3,551 *rsv.,* including 1,600 for the commissioner and the mayor of the village who provided the workforce, as well as 1,951 for the opening of tracks and transport to the shipping hub of El Portal (Jerez de la Frontera). For the final delivery in El Puntal, the Navy made a direct arrangement with Marcos Ufano, who charged 879 *rsv.* for the service[9] (Map 1).

In June 1735, the lack of pumps and tackles made the Navy seek for the abundant black poplar (*alamo negro* - *Populus nigra*[10]) woodland *Real Sítio de Soto de Roma*

4. Archivo General de Indias, *Contratación,* 4720, Cartaya, 18/12/1716, *Fernando Sánchez a Varas; Idem,* 05/01/1717*, Fernando Sánchez a Varas; Idem,* as quoted by the author.
5. AGI, *Contratación,* 4720, Cartaya, 17/03/1717, *Pedro Combas a Varas; Idem, Relación y concepto de los gastos,* as quoted by the author.
6. Archivo General de Simancas, Tribunal Mayor de Cuentas, *Marina, Cádiz*, 4058, 24/02/1722.
7. *Idem*, 26/10/1721.
8. *Plano Geográfico y Mapa General de (…) la Provincia de Ayamonte* (1748- 1752); *Carta o Mapa General de (…) la provincia de marina de Sevilla* (1754); *Carta Geográfica o Mapa General de (…) la provincia de Marina de Sanlúcar de Barrameda* (1754)*; Mapa o carta corográfica que comprende todas las provincias de marina, que componen el Departamento de Cádiz* (1765), published in Gómez (1991; 27-31, 35-42).
9. AGS, TMC, *Marina, Cádiz*, 4070, 02/02/1729; *Idem*, 4071, 21/01/1730.
10. widespread across eastern Andalusia (Salazar and Quesada, 2011:700).

(Gananda), which was property of the Spanish Crown (Arroyo and Trápaga, 2018) (Map 1). Pedro Roux, pulley maker in La Carraca, was sent as the commissioner to manage the felling and transport of 100 trees, which should be previously marked with the authorization of the mayor Leonardo Vibanco. Works did not start until September, as the mayor waited for the advanced payment of 10,000 *rs. vellón* through Pedro de Javegui, treasurer of the provincial revenues[11]. This campaign yielded a total of 501 timbers (including 100 pumps, 400 tackle elements, and 1 timber for generic purposes), delivered in 231 carloads, whose conductions to Puerto Real lasted until November and were operated by 17 different individuals from villages such as Maracena, Alhendin, Montefrío, Zafaraya, Illora, Moclín, Padul, Cullar (Granada), Lorca (Murcia), Huelma (Jaén) and Cuenca, having a total cost of 53,670 *rsv.*[12] (Quintero, 2004a: 405). By September 1736, the totality of the costs was still unpaid, despite the constant claims of Vibanco. Due to this debt, the conductors had not received their wages and the situation was worse for those who had lost carts and oxen because of the very difficult weather conditions that they had to face. In September 18, Patiño ordered the transference of 43,670 *rsv.* to the *Corregidor* of Granada (magistrate), which would be delivered to the Navy Treasury by the Indies Depository (*Depositario de Caudales de Indias*)[13].

2.1.2. Purchase in regional markets (1717)

According to the data[14] provided by Quintero (2004a; 394, 491, 492), the 1717 timber purchases, for the careening dockyard of Puente de Suazo, were operated by the commissioners Fernando Sánchez, in Seville and Pedro de Combas, in Huelva (Map 1). In Seville, an undetermined amount of timber was bought for 150 *pesos de plata*, whereas the 40 *palos* (timbers) from Huelva costed 14 ½ *pesos de plata*, totalizing 164 ½ *pesos de plata* (2,467 ½ *reales de vellón*).

11. Archivo General de Simancas, Secretaría de Marina, *Arsenales,* 305, Cádiz, 28/06/1735, *Don Francisco de Varas; Idem,* 25/07/1735, *Don Francisco de Varas; Idem,* 23/08/1735, *Don Francisco de Varas; Idem,* 26/08/1735, *A Don Leonardo Vibanco.*

12. *Idem,* Granada, 27/09/1735, *Don Leonardo de Vibanco; Idem,* 11/10/1735, *Don Leonardo de Vibanco; Idem,* Soto de Roma, 25/10/1735, *Don Leonardo de Vibanco; Idem,* 01/11/1735, *Don Leonardo de Vibanco; Idem,* 01/11/1735, *Cuenta de los Gastos (…).*

13. *Idem,* Granada, 08/11/1735, *Don Leonardo de Vibanco*; *Idem,* 29/11/1735, *Don Leonardo de Vibanco; Idem,* 306, Granada, 17/04/1736, *Don Juan Antonio de Molina; Idem,* 05/06/1736, *El Corrigedor; Idem,* 01/08/1736, *Don Juan Antonio de Molina; Idem,* San Ildefonso, 07/09/1736, *José* Patiño; *Idem*, Cádiz, 18/09/1736, *Don Francisco de Varas.*

14. AGI, *Contratación*, 4720, Sevilla, 12/01/1717*; Recebí de Jose Maestre cinto cincuenta pesos de plata; Idem,* Puente de Suazo, 31/03/1717, *El Patrón Juan Santiago ha entregado en este Real de Puente de Suazo,* as quoted by the author.

2.2. *Purchase from regional middlemen merchants (1718-1735)*

According to the available sources, the purchase from private middlemen merchants appears to be the most extended and regular method throughout the period, with an uninterrupted flow of yearly supply, operated by 66 different individuals[15], referred as *traficantes de maderas*, from 1718 to 1735 (Chart1; Table 1).

The purchases ordered by the Navy authorities can be identified by variations of the expression [*maderas*] *que de mi orden se han comprado* and constitute the dominant practice, whereas there is only 6 cases of previous contracts (*en conformidad con contrata*). According to the calculations, a total of 84,568 timber pieces arrived at the shipyards of Puente de Suazo, Puntales, and La Carraca in 185 deliveries, corresponding to the whole sum of 2,461, 457 *rs., 08 ½ maravedís de vellón* (Table 1). These amounts are underestimated and must be seen as indicative figures, because some documents do not contain any information about the quantity, volume, size, species and type of pieces, and the prices are very variable. Moreover, some documents were left out of this account, due to the total absence of geographical mentions or any other clue, such as the mention to native species of trees, from which an origin could be inferred, even if generic.

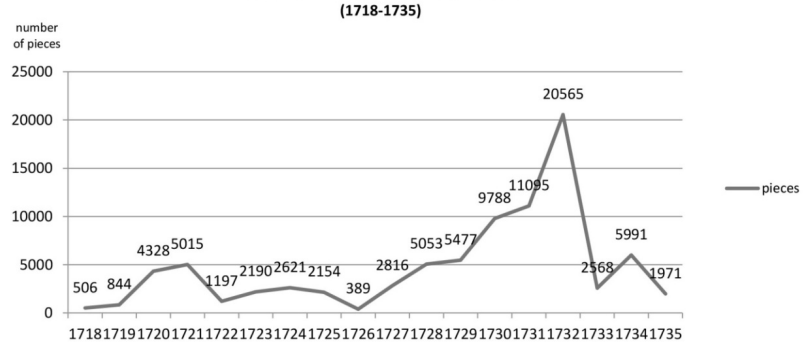
Among the documents taken into this account, the provenance of the timber is not very clear, since the only geographical reference, when available, is the origin of the supplier (*vecino de*), which invariably lived in places located in the current provinces of Cádiz, Seville or Huelva, region of western Andalusia, former Kingdom of Seville (Map 1). As an exception, the pine forests of Chiclana de la Frontera (Cádiz, Map 1) are explicitly indicated in the case of Juan de Aragón (1719-1721)[16]. Some generic allusions to the origin of the purchased pieces presented in the sources from the *Secretaría de Marina*, attribute the planks made out of *pino de la tierra* (pine) to the whole region of the Kingdom of Seville, Condado de Niebla (Huelva), and territory of the city of Seville[17] (Quintero, 2004a: 396). Along with *pino*, or *pino*

15. AGS, TMC, *Marina, Cádiz*, 4058 (109 *libranzas*, 26/05/1719-14/12/1724); 4066 (8 *libranzas,* 29/01/1725-14/01/1726); 4069 (30 *libranzas,* 09/08/1726-05/10/1729); *Idem*, 4075, 12/11/1731; 4077 (101 *libranzas,* 31/01/1730-25/07/1734); 4084 (10 *libranzas,* 09/04/1734-19/01/1735); AGS, SMA, *Arsenales,* 303, 1729, *Francisco Podestad; Idem,* 305, Cádiz, 20/12/1735, *Don Francisco Driget*; *Idem,* 01/07/1741 [copy of *libranza:* 17/05/1735]; *Idem,* 306, Cádiz, 03/01/1736, *Don Francisco Driget; Idem,* 17/01/1736, *Don José Blanco; Idem,* 04/1736, *José Blanco; Idem,* Cádiz, 03/10/1736, *Don Francisco de Varas; Idem, Asientos*, 599, Cádiz, 15/11/1735, *Don Francisco Driget; Idem, Nota de las Libranzas que se han despachado a José Blanco.*

16. AGS, TMC, *Marina, Cádiz*, 4058 (6 *libranzas:* 27/05/1719-20/12/1721).

17. AGS, SMA, *Arsenales*, 303, Carraca, 16/09/1729, *Estado de los géneros que se piden (…); Idem,* 305, Cádiz, 11/01/1735, *Don Francisco de Varas. Idem,* 28/08/1735, *Don Francisco de Varas.*

CHART 1
PURCHASES FROM MIDDLEMEN MERCHANTS
(1718-1735)



Source: AGS, TMC, 4058, 4066, 4069, 4077, 4084; AGS, SMA, 305, 306

de la tierra, other native species indicate the Andalusian origin of the timber, especially when combined in the same source. It is the case of species belonging to the genus *Quercus* such as *encina* (olm oak - *Q. ilex rotundifolia*), *quejigo* (gall oak- Q. faginea), *alcornoque* (cork oak - *Q. suber*). *Roble* (oak) can either correspond to the *roble andaluz* (*Q. canariensis* - known as Algerian oak*)* and *roble melojo* (*Q. pyrenaica* - Pyrenean oak), or be interpreted as a loose term to designate all indigenous *Quercus* species, except *encina,* in this context. *Alamo negro* (black poplar, *Populus nigra*) and *nogal* (walnut tree, *Juglans regia*) were also commercialized (Table1). This hypothesis is based on the mid-18th century[18] and current distribution of these species in the western and eastern Andalusia territories (Fernández, 1987a: 82-83; Fernández, 1987b: 161-163; Pérez & Cabezudo, 2011: 83-84; Salazar & Quesada, 2011: 700; Galán, Morales, Vivente, 2011: 922-924; Trigo, 2011: 926).

Despite the variety of species, pine is the absolute dominant raw material among the purchased pieces, with 77,101 units, corresponding to 91 %, followed by oak, (4,226 units, 5 %), olm oak (1,895 units, 2 %), pieces of not identified species (777 units, 1 %), and the remaining with less than 1 % each. Pine and oak planks constitute the main good, by representing 75 % of the delivered timber elements (70

18. *Plano Geográfico y Mapa General de (…) la Provincia de Ayamonte* (1748- 1752); *Carta o Mapa General de (…) la provincia de marina de Sevilla* (1754); *Carta Geográfica o Mapa General de (…) la provincia de Marina de Sanlúcar de Barrameda* (1754)*; Mapa o carta corográfica que comprende todas las provincias de marina, que componen el Departamento de Cádiz* (1765); *Carta Geográfica o Mapa General de (…) la provincia de Marina de Málaga* (1758), published in Gómez (1991; 27-31, 35, 36,39, 40, 42, 44, 45).

TABLE 1
PURCHASES FROM MIDDLEMEN MERCHANTS
(1718-1735)

YEAR	NUMBER OF DELIVERIES	TIMBER SPECIES	UNITS PER TYPE OF PIECE	TOTAL UNITS PER SPECIE	TOTAL COST PER SPECIES (*Reales. Maravedís de Vellón*)	TOTAL UNITS	TOTAL COST (*Reales. Maravedís de Vellón*)
1718	1	oak	**201** *tablones* (planks over 2 inches thick); **169** *cuartones* (squared timbers); **72** *palos* (timbers); **32** *tablas* (planks); **21** *curvas* (knees); **7** aposturas (top timbers)	502	138,171. 31	506	138,531. 31
		pine	**4** *curvas* (knees)	4	360		
1719	6	pine	**352** *piezas de ligazón* (futtocks)	352	1,778. 08	844	23,384. 28
		oak	**300** *tablas* (planks); **22** *palos* (timbers); **12** *cuartones* (squared timbers); **6** *tablones* (planks over 2 inches thick)	340	19,701. 28		
		black poplar	**102** *palos para pinzotes y barras de cabrestante* (sticks for rods and capstan bars)	102	1,530		
		not defined	**50** *tablas (*planks)	50	375		
1720	18	oak	**284** *tablones* (planks over 2 inches thick); **117** *curvas* (knees); **39** aposturas (top timbers) ; **22** *astas de pié* (frames); **8** *horcazes* (crutches); **5** *tablas* (planks); **13** *palos* (timbers); **3** *buzardas* (hooks) ; **1** *cepo* (stock); **1** *palo para cabrestante* (timber for capstan)	493	78,500. 02	4328	223,850. 18
		not defined	**370** *tablas* (planks)	370	3,309. 12		
		gall oak	**135** *palos* (timbers); **112** *tablones* (planks over 2 inches thick)	247	31,579		
1721	10	pine	**3275** *tablas* (planks); **613** *tablones* (planks over 2 inches thick); **569** *piezas de ligazón* (futtocks); **125** *palos* (timbers)	4582	138,003. 14 1/2	5015	155,463. 23 1/2
		oak	**427** *tablones* (planks over 2 inches thick); **4** *curvas* (knees)	431	17,310. 09		
		holm oak	**2** *trozos* (uncrafted timbers)	2	150		
1722	4	oak	**1002** *tablones* (planks over 2 inches thick)	1002	57,950	1197	75,906
		pine	**58** *tablones* (planks over 2 inches thick); **46** *tablas* (planks)	104	939		
		not defined	**91** *curvas (knees)*	91	17,017		
1723	6	pine	**640** *estemenaras* (futtocks); **300** *planes* (floor timbers); **210** *tablas* (planks); **154** *curvas* (small knees); **150** *astas* (frames); **150** *piques* (crutch); **150** *singlones* (lower futtocks)	1754	18,592. 17	2190 + unknown quantity	164,597. 18 1/4
		oak	**436** *tablones* (planks over 2 inches thick)	436	40,555. 01 3/4		
		not defined	*maderas, palos, tablones* (timbers and planks)		105,450		
1724	7	pine	**1812** *tablas* (planks); **125** *tablones* (planks over 2 inches thick); **60** *piezas de ligazón* (futtocks)	1997	74,774. 29	2621	136,150. 26 1/2
		oak	**556** *tablones* (planks over 2 inches thick); **1** *palo para codaste* (stern post)	557	51,748. 03		
		not defined	**27** *tablones* (planks over 2 inches thick); **7** *piezas de ligazón* (futtocks)**; 1** *palo* (timber)	35	*4,859*		
		cork oak	**32** *curvas* (knees)	32	4,768. 28 1/2		
1725	8	pine	**1754** *tablas* (planks); **54** *piezas de ligazón* (futtocks)**; 28** *tablones* (planks over 2 inches thick)**; 1** *palo* (timber)	1837	68,996	2154 + unknown quantity	151,832. 17
		holm oak	**156** *piezas de ligazón* (futtocks); **41** *curvas* (knees); **12** *aposturas* (top timbers); **3** *bularcamas* (floor riders); **2** *horcazes* (crutches); **1** *estemenara* (futtock)	215			
		cork oak	**40** *curvas* (knees)	40			
		oak	**62** *palos* (timbers)	62	32,816. 17		
		not defined	*tablazón* (planks); *piezas de ligazón* (futtocks)		50,020		
1726	3	pine	**342** *tablas* (planks); **47** *piezas de ligazón* (futtocks)	389	13,185	389	13,185

Source: AGS, TMC, 4058, 4066, 4069

TABLE 1
PURCHASES FROM MIDDLEMEN MERCHANTS
(1718-1735) cont.

YEAR	NUMBER OF DELIVERIES	TIMBER SPECIES	UNITS PER TYPE OF PIECE	TOTAL UNITS PER SPECIE	TOTAL COST PER SPECIES (*Reales. Maravedís de Vellón*)	TOTAL UNITS	TOTAL COST (*Reales. Maravedís de Vellón*)
1727	7	pine	**1569** *tablones* (planks over 2 inches thick); **728** *tablas* (planks); **5** *arboles* (trees)	2302	79,205. 17	2816	125,732. 01
		holm oak	**6** *curvas* (knees)	6	900		
		oak	**300** *tablones* (planks over 2 inches thick)	300	45,626. 28		
		walnut tree	**120** *tablones* (planks over 2 inches thick)	120			
		not defined	**77** *curvas* (knees); **7** *palos curvos* (compass timbers); **3** *palos de cepos de anclas* (timbers for anchor stocks); **1** *curvatón* (small knee)	88			
1728	7	pine	**4000** *tablas* (planks); **702** piezas de ligazón (futtocks); **189** *tablones* (planks over 2 inches thick); **60** *curvatones* (small knees) ; **12** *arbolillos* (small tree trunks)	4963		5053	126,666. 17
		oak	**90** *palos* (timbers)	90			
1729	6	pine	**3611** *tablas (*planks) ; **1689** *piezas de ligazón* (futtocks); **20** *curvatones* (small knees); **14** *tablones* (planks over 2 inches thick); **7** *curvas* (small knees)	5341	57,517	5477	86,597
		not defined	**71** *tablones* (planks over 2 inches thick); **41** *curvas* (small knees) ; **24** *piezas de ligazón* (futtocks)	136	29,080		
1730	11	pine	**7754** *tablas* (planks); **1610** *piezas de ligazón* (futtocks); **267** *tablones* (planks over 2 inches thick); **157** *curvatones* (small knees)	9788	234,961. 03	9788	234,961. 03
1731	24	pine	**8079** *tablas* (planks) ; **2195** *piezas de ligazón* (futtocks); **570** *curvatones* (small knees); **208** tablones (planks over 2 inches thick); **3** *cuadernas de tajamar* (cutwater timbers); **3** *palos para* [ilegible] *de las perchas* (timbers for [?] of the head rails); **1** *madre de tajamar* (beak of the cutwater); **1** *sobremadre de tajamar* (fore piece of the cutwater)	11060	263,831. 29	11 095	264,845
		cork oak	**15** *curvas* (knees)	15	232. 17		
		oak	**5** *tablones* (planks over 2 inches thick); **4** *curvas* (knees); **2** *palos para perchas de tajamar* (timbers for head rails); **1** *cuartón* (squared timber)	13	671. 11		
		not defined	**6** *palos para bombas* (timber for pumps); **1** *stern post* (codaste)	7	150		
1732	43	pine	**12 012** *tablas* (planks) ; **3218** *tablones* (planks over 2 inches thick); **2238** *piezas de ligazón* (futtocks); **1075** *trozos para morteros de bomba* (timbers for pump boxes); **401** *curvatones* (small knees) ; **90** *estacas para cintas y caireles* (poles for wales and rails); **1** *palo* (timber); **160** not defined	19 195	219,517	20 565	239,940.04
		holm oak	**766** *curvas* (knees) ; **348** *palos* (timbers); **172** *curvatones* (small knees) ; **62** *palos curvos* (compass timbers); **6** *piezas de ligazón* (futtocks); **3** *horcazes* (crutches)	1357	20,423. 04		
		cork oak	**9** *curvas* (knees); **4** *palos* (timbers)	13			
1733	8	pine	**1885** *tablas* (planks); **365** *tablones* (planks over 2 inches thick); **65** *piezas de ligazón* (futtocks); **47** *curvatones* (small knees)	2362	66.450	2568	103,309. 30
		holm oak	**90** *palos curvos* (compass timbers); **78** *curvas* (knees); **38** *curvatones* (small knees)	206	36,859. 30		
1734	10	Pine	**2041** *tablas* (planks); **1494** *tablones* (planks over 2 inches thick); **1019** *piezas de ligazón* (futtocks); **860** *planes* (floor timbers); **468** *curvatones* (small knees)	5882	129,466. 22	5991	140,981. 33
		holm oak	**58** *curvas* (knees); **51** *palos curvos* (compass timbers)	109	11,515. 11		
1735	5	pine	**1858** *tablas* (planks); **98** *tablones* (planks over 2 inches thick); **8** *piezas de ligazón* (futtocks); **7** *curvatones* (small knees)	1971	88,126	1971 + unknown quantity	225,481. 22
		not defined	*piezas de ligazón* (futtocks)		137,355. 22		

Source: AGS, TMC, 4069, 4077, 4084; AGS, SMA, 303, 305, 306

% pine and 5 % oak), with a total of 64,129 units. Different categories of futtocks for larger and minor vessels occupy the second position with 15 % correspondent to 12,858 units, followed by knees with 5 % and 3,898 units. The third and fourth positions belong to pump elements (1,801 units) and generic/uncrafted timber (1,444), with 2 % each. The less significant typologies representing under 1 % each, correspond to the groups of the floor timbers and riders, with 777 pieces, the hooks and crutches (166 units), and a group composed of very small amounts of capstan elements, wales and rails, cutwater elements, anchor stocks and stern posts, totalizing 209 pieces (Table 1).

Except three cases of deliveries in carloads, the chosen quantification mode is in number of timber elements. The prices were very variable, and assigned by specie/type of piece/size, specie/type of piece/volume or even specie/type of piece/type of vessel (ships, frigates, pinnaces and long boats), therefore presenting a large range (Table 2). The prices included all stages of the supply service, which were guaranteed by the provider, from the selection and acquisition of the material to its transport.

TABLE 2
TIMBER PURCHASES PRICES
(1718-1735)

SPECIES	PRICE PER UNIT	PRICE PER *CODO*	PRICE PER *CODO CUBICO*
pine	3 - 280 *rs. vellón*	6 - 11 1/4 *rs. vellón*	
	6-18 *rs. plata antigua*	6 *rs. plata antigua*	
oak	30-300 *rs. vellón*	27-45 *rs. vellón*	
		1 – 14 *rs. plata antigua*	
holm oak	7 1/2-150 *rs. vellón*		105-120 *rs. vellón*
cork oak			60 *rs. vellón*
black poplar	15 *rs. vellón*		

Source: AGS, TMC, 4058, 4066, 4069, 4077, 4084

Juan Aragón is one of the rare cases of reference to transport, in 1719-1721: the provider had to guarantee the transport from the forest of Chiclana de la Frontera (Cádiz) by ox-carts (*carretas*) to Cádiz, or to the coastal shipping hub of Chiclana, from which the timber had to be conducted by boat at his expenses as well[19]. In 1729, Francisco Podestad (Cádiz) alluded to the transport of timber in two floats

19. AGS, TMC, *Marina, Cádiz*, 4058 (6 *libranzas:* 27/05/1719-20/12/1721).

commanded by the respective masters[20]. In 1735, José Blanco (Huelva) lost his boat to Algerian corsairs, in 1735, while transporting timber from Huelva to Cádiz, in an attack that affected two other vessels that had departed from as Huelva and Seville with a similar cargo[21].

Contracts between the middlemen merchants and José Patiño as Navy Intendant, or the Intendancy delegates stipulated the prices and timber features before delivery, and included advanced payments. In July 2, 1723, Francisco Soltero (Seville) signed a contract with José Patiño, receiving an advance payment of 5,955 *rsv.* for a single delivery to La Carraca[22]. Domingo Grangent (Cádiz) signed contract in October 29, 1723, where he compromised to conduct timber from different unidentified locations to La Carraca and Puente de Suazo, receiving advance payments of 7,200, 23,250 and 75,000 *rsv.*[23]. Two suppliers of unknown origin, Ignacio Pérez Conde and José Espinoza, signed contracts in December 9,1726[24] and 1727[25], respectively. José de Barreda (Huelva), was a frequent supplier from 1728 to 1735, and signed contract in February 20, 1728, receiving frequent advance payments: 3,000 *rsv.* upon contract, followed by another 3,000 in the same year, 2,200, in 1729 and 6,000 *rsv.* in 1730[26]. José Blanco, from Huelva as well, was the most frequent provider of all, with 21 identified deliveries between 1732 and 1735, and constitutes the only individual to be referred as *asentista* (contractor), even though this research did not find any further evidence of that[27].

In the cases of ordered timber, the prices were seemingly arranged upon delivery, with the intervention of the Navy Intendant, or its representative in Cadiz, and, from 1727 onwards, the *Intendente del Departamento Marítimo de Cádiz* (Cadiz Maritime Department Intendant). The determination of the prices included the technical assessment of the delivered material made by the *Capitan de Maestranza* (master foreman) and/or the *carpintero mayor* (master carpenter).

Payments were processed directly by the Navy Department Treasury, and, in periods of budget restrictions, it took some time to set the debt with providers. It was the case of Domingo Grangent (Cádiz), who in 1725, was still waiting for the

20. AGS, SMA, *Arsenales*, 303, 1729, *Francisco Podestad.*

21. *Idem*, 306, Cádiz, 17/01/1736, *Don José Blanco; Idem,*04/1736*, José Blanco; Idem, Asientos*, 599, Cádiz, 15/11/1735, *Don Francisco Driget.*

22. AGS, TMC, *Marina, Cádiz*, 4058 (2 *libranzas:* 03/07/1723-08/08/1723).

23. *Idem* (9 *libranzas:* 01/10/1721-03/07/1724).

24. *Idem,* 4069 (2 *libranzas:* 09/12/1726-17/03/1727).

25. *Idem* (2 *libranzas:*11/11/1727-10/12/1727).

26. *Idem,* 4069, (8 *libranzas:* 20/02/1728-05/10/1729); *Idem,*4077 (8 *libranzas:* 31/01/1730-07/07/1732).

27. AGS, SMA, Asientos, 599, Cádiz, 15/11/1735, *Don Francisco Driget. Instancia sobre que se pague al Asentista de maderas de ligazón.*

payment of 30,000 *rsv.* for 1722-1723 deliveries[28]. In 1736, the Navy still owed Jose de Barreda (Huelva) 17,940 *rsv.* for planks delivered in 1735[29]. In 1735, José Blanco (Huelva) claimed for the payment of his services, which continuity was at risk due to his own lack of fund liquidity. He was himself in debt with the people from whom he purchased the timber. As a result, he was the one who had to suffer the violent pressure from his creditors because they did not have a direct relation with the state. In his words, he defines the paradigm of the whole method of supply: (…) *porque la madera no la tiene de su cosecha, pues la compra a varios particulares, los cuales como no se entienden con la real hacienda para su cobranza* (…). In 1736, he claimed that the *libranzas* corresponding to more than 160,000 *rsv.* had not even been issued. In 1741, the Navy still owed him at least, 27,428 *rsv.*[30].

Thus, the suppliers acted as commercial intermediaries between the Navy and the local producers of timber, forest owners and transport agents. Their task was to provide the material that fitted in the shipbuilding and repair requirements and arrange the overland and maritime transport to the shipping hubs and shipyards. State intervention in this process seems to be reduced to the definition of features and prices, as the selection, acquisition and transport were made at the supplier's own risk and expense. This limited state supervision might be the reason behind the absence of documents mentioning the exact provenance of timber and other supply details, beyond the product features. Moreover, it might be related to its characteristics: low diversity and a majority of pieces with a simple straight morphology that could be easily standardized, through measurement definition, and mass produced without the close control of specialized shipbuilding staff. That is the case of planks which, significantly, represents 75 % of these purchases.

2.3. *Articulation of methods: contracts and direct administration networks (1720-1736)*

Around 1720, the Navy implemented another system of supply for Cádiz, which most distinctive characteristic was the articulation of felling, crafting, and overland transport of timber elements under contract, with the direct administration of the maritime transport of the material to the shipyards. During this period, two main so called *asentistas de corta, labra y conducción de maderas* were at the core of two different supply networks. Pedro de Amestoy was the center of the operations in

28. AGS, TMC, *Marina, Cádiz*, 4066, 20/02/1725.

29. AGS, SMA, *Arsenales*, 305, Cádiz, 20/12/1735, *Don Francisco Driget*; Idem, 306, Cádiz, 03/10/1736, *Don Francisco de Varas.*

30. *Idem,* 305, 01/07/1741 [copy of *libranza:* 17/05/1735]; *Idem*, 306, Cádiz, 17/01/1736, *Don José Blanco; Idem,* 04/1736, *José Blanco; Idem, Asientos*, 599, Cádiz, 15/11/1735, *Don Francisco Driget; Idem, Nota de las Libranzas que se han despachado a José Blanco.*

the woodlands of Gibraltar and La Janda, in the current Cádiz province, between 1720 and 1730 (Maps 1, 2; Tables 3-6). In Málaga, from 1728 to 1736, Juan Navarro established as the provider of a more complex network, which was not so centered on the contractor, but more on the territorial and administrative identity of that Maritime Province (Maps 1, 3; Tables 8-13).

Contrarily to purchases, in this type of supply, the state practiced a closer supervision of the different stages of the operational chain. The felling campaigns of each contract were preceded by assessments of the woodlands, performed by specialized shipbuilding staff of the arsenal. These would signalize the trees, according to the quantity and type of pieces needed for construction and repair, as well as their distance to the nearest coastal shipping hubs. The quality of the wood, size and natural morphology of trees would be determinant for the technical aspects, and the location of the woodlands for the logistic factors related with transport. The wood works could be controlled by visits of administrative officers, or have a more permanent presence of a felling supervisor, in order to guarantee the accomplishment of the technical requirements and the effectiveness of the logistics and production rhythm. Measurements and morphology should be standardized, according to the types and sizes of vessels. The intervention of experts was crucial to obtain the wide range of types of timber elements, specific to the different parts of vessels of different classes that can be observed in the lists of assessments as well as of felling campaigns. The supply of hull structure and reinforcement elements made out species of the genus *Quercus* seems to be the main purpose of these contracts (Tables 3, 4, 6, 8-12).

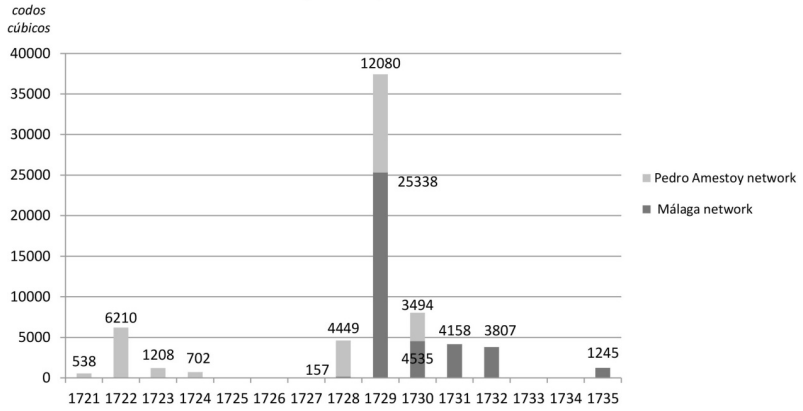
Hinterland operations were dominated by the contractor. He was responsible for the felling, crafting, and transport of the timber to the coastal shipping hubs, providing the means, the workforce as well taking responsibility on the tracks. All these services were included in the final costs of the delivered timber. The shipping hubs were fixed and located in beaches and at river mouths and each one was connected to specific woodlands of the hinterland (Tables 3, 4, 8, 9, 11 ; Maps 2, 3).

Once the timber was deposited on the shipping hubs, the Navy took charge of its maritime transport to the shipyards of Puente Suazo, El Puntal and Arsenal of La Carraca. The overwhelming majority of the conductions were operated by chartered private vessels, whose masters negotiated directly with the Navy authorities. Among the different typologies of vessels used in this transport, there are typical coastal navigation vessels and port cargo carriers, such as *gabarras* (barges), *barcos* (boats), *barcos roperos, barcos longos, lanchones* (types of pontoons) *pingues* (pinques), *tartanas* (tartans) and *saetias* (setees). Each contractor network integrated their own unique group of vessel masters, with a few rare cases of individuals serving both. The payment was processed directly by the Navy Department Treasury upon delivery, after the certification issued by the officers who were in charge of the storage of naval equipment in each of the different shipyards. From 1728 to 1729,

the practice of advance payment was generalized. Before the trip, the vessel's master received a given quantity against the total cost of the complete service.

The few accounts of the timber felled, crafted and delivered by each of the contractors to the shipping hubs are inconsistent, with significant information gaps. Therefore, is very difficult to calculate the total amounts with a minimum of accuracy. Moreover, they do not fully match with the even fewer lists about timber transported from the shipping hubs to Cádiz. These represent a small portion of the whole supply and serve better as samples of information with qualitative data about provenance, estimated time of felling, species and types of timber elements (Tables 3, 4, 8-11). On the other hand, the accounts of the volume of the timber transported from the shipping hubs to Cádiz (Table 6, 12) extracted from the *libranzas* and uniformized in *codos cubicos* (Chart 2) are very regular, and, since they correspond to the actual supply, they are taken as the quantitative reference for this system of supply, despite some gaps of information and their lack of detail on other aspects.

CHART 2
TIMBER VOLUME FROM CONTRACT / DIRECT ADMINISTRATION NETWORKS (1721-1735)



Source: AGS, SMA, 303, 599; AGS, TMC, 4058, 4063, 4069, 4070, 4071, 4080, 4087

According to the available data, and taking into account the existing gaps of information, these two networks contributed with, at least, 67,921 *codos cubicos* of timber, representing the total expenditure of, at least, 2,371,797 rs., *04 maravedís de vellón* divided in 1,555,743 *rs.,* 05 *maravedís de vellón*, for Pedro de Amestoy and 816 053 *rs.,* 33 *maravedís de vellón*, for the Málaga network.

2.3.1. Pedro de Amestoy in Gibraltar: 1720-1730

In the periods of 1720-1724 and 1728-1730, Pedro de Amestoy, was the center of the supply network that operated in the southeastern region of the province of Cádiz, corresponding to the current counties of Campo de Gibraltar and a small portion of La Janda. The first included the territories of the municipalities of Castellar de la Frontera, Los Barrios, Algeciras, Jimena de la Frontera, and the second, Alcalá de los Gazules (Map1, 2; Tables 3, 4).

Despite some scarce references to *aliso* (alder - *Aldus glutionsa*) in Campo de Gibraltar, in general, and in Dehesa de Ojén (Los Barrios) in 1721/1722[31], and to *roble* (oak) in El Palancar (*Los Barrios*), in 1723/1724[32], the accounts of timber do not define timber species, in general. According to the mid-18th century forest maps, the corresponding territory had, indeed, a significant number of alder trees, but the dominant species were cork oak and gall oak, which were usually applied to the production of structural elements of the hull. These may correspond to the term *roble,* and to unidentified species, among the studied sources[33]. Besides these, *roble* could as well correspond to other native *Quercus* species such as Algerian oak, Pyrenean oak or even holm oak (Fernández, 1987a: 161-163). As the accounts on types of pieces and species are inconsistent, it is difficult to have more than an approximate idea about such qualitative aspects. The 1721-1724 lists attest the delivery of 405 generic alder pieces[34] as well as the use of *roble* in the crafting of 261 futtocks, 48 pieces of generic timber, 27 knees and 4 crutches[35]. Apart from 4,863 nails and bolts, the lists regarding pieces of not defined species indicate a 50 % of generic timber pieces (4,282 *palos* and *espeques*), 27 % of varied types of futtocks (2,347 units), 18 % of 1,525 different categories of knees, 3 % of 223 floor riders and floor timbers, 74 capstan bars and 84 planks, representing 1 % each, and the rest of the types representing less than 1 % each: 41 hooks and crutches, 18 anchor stocks, 17 ledges, 15 waterways, 14 wale pieces, 2 fore feet, 2 caps of the mast heads and 1 top of stem[36] (Table 3). From 1728 to 1730, there are some very sparse and vague references to planks, knees, beams, wales, without any form of quantification (Table 4).

31. AGS, TMC, *Marina, Cádiz,* 4058 (3 *libranzas:* 04/04/1722-09/04/1722); *Idem*, 4059, 29/04/1722.

32. Idem, 4063 (9 *libranzas:* 10/01/1724-05/04/1724).

33. *Carta Geográfica o Mapa General de (…) la provincia de Marina de Sanlúcar de Barrameda* (1754)*; Mapa o carta corográfica que comprende todas las províncias de marina, que componen el Departamento de Cádiz* (1765), published in Gómez (1991; 40, 42).

34. AGS, TMC, *Marina, Cádiz,* 4058 (3 *libranzas:* 04/04/1722-09/04/1722).

35. *Idem*, 4063 (10 *libranzas:* 10/01/1724-20/07/1724).

36. *Idem,* 4058, (9 *libranzas:* 17/10/1721-13/04/1722); *Idem,* 4059 (2 *libranzas:* 19/04/1723); *Idem,* 4063 (7 *libranzas:* 11/10/1723-20/07/1724).

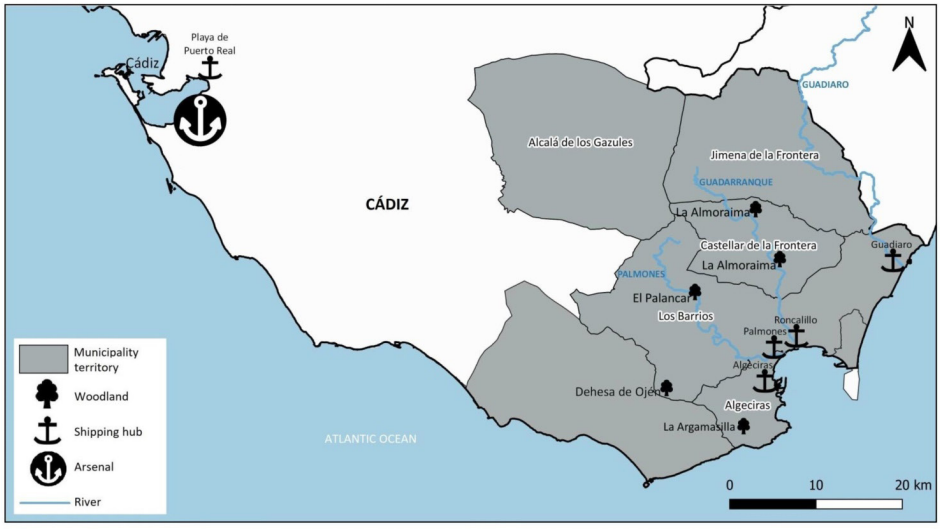
The preparations for the first felling campaign started in December 1720, with the assessment of woodlands by the Master Carpenter Cristóbal Pinzón. This operation had the objective of signalizing trees in the woodlands of Castellar de la Frontera, as well as others within the region of Campo de Gibraltar (Cádiz)[37]. According to a later report[38], and the first maritime transport registers[39] the felling initiated in 1721 in the forest territories (*montes*) of Castellar de la Frontera, Jimena de la Frontera, Dehesa de Ojén (Los Barrios) as well as other *montes* of Campo de Gibraltar and must have lasted until early 1722[40]. In the subsequent felling periods of 1722/1723[41], and 1723/1724[42], the woodlands of Palancar (Los Barrios) and Argamasilla (Algeciras) start to appear in the accounts, instead of Jimena and Castellar. After nearly four years of pause, in 1728, Pedro de Amestoy returned to the region. Once again, in late 1727, the field works were preceded by a visit of a technical team, now headed by the Master Shipwright Jean Belletrud, in order to select the adequate trees[43]. In December 27, 1727, José Patiño issued a Royal Order for the felling to start, which happened in early February, 1728, in the territories of Jimena and Los Barrios, according to the testimonial of the notaries of the respective villages[44]. By October 1728, a carpenter visited Jimena in order to evaluate the ongoing works, leaving 50 trees signalized. Besides these, the felling period of 1728/1729 took also place in Alcalá de los Gazules[45]. The works on those three territories proceeded in the 1729/1730 period, as well as in Castellar de la Frontera, with specific references to the woodlands of El Palancar and Rincón, in Los Barrios, Monte de la Zarza, in Jimena and Almoraima (*Alta* and *Vaja*), in Castellar[46] (Map 2; Tables 3,4).

As part of the service, Pedro de Amestoy provided the transport from each of the woodlands to the more convenient shipping hubs in the coast. Palmones was the main hub and received timber from region of Castellar, Jimena, Los Barrios,

37. *Idem,* 4057, 10/12/1720.
38. AGS, SMA, *Asientos*, 599, Madrid, 20/01/1725, *Con vista de las representaciones (…).*
39. AGS, TMC, *Marina, Cádiz*, 4058, (10 *libranzas:* 17/10/1721-11/04/1722).
40. *Idem,* 4059 (3 *libranzas:* 19/04/1722- 01/07/1722); *Idem,* 4063 (4 *libranzas:* 30/06/1723-31/12/1723).
41. *Idem* 4063 (3 *libranzas:* 11/10/1723-15/10/1723); *Idem* 4069 (3 *libranzas:* 04/10/1726-17/02/1728).
42. *Idem* 4063 (10 *libranzas:* 10/01/1724-20/07/1724).
43. *Idem,* 4069, 13/01/1728.
44. *Idem*, 17/02/1728.
45. *Idem* (2 *libranzas:* 13/01/1728- 17/021728); *Idem,* 4071 (14 *libranzas:* 30/11/1728-07/09/1729); AGS, SMA, *Arsenales,* 303, Cádiz, 01/11/1728, *Juan Belletrud*; *Idem,* Cádiz, 02/11/1728, *Don Esteban Fanales*; *Idem,* 16/11/1728, *Esteban Fanales; Idem, Asientos*, 599, Cádiz, 29/11/1728, *Sobre la providencia que acordó com Fanales*; *Idem,* 30/11/1728, *Sobre acarreto de maderas; Idem, Esteban Fanales* .
46. AGS, TMC, *Marina,* Cádiz, 4071,31/10/1731; *Idem,* 4079, (15 *libranzas:* 29/03/1730-08/07/1732); *Idem,* 4084, 15/01/1735.

as well as others, not referred. Algeciras seemed to be specifically connected to the woodlands of Ojén and Argamasilla, whereas Roncalillo served Los Barrios, and Guadiaro the region of Castellar, including the two woodlands named as Almoraima. Between 1729 and 1730, the transport from Jimena and Alcalá de los Gazules was being made directly by land to Puerto Real (Cádiz), where the Navy kept a dam for timber storage[47] (Map 2; Tables 3, 4). A 1734 report by Cirprian Autran refers the existence of a track connecting the woodlands of Jimena to Puerto Real[48]. Due to the urgent needs of deliveries, Pedro Amestoy subcontracted Diego Pérez, from Medina Sidónia, who was supposed to deliver 30 carloads of planks, wales and other not specified types of pieces to Puerto Real, from January 4, 1729 onwards. In order to have funds to cover his own expenses with the subcontractor, Pedro Amestroy received 30,000 *rsv.* in advance and the additional amount of 7,500 *rsv.* for ox-carts[49]. Since there are no accounts of the timber sent to Puerto Real, this means that, in this period, the total volume of the deliveries received in Cádiz is superior to the calculations made from the data of the maritime transport.

MAP 2
TIMBER SUPPLY: PEDRO DE AMESTOY NETWORK
(1721-1730)



Source: AGS, SMA, 303, 599; AGS, TMC, 4058, 5059, 4063, 4069, 4070, 4071, 4079, 4080, 4084; MTN25

47. AGS, SMA, Arsenales, 304, Cadiz, 31/05/1734, *Don Salvador de Olivares.*
48. *Idem,* 304, Puerto Real, 30/08/1734, *Estado del Numero de Arboles de roble (…).*
49. AGS, TMC, *Marina, Cádiz*, 4071 (2 *libranzas:* 04/01/1729).

TABLE 3
PEDRO DE AMESTOY NETWORK: FELLING, CRAFTING AND OVERLAND TRANSPORT
(1721-1724)

ESTIMATED FELLING PERIOD	TOPONYMY IN SOURCES	CURRENT TOPONYMY AND JURISDICTION	UNITS PER TYPE OF PIECE AND SPECIES	TOTAL PIECES *(minimum)*	SHIPPING HUB	COST (*Reales. Maravedís de Vellón*)
1721	*Monte del Castellar*	**Castellar de la Frontera** (Campo de Gibraltar, Cádiz)		3957	**Palmones** (Los Barrios, Campo de Gibraltar, Cádiz)	
	Jimena	**Jimena de la Frontera** (Campo de Gibraltar, Cádiz)				
	Ojén	**Dehesa de Ojén** (Los Barrios, Campo de Gibraltar, Cádiz)				
	Montes de Gibraltar	**Campo de Gibraltar** (Cádiz)	**2627***espeques* (bars); **672** *curvas* (curvas); **273** *piezas de ligazón, aposturas, singlones* (futtocks); **10** *sobreplanes* (floor riders); **5** *planes* (floor timbers)			
			alder and other species, not defined: **366** *palos* (timbers)			
1721 - 1722	*Ojén*	**Dehesa de Ojén** (Los Barrios, Campo de Gibraltar, Cádiz)	**4863** *clavos y pernos* (nails and bolts); **1222** *espeques* (bars); **1061** *aposturas, barraganetes* (top timbers); **812** *astas de pié, estemenaras, piezas de ligazón* (futtocks); **785** *curvas* (knees); **111** *bularcamas* (floor riders); **93** planes (floor timbers); **42** *palos* (timbers); **28** *busardas* (hooks); **17** *latas* (ledges); **15** *trancaniles, manos de trancaniles* (waterway pieces); **14** *cepos de ancla* (anchor stocks); **14** *cintas, manos de cinta* (wale pieces); **12** *horcaz* (hooks); **11** *sobreplanes* (floor riders); **10** *pies de roda* (fore feet); **2** *palos para tamboretes* (caps of the mast heads); **1** *caperol* (top of the stem); **1** *coral* (knee of the stern post)	9505	**Palmones** (Los Barrios, Campo de Gibraltar, Cádiz) **Algeciras** (Campo de Gibraltar, Cádiz)	382,320. 20
			alder: 39 *palos* (timbers)			
	Montes de Gibraltar	**Campo de Gibraltar** (Cádiz)				
1722 - 1723	*Palancar*	**El Palancar** (Los Barrios, Campo de Gibraltar, Cádiz)	**323** *espeques* (bars); **74** *palos para barras de cabrestante* (capstan bars); **40** *aposturas* (top timbers); **40** tablones (planks); **2** *curvas* (knees); **1** horcaz (crutch); **1** *bularcama* (floor rider)	481	**Palmones** (Los Barrios, Campo de Gibraltar, Cádiz)	106,057. 02 1/2
	Ojén	**Dehesa de Ojén** (Los Barrios, Campo de Gibraltar, Cádiz)		112 + unknown quantity	**Palmones** (Los Barrios, Campo de Gibraltar, Cádiz) **Algeciras** (Campo de Gibraltar, Cádiz)	
	Montes de Gibraltar	**Campo de Gibraltar** (Cádiz)	**54** *aposturas* (top timbers); **50** *curvas y aposturas* (knees and top timbers); **8** palos (timbers); tablones			
1723 - 1724	*Argamasilla*	**La Argamasilla** (Algeciras, Campo de Gibraltar, Cádiz)	**54** *aposturas* (top timbers); **39** *curvas* (knees); **3** palos (timbers); **2** bularcamas (floor riders); **2** *piezas de ligazón* (futtocks); **2** *zepos de ancla* (anchor stocks)	102	**Algeciras** (Campo de Gibraltar, Cádiz)	19,511. 01
	Ojén	**Dehesa de Ojén** (Los Barrios, Campo de Gibraltar, Cádiz)	**26** *aposturas* (top timbers); **18** *palos* (timbers); **4** tablones (planks); **1** *curva* (knee); **2** *zepos de ancla* (anchor stocks)	51	**Palmones** (Los Barrios, Campo de Gibraltar, Cádiz)	9,457. 30
	Palancar	**El Palancar** (Los Barrios, Campo de Gibraltar, Cádiz)	**oak: 261** *aposturas* (top timbers); **48** *palos* (timbers); **27** curvas (knees); **4** *horcazes* (crutches)	340	**Palmones** (Los Barrios, Campo de Gibraltar, Cádiz)	59,957. 29

Source: AGS, SMA, 599; AGS, TMC, 4058, 4059, 4063, 4069

TABLE 4
PEDRO DE AMESTOY NETWORK: FELLING, CRAFTING AND OVERLAND TRANSPORT (1728-1730)

ESTIMATED FELLING PERIOD	TOPONYMY IN SOURCE	CURRENT TOPONYMY AND JURISDICTION	TYPE OF PIECES	SHIPPING HUB	COST (*Reales. Maravedís de Vellón*)	
					FELLING AND OVERLAND TRANSPORT BY CONTRACTOR	OVERLAND TRANSPORT BY DIRECT ADMINISTRATION
1728 - 1729	*Montes de Gibraltar*	**Campo de Gibraltar** (Cádiz)	*tablones* (planks): curvas (knees); *baos* (beams), *cintas* (wales) and more, not defined	**Roncalillo** (San Roque, Campo de Gibraltar, Cádiz)	292,500	160,000
	Los Barrios del Campo	**Los Barrios** (Campo de Gibraltar, Cádiz)		**Palmones** (Los Barrios, Campo de Gibraltar, Cádiz)		
	Jimena	**Jimena de la Frontera** (Campo de Gibraltar, Cádiz)		**Playa de Puerto Real** (Puerto Real, Bahía de Cádiz, Cádiz)		
	Alcalá de los Gasules	**Alcalá de los Gazules** (La Janda, Cádiz)				
1729 - 1730	*Monte del Castellar*	**Castellar de la Frontera** (Campo de Gibraltar, Cádiz)	*maderas y tablazón* (timber and planks)	**Guadiaro** (San Roque, Campo de Gibraltar, Cádiz)	74,490. 33	57,180
	Almoraima Vaja	**La Almoraima** (Castellar de la Frontera, Campo de Gibraltar, Cádiz)				
	Almoraima Alta	**La Almoraima** (Castellar de la Frontera, Campo de Gibraltar, Cádiz)				
	Palancar	**El Palancar** (Los Barrios, Campo de Gibraltar, Cádiz)				
	Rincón	[not identified] Los Barrios (Campo de Gibraltar, Cádiz)				
	Jimena	**Jimena de la Frontera** (Campo de Gibraltar, Cádiz)		**Playa de Puerto Real** (Puerto Real, Bahía de Cádiz, Cádiz)		
	Monte de la Zarza	[not identified] (Jimena de la Frontera, Campo de Gibraltar, Cádiz)				
	Alcalá de los Gasules	**Alcalá de los Gazules** (La Janda, Cádiz)				

Source: AGS, SMA, 303, 599; AGS, TMC, 4069, 4071, 4079, 4084

Reports from November 1728 give some insight about details and obstacles to the contractor's transport service. Pedro de Amestoy not only made arrangements with local cart conductors, but also constructed ox-carts, for which he felled an extra portion of trees. Periods of rigorous weather could severely slow down the transport or even stop it completely, due to the impracticability of the tracks and the lack of energy of the oxen, which made impossible the conduction of heavy pieces such as knees and beams. To aggravate the whole situation, the contactor owed payments to the conductors[50]. Posthumous documents include construction and maintenance of tracks as part of his services[51] (Quintero, 2004a: 395-396).

50. AGS, SMA, *Arsenales,* 303, El Puntal, 01/11/1728*, Construcción de un Navío en El Puntal; Idem,* 02/11/1728, *Esteban Fanales; Idem*, Cádiz, 16/11/1728, *Esteban Fanales*; *Idem, Asientos*, 599, 30/11/1728, *Sobre acarreto de Maderas.*

51. AGS, TMC, *Marina, Cádiz*, 4079 (2 *libranzas:* 18/12/1731-08/07/1732); *Idem*, 4084 (2 *libranzas:* 15/01/1735).

Pedro de Amestoy's services were paid directly by the Navy Treasury, according to the contracts, as well as to the certifications issued by the Master Carpenter or the Shipwright upon inspection of the material and respective extraction areas. The contract signed in May 12, 1722 regulated the prices of the deliveries of timber felled between 1721 and 1724, with the intervention of Cristóbal Pinzón. They were calculated through a *pro ratio* that resulted from the combination of factors such as typology, size and distance from the respective woodlands to the shipping hubs, as the references to the carpenter's certification and the organization of the lists of delivered material indicate. Prices are not mentioned in such lists, but only the final costs per groups of pieces, according to their type, size range, and provenance[52]. Money tranches were paid to settle remaining debts, sometimes years after the conclusion of the services[53]. Despite Patiño's order to initiate the felling works in December 1727, the contractor did not start until receiving the first of two 29,778 *rs.* 18 *maravedís de vellón* tranches, regarding 1723 deliveries[54]. According to the April 2, 1728 contract, that would regulate the 1728-1730 phase, the provider would receive an advance of 240,000 *rsv.* paid in three tranches to his representative Luis de Valderrama[55]. Members of the technical staff would periodically visit the forest in order to evaluate the quality of the product and service and keep an account for payment purposes[56]. Contrarily to the previous phase, lists on types, species and timber costs were not found, and none of the documents mentions the existence of fixed prices. Posthumous *libranzas* refer that, in this phase, timber was quantified in *codos cúbicos*[57]. Money tranches could be paid when certain stages of the service were accomplished, according to the contract[58] or in advance, in order to mitigate the provider's constant lack of fund liquidity that could put the transport at risk, in periods of special urgency. It is the case of the 15,000 *rsv.* for ox-carts, in November 1728[59], and the 6,000 *rsv.* for other provisions, in July 1730[60]. The death of the provider must have been the cause for the end of service, because between 1731

52. *Idem*, 4063 (2 *libranzas:* 31/12/1723, 20/07/1734).
53. *Idem*, 4069, 04/10/1726.
54. *Idem* (2 *libranzas:* 13/01/1728-17/02/1728).
55. *Idem*, 4071 (3 *libranzas:* 19/06/1728-14/07/1728).
56. AGS, SMA, Arsenales, 303, El Puntal, 01/11/1728, *Construcción de un Navío en El Puntal*; *Idem,* Cádiz, 02/11/1728, *Esteban Fanales.*
57. *Idem,* 4079 (2 *libranzas:* 18/12/1731-08/07/1732); *Idem* 4084 (2 libranzas: 15/01/1735).
58. *Idem,* 4084, 31/10/1729.
59. AGS, SMA, *Asientos,* 599, Cádiz, 29/11/1728, *Sobre la providencia que acordó con Fanales;* AGS, TMC, Marina, Cádiz,4071, 30/11/1728.
60. AGS, TMC, *Marina, Cádiz*, 4079, 30/07/1730.

and 1735, the widow, Juliana Ferrary appears as one of the posthumous creditors[61]. The other is Baltasar Gómez, a sub-provider of victuals[62].

Between 1721 and 1735, according to the available sources, a total of 944,293 *rs.,* 13 *maravedís de vellón* were paid for the services Pedro de Amestoy, which certainly must be far from the reality, due to the information gaps.

The role of direct administration in this operational chain included a portion of the overland transport and the entirety of maritime transport, totalizing the cost of 611,449 *rs.* 26 *mrs de vellón.* (Tables 4, 5, 6).

A limited intervention in overland transport took place during the second phase, when the local cart conductors started to demobilize, as the contractor failed on payments, in a context of urgent timber needs. In late 1728, José Patiño gave instructions for the nomination of an officer to go to the field with an extra provision of funds, in order to evaluate the situation and make direct arrangements with the conductors, so that the transport could carry on. The cost of these additional services would be discounted from the payments to the contractor[63]. In 1729, such responsibility was delegated on the Navy Commissary Alexo Gutiérrez de Rubalcava, who received a total of 160,000 *rsv.* to organize transport to the shipping hubs of Palmones, Roncalillo and Puerto Real[64]. In 1730, 57,180 *rsv.* were distributed among the Navy Comissary Fernando Esparza, and Francisco Caracuel, frigate Ensign, for the management of the conduction logistics to Puerto Real and Guadiaro[65] (Table 4).

The maritime transport included the services of the chartered private vessels that worked as cargo loaders at the shipping hubs, the chartered private vessels that transported timber from these to the shipyards in Cádiz, and also the Navy's barge used in this same purpose (Table 5).

Evidences of cargo loaders appear between April 1722 and December 1729[66]. The function of this auxiliary service was the transport of timber pieces from the shipping hubs of Palmones and Roncalillo to the vessels that could not pass the bar, due to the shallow depth of river mouths. From 1721 to January 1724, the loaders assisted the Navy's barge *Santa Cruz,* exclusively, and, after 1728, any others. The Navy chartered private vessels from three different masters for four single services until January 1723, with costs varying from 150 to 180 *rsv.* From August 1723 to April 1724, the work started to be permanently guaranteed by the long boat

61. *Idem* (2 *libranzas:* 18/12/1731-08/07/1732); *Idem* 4084, 15/01/1735.
62. *Idem* 4084, 15/01/1735.
63. AGS, SMA, *Arsenales*, 303,Cádiz, 16/11/1728, *Esteban Fanales*; *Idem,* 23/11/1728, *José Patiño.*
64. AGS, TMC, *Marina, Cádiz*, 4071, (6 libranzas: 02/05/1729-07/09/1729).
65. *Idem,* 24/12/1729*; Idem,* 4079 (9 *libranzas:* 29/03/1730-18/12/1730).
66. *Idem,* 4058 (4 *libranzas:* 13/04/1722-27/11/1722); *Idem,* 4063 (8 *libranzas:* 01/02/1723-07/04/1724); *Idem,* 4070 (10 *libranzas:* 29/07/1728-17/12/1729.

Passacavallos operated by the team of the master Juan Sidón plus four assistants, paid by days of service, according to a hierarchy of functions. In the second phase of 1728-1730, the same practice and vessel were adopted again and performed by the team of Juan Covos and six assistants. A total of 24,976 *rsv.* were spent (Tables 5, 7).

The Navy's barge *Santa Cruz* was in charge of the transport of timber from Palmones to the shipyards in the first phase, between 1722 and 1724, as well as from Algeciras, in August 1722[67]. Francisco Diaz and a team of 11 sailors and two assistants took charge of this permanent service, which was also paid according to the number of days and to the worker's status, in a total sum of 37,380 *rsv.*[68] (Tables 5, 7). Like the timber directly transported to Puerto Real, there is not any account of the material, which contributes to the notion of the existence of a superior volume of deliveries, than the registered on the available documents.

TABLE 5
PEDRO DE AMESTOY NETWORK: NAVY'S BARGE AND LOADING SERVICES (1728-1730)

ESTIMATED FELLING PERIOD	SHIPPING HUB	TRANSPORT PERIOD	SERVICE	AGENT AND TEAM	VESSEL	NUMBER OF DAYS	DESTINATION	COST (*Reales de Vellón*)
1721	Palmones	apr 1722	loading	Sebastian Suazo	chartered private boat *San Pedro de Alcántara*		Navy's barge *Santa Cruz*	180
1721 - 1722	Algeciras	aug-1722	transport	Fracisco Diaz; 11 sailors, 2 assistants	Navy's barge *Santa Cruz*	31	La Carraca, Puente de Suazo	2,604
	Palmones	sep- dec 1722	transport	Fracisco Diaz; 11 sailors, 2 assistants	Navy's barge *Santa Cruz*	122	La Carraca, Puente de Suazo	10,248
		sep 1722	loading	Sebastian Suazo	chartered private boat *San Pedro de Alcantara*		Navy's barge *Santa Cruz*	180
		nov 1722	loading	Rodrigo Morilla	chartered private boat *Nuestra Señora del Carmen y San Francisco Xavier*		Navy's barge *Santa Cruz*	150
		jan- fev 1723	transport	Fracisco Diaz; 11 sailors, 2 assistants	Navy's barge *Santa Cruz*	32	La Carraca, Puente de Suazo	2,688
		jan 1723	loading	Juan Melendez	chartered private boat *San Joseph y las Animas*		Navy's barge *Santa Cruz*	150
1722 - 1723	Palmones	aug - nov 1723	loading	Juan Sidon; 4 assistants	chartered private long boat *Pasacavallos*	120	Navy's barge *Santa Cruz*	3,120
		aug - nov 1723	transport	Fracisco Diaz; 11 sailors, 2 assistants	Navy's barge *Santa Cruz*	120	La Carraca, Puente de Suazo	10,080
		dec 1723	loading	Juan Sidon; 4 assistants	chartered private long boat *Pasacavallos*	19	Navy's barge *Santa Cruz*	494
		dec 1723	transport	Fracisco Diaz; 11 sailors, 2 assistants	Navy's barge *Santa Cruz*	19	La Carraca, Puente de Suazo	1,596
1723 - 1724	Palmones	jan-abr 1724	loading	Juan Sidon; 4 assistants	chartered private long boat *Pasacavallos*	121	Navy's barge *Santa Cruz*	3,146
		jan-abr 1724	transport	Fracisco Diaz; 11 sailors, 2 assistants	Navy's barge *Santa Cruz*	121	La Carraca, Puente de Suazo	10,164
1728	Roncalillo, Palmones	jun-dec 1728	loading	Juan Covos; 6 assistants	chartered private long boat *Pasacavallos*	157	chartered private vessels	6,908
		jan-apr 1729	loading	Juan Covos; 6 assistants	chartered private long boat *Pasacavallos*	120	chartered private vessels	5,280

Source: AGS, TMC, 4058, 4063, 4070

67. AGS, TMC, *Marina, Cádiz*, 4058 (9 *libranzas:*13/04/1722-27/11/1722); *Idem,* 4063 (16 *libranzas:* 01/02/1723-07/04/1724).

68. vessel's master - 8 *rs. vellón*/day ; sailor - 6 *rs. vellón*/day; assistant: 5 *rs. vellón*/day.

TABLE 6
PEDRO AMESTOY NETWORK: MARITIME TRANSPORT BY CHARTERED VESSELS (1721-1730)

ESTIMATED FELLING PERIOD	TRANSPORT PERIOD	SHIPPING HUB	DESTINATION	NUMBER OF DELIVERIES	UNITS PER TYPE AND SPECIES	TOTAL UNITS	VOLUME	WEIGHT	COST (*Reales. Maravedís de Vellón*)
1721	oct 1721	Palmones	Puente de Suazo	2				2300 *quintales*	3.652. 17
	nov 1721	Palmones	La Carraca	1	**700** *espeques* (bars); **35** *curvas* (knees); **1** *sobreplan* (floor rider) **alder: 200** *palos* (timbers)	936			1,875
	jan, apr 1722	Palmones	La Carraca	10	**1927** *espeques* (bars); **637***curvas* (curvas); **273** *piezas de ligazón* (futtocks); **9** *sobreplanes* (floor riders); **5** *planes* (floor timbers) **alder: 166** *palos* (timbers)	3017			10,005
1721 - 1722	jun-dec 1722	Palmones	La Carraca, Puente de Suazo	34				34 400 *quintales*	32,545. 21
	jul-sep 1722	Algeciras	La Carraca	7				4800 *quintales*	4,504. 13
	jan 1723	Palmones	Puente de Suazo	2				2200 *quintales*	2,062. 17
1722 - 1723	out-dec 1723	Palmones	La Carraca, Puente de Suazo	9	**323** *espeques* (bars); **94** *aposturas* (top timbers); **74** *palos para barras de cabrestante* (capstan bars); **40** *tablones* (planks); **8** *palos* (timbers); **2** *curvas* (knees); **1** *horcaz* (crutch); **1** *bularcama* (floor rider)	543	6464 106/178 *pies cubicos*	6464 106/178 *quintales*	7,059. 33
	nov 1723	Algeciras	La Carraca	1	**50** *curvas y aposturas* (knees, top timbers)	50		1000 *quintales*	937. 17
1723 - 1724	feb-apr 1724	Palmones	La Carraca	7	*madera de roble* (oak timber)		5608 169/178 *pies cubicos*	5608 169/178 *quintales*	10,518. 24
1728	set-nov 1728	Roncalillo; Palmones	Puntal	22			35 590 *pies cubicos*		73,911. 05
	jan 1729	Roncalillo; Palmones	Puntal	2			5434 *pies cubicos*		2,899
1728 - 1729	may-dec 1729	Roncalillo; Palmones	Puntal	44			11 400 424/484 *codos cubicos*		140,671. 21
1729 - 1730	jul-dec 1730	Guadiaro	Puntal	13			3494 146/484 *codos cubicos*		41,270. 28

Source: AGS, TMC, 4058; 4059, 4063, 4069, 4070, 4071, 4079, 4080; AGS, SMA, 303

The maritime transport by chartered private vessels followed the rhythm and the geographical expansion of the contractor's work. During the two phases of this operational chain, October 1721-April 1724[69] and September 1728-December 1730[70], a total of 28,681 *codos cúbicos* of timber arrived at Cadiz in 154 shipments,

69. AGS, TMC, *Marina, Cádiz*, 4058 (49 *libranzas:* 17/10/1721-01/12/1722); *Idem*, 4063 (23 *libranzas:* 05/01/1723-25/04/1724).

70. AGS, SMA, *Arsenales,* 303, Cádiz, 02/11/1728, *Esteban Fanales; Idem*, 23/11/1728, *Don Esteban Fanales;* AGS, TMC, *Marina, Cádiz*, 4070 (83 libranzas: 01/07/1728-19/12/1729); *Idem*, 4080 (*7 libranzas:* 05/07/1730- 30/12/1730).

TABLE 7
MARITIME TRANSPORT PRICES
(1721-1735)

SERVICE	YEARS	SHIPPING HUBS	PRICE	UNIT
transport by Navy's barge *Santa Cruz*	1721-1724	Palmones, Algeciras	8 *rs. vellón* (vessel master); 6 *rs. vellón* (sailor); 5 *rs. vellón* (assistant)	day
loading by charted private long boat *Pasacavallos*	1722-1724	Palmones	6 *rs. vellón* (vessel master); 5 *rs. vellón* (assistant)	day
loading by charted private long boat *Pasacavallos*	1728-1729	Palmones, Roncalillo	8 *rs. vellón* (vessel master); 6 *rs. vellón* (assistant)	day
transport by charted private vessel	1721	Palmones, Algeciras	1 *r. plata antigua* (63 3/4 *mrs. vellón*)	*quintal*
transport by charted private vessel	1722-1723	Palmones, Algeciras	32 *mrs. vellón*	*quintal*
transport by charted private vessel	1722-1723	Palmones, Algeciras	1/2 *r. plata antigua* (31 7/8 *mrs. vellón)*	*quintal*
transport by charted private vessel	1729	Torre del Mar	*3 reales de vellón*	*quintal*
transport by charted private vessel	1723-1724, 1728-1729	Palmones, Roncalillo	1 *r. plata antigua* (63 3/4 *mrs. vellón*)	*quintal / pié cubico*
transport by charted private vessel	1728-1729	Torre del Mar	150-300 *pesos* (2,250 – 4,500 *rs. vellón*)	trip, per vessel
transport by charted private vessel	1729-1732	Torre del Mar	14 1/4 *rs. vellón*	*codo cúbico*
transport by charted private vessel	1729-1735	Palmones, Roncalillo, Guadiaro, Sabinillas, Salto de la Mora, Guadaiza	12 *rs. vellón*	*codo cúbico*

Source: AGS, TMC, 4058; 4059, 4063, 4069, 4070, 4071, 4079, 4080

representing the whole expenditure of 331,913 *rsv.* (Table 6, Chart 2). This activity attracted 84 different masters from Huelva, Puerto de Santa María, Puerto Real, Chiclana de la Frontera, Tarifa (Cádiz), Seville, Coria del Río (Seville), as well as Málaga and even Ceuta.

The accounts on the number and timber features of the timbers delivered by this chartered vessels are very rare, and, so, the calculation of quantities relies on the weight and volume units of transport and their internal correlation. Such units determine the price of the transport. In 1721, the transport from Palmones and Algeciras was quantified by weight in *quintales*, but, in late 1723 - April 1724, the convention of equivalence between *pies cubicos* and *quintales* was introduced[71]. After that, *codo cúbico* was adopted as the universal volume unit (Table 7). Advance payments were seemingly fixed in 1,500 *rsv.* in the first services of late 1728, but soon after 1,000 *rsv.* became the norm until 1729.

71. Regulation of December 22, 1723 issued by Francisco Nicolta, Treasury Officer, referenced in *libranzas* such as AGS, TMC, 4063, Cádiz, 31/12/1723, among others. This convention, and the reference of the equivalence of each *codo cúbico* of oak to more or less 8 *quintales,* in AGS, SMA, 304, Puerto Real,30/08/1734, *Don Ciprian Autran,* allowed the conversion of all values to *codos cubicos* for this research.

2.3.2. The Province of Malaga and Juan Navarro: 1728-1736

From 1728 to 1736, the supply network of the Province of Malaga (also called *Departamento de Malaga*) established as a system with a further level of complexity. This Naval jurisdiction was the territory and operation centre that articulated the relation between the contractors, the central administration of the Navy (Cádiz Maritime Department and Navy Ministry) and the revenue treasury (*aduana*) of Málaga as source of funding. Felipe de Ansa, as the authority of this jurisdiction (*ministro*), was responsible for the management of logistics, recruitment of supervision and accounting staff, as well as the distribution of funds. The existence of multiple contractors was ephemeral, and Juan Navarro, *asentista de corta, labra, esquadreo y condución de madera,* from Málaga, became the backbone of this system as the sole provider of workforce and means of production.

The areas of timber extraction were concentrated in the regions of Alhama and Loja (current province of Granada) Axárquia (Málaga) and, in the opposite extremity, the regions of Serranía de Ronda and Costa Occidental (Málaga) (Maps 1, 3).

Regarding species, oak is the most common reference and is associated with all the above mentioned regions[72]. Gall oak was being provided by woodlands in Serranía de Ronda[73]. Spanish fir (*pinsapo – Abies pinsapo*) is exclusive to a place named *Pinsapar de Ronda* (Ronda, Málaga)[74]. Some of the accounts do not define species[75] (Tables 8-10). This distribution is corroborated by the mid-18th century Navy forest maps (except Spanish fir) and, once again, oak could also refer to holm oak or gall oak[76]. Currently, Spanish fir can be found in the same region (Pérez and Cabezudo, 2011: 81), and *Quercus* species (including Algerian oak and Pyrenean oak) are widely disseminated (Galán, Morales, Vivente, 2011: 922-924).

Besides information gaps, there is also the problem of overlapping data, due to the existence of different accounts for the same woodlands and same timber, as

72. AGS, SMA, Arsenales, 303, Zafarraya, 10/11/1728, *Estado de las piezas de roble (…)*; *Idem,* Málaga, 17/07/1731, *Relación de las Piezas de Madera (…)*; *Idem,* 304, Málaga, 22/06/1734, *Relación de las Maderas (…); Idem,* 304, Puerto Real, 30/08/1734, *Estado del número de árboles de roble (…)*; *Idem, Estado de las piezas labradas de roble (…)*; *Idem,* 306, Málaga, 11/10/1736, *Don Felipe de Ansa*; *Idem,* Monte del Robledal de Arroyo, 03/09/1736, *Agustín de Salomón*; *Idem*, *Asientos,* 599, Cádiz,15/01/1735, *Nota de las Maderas de Roble (…).*

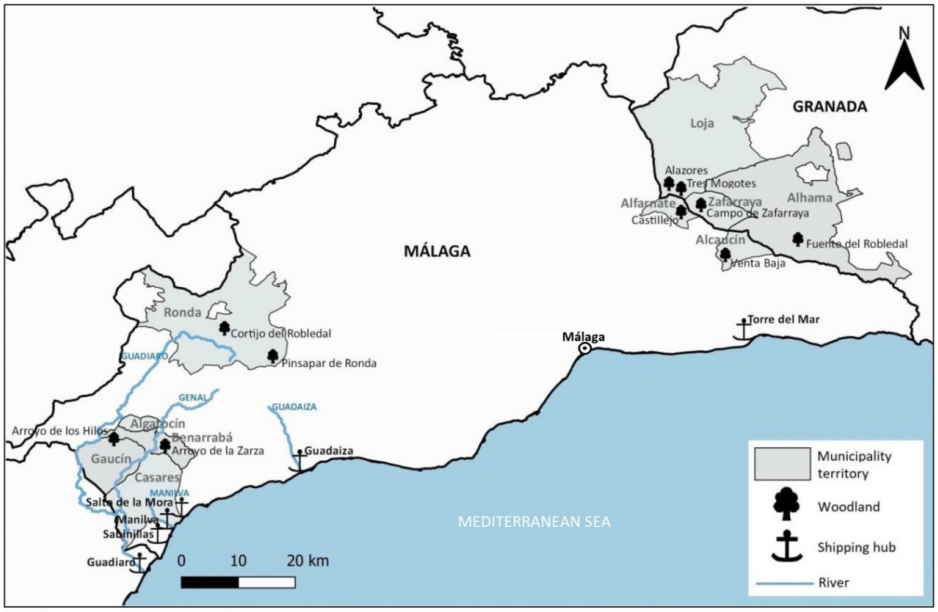
73. AGS, SMA, *Montes y sus Incidencias* 552, Gaucín, 08/11/1736, *Don Felipe de Ansa*; *Idem*, 08/11/1736, *La Villa.*

74. AGS, SMA, Arsenales, 303, Málaga, 17/07/1731, *Relación de las Piezas de Madera (…).*

75. *Idem,* 303, Velez, 11/11/1728, *Relación de los maderos.*

76. *Carta Geográfica o Mapa General de (…) la provincia de Marina de Málaga* (1758) in Gómez (1991; 45).

MAP 3
TIMBER SUPPLY: MÁLAGA NETWORK
(1728-1736)



Source: AGS, SMA, 303, 304, 306, 552, 599; AGS, TMC, 4070, 4080, 4084, 4087;MTN25

well, material deposited in the shipping hubs in 1731[77] and 1734[78] (Tables 9, 11). Since accuracy is impossible, the following calculation approximates the main trends of the supply regarding types of pieces per specie. Oak, in the broad extension of the term, was used for a wide range of typologies. The different categories of 4,590 futtocks correspond to 48 % of the information sample, followed by 2,676 planks, with 28 %, 756 floor riders and floor timbers, with 8 %, 650 knees of different types, with 7 %, 277 pillars, with 3 %, and each of the remaining types with 1 %, or less: ledges and beams, waterways and inner waterways, wales and compassing wales, hooks and crutches, thick stuff, flights, hawse pieces, caps of the mast head, stems and stemsons, keel elements, bitts and spurs of the bitts, carlings, transom and wing transom, fore feet, stern posts, cheek of the head, forward fashion piece, mast step, topmast trestletree. Along with oak, gall oak was destined to 1,200 capstan

77. AGS, SMA, Arsenales, 303, Málaga, 17/07/1731, *Relación de las Piezas de Madera.*
78. *Idem,* 304, Puerto Real, 30/08/1734, *Estado de las piezas labradas de roble (…).*

bars and 700 knees, whereas the Spanish fir was exclusively used in the crafting of, at least, 4,350 planks (Tables 8-11).

Zafarraya (Granada) was the exclusive area of timber extraction until August 1730[79]. According to the report of Jean Gairraard, felling supervisor (*director de cortas*), the works had started, at least, in September 15, 1728 and, until October 31, a total of 1,917 oak pieces had been felled (besides the 34 of unidentified species that had been sent from the shipping hub of *Torre de Velez* (Torre del Mar)[80] (Map 3, Table 8). At least in late 1728, Juan Navarro was sharing these works with José de Herrera, another so called *asentista*, who provided the labor force of 50 men from the surrounding villages. The scarce evidences of his service must be related to its presumable short duration, perhaps motivated by conflicts with the workforce and lack of the Navy's support in his terms. The contractor claimed the Navy's protection after he had paid in advance to some workers who fled to their villages with the money without accomplishing their tasks and it was very difficult to make use of justice to make them work. Moreover, there were also conflicts with the Navy's foremen (*capataces de maestranza*) in the field, Pedro de la Rosa and Agustín de Salomon. The clash was related to the contractor's refusal to remove more than the bark of the oak pieces, as the Navy requested the removal of sapwood, in order to economize in transport and further crafting in the shipyard[81].

In August 30, 1730, Juan Navarro started to expand his working area to the woodlands of *Pinsapar de Ronda*, *Robledal de Ronda* and Casares, in the western coast (Costa Occidental) of Malaga. According to the report of Felipe de Ansa, *Ministro del Departamento de Malaga*, the works were still happening in July 1731, and part of the material was already deposited in the shipping hubs of Torre del Mar, Guadaiza, Guadiaro, Sabinillas and Salto de Mora (Table 11)[82]. In the next month, the contractor proposed the advance into the woodlands of Alazores (Loja, Granada), and later reports mention that the felling works were performed by 120 workingmen in 9 days[83] (Map 3, Table 9). Eventually both the felling and transport

79. AGS, SMA, *Arsenales,* 303, Málaga, 08/11/1728, *Don Felipe de Ansa*; *Idem*, Zafarraya, 10/11/1728, *Estado de las piezas de roble (…)*; *Idem*, Velez, 11/11/1728, *Relación de los maderos (…)*; *Idem,* Zafarraya, 22/11/1728, *Sobre cortas de maderas*; *Idem,* Cádiz, 23/11/1728, *Don Esteban Fanales*; *Idem*, *Asientos,* 599, 1729, *Conducción de maderas*; AGS, TMC, Marina, Cádiz, 4070 (115 libranzas: 17/10/1728-24/12/1729); *Idem,* 4080 (6 *libranzas:* 05/07/1730-30/12/1730).

80. AGS, SMA, Arsenales, 303, Zafarraya , 10/11/1728, *Estado de las piezas de roble (...)*; *Idem,* Velez, 11/11/1728, *Relación de los maderos (…).*

81. *Idem,* Málaga, 16/11/1728, *Jean Gairaard*; *Idem,* Zafarraya, 22/11/1728, *Sobre cortas de maderas.*

82. *Idem;* Velez, 01/09/1730, *Don Felipe de Ansa*; *Idem,* Málaga, 17/07/1731, *Relación de las Piezas de Madera (…).*

83. *Idem, Asientos,* 599, Málaga, 21/08/1731, *Don Felipe de Ansa*; *Idem, Arsenales,* 304, Puerto Real, 30/08/1734, *Ciprian Autran.*

activities were forced to stop. After nearly three years, the contractor returned to the field. Works in the woodlands in Gaucín, Benarrabá and Algatocín, in Serranía de Ronda started, reportedly in 1733[84] (Map 3; Table 10).

Meanwhile, the Navy was preparing the evaluation of the effects of the interruption, because a significant number of pieces had been left abandoned, not only in the woodlands, but also in the shipping hubs. Rumors about its rapid degradation, in addition to alleged irregularities in timber account, reached Patiño, through Jean Gairaard[85]. Soon after, the Minister ordered an inspection of the existing material to Felipe de Ansa, who sent a preliminary list of the crafted and uncrafted timbers in both woodlands and shipping hubs[86], but the need of a more technical assessment sent the new Master Shipwright Ciprian Autran on a field expedition[87]. Autran's team visited the ongoing works on the areas that had been abandoned in 1731, where the contractor was supposed to craft the already felled trees, such as the Spanish fir woodland of *Pinsapal de Ronda,* as well as the oak forests of Casares, *Robledal de Ronda,* and Alazores. The itinerary included also some of the oak areas that had recently started to be explored, like *Monte de la Zarza* (Genalguacil), Venta de Arvite[88] (both in Serranía de Ronda, Málaga), Venta Baja, Castillejo (Alcaucín and Alfarnate, respectively) and Tres Mogotes (Loja, Granada) (Table 9, 10, Map 3). Additionally, Autran assessed the existing material in the shipping hubs of Torre del Mar, Guadaiza, Guadiaro, Manilva, Sabinilla and Salto de la Mora (Table 11, Map 3). Autran's report not only considered the typology of pieces, but also the classes of the correspondent vessels. In summary, the totality of crafted oak pieces was divided in 1,770 elements for 70-gun ships of the line, 566 for 40/50gun frigates, 124 for 20/30-gun frigates, 916 planks and 128 damaged pieces. The uncrafted oak wood corresponded to 2,442 felled trees for pieces of 70-gun ships and 148 for the 40/50-gun frigates. 3,000 trees of Spanish fir were waiting to be transformed in planks and a total of 2,229 of these were deposited in the woodland and corresponding shipping hub[89] (Quintero, 2004a: 398-401, 404).

In addition, the team signalized trees with potential for the production of different elements for the structure and reinforcements of the hull of 60/70-gun ships

84. *Idem, Montes y sus Incidencias*, 552, Málaga, 03/07/1736, *Don Felipe de Ansa*; *Idem,* Gaucín, 11/08/1736, *La Villa*; *Idem, Don Felipe de Ansa*; *Idem, Arsenales*, 304, Málaga, 22/06/1734, *Don Felipe de Ansa.*

85. *Idem*, *Arsenales,* 304, Málaga, 03/05/1734, *Jean Gairraard.*

86. *Idem*, Málaga, 18/05/1734, *Don Felipe de Ansa*; *Idem*, 22/06/1734, *Relación de las Maderas (...).*

87. *Idem,* Carraca, 06/07/1734, *Don Salvador de Olivares.*

88. Not identified in current maps.

89. AGS, SMA, *Arsenales*, 304, Puerto Real, 30/08/1734, *Resumen de las piezas labradas de roble (...).*

of the line: 2,000 holm oaks in Zafarraya and up to 20,900 oaks in 22 woodlands across the territories of the villages of Zafarraya, Alhama, Játar, Loja (Granada), Alfarnate, Casares, Algatocín, Benalauria, Cortes de la Frontera, Gaucín (Málaga) and Jimena de la Frontera (Cádiz)[90] (Quintero, 2004a: 401-403).

Despite the wood availability, all the field work would soon paralyze until 1736. Juan Navarro provided his services in Alazores, Casares and Serranía de Ronda, including Gausin and Benarrabá, at least until September 1734[91] (Map 3, Table 10). The slow pace[92] followed by interruption of works happened as a result of a conjuncture marked by lack of financial resources which lead to delays in the payment to the contractor, as well as to the personnel under direct administration, with the consequent demobilization of the workforce. The heavy weather conditions would contribute to the difficult situation[93].

TABLE 8
MÁLAGA NETWORK: FELLING, CRAFTING AND OVERLAND TRANSPORT
(1728-1731)

ESTIMATED FELLING PERIOD	TOPONYMY IN SOURCES	CURRENT TOPONYMY AND JURISDICTION	SPECIES	UNITS PER TYPE OF PIECE	TOTAL PIECES (minimum)	SHIPPING HUB
1728	*Monte de Zafarraya*	**Zafarraya** (Alhama, Granada)	not defined	**11** *barraganetes* (top timbers); **7** *planes* (floor timbers); 5 *curvas* (knees); **4** *latas* (ledges); **4** horquillas (hooks); **3** *estemenaras* (futtocks); **2** astas (frames)	1953	**Torre del Mar** (Velez-Málaga, Axarquía, Málaga
			oak	**733** *allonge de primera y segunda* (second and third futtocks); **380** *allonges de reves* (top timbers); **313** *genous de font, de reves, de porque, allongue de porque* (lower futtocks); **101** *puntillos* [?]; **74** *puin de perrinte* [?] ; **68** *varangues, varangues de font* (floor timbers); **67** *courbe* (knees); **44** latas (ledges); **35** *piéces de carreaux* (wales); **27** *fourquat, guirlandes* (hooks); **14** *baux* (beams); **13** *porques* (floor riders); **12** *serre-gouttiére* (inner waterways); **9** *tamboretes* (caps of the mast head); **8** *barrote* (ledge); **5** *piéce de ute* [?]; **3** contre étrave [stemson]; **2** étrave [stem]; **2** *bitas* (bitts); **2** *contrabitas* (spurs of the bitts); **2** *esloras* (carlings); **1** *lisse d'hourdi* (wing transom); **1** *jauttereau* (cheek of the head); **1** *contre corniére* (forward fashion piece)		
1728 - 1729	*Monte de Zafarraya*	**Zafarraya** (Alhama, Granada)	oak			
1729 - 1730	*Monte de Zafarraya*	**Zafarraya** (Alhama, Granada)	not defined			
1730 - 1731	*Monte de Zafarraya*	**Zafarraya** (Alhama, Granada)	not defined		400	

Source: AGS, SMA, 303

90. *Idem*, 304, Puerto Real, 30/08/1734, *Estado del Numero de Arboles de roble (...).*
91. AGS, TMC, *Marina, Cádiz*, 4084, 22/12/1734; *Idem*, 4087, 26/05/1735.
92. AGS, SMA, Arsenales, 304, Malaga,06/07/1734, *Don Francisco de Monsalve*.
93. Correspondence between José Patiño and Maritime Department authorities in AGS, SMA, Arsenales, 305: 24/12/1734-18/10/1735; *Idem*, 306: 03/01-1736-14/04/1736.

Between April and June 1736, the situation started to unlock as the availability of a small amount of capital and the negotiations between Patiño and Felipe de Ansa[94] led to the first fund transference in many months[95]. As a result, in May, the new felling supervisor, Agustín de Salomon, went on a field inspection with the prospect of new felling campaigns under his supervision[96], with the workforce provided by Juan Navarro[97]. This return was marked by slow and limited activity, due to budget restrictions on the Navy's side and the alleged lack of liquidity of the contractor[98]. The first campaign took place in *Arroyo de los Hilos* (Gaucín) and Benarrabá, in June 30 (Quintero, 2004a: 406). The team should craft planks out the felled trees and do the same to the ones that had been left in Monte de la Zarza (Genalguacil), in 1734[99]. Meanwhile, in the waning moon of early September, the works advanced into the oak woodland of Fuente del Robledal (Alhama, Granada) and, by early November another felling had been concluded in Gaucín[100] (Map 3, Table 10).

There are no evidences of the participation of Juan Navarro in the overland timber transport from Zafarraya to Torre del Mar, at an early stage. Some scarce references indicate the existence of a third *asentista*, named Antonio Velbiches, who was in charge of the conduction of the material from 12,000 trees until, at least 1729, having Narciso Puig as his agent (*factor*)[101]. In November 1728, a total of 40 men, including labourers and blasters, were working on the repair of tracks that connected Zafarraya to the outskirts of Velez, due to their poor state after the heavy rains of that season, and, has a result, the conductions were paralyzed[102].

Between 1731 and 1734, as Juan Navarro's monopoly of services was expanding, so were the transport connections to shipping hubs under his responsibility. The contractor took charge of the timber transport from the woodlands served by

94. AGS, SMA, *Arsenales*, 306: 17/04/1736-12/06/1736.
95. AGS, TMC, *Marina, Cádiz*, 4087, 24/05/1736.
96. *Idem*, 4087 (2 *libranzas:* 28/05/1736).
97. AGS, SMA, Arsenales, 306, Carraca, 26/05/1736, *Nicolas Carlos Colón*; *Idem*, Isla de León, 29/05/1736, *Don Rodrigo de Torres*; *Idem,* Málaga, 10/07/1736, *Don Felipe de Ansa.*
98. AGS, SMA, Arsenales, 306, Málaga, 07/08/1736, *Don Felipe de Ansa*; *Idem,* Monte del Robledal de Arroyo, 03/09/1736, *Agustín de Salomon*; *Idem,* Málaga, 11/09/1736, *Don Felipe de Ansa*; *Idem,* 16/09/1736, *Juan Navarro*; *Idem,* 18/09/1736, *Don Felipe de Ansa.*
99. AGS, SMA, Arsenales, 306, Málaga, 26/06/1736, *Don Felipe de Ansa*; *Idem,* 10/07/1736, *Don Felipe de Ansa*; *Idem,* 07/08/1736, *Don Felipe de Ansa* ; *Idem,* Montes y sus Incidencias 552, Málaga, 03/07/1736, *Don Felipe de Ansa.*
100. *Idem*, *Arsenales,* 306, Monte del Robledal de Arroyo, 03/09/1736, Agustín de Salomón; *Idem*, Málaga, 16/09/1736, *Felipe de Ansa*; *Idem,* 18/09/1736, *Don Felipe de Ansa*; *Idem,* 08/11/1736, *Don Felipe de Ansa*; *Idem, Montes y sus Incidencias* 552, Málaga,11/09/1736, *Don Felipe de Ansa.*
101. *Idem, Asientos,* 599, 1729, *Conducción de maderas de Andalucía.*
102. *Idem*, *Arsenales,* 303, Málaga, 08/11/1728, *Don Felipe de Ansa.*

TABLE 9
MÁLAGA NETWORK (JUAN NAVARRO): FELLING AND CRAFTING (1730-1734)

ESTIMATED FELLING PERIOD	TOPONYMY IN SOURCES	CURRENT TOPONYMY AND JURISDICTION	SPECIES	LIST YEAR	UNITS PER TYPE OF PIECE	TOTAL CRAFTED PIECES	TOTAL TREES/ UNCRAFTED PIECES	SHIPPING HUB
1730 - 1731, 1734	*Montes de Casares*	**Casares** (Costa de Sol Occidental, Málaga)	oak	1731	**1500** *tablones* (planks over 2 inches thick); **200** *pasturage* (second futtocks); **150** *cruvas* (knees); **120** *baos* (beams); **20** *planes* (floor timbers); **8** *quillas* (keels); **2** *piés de estrava* (fore feet); **2** *yugos* (transoms); 1 *estambor* (stern post); **1** *curva de estambor* (stern post knee)	2844		**Guadiaro** (San Roque, Campo de Gibraltar, Cádiz) **Salto de la Mora** (Casares, Costa de Sol Occidental, Málaga) **Sabinillas Manilva** (Manilva, Costa de Sol Occidental, Málaga)
				1734	**57** *primeras, segundas terceras, cuartas ligazones* (second, third, upper futtocks, top timbers); **50** *genoles de medio, de revés* (lower futtocks); **30** *palmejares* (thick stuff); **19** *curvas de primera, segunda puente, de contra zapato* (gundeck, upper deck, false keel knees); **12** *baos de primera, segunda puente* (gundeck, upper deck beams); **7** *varengas llanas* (floor timbers); **2** *yugos de primera puente* (gundeck transoms); **1** *carlinga* (mast step)	178		
	Pinsapar de Ronda	**Pinsapar de Ronda** (Ronda, Serranía de Ronda, Málaga)	Spanish fir	1731	**3400** *tablones* (planks over 2 inches thick)	3400		**Guadaiza** (Marbella, Costa de Sol Occidental, Málaga)
					tablones (planks over 2 inches thick)		600	
				1734	**2000** *tablones* (planks over 2 inches thick)	2000		
					tablones (planks over 2 inches thick)		3000	
	Robledad de la ciudad de Ronda	**Cortijo del Robledal** (Ronda Serranía de Ronda, Málaga)	oak	1731	**1460** *genoles, ligazones* (lower futtocks, futtocks); **40** *curvas* (knees)	2000		
				1734	**21** *primeras, segundas ligazones* (second, third futtocks); **20** *curvas de primera, segunda puente, de alcazares* (gundeck, upper deck, quarterdeck knees); **10** *genoles de medio, de revés* (lower futtocks); **6** *varengas llanas, levantadas* (floor timbers, rising floor timbers); **4** *baos* (beams); **2** *horquillas* (hooks); **1** *codaste* (stern post)	70		
					44 *primeras, segundas, terceras ligazones* (second, third, upper futtocks); **41** *curvas de primera, segunda puente, de alcazares* (gundeck, upper deck, quarterdeck knees); **14** *genoles de medio, de revés* (lower futtocks); **16** *trancaniles* (waterways); **10** *varengas llanas, levantadas* (floor timbers, rising floor timbers); **1** *horquilla de popa* (hook)		120	
1731, 1734	*Montes de los Alazores*	**Alazores** (Loja, Loja, Granada)	oak	1734	**118** *curvas de primera, segunda puente, de alcazares* (gundeck, upper deck, quarterdeck knees); **101** *primeras, segundas, teceras, cuartas ligazones* (second, third, upper futtocks, top timbers); **4** *genoles de medio* (lower futtocks); and more, not defined	223	3742	**Torre del Mar** (Velez-Málaga, Axarquía, Málaga)

Source: AGS, SMA, 303, 304, 599

TABLE 10
MÁLAGA NETWORK (JUAN NAVARRO): FELLING AND CRAFTING
(1730-1734)

ESTIMATED FELLING PERIOD	TOPONYMY IN SOURCES	CURRENT TOPONYMY AND JURISDICTION	SPECIES	UNITS PER TYPE OF PIECE	TOTAL CRAFTED PIECES	TOTAL TREES/ UNCRAFTED PIECES
1733 - 1734	*Montes de Gausín*	**Gaucín** (Serranía de Ronda, Málaga)	oak			2000
	Coto de Venarrabal	**Benarrabá** (Serranía de Ronda, Málaga)	gall oak			
	Algatosín	**Algatocín** (Serranía de Ronda, Málaga)				
1734	*Monte de la Zarza*	**Arroyo de la Zarza** (Genalguacil, Serranía de Ronda, Málaga)	oak	**170** *cintas* (wales), *tablas* (planks)	170	
				tablas (planks), *palmejares* (thick stuff), *cintas* (wales), *baos* (beams), *madres de timón* (tiller)		1830
	Venta de Arvite	[not identified] Serranía de Ronda, Málaga	oak	**31** *primeras, segundas, terceras ligazones* (second, third, upper futtocks)	31	
	Venta del Mellado	**Venta Baja** (Alcaucín, Axarquía, Málaga)	oak	**209** *primeras, segundas, terceras, cuartas ligazones* (second, third, upper futtocks; top timbers); **30** *palos derechos* (straight timbers); **14** *varengas llanas, levantadas* (floor timber, floor rising timbers); **17** *curvas de primera, segunda puente, alcázares* (gundeck, upperdeck, quarterdeck knees); **9** *genoles de medio, de revés* (lower futtocks); **4** *trancaniles* (waterways); **2** *cintas galimas* (compassing wales); **11** damaged	296	
	Monte de Cartarejo	**El Castillejo** (Alfarnate, Axarquía, Málaga)	oak	**19** *curvas de primera, segunda puente* (gundeck, upperdeck knees); **17** *primeras, segundas, terceras ligazones* (second, third, upper futtocks); **4** *varengas levantadas* (floor rising timbers)		40
				94 *curvas de primera, segunda puente, de alcázares* (gundeck, upperdeck, quarterdeck knees); **70** *genoles* (lower futtocks); **6** *primeras y terceras ligazones* (second, third futtocks)	170	
	Monte de Mangones	**Tres Mogotes** (Loja , Loja, Granada)	oak	**369** *primeras, segundas, terceras, cuartas ligazones* (second, third, upper futtocks, top timbers); **90** *curvas de primera, segunda puente, de alcazares, de contra zapato* (gundeck, upperdeck, quarterdeck, false keel knees); **59** *genoles de medio, de revés* (lower futtocks); **39** *razeles* (flights); **18** *varengas llanas, levantadas* (floor timber, rising floor timbers); **10** *espaldones* (hawse pieces); **8** *horquillas de popa, horquillas al escuadro,* (hooks, square crutches); **5** *bularcamas* (floor riders); **2** branques (stems)		600
1736	*Monte de los Hilos*	**Arroyo de los Hilos** (Gaucín, Serranía de Ronda, Malága)	oak, gall oak	*tablas* (planks)		446
				1200 *barras de cabrestante* (capstan bars)	1200	
	Coto de Venarrabal	**Benarrabá** (Serranía de Ronda, Malága)	Oak, gall oak	*tablas* (planks)		254
	Monte de Robledad y Competin / Robledad de José de Arroyo	**Fuente del Robledad** (Alhama, Alhama, Granada)	oak	**800** *tablonage* (planks); **414** *cintas* (wales), *curvas* (knees) and others		1214
	Montes de los Alazores	**Alazores** (Loja, Loja, Granada)	oak	*curvas* (knees)		

Source: AGS, SMA, 304, 306, 552, 599; AGS, TMC, 4084, 4087

TABLE 11
MÁLAGA NETWORK: TIMBER DEPOSITED IN SHIPPING HUBS

LIST YEAR	SHIPPING HUB	TIMBER ORIGIN	SPECIES	UNITS PER TYPE OF PIECE	TOTAL PIECES
1731	Torre de Velez	*Montes de Zafarraya*	not defined	**398** *ligazones* (futtocks), *barraganetes* (top timbers), *curvas pequeñas* (small knees); **2** *piques* (crutches)	400
1734	Torre de Velez	*Montes de Zafarraya*	oak	**170** *primeras, segundas, terceras, cuartas ligazones* (second, third, upper futtocks, top timbers); **34** *curvas de primera, segunda puente, de alcazares* (gundeck, upperdeck, quarterdeck knees); **17** *palmejares* (thick stuff); **13** *genoles de medio y de revés* (lower futtocks); **4** *horquillas* (hooks); **2** *varengas llanas* (floor timbers); **2** *yugos* (transoms); **2** *trancaniles* (waterways); **1** *branque* (stem); **1** *bularcama* (floor rider); **1** *cinta galima* (compassing wale); **40** damaged	287
1731	Guadaiza	*Pinsapar de Ronda*	Spanish fir	**350** *tablas* (planks)	350
1734	Guadaiza	*Pinsapar de Ronda*	Spanish fir	**229** *tablones* (planks over 2 inches thick)	229
1734	Guadaiza	*Robledal de Ronda*	oak	**226** *primeras, segundas, terceras, cuartas ligazones* (second, third, upper futtocks, top timbers); **24** *trancaniles* (waterways); **22** *baos de segunda puente* (gundeck beams); **17** *genoles de medio, de revés* (lower futtocks); **13** *puntales* (pillars); **9** *varengas llanas, levantadas* (floor timbers, rising floor timbers); **8** *cinta galimas* (compassing wales); **5** *espaldones* (hawse pieces); **2** *horquillas* (hooks); **1** *bao de gavia* (topmast trestletree); **1** *curva de segunda puente* (upperdeck knee); **30** damaged	358
1731	Guadiaro, Sabinillas, Salto de la Mora	*Montes de Casares*	not defined	**464** *genoles* (lower futtocks); **376** *tablas* (planks)	800
1734	Guadiaro	*Montes de Casares*	oak	**731** *tablones* (planks over 2 inches thick); **277** *puntales* (pillars); **70** *primeras, segundas, terceras ligazones* (second, third, upper futtocks); **29** *trancaniles* (waterways); **16** *palos derechos* (straight timbers); **4** *cintas galimas* (compassing wales); **2** *curvas de primera puente* (gundeck knees); **2** *baos de primera, segunda puente* (gundeck, upperdeck beams); **2** *espaldones* (hawse pieces); **2** *genoles de revés* (lower futtocks); **17** damaged	1152
1734	Manilva, Sabinillas, Salto de la Mora	*Montes de Casares*	oak	**185** *tablones* (planks over 2 inches thick); **86** *primeras, segundas, terceras, cuartas ligazones* (second, third, upper futtocks, top timbers); **16** *trancaniles* (waterways); **29** *palmejares* (thick stuff); **25** *curvas de primera, segunda puente, de alcazares* (gundeck, upperdeck, quarterdeck knees); **24** *baos de segunda puente, de alcazares* (upperdeck, quarterdeck knees); **13** *espaldones* (hawse pieces); **11** *genoles médios, de revés* (lower futtocks); **7** *cintas galimas* (compassing wales); **30** damaged	426

Source: AGS, SMA, 303, 304

Torre del Mar: Zafarraya, Alazores, Tres Mogotes *(*Granada). In western Málaga, Navarro guaranteed, at least, the following connections: Pinsapar and Robledal de *Ronda* to the shipping hub of Guadaiza; Gaucín, Benarrabá, Casares to Guadiaro, Sabinillas, Manilva and Salto de la Mora (Map 3, Table 8, 9). In 1731, a new contract formalized the obligation of conduction, as well as the opening and maintenance of tracks at his expenses. In his 1734 report, Ciprian Autran referred the track that the contractor had opened to connect the Pinsapar de Ronda. The means of transport consisted on convoys of ox-carts and trailers. For the connection between Alazores and Torre del Mar, the contractor recruited conductors and the respective ox-carts among habitants of Alfarnate (Granada)[103].

According to some references, part of the western Málaga routes was made by fluvial transport. When mentioning the heavy rain and snow of the 1734/1735 winter that made the hinterland timber transport impossible, Franciso de Varas

103. *Idem,* 17/07/1731, *Relación de las Piezas de Madera y tabla (…)*; *Idem,* 304, Puerto Real, 30/08/1734, *Ciprian Autran*; *Idem, Asientos*, 599, Málaga,01/08/1731, *Relación de las distancias (…)*; *Idem,* 21/08/1734, *Don Felipe de Ansa*; AGS, TMC, Marina, Cádiz, 4084, 22/12/1734; *Idem,* 4087, 26/05/1735.

TABLE 12
MÁLAGA NETWORK: MARITIME TRANSPORT BY CHARTERED VESSELS (1728-1735)

ESTIMATED FELLING PERIOD	TRANSPORT PERIOD	SHIPPING HUB	DESTINATION	NUMBER OF DELIVERIES	UNITS PER TYPE OF PIECE AND SPECIES	TOTAL UNITS	VOLUME (*codos cubicos*)	WEIGHT	COST (*Reales, Maravedís de Vellón*)
1728	nov 1728	Torre del Mar	Puntal	**1**	**11** *barraganetes* (top timbers); **7** *planes* (floor timbers); **5** *curvas* (knees); **4** *latas* (ledges); **4** *horquillas* (hooks); **3** *estemenaras* (futtocks); **2** *astas* (frames)	35	156 299/484		4,395
	jan-mar 1729	Torre del Mar	Puntal	18	**737** *palos* (timbers); **1** *lata* (ledge)	738			57,129
	fev 1729	Torre del Mar	Puntal	1	**67** *palos* (timbers)	67		1125 *quintales* 36 *libras*	3,376. 02
1728 - 1729	may-dec 1729	Torre del Mar	Puntal	93			23 162 227/484		468,000. 04
1729 - 1730	jul-dec 1730	Torre del Mar	Puntal	11			4535 227/484		42,300. 02
1730	fev-mar 1731	Torre del Mar	Puntal	7			1988 143/484		27,869. 18
1730 - 1731	may 1731	Guadiaro	Puntal	5			1436 266/484		17,130. 18
	jul-ago 1731	Torrel del Mar, Sabinillas, Salto de la Mora, Guadaiza	Puntal	3			733 238/484		9,447. 12
	ago-out 1732	Torrel del Mar	La Carraca	7			2121 199/484		30,087. 18
	set-out 1732	Guadaiza	La Carraca	4	**687** *piezas* (pieces)	687	1450 10/484		14,572. 02
	nov 1732	Sabinillas	Bahia de Cádiz	1	**oak: 171** *aposturas* (second futtocks)**; 13** *latas* (ledges)**; 2** *baos* (beams)	186	235 308/484		2,817. 21
1730 - 1731; 1734	jun-jul 1735	Guadiaro, Sabinillas, Salto de la Mora	La Carraca	5	**oak:** *tablones* (planks)*, tancaniles* (waterways)		1244 449/484		17,055. 09

Source: AGS, TMC, 303, 599; AGS, TMC, 4070, 4080, 4087

included the rivers in this situation and so did Felipe de Ansa, in 1736[104]. The timber was taken to rivers and then it went down to the coastal shipping hubs. The Genal, tributary to the Guadiaro, crossing the territories of Ganalguacil, Benarrabá, Gaucín and Casares was involved in this transport, as Felipe de Ansa referred the activity of dragging timber to that river and, later on, the need to flatten some segments of its course, in order unblock the passage[105] (Map 3).

Difficult weather and insurmountable orography were some of the factors that made all the overland transport paralyze, along with the felling work, between

104. AGS, SMA, *Arsenales,* 305, Cádiz, 04/02/1735, *Don Francisco de Varas*; *Idem,* 306, Málaga, 14/04/1736, *Felipe de Ansa.*

105. *Idem,* 305, Málaga, 26/04/1735, *Don Felipe de Ansa*; *Idem,* Asientos, 599, Málaga, 03/05/1735, *Felipe de Ansa.*

1734 and 1736, in a context of an economic restraint that hindered the repair of the damaged tracks, the opening of new ones, as well as the recruitment of human and material resources[106](Quintero, 2004a: 405). In this conjuncture, it was very difficult to find any contractor willing to take this unprofitable responsibility[107].

Despite the resuming of field works in the summer and autumn of 1736 by Juan Navarro, the overland transport was still nearly impossible. The contractor claimed the insufficiency of the available funds to the opening and repair of tracks, and, in the meantime, he could only ensure the conductions from Monte de la Zarza (Genalguacil)[108].

Shipping hubs were operated by different officers recruited by direct administration through the jurisdiction of Málaga. The *comisarios de riveros* were in charge of the supervision of works, while *guardas de embarcaderos* had the responsibility of surveillance of the deposited material. Administrative tasks for payment purposes, such as measurement, calculation of volume and accounting, were performed by *cubicadores* and *medidores de madera*, who applied a water resistant black mark to each piece with the respective number of *codos,* which was verified upon arrival at the shipyard. The loading of the vessels that conducted timber to Cádiz was assisted by labourers and sailors were recruited to participate in the transport[109].

Between 1728 and 1735, at least, 39 240 *codos cubicos* were transported from the shipping hubs of Málaga in 156 shipments operated by 55 different masters of chartered private vessels[110], recruited through the arrangements of Felipe de Ansa, in Málaga. This constitutes the most approximate quantitative reference of the contribution of this timber supply network as a whole (Table 12, Chart 2).

Lack of funds affected as well maritime transport leading to an irregular rhythm with long interruptions, such as in 1731/1732 and 1733-1734. The urgent material

106. AGS, SMA, *Arsenales,*304, Puerto Real, 30/08/ 1734, *Estado de las piezas de roble (…); Idem*, 305, Cádiz, 04/02/1735, *Don Francisco de Varas*; *Idem*, 26/04/1735, *Don Felipe de Ansa*; *Idem,* 306, Málaga, 14/04/1736, Felipe de Ansa; *Idem, Asientos,* 599, Málaga, 03/05/1735, *Felipe de Ansa.*

107. *Idem*, *Arsenales,* 305, Málaga, 23/04/1735, *Felipe de Ansa.*

108. *Idem,* 306, Carraca, 26/05/1736, *Nicholas Carlos Colón*; *Idem,* Málaga, 26/06/1736, *Dom Felipe de Ansa*; *Idem,* Monte del Robledal de Arroyo, 03/09/1736, *Agustín de Salomón*; *Idem,*16/09/1736, *Juan Navarro*.

109. AGS, SMA, Arsenales, 304, Málaga, 03/05/1734, *Jean Gairraard*; *Idem,* 06/07/1734, *Don Francisco de Monsalve*; *Idem,* 305, Málaga, 18/10/1735, *Don Felipe de Ansa*; AGS, TMC, *Marina, Cádiz*, 4087, 26/05/1735.

110. AGS, SMA, Arsenales, 303, Velez, 11/11/1728, *Relación de los maderos (…)*; AGS, TMC, *Marina, Cádiz*, 4070 (110 *libranzas:* 18/10/1728-24/12/1729); *Idem,* 4080 (19 *libranzas:* 05/07/1730-04/10/1732); *Idem,* 4080 (5 *libranzas:* 06/06/1735-09/07/1735).

necessities led to the arrangements that ended up in the ephemeral deliveries of 1735 (Table 12, Chart 2)[111].

With the resuming of field works in 1736, Patiño asked Felipe de Ansa to find a contractor on whom to delegate the maritime transport at his own expenses. After receiving negative answers, as no one was willing to take such risk, the hopes of persuading Juan Navarro were also frustrated, as he also refused, alleging the dangers of the coastal navigation caused by the crescent threaten of northern African corsairs and frequent rainstorms[112] (Quintero, 2004a: 405).

The available information on the selected sources regarding the state expenditure with this supply network is inconsistent and has significant gaps. Part of these gaps may be caused by the actual failures in payments, as indicated by the constant references to the restrictions of the Navy's budget and lack of fund liquidity of the contractors. In addition, contractors and the personnel that operated in the hinterland and shipping hub works by direct administration were paid through a complex bureaucratic process based on the articulation of the Treasury of the Maritime Department of Cádiz, the Navy jurisdiction of Málaga, and the *aduana* of Málaga. All these factors combined resulted in an irregular supply, marked by extended periods of interruption, un-accomplishment of felling and delivery plans, and works carried out at a slow pace.

In what concerns the felling, crafting and overland transport spending, the period of 1728-1731 is rather obscure, without mentions to prices, payments or any other financial matter, except for one case. The men who worked for the contractor of transport and tracks, Antonio Velbiches, were not being paid their weekly wages and, in order to keep the work carrying on, Ignacio de Palacios, Royal Taxes Treasurer (*Tesorero General de Rentas Reales),* released a credit of 4,500 *rsv.* upon requirement of Felipe de Ansa, with the agreement of Patiño[113].

The only references to the accounts of Juan Navarro date from December 1734 and May 1735 and regard to past services performed from at least, October 1731, until September 1734, and paid through the intervention of Felipe de Ansa and Juan Carnero y Ramos, revenue treasurer of Málaga, in a total of 481,000 *rsv.*[114]. According to the contract that regulated the services in 1734, the prices were defined by *codo cúbico*/provenance. The *pro ratio* was determined by the distance from the woodlands to shipping hubs [115] (Table 13; Map 3).

111. Correspondence between José Patiño and Maritime Department authorities: in AGS, SMA, *Arsenales* 304, 18/05/1734, 16/11/1734; *Idem,* 305, 04/01/1735-30/04/1735; *Idem*, Asientos, 599, 15/01/1735-31/05/1735.
112. *Idem*, 306, Málaga, 10/07/1736, *Don Felipe de Ansa.*
113. *Idem* 303, Malaga, 08/11/1728, *Don Felipe de Ansa.*
114. AGS, TMC, *Marina, Cádiz*, 4084, 22/12/1734; Idem, 4087, 26/05/1735.
115. AGS, SMA, 304, Puerto Real, 30/08/1734, *Ciprian Autran.*

TABLE 13
MÁLAGA NETWORK: PRICES PER WOODLAND (CONTRACTOR AND CHARTERED VESSELS) (1734)

WOODLAND	SHIPPING HUB	CONTRACTOR: PRICE PER CODO CUBICO *(Reales de Vellón)*	CHARTERED VESSELS: PRICE PER CODO CUBICO *(Reales de Vellón)*	TOTAL PRICE *(Reales de Vellón)*
Alazores	Torre del Mar	48	14 ¼	62 ¼
Robledal de Ronda	Guadaiza	36	12	48
Pinsapar de Ronda	Guadaiza	24 (+1 per *codo* in planks)	12	36 (+1 per *codo* in planks)
Montes de Casares	Guadiaro, Sabinilla, Salto de la Mora	36	12	48

Source: AGS, SMA, 304, 599

The existing accounts on services managed by direct administration of the Navy jurisdiction, in the same period until September 1734, are as well limited, but provide an insight on the work organization. A total of 279,987 *rs.* 30 *maravedís de vellón* were destined to wages of personnel such as the higher officers of Department of Málaga (Felipe de Ansa and the second officer), officers with supervision and administrative functions in the field works (*director de la labra, capataces de la maestranza, comisarios de riveros, cubicadores, medidores de madera*), surveillance guards of woodlands and shipping hubs, labourers that assisted on the loading of cargo vessels, as well as the sailors that participated in the transport. Extras such as assessment visits, religious services in the fields during festive days, juridical expenses on cases of timber theft, or purchase of some materials totalized 15,566 *rs.* 3 *maravedís de vellón*[116]. These must correspond to the last payments, at least, to the supervision, administration and surveillance staff in the field operations, as, in April 1736, their situation reached dramatic proportions after having been waiting for their salaries since June 1734, despite the constant claims for funds from Felipe de Ansa[117] (Quintero, 2004a: 405).

After a cycle of constant timber requests from the central administration, which were invariably responded with Ansa's calculations of operation costs and fund claiming[118], in April 1736, José Patiño announced the allocation of 45,000 *rsv.* for timber supply from Málaga, which had been delivered to the Navy Treasury by Guillermo de Tirry, Marques of la Cãnada, *Alferez Mayor* in Puerto de Santa

116. AGS, TMC, *Marina, Cádiz*, 4084, 22/12/1734; Idem, 4087, 26/05/1735.

117. AGS, Arsenales, 305, Malaga, 18/10/1735, Don Felipe de Ansa; Idem, 306, Málaga,14/04 1736, *Felipe de Ansa.*

118. Correspondence between José Patiño, Francisco de Varas, Miguel Bonet, Rodrigo de Torres, Ciprian Autran and Felipe de Ansa, in AGS, SMA, Arsenales, 305: 24/12/1734-18/10/1735; *Idem*, 306: 03/01-1736-14/04/1736.

María[119]. A first tranche of 35,000 was delivered in May 24 to José de Ansa, son and representative of Felipe de Ansa. The remaining 10,000 were reserved in Cádiz for the payment of charted private vessels[120].

Such amount could not cover the initial costs of transport, for which was necessary the double, at least. Moreover, all the amounts agreed with Juan Navarro in the context of the new contract were far superior. The contractor should receive an initial advance payment of 8,000 *pesos escudos de plata* (120,470 *rs.* 20 *maravedís de vellón*) and monthly consignments of 4,000 *pesos escudos de plata* (60,235 *rs.*, 10 *maravedís de vellón*) against the total cost of 37,000 *pesos escudos de plata* (557,176 *rs. 16 maravedís de vellón*). This final amount had been estimated according to a list of timber needs equivalent to 11,600 *codos cubicos*, approximately, at the unique price of 48 *rsv.* per *codo cúbico* (plus *1 rv.* per *codo tirado,* in planks and wales), which also included the transport and opening and maintenance of tracks[121] (Quintero, 2004a: 406). Nevertheless, once again, the budget restrictions did not allow these plans to be put in practice.

As the Navy failed the advance payment to the contractor, the workforce was not receiving their salaries. In order to keep minimum services, in September 16, Juan Navarro reluctantly agreed to maintain a limited number of 50 workers for more 15 or 20 days, at his own expenses, after which the works could not be guaranteed if the Minister did not provide the necessary funds[122].

The chartered private vessels that had kept the timber transport to Cádiz represented the expenditure of 677,048 *rs.* 32 *maravedís de vellón* (Table 12). From late 1728 to mid-1729, co-existed the price systems based on weight and trip, depending on the vessel size or agreed quantity, before the adoption of *codo cubico* as unit. Some masters opted for advance payments in the trip/vessel and volume system. The first would receive half of the arranged cost, before the trip, in the majority of the cases, and the second 1,000 *rsv*. (Table 7).

119. AGS, SMA, Arsenales, 306, Málaga, 17/04/1736, *Don Felipe de Ansa*; *Idem*, Cádiz, 24/04/1736, *Don Francisco de Varas.*

120. AGS, SMA, *Arsenales,* 306, Málaga 15/05/1736, Don Felipe de Ansa; *Idem*, Cádiz, 29/05/1736, *Don Francisco de Varas*; Idem, Málaga, 12/6/1736, *Don Felipe de Ansa*; AGS, TMC, *Marina, Cadiz,* 4087, 24/05/1736.

121. AGS, SMA, Arsenales, 306, Carraca, 26/05/1736, Nicolas Carlos Colón; *Idem,* Isla de León, 29/05/1736, *Don Rodrigo de Torres; Idem,* Cádiz, 29/05/1736, *Don Francisco de Varas; Idem,* Málaga, 10/07/1736, *Don Felipe de Ansa; Idem,* 31/07/1736, *Don Felipe de Ansa.*

122. AGS, SMA, Arsenales, 306, Malaga, 07/08/1736, *Don Felipe de Ansa; Idem,* Monte del Robledal de Arroyo 03/09/1736, Agustín de Salomon; *Idem,* Málaga, 11/09/1736, *Don Felipe de Ansa; Idem,* 19/09/1736, *Don Felipe de Ansa; Idem,* 19/09/1736, *Juan Navarro.*

2.4. *Articulation with* Real Negociado de Maderas de Segura de la Sierra

In 1732, the Royal Exchequer began the construction of the *Real Fábrica de Tabacos* (royal factory of tobacco) in Seville, having Segura de la Sierra (Jaén) as its timber source (Map 1). The *Negociado de Maderas de Segura de la Sierra* was created in 1733 as a special sub-department in charge of the management this supply. In 1734, as the first timber arrived to Seville by flotation in the Guadalquivir river, so began the interest of the Navy towards its high quality pine. Initially, the pine ordered by La Carraca to the *Negociado* was destined for the ongoing construction of the Arsenal infrastructures, but, in 1736, the possibility of its application for vessels was starting to be discussed (Rodríguez, 2013: 85-88; López, 2017: 26-27).

The quality of the material that was arriving at Cadiz had potential as furr and internal planking or even masts and spars, and could become an alternative to imported material. A shipment of 100 timbers for planks was already on its way, in September, by request of the Lieutenant General Rodrigo de Torres and its flotation to Seville should start in the following year. For the delivery of some experimental masting elements, it was necessary a special order from Patiño, because it exceeded the stipulated measurements. Sebastian Caballero agreed on the supply for vessels, but, in order to fulfill the technical requirements of which he was unware, the Navy should organize an assessment visit and provide precise instructions. In his final days, José Patiño (died in November 3, 1736) opened the way for the future exploitation of Segura de la Sierra as a source of pine timber for shipbuilding and maintenance, by giving permission to such requests and suggestions[123].

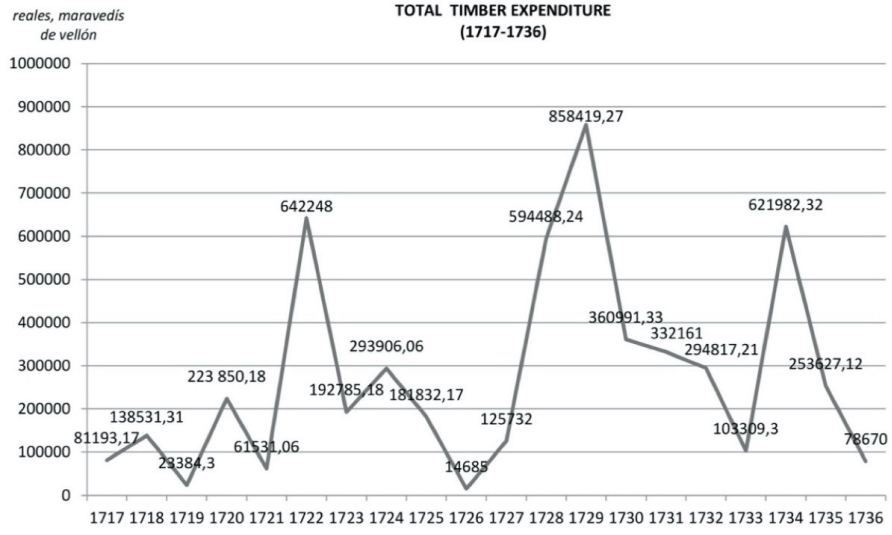
3. PHASES OF TIMBER SUPPLY

The rhythm of timber supply as well as the respective expenditure, from 1717 to 1736, reflected the progressive attribution of shipbuilding and maintenance responsibilities to the new Maritime Department, as a result of the deep investment of José Patiño in the emerging of Cádiz as a Naval and commercial center, but also the effects of the Bourbon foreign policy and fund availability.

While the shipbuilding program was carried out in a limited way, maintenance became the main activity of Cadiz as Naval center. In 20 years, Cadiz contributed with just two ships of the line, one frigate, two bomb vessels, 13 minor vessels for internal use, and started the construction of a demi-frigate. In the same period, a total of 150 interventions were identified, considering the number of docked vessels, per

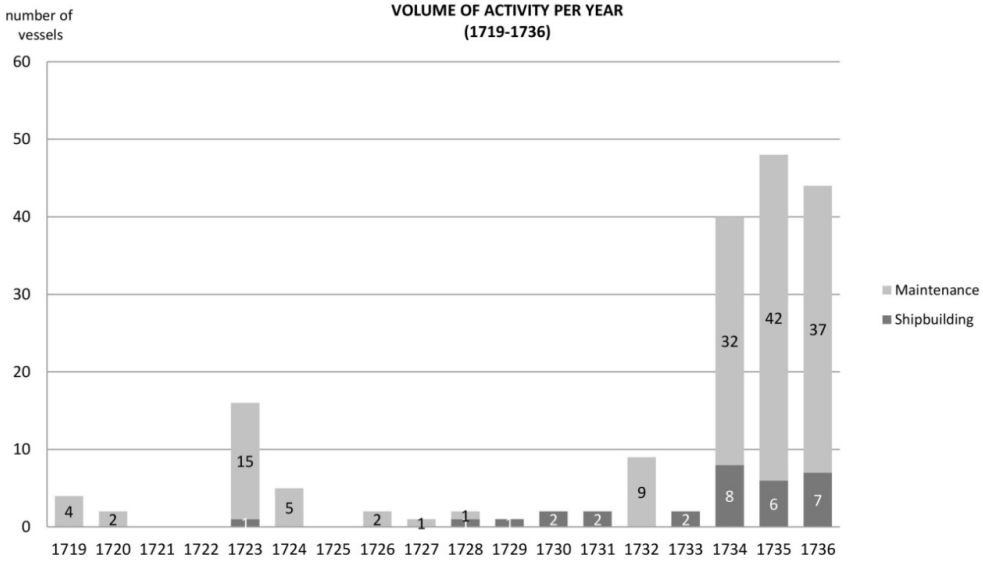
123. *Idem,* Cádiz, 18/09/1736, *D. Rodrigo de Torres; Idem,* Seville, 18/09/1736, *D. Sebastian Caballero; Idem,* Cádiz, 18/09/1736, *D.Francisco Driget.*

CHART 3
TOTAL TIMBER EXPENDITURE
(1717-1736)



Source: AGS, SMA, 303, 304, 305,306, 599; AGS, TMC, 4058, 4059, 4063, 4066, 4069, 4070, 4071, 4077, 4079, 4084, 4084; Quintero, 2004a: 393, 394

CHART 4
VOLUME OF ACTIVITY PER YEAR
(1719-1736)



Source: AGMAB, Departamento Marítimo de Cádiz, 6507, 6508; AGS, SMA, 303, 304, 305, 306, 313; AGS, TMC, 4058, 4069

year, under maintenance[124] and only the repairs and maintenances that consumed timber, like *carenas* and *carena de firme* (careening), *forro, forrar, aforrar, embonar* (furr, furring, doubling), *obras de carpintería,* (carpentry works) as well as the works on the *arboladura* (masting elements).

Despite the gaps in all categories of quantitative data regarding timber supply, the available information allows some indicative calculations and the identification of three different phases.

3.1. *Maintenance of fleets during the establishment of Cádiz as a naval and commercial center (1717-1727)*

From the beginning of the construction of the Arsenal, until the full function of Cádiz as Maritime Department, the first 10 years were marked by the total absence of construction of warships. The only registered shipbuilding activity corresponds to a pontoon for the cleaning of the channels of La Carraca, as part of the building process, in 1723, in the shipyard of Puntal[125] (Chart 4).

While the Cadiz shipyard network still did not have shipbuilding facilities, it could only perform maintenance and repair activities, following the tradition in the Royal careening dockyard of Puente de Suazo, as well as in El Puntal (Quintero, 2004a: 89-94, 316). In the early 20's Patiño fostered the activity of these facilities, by investing in its refurbishment (Crespo, 2017: 102-103). Between 1719 and 1727, at least, 29 interventions took place in Cádiz, as consequence of different events and dynamics of the Mediterranean and Atlantic spaces (Chart 4). In the first group are included vessels with links to the expeditions to Sicily (Cape Passaro, 1718; Mesina, 1719), in the context of the War of the Quadruple Alliance (1717-1720)[126], the defense against the Moroccan Siege of Ceuta (1694-1720)[127] and the subsequent confrontations with Berber corsairs such as the 1722 and 1725[128] (Blanco, 2001: 35-47, 43-55; Fernández, 1900: 147-166, 175).

In this period of consolidation of the position of Cadiz as a Naval and commercial center, transatlantic navigation was the factor that had the biggest impact in

124. Taking into account that single vessel could be repaired more than once and an intervention could take place during the transition from one year to another.

125. Archivo General de Marina Ávaro de Bazán, *Departamento Marítimo de Cádiz, Reales Ordenes*, 6507, 1723, *Presupuesto del gasto (…).*

126. AGS, TMC, Marina, Cádiz, 4058, 26/03/1720.

127. AGS, TMC, Marina, Cadiz, 4058, 09/10/1720; *Gaceta de Madrid*, 24, 06/06/1722: 83; *Idem,* 45, 10/11/1722: 180.

128. AGMAB, Departamento Marítimo de Cádiz, *Reales Ordenes*, 6507, 1723, *Presupuesto del gasto (…).*; AGS, TMC, Marina, Cadiz, 4058, 09/06/1724; Idem, 20/06/1724; *Gaceta de Madrid*, 24, 06/06/1722: 83; *Idem,* 45, 10/11/1722: 180; *Idem*, 44, 30/10/1725: 176.

the repair activity, especially in 1723 and 1724, with 12 interventions linked with the impulse given to the system of the *Carrera de Indias* (Indies Run) after the 1720 *Proyecto de Flotas y Galeones.* The repaired vessels belonged to the 1721 and 1723 fleets of *Galeones de Tierra Firme,* the 1723 fleet of *Nueva España*[129] as well as the 1722 and 1724 fleets of the *Azogue*[130]. The interventions of 1726 and 1727[131] correspond to ships integrated in the *Armada de Barlovento*, in the context of the Forth Anglo-Spanish War (1726-1729) and the Blockade of Portobello of 1726-1727. Such conflict caused an interruption to the system, between 1725 and 1727, with repercussion in the very low repair activity in these years (Crespo, 1996: 182-197; Fernández, 1900: 176, 188-189, 193; Garcia, 1988: 156, 278-289; Heredia, 1978: 106, 227; Kuethe and Adrien, 2014: 103-105; Torres, 1981: 202-203; Walker, 1979: 165-197, 281-282).

During this period, the Andalusian timber supply for these repairs came from three sources: the commissioners in Huelva and Seville, in 1717 and 1721, the purchase of timber from the regional middlemen merchants, from 1718, onwards and the first phase of the services Pedro de Amestoy, between 1721 and 1724. The supply from the first two was mostly oriented to planks, which were highly requested timber elements for repair interventions, due to the frequent maintenance of external planking. Both increased until 1721. The purchase of timber remained uninterrupted, starting with a total of 506 units in 1718 and reached its peak in 1720 and 1721, with 4,328 and 5,015 units, respectively (Chart 1), keeping a stable annual delivery up to 2,621 units, until 1726, when it dropped drastically to the 389 pieces. The introduction of the contractor Pedro de Amestoy for the supply of main timber elements, under technical supervision of the State, was a significant step towards the implantation of an industrial shipbuilding complex, as part of the process of the establishment of Cádiz as a Maritime Department. The product of the first 1721 and 1722 fellings (Table 3) resulted in a total of 6,210 *codos cubicos* delivered in 1722 and, in the two following years the deliveries dropped significantly, to 1,208 and 702 *codos cúbicos*, respectively, before the complete interruption of service (Chart 2; Table 6).

The sum of the annual timber expenditure, considering payment arrears, relates to the annual volume of deliveries and repair activity. In 1720, 1722 and 1724, the Department spent, respectively 223,850 *rs*., 18 *maravedís de vellón*, 642,248 *rsv*, and 293,906 *rs.,* 06 *maravedís de vellón*, which corresponds to actions of replenishment

129. AGMAB, Departamento Marítimo de Cádiz, *Reales Ordenes*, 6507, 1723, *Presupuesto del gasto (…); Gaceta de Madrid*, 7, 16/02/1723: 17.

130. AGMAB, Departamento Marítimo de Cádiz, *Reales Ordenes*, 6507, 1723, *Presupuesto del gasto (…);* AGS, TMC, Marina, Cadiz, 4058, 09/06/1724*; Idem,* 20/06/1724.

131. AGMAB, Departamento Marítimo de Cádiz, *Reales Ordenes*, 6508, Madrid, 05/02/1726, *Carta a Estebán Filipe Fanales;* AGS, TMC, Marina, Cadiz, 4069, 11/11/1727.

of stocks and advance supply, in preparation to more active years such as 1723, with 15 warships repairs and a pontoon construction. The drastic drop to 14,688 *rsv.,* in 1726, follows the general work slowdown of the mid-20's (Charts 3, 4).

In 10 years, a total of, at least, 1,979,681*rs.*, 07 *maravedís de vellón* were spent in timber and respective transport, including a total of 8,658 *codos cubicos* from the contractor, and a total of 22,060 single pieces, from purchases (Charts 1-3).

3.2. *The* Hercules *and the first shipbuilding series (1728-1731)*

After the establishment of the Maritime Deparment, a new phase in the shipbuilding industry of Cádiz began, in 1728, with the construction the *Hércules ll*, by the Master Shipwright Juan Belletrud[132]. Its launching in 1729, in Isla de León, had the very symbolic presence of Philip V and the Royal Family, who, shortly afterwards, ordered the construction of the shipyard in the Arsenal of La Carraca, as well as the provision of all the timber needed for the ongoing shipbuilding program, as matter of state interest. This 60-gun ship of the line was the product of a period of articulation between the shipyard of El Puntal, with its recently built slipway, and La Carraca, where only finishing works took place, before the full functioning of its shipyard[133]. Soon after, the identical ship of the line *Real Familia,* by Juan Belletrud, and the 54-gun frigate *Galga,* by Juan de Casanova, had their construction started in late 1729/ early 1730, and launching in 1731[134] (Quintero, 2004a: 95, 226-228).

In just four years, without any other maintenance activity than the conversion of the pink *Dorotea* into pontoon[135], the practically exclusive dedication to the construction of three warships was enough to generate the highest levels of timber supply and expenditure of the studied period. The total figures of this impact translate into 2,146,061 *rs.,* 16 *maravedis de vellón* spent in timber supply, including 54,211 *codos cúbicos* from contractors, 31,413 purchased pieces, as well as 209 elements from a commissioner (Charts 1-3).

This shipbuilding series involved not only the return of Pedro de Amestoy and the expansion of his working area, but also the advance of felling works into the territories of Málaga (Map 3), with the intervention of the new contractors, Juan Navarro, as well as José de Herrera, at an early stage. Multiplication of timber

132. AGS, SMA, Arsenales, 303, El Puntal, 25/10/1728, *Jean Belletrud*; *Idem*, Cádiz, 1/11/1728, Esteban Mari; *Idem*, Estado en que se halla el Navío; *Idem*, El Puntal, 20/11/1728, *Estado de las obras (…); Idem*, Cádiz, 23/11/1728, Esteban de Fanales.

133. *Idem,* El Puerto de Santa María, 21/09/1729, *Sobre el establecimiento del Astillero en La Carraca (…).*

134. *Idem*, 313, 21/6/1745, *Cuaderno de los navíos de guerra*.

135. *Idem,* 303, Cádiz, 30/11/ 1728; *Ibidem*, Carraca, 22/11/ 1728, *Estado de las obras (…)*; *Ibidem*, 23/11/1728, *Esteban de Fanales*.

contractors and provenance was not just a matter of timber quantity: the construction of three warships demanded, as well, a more diverse range of specific elements for different parts of the vessels, specifically created for the new Gaztañeta model, which, in this context, only contractors under technical supervision could provide (Tables 3, 4, 6, 8-11).

However, by October and November 1728, this process was initiating with constraints due to timber shortage, to the point of putting the continuation of the works at risk. Difficult weather conditions, the sinking of cargo carriers, menace or corsair attacks, damaged tracks or demobilization of unpaid field workers were factors of slowdown. The urgent need of main elements for the construction of the *Hercules,* such as futtocks, knees, beams, hooks, and planks, was leading the central administration to make pressure on the agents, in order to accelerate both the land and maritime transports. In pair with a stricter supervision to the field works, arrangements for the complementary services of overland transport to Puerto Real by state administration began to be made, with effect in 1729 and 1730. Due to the state of the tracks in Gibraltar, heavy pieces such as beams and knees should be provided by Zafarraya, instead[136] (Quintero, 2004a: 395-396).

As a consequence of this impulse, the first maritime shipments, totalized 4,606 *codos cúbicos*, in just three months, in late 1728. However, it was in 1729 when the product of the massive felling campaigns of 1728/1729 reached its destiny, resulting in an exceptional delivery of 37,418 *codos cubicos,* at least by maritime transport. Pedro Amestoy's timber totalized 12,080 *codos cubicos,* while the sum of Navarro's and Herrera's products resulted in 25,330 *codos cubicos.* In the following years, the deliveries of timber from contractors dropped significantly to 8,029 *codos cubicos,* in 1730, and 4,158 *codos cubicos*, in 1731, maybe because of the abrupt endings of both contractor's services. Amestoy's died c. 1730, and the operational chain of Málaga was interrupted, due to the concentration of efforts in the Tuscany and Oran operations, during 1731-1732. Meanwhile the September 1729 and November 1730 lists of timber needs still attested the lack of some oak pieces normally provided by contractors[137], despite the abundant shipments of 1729, which indicates the fast consumption of material (Chart 2).

Purchases of planks and other complementary pieces, from the regional middlemen merchants, kept the steady ascending flow that had started in 1727. During the starting and finishing phases of the *Hercules,* between 1728 and 1729, a total of 5,053 and 5,477 pieces arrived, respectively. The supply doubled in the same proportion

136. Correspondence between José Patiño and Esteban de fanales in AGS, SMA, Arsenales 25/10/1728-23/11/1728*; Idem, Asientos, 599,* 30/11/1728.

137. AGS, SMA, Arsenales, 303, Carraca, 16/09/1729, *Estado de los géneros que se piden (…); Idem,* 08/11/ 1729, *Estado de los generos y pertrechos (…).*

as the next two vessels in construction, reaching the 9,788 pieces in 1730 and 11,095, in 1731, in response to the lists of timber needs of 1729 and 1730[138] (Chart 1).

The rhythm of total timber costs was highly influenced by the expenditures with contractors and maritime transport. In 1728, the fast increase to 594,488 *rs,* 24 *maravedís de vellón*, had the impact of the advance payments to Pedro Amestoy, as well as the settling of the debt regarding deliveries of the first contract in the early 20's. In 1729, the spending on chartered private vessels, in the context of the delivery urge, was definitely the factor that mostly contributed to the total figure of 858,419 *rs*., 27 *maravedís de vellón* As the shipments of timber from contactors lost its preponderance in the following years, the expenditures dropped significantly to 360,991 *rs*., 33 *maravedís de vellón* and 332,161 *reales de vellón* corresponding mainly to purchased timber (Chart 3).

3.3. *The impact of the Mediterranean campaigns (1731-1736) and Ciprian Autran's shipbuilding contributions*

In 1731, started a new dynamic in the Bourbon foreign policy of post Utrecht revisionism, and dynastic manoeuvers of the queen Elizabeth Farnese (1692-1766), marked by intensive amphibious campaigns in the Mediterranean, with the objective of re-conquest of the former Italian and North African possessions. Cadiz became an important naval base for the preparation of missions and support to the vessels that participated in expeditions, such as the one to Tuscany to support Infant Charles, future Charles III (1716-1788) taking possession of the Duchies of Parma and Piacenza, in late 1731, the re-conquest of Oran and Mers-el-Kebir, in 1732, the subsequent episodes of confrontation with Algerian forces in 1732, 1733 and 1734, and, finally, the re-conquest of Naples and Sicily, from 1733 to 1735, within the context of the War of the Polish Succession (1733-1738) (Baudot, 2016: 67-88; Béthencourt, 1998: 88-128, 151-164, 221-247, 259; Blanco, 2001: 96-112; González, 2014: 15-35; Fé, 2016: 89-110, Fernández, 1900: 197-206).

The trans-Atlantic system maintained as a parallel uninterrupted dimension, which was reflected on the continuous flow of the maintenance activity. It was the case of some ships of the fleets of *Tierra Firme* (returning in 1732[139]), *Nueva España* (departing in 1732; and 1735), *Azogue* (returning in 1731; returning in 1734), as well as the *Armada de Barlovento*[140] (García, 1988: 159, 278-281; Heredia, 1978:

138. *Ibidem*.

139. *Gaceta de Madrid*, 30, 24/07/1731: 120; *Idem*, 30, 22/07/1732: 128; *Gaceta de Mexico*, 59, 1732: 470; *Idem*, 99, 1736:792-793.

140. *Idem,* 60, 1732: 639; *Idem*, 82, 1734: 650; *Idem,* 80, 1734: 639; *Idem,* 90, 1734: 731; *Idem,* 94, 1734: p. 750.

172, 228; Kuethe and Andrien, 2014: 119-120; Torres, 1981: 205-207; Walker, 1979: 218-238, 247-250, 281-282).

These dynamics led to 120 maintenance interventions in Cádiz, between 1732 and 1736, made in the 41 different war vessels, as well as 32 auxiliary boats, that, consecutively, took part in those expeditions[141]. Part of these interventions correspond to conversion of damaged vessels into pontoons for internal use, as well as repair to existing ones that were assisting these massive works. At the height of the conflict, in 1734 and 1735, and its aftermaths, in 1736, the War of the Polish Succession in the Italian Territories, led to exceptional concentrations of vessels, as they returned and departed to their missions and were submitted to different levels of maintenance and repairs. As a result, the number of interventions increased abruptly, in 1734, to 32 interventions, and in 1735, 42 vessels were docked in Cádiz, followed by 37 units in 1736 (Chart 4) (Quintero, 2004a: 324, 331-336, 374-376).

During this period, financial and logistic constraints caused by the war effort, did not allow more than the accomplishment of a restricted shipbuilding series, by the new Master Shipwright Ciprian Autran. In February 1733, before the effects of the last Italian campaign hit the Arsenal, La Carraca was able initiate the construction of two 8-gun bomb vessels, *Brontes* and *Piracmon*, which were launched in 1734[142]. In merely quantitative terms, the most significant contributions of the period were the 12 pontoons and long boats, built between 1734 and 1736, for the control of marshlands and the assistance of the voluminous maintenance activity[143]. Ciprian Autran attempted to persuade the administration to a more ambitious plan, but, due the lack of timber, only one demi-frigate was allowed[144]. By the death of Patiño, *Aurora*, the first of a series of two was on construction[145] (Chart 4) (Quintero, 2004a: 228-232, 404-405).

141. Correspondence between José Patiño and the Maritime Department authorities, under the theme *Carenas y construcciones*, about the progress of maintenance works in each single vessel in : AGS, SMA, Arsenales, 303, 06/09/1732*; Idem,* 304, 01/05/1734 – 28/12/1734; *Idem*, 305, 04/01/1735 – 22/11/1735; *Idem,* 306, 12/03/1736 - 20/11/1736.

142. AGS, SMA, Arsenales, 303, Carraca, 7/02/1733, *Obras de carpintería (…); Idem*, 28/02 1733, *Proyecto para astillero*; *Idem,* 21/02/1733, *Obras de carpintería (…)*; *Idem*, 25/01/1733, *Sobre la fábrica (…)*; *Idem,* 304, Carraca, 26/01/1734, *Estado de obras (…)*; *Idem*, 313, 21/06/1745*, Cuaderno de los navíos de Guerra (…).*

143. Extensive correspondence under the theme *Carenas y construcciones* in AGS, SMA, Arsenales, 304, 28/09/1734 - 28/12/ 1734*; Idem* , 305, 15/01/1735 – 24/10/1735; *Idem*, 306, 24/01/1736 – 01/05/1736.

144. AGS, SMA, Arsenales, 304, Carraca 31/05/1734, *Don Ciprian Autran; Idem*, 305, El Pardo, 22/02/1735, *José Patiño*; *Idem*, 305, El Puntal, 25/02/1735, *Ciprian Autran; Idem,* Carraca, 24/07/1735.

145. *Idem,* 306, Cádiz, 30/07/1736 – 06/11/1736.

Dealing with timber shortage on budget restrictions was the challenge of this period. The volume of timber for main elements supplied by contract/direct administration hit the bottom, with only 5,052 *codos cúbicos* registered in five years. On the contrary, purchased timber totalized the considerable figure of 31,095 units, while the complementary contributions of commissioned services yielded 501 elements. According to the available data, total expenditures corresponded to the amount of 1 352,407 *rs.,27 maravedís de vellón,* the lowest of the three identified phases (Charts 1-3).

The first effect of the Mediterranean campaigns in Tuscany and Oran on timber supply was the interruption of maritime transport from Málaga between August 1731 and August 1732, due to mobilization of resources in the campaigns[146] and the impracticability of such kind of navigation, in that context. The shipments lasted until November 1732 and corresponded to 3,807 *codos cubicos,* the highest volume of main elements of this phase, which allowed the construction of the two bomb vessels in 1733 and 1734[147]. Meanwhile, the felling and overland transport stopped by late 1731/early 1732, due to lack of funds and consequent accumulation of pieces in shipping hubs. Paradoxically, 1732 was the year of the highest registered acquisition of purchased pieces, with the amount of 20,565 units, in 43 deliveries. The 294,817 rs, 17 maravedís de vellón spent in timber, correspond mostly to these purchases. Such an exceptional accumulation was for stock replenishment, after 4 years dedicated to the construction of 3 large vessels, and a late response to the remaining deficiencies after the 1730 list of timber needs[148]. The objective was the preparation for a (frustrated) shipbuilding program, or even the anticipation of the maintenance needs in an eventual war context. 15,230 of these pieces were planks, which proved to be highly useful during the period of 1734-1736. In reports about vessels damaged during the re-conquest of Naples and Sicily, planks appear as the most requested items[149] (Charts 1-3).

In 1733, the mobilization of resources for the war in Italy, made the timber purchases drop abruptly to 2,568 units, along with the expenditures, to 103,309 *rs*., 03 *maravedís de vellón*, while all the Málaga operational chain was interrupted. In La Carraca, only the construction of the bomb vessels kept the shipyard busy (Charts 1-3).

146. *Idem,* 304, Málaga, 18/05/1734, *Don Felipe de Ansa.*

147. *Idem,* Carraca, 31/05/1734, *Don Ciprian Autran; Idem, Puerto Real,* 30/08/1734, *Don Ciprian Autran.*

148. Idem, 303, Carraca, 08/11/ 1729, Estado de los generos y pertrechos (…).

149. *Idem*, 304, Carraca, 12/01/1734,Estado de los generos (…); *Idem*, 22/04/1734; *Idem,* 31/07/1734; *Idem,*305, Carraca, 24/07/1735; *Idem,* 306, Cadiz, 03/01/1736, *Don Francisco Driget.; Idem ,* Málaga, 03/04/1736, *Estado de las maderas (…); Idem,* Carraca, 26/05/1736, *Estado de las Maderas (…).*

In 1734, as the first ships were intervened, the works in Málaga resumed, in a context of aggravated budget restrictions[150]. However, all transports remained paralyzed, contributing to the accumulation of material in the fields and shipping hubs. The Department had to rely on timber purchases[151], which increased to 5,991 units (Chart 1, 2). Expenditures increased to 621,982 *rs.*, 32 *maravedís de vellón* mainly due to payments for the services of Juan Navarro (Chart 3). Meanwhile, Autran initiated his attempt to expand the shipbuilding program, referring the existence of timber to start a ship or two, or two frigates of 40/50 guns, instead, provided that the supply from Málaga resumed, because repairs would rapidly deplete the stocks. According to Autran's account, in May 31, 1734, there was a total of 12,203 pieces, including from Andalusia and other provenances, which attests the velocity of timber consumption, comparing to the delivery accounts of 1732[152]. Such velocity is corroborated by some 1734 reports of repairs, which mention the timber necessities, totalizing 12,025 pieces (including 11,368 planks) for 22 interventions[153]. The need of an evaluation of the whole situation resulted in the assessment visits to Málaga, in the summer of 1734. By the end of the year, as both shipments and felling in Málaga were paralyzed, due to lack of funds, the stocks were near complete exhaustion[154].

1735 provided some modest provisional solutions, as the appeals for urgent shipments and lists of timber needs reached José Patiño, and the subsequent arrangements were made[155] (Quintero, 2004a: 405). However, the war effort, led to even more fund constraints, affecting all Andalusian sources of supply. As a result, the expenditure reduced to 253,627 *rs.*, 12 *maravedís de vellón*. The major contribution to this amount corresponds to purchased timber, despite the supply reduction to 1,971 pieces, as the Navy failed the payments to the main provider, José Blanco, as well as to other providers[156]. During June and July, 5 shipments from Málaga allowed to provision of 1,245 *codos cubicos* of oak timber (Charts 1-3). In late 1735, the operational chain of Soto de Roma put 501 timbers for pumps and tackles on their way to Cádiz, becoming another victim of the Navy's debt.

In the aftermaths of the war, in early 1736, the claims for more timber increased, as the ships under maintenance accumulated with the construction of auxiliary

150. *Idem,* 304, Málaga, 18/05/1734, *Don Felipe de Ansa*.
151. *Idem,* 305, Cádiz, 11/01/1735, *Don Francisco de Varas.*
152. *Idem,* Carraca, 31/05/1734, *Don Ciprian Autran.*
153. *Idem*, 304, Carraca, 12/01/1734, Estado de los generos (…); *Idem*, 22/04/1734; *Idem,* 31/07/1734.
154. *Idem,* 305, Carraca, 25/12/1734, *Don Miguel Bonet.*
155. *Idem,* 305, 15/01/1735- 24/07/1735.
156. *Idem,* Cádiz, 28/08/1735, Don Francisco de Varas.

vessels[157] (Quintero, 2004a: 405). Both purchased and contracted timber were paralyzed and shipments would not resume until after the studied period. As a result, expenditure dropped to 78,670 *rsv.* Such amount corresponded to the payment of last year's supply from Soto de Roma, and a small impulse given to the return of Juan Navarro to the field (Chart 3). Despite the existence of accumulated timber on the shipping hubs, and a small portion in El Puntal, there was a lack of appropriate main elements for 70/80-gun ships, like the ones in repair, and the supply of new beams, waterways or wales was essential to keep the work carrying on[158]. The existing elements that could not be used in repairs were canalized for the construction of the first demi-frigate[159] (Chart 4). As the purchase of timber was interrupted, the stock of pine planks and other pieces was as well at the risk of exhaustion[160]. By the death of José Patiño, in November 3, 1736, the expectations of overcoming timber shortage were still far from reality.

4. CONCLUSION

The Bourbon reforms in the Naval sector expanded the systematic exploitation of forest resources to the peninsular South with the creation of the Arsenal of La Carraca and the Maritime Department of Cádiz. The 1717-1736 period corresponds to the beginning of such process, marked by the experimentation of old and new methods of supply, motivated by practical criteria, with clear functional and purpose distinction.

Direct administration methods like commissioned services and articulation with the Royal Exchequer were limited and sporadic. Commissioned services in Huelva, Seville, Cádiz and Soto de Roma were the remnant of previous practices of non-systematic exploitation of regional resources, related with the traditional careening dockyards, constituting an extra resource for periods of high demand, and for the acquisition of specific timber species. The beginning of the articulation with the Royal Exchequer for the supply of pine from Sierra de Segura to war fleets had a total experimental character and was motivated by the aim of using such high quality material as an alternative to imports.

Private agency was the solution for the increasing demands of timber and dominated the most prolific networks of supply. The purchase from middlemen merchants

157. *Idem,* 306, Cádiz, 20/02/1736, *Estado de las piezas de Madera*; *Idem*, Cádiz, 09/03/1736, Don Rodrigo de Torres.

158. *Idem,* Carraca, 26/05/1736, *Nicolas Carlos Colón; Idem,* Isla de León, 29/05/1736, *Don Rodrigo de Torres.*

159. *Idem,* Isla de León, 30/07/1736, *Don Rodrigo de Torres*; *Idem*, San Ildefonso, 08/8/1736, *José Patiño.*

160. *Idem*, Cádiz, 14/08/1736, *Don Francisco Driget.*

allowed immediate acquisitions of large portions of planks and pine timber from the Kingdom of Seville, essential for the maintenance activity. The introduction of contractors in Cádiz, Málaga and portions of Granada corresponds to the aim of a systematic and planned exploitation, more oriented to *Quercus* hull elements for the production of series of war vessels, for which state intervention, in the form of tight logistic and technical supervision, was essential. Maritime transport of this material by chartered vessels, arranged between the state and their owners, constitutes the most consistent practice of direct administration, of the whole period.

The increasing maintenance and shipbuilding activities demanded an increasing supply, which motivated the introduction of more than one contractor, the geographical expansion to Málaga and Granada, and more purchases. The first shipbuilding series of 1728-1731 constitutes the factor of highest timber supply. Nevertheless, periods of intense maintenance activity like 1734-1736, motivated by the re-conquest of Naples campaign, did not count with the adequate supply, due to restrictions of budget. The war effort aggravated the already permanent situation of lack of funds, which had been causing payment defaults by the state, with the consequent exhaustion of liquidity on the side of providers. Services were forced to interrupt, as the front line of all these networks, constituted by labourers, conductors, timber producers and draught animals suffered from long periods of material needs, due to lack of payment, and ended up demobilizing.

Considering the limits of this research, the calculated timber expenditure totalizes 5,023,692 *rs.,* 12 *½ maravedís de vellón.*

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