PUBLIC OR PRIVATE? SUBCONTRACTING FRENCH NAVAL VESSELS IN THE SEVENTEENTH AND EIGHTEENTH CENTURIES

DAVID PLOUVIEZ

INTRODUCTION

In 1690, the artist Nicolas Berquin produced a series of drawings depicting the shipyards of the Arsenal of Rochefort, where vessels and galleys were under construction (see Appendix 1). At a time when France was fighting the War of the League of Augsburg (1688-1697), we can see an arsenal given over entirely to the war effort, with each scene showing the overall organization of the shipyards and the various trades (carpenters, sawyers, drillers, and other kinds of shipwrights, etc.). But while these drawings are important documents for the historian looking to reconstruct the working environment of a European arsenal in the Early Modern era, they tell us nothing about the economic arrangements chosen by France to build its fleet. Are the craftsmen portrayed by Berquin working for the arsenal, a contractor, or both? Is the vessel's construction being overseen by the commander of the port or by an entrepreneur who has signed a contract with the State?

In France, when it came to building and maintaining a permanent fleet of warships under the *Ancien Régime*, it was essential to use contractors to build vessels for the war effort, which led to novel ways of organizing the sector and exchanging know-how. Surprisingly, however, there have been very few studies of naval subcontracting, despite the wealth of synthetic works available about the building of warships during this period[1].

[1] ACERRA, 1993.

By drawing on a corpus of documents on subcontracting for the construction and maintenance of warships, ranging from the 1620s to the eve of the French Revolution, this study aims to flesh out this process. It is therefore necessary to contextualize these subcontracting practices both at European level and in the framework of French naval policy, while considering the technical objects created and those who created them.

1. NAVAL SUBCONTRACTING IN EUROPE: A UNIVERSAL PRACTICE?

The creation of national navies that characterizes Europe in the Early Modern era has provided material for a rich historiography, although to varying extents for the different navies concerned and the subjects addressed[2]. While the arms race and the increase in tonnage of naval fleets starting in the middle of the seventeenth century and the changes in shipping design and port infrastructure have been the focus of renewed attention since the 1960s and 1970s[3], the economic and financial aspects that underlie these naval policies have not yet given rise to a comprehensive and comparative approach, particularly for France[4].

More has undoubtedly been achieved concerning the English and, to a lesser extent, Dutch and Spanish fleets, which had been studied very early on and again with renewed interest since the debates in the 1990s about the notions of the «fiscal-military state»[5] — or the «fiscal-naval state»[6] — or even the «contractor state». This latter trend in research has helped shed light on the mechanisms enabling states to maintain larger and better-equipped armies and navies, through an improved understanding of the way administrations functioned, the construction and dissemination of military knowledge, the actual potential of taxation, and the burden of war on the economies of these States. In particular, the complex relationships between the private and public sectors, by contracting out military requirements, were seen very early on as key for understanding a State's capacity for military mobilization, especially of its naval forces.

These studies show the importance of subcontracting in the construction of fleets, though in different ways and to different extents in the various naval powers. Without oversimplifying a complex phenomenon[7], from the sixteenth century onward Spain delegated a considerable part of the construction of its vessels to entrepreneurs in the Peninsula, in particular in Basque and Cantabrian ports such as Gijón, Avilés, Ribadeo,

[2] GLETE, 1993.
[3] LLINARES & HRODEJ, 2010.
[4] PLOUVIEZ, 2016.
[5] TORRES-SÁNCHEZ, 2007.
[6] BOWEN & GONZÁLEZ ENCISO, 2006; CONWAY & TORRES-SÁNCHEZ, 2011.
[7] The subcontracting of shipbuilding did not always lead to the construction of «finished» vessels, but more frequently of hulls, the most important part of the project both technically and financially. In this first part, I make no distinction between the subcontracting of hulls and of complete ships.

Gamero, Pasajes, and San Sebastián[8], and also throughout its Empire. This tendency was concomitant with the establishment of legislative provisions facilitating the work of the shipyards[9] and a slow standardization of ships' characteristics. Yet it did not prevent the development of State arsenals (Cartagena, La Carraca, Ferrol, and Havana), even though these infrastructures were never able to assume the entire work of construction and repair on their own, particularly during times of conflict. Spain thus developed an original model in Europe that resulted in a substantial proportion of its military needs being delegated to private businesses.

England and the United Provinces moved in stages toward the massive subcontracting of their fleets. In the seventeenth century, the practice was marginal in Britain, which generally speaking managed to build its own ships, except for brief periods during the reign of William III when recourse to private shipyards was required, while the five Dutch Admiralties built a small number of ships and leased the rest of their fleet from merchants. The rapid succession of conflicts in the eighteenth century forced the Royal Navy to entrust part of the construction of its frigates and lighter vessels to private shipyards, mostly located on the River Thames, before gradually subcontracting for larger vessels (see Table 4.1). The British arsenals remained important for all the phases of arming, gathering supplies and, especially, the maintenance and repair of ships-highly technical tasks that the Admiralty did not wish to delegate to private contractors.

Table 4.1. Subcontracting for the British Fleet, 1688-1815

	Number of Battleships	Tonnage
Private Shipyards	244	322,010
Royal Arsenals	392	521,135
Total	**636**	**843,145**

Source: LAVERY, 1983: vol. 1, 163-190, taken up in KNIGHT, 1988: 59

This movement toward subcontracting on a massive scale was never subsequently questioned and represented nearly 72% of the tonnage launched during the French Revolutionary Wars (1793-1815)[10]. This occurred later in the Dutch Republic, which fully adopted the process during the American Revolution when it was unable to build enough vessels in the Admiralty shipyards alone, especially as they had produced little in the first half of the eighteenth century. By having recourse to private shipyards, the

[8] PLOUVIEZ, 2013.
[9] This was particularly the case for forestry: GOODMAN, 1997.
[10] During this period, private British shipyards launched 60 ships of the line and 627 other secondary vessels, for a total of 354,772 tonnes, or 72% of all military shipbuilding: MORRISS, 1983: 28.

country was able to produce an unprecedented number of vessels, launching 36 ships of the line and 54 frigates between 1778 and 1789.

All European states subcontracted out the construction of at least part of their fleets, proportionally to the burden of the war effort, and also because of many structural parameters such as the availability and quality of public port infrastructures or the ability to raise the necessary funds. Furthermore, the best sources for studying these practices are to be found among the navies of the minor powers (Sweden, Denmark, Russia, etc.) that chose to build outside the state system[11], often in higher proportions than the major naval powers when they neither wanted nor were able to maintain substantial arsenals. Thus, the way the Danish fleet was built up before and during the reign of Christian IV is very instructive, as many possibilities were combined to increase its numbers. Complete construction of vessels in the arsenals of the kingdom, partial subcontracting under the direction of public shipbuilders and with equipment supplied by the arsenals, or complete subcontracting after signing a contract with a private contractor were all used with infinite variations, making Denmark a precursor — alongside Sweden[12] — of methods adopted by all the other European navies from the second half of the seventeenth century. At the beginning of the French Revolution, the Secretary of State of the French Navy, César Henri de la Luzerne, when reporting on his actions by comparing them with other European fleets, rightly emphasized that naval subcontracting had by then become a «universal practice»[13].

The situation in France on delegating naval construction is more complex to characterize. It is likewise difficult to understand the Navy's complex financial arrangements and its relationship with private enterprise from the seventeenth century through to the Empire considering that the archives — contracts, specifications, storebooks, etc. — were partially destroyed during major reorganizations in the nineteenth century. The only remaining possibility for learning about this essential area of military activity is to use the correspondence between the intendants, the commissioners, and the central authority or, much more onerous but leading to much richer results, to compile the agreements signed between the State and private operators for the supply and construction of ships. From the end of the eighteenth century, more documentary material concerning subcontracting becomes available with the correspondence and technical archives left by certain engineer-builders and some companies' archives, which grant insight into this process from the point of view of private actors.

In addition, the terminology used by the Navy to describe subcontracting in the Early Modern era is most unhelpful for the researcher seeking to understand this

[11] BELLAMY, 1997: 377; BELLAMY, 2006.

[12] We should not overlook the contribution of the navies of Venice and the Ottoman Empire, which also inspired the fleets developed in the seventeenth century. For Sweden: GLETE, 2010.

[13] This citation originally in French and all following ones have been translated by the translator. *Mémoire de M. de la Luzerne sur les administrations dont il a été chargé*, 1790 (AN — *Colonies*, F^3 158).

phenomenon. In the various legal texts providing an organizational framework for the naval authorities, subcontracting is frequently referred to via expressions such as «award at a discount», «fixed-price contract», or «private contract», as opposed to work undertaken «par économie» or «à la journée du roi», which meant work done by the journeymen of the arsenals under the supervision of engineers or the Intendant. Although the practice already existed, the Navy Ordonnance of 1689 was the first legislative instrument to indicate that shipbuilding could be undertaken «at a fixed price and not by [number of] days worked»[14], thus recognizing the custom but without giving it a very precise framework. Moreover, it was never properly defined because apart from this one reference, no other official text provides any framework for the subcontracting that can be glimpsed in the various extant contracts, the correspondence describing the day-to--day work, or in the rare descriptions offered by observers, particularly at the end of the eighteenth century[15].

2. SUBCONTRACTING AND SHIPBUILDING POLICY IN FRANCE: SEVENTEENTH-EIGHTEENTH CENTURIES

As for the construction of the fleet, we can identify an initial period that extends from Richelieu's desire to equip France with a permanent Navy until the beginning of the personal rule of Louis XIV. In the absence of a complete range of infrastructures and trained carpenters, the State had no other choice than to entrust the building of its Navy to private companies, both French and foreign. This was subcontracting as apprenticeship, with the dual purpose of providing ships as quickly as possible and of encouraging a process for training of a pool of men who would learn the shipbuilding trades and then be available to work in the French state arsenals. From then on, there were two levels of shipbuilding delegation, as a proportion of the smaller vessels and the routine maintenance were entrusted to tried-and-tested French private shipyards, mostly in Charente, Brittany, and Normandy, while the fighting ships were contracted out to Dutch shipyards and built in the United Provinces or in France. The fleet was built intermittently, but the distribution of tasks can generally be seen operating from 1626, the date of the first large--scale shipbuilding program led by Isaac de Razilly (see Table 4.2), a friend of Richelieu, until the arsenals were capable of fulfilling their missions in the 1670s and 1680s.

[14] *Ordonnance de Louis XIV pour les armées navales et arcenaux de marine, 1689*: titre II, art. III.

[15] The different attempts to reorganise the Navy during the Revolution are useful for understanding subcontracting: *Mémoire de M. de la Luzerne sur les administrations dont il a été chargé*, 1790 (AN — *Colonies*, F^3 158; THÉVENARD, 1790: VIII; MALOUET, 1790).

Table 4.2. French shipbuilding program of 1626

Tonnage/Type of Vessel	Number
500	18
300	6
200	6
Tenders	10
Galleons	5
Total	**45**

Source: CASTAGNOS, 1989: 101-103

In 1626, six complete coastal protection vessels were ordered from Jacques Soullau of Dieppe[16], while other contracts were signed for specific tasks to be carried out on the ships already under construction, such as making the rigging, the interior arrangements, or a refit for example, as with the *Salamandre* and of the *Lionne* in 1632[17]. All these constructions were regularly inspected by delegates appointed by Richelieu (Beaulieu, Nicolas Leroy du Mé, and Razilly), who would either approve or not the way the work was progressing. At the same time, carpenters and «maîtres de hache» (men so skilled with their axes that they had no need of saws) were constantly honing their crafts as they circulated between shipyards. The contractual documents from this period offer interesting sources for the historian of naval architecture, showing the stages through which the ships proceeded via the accompanying specifications, which often mention the different dimensions (length of the keel, width of the beam, depth, etc.), the characteristics of the guns, as well as details on the internal fittings. However, these documents have little to tell us concerning the general economics of shipyard organization, how the work was done in practical terms, or the actors involved. There is more information in documents concerning larger vessels[18] of more than 400 tons, for which foreign carpenters were required. Here, certain clauses in the contract require the presence of French carpenters to work side-by-side with their Dutch counterparts. The subcontracting that occurred in the 1630s and 1640s had been a decisive step in the evolution of naval military architecture and the overall management of shipyards. The Dutch carpenters improved the French vessels by giving them lower lines, by decreasing the size of the after castle and increasing the artillery, while also encouraging the writing down of all these innovations in technical

[16] AN — *Minutier central des notaires parisiens* (hereafter MC), Marché de construction de six vaisseaux passé par Richelieu au nom du roi avec Jacques Soullau, marchand de Dieppe, 10 décembre 1626, XCVI-14.
[17] AD 76 — *Travaux d'aménagement de la Salamandre et de la Lionne*, 15 mars 1632, 2E 70-190; I would like to thank Michel Daeffler for sending me these documents.
[18] AN-MC — *Marché pour fabriquer trois vaisseaux en hollande*, 12 novembre 1635, LXXXVI-309 fls. 1-6 r; BNF — *Marché fait avec les charpentiers hollandois*, 12 juin 1639, Ms Fr. 6408 fl. 503.

documents[19]. At the beginning of the personal rule of Louis XIV, subcontracting was still necessary to constitute a fleet, but the contracts were henceforth signed with French shipbuilders who had acquired their skills during the previous decades. In 1666, Laurent Hubac, the only man «qui puisse raisonner [who has the required knowledge]»[20], obtained a contract to build ten vessels at the arsenal of Brest. He was in fact unable to complete them, but this shows the new skills of such men[21].

The Navy acquired an administrative structure in the 1660s that enabled the arsenals to become progressively more independent in executing naval policy, especially after the 1671 regulation that every arsenal should have its own shipbuilding committee responsible for supervising the «measurements and proportions of the vessels to be built» and «examining, and possibly altering, the costs estimated by the master shipwrights»[22]. In peace time, far fewer shipbuilding contracts were awarded, and orders even dried up completely in some arsenals, leaving the Navy to pursue its shipbuilding programs alone. From then on, the recourse to subcontracting was characteristic of periods of conflict, dictated by logistic and economic imperatives as it was necessary to lighten the load on the arsenals whose order books were full while also building at lower cost — a practice common to all the navies of Europe in the same circumstances.

This emergency subcontracting had recurrent features throughout the whole of the period. The idea was to delegate the construction of heavy combat vessels to contractors. This fact calls into question the idea that subcontracting primarily concerned secondary vessels, essentially for transport or logistics. On the contrary, from the seventeenth century onwards the aim was to support the mobilization of naval forces with the rapid delivery of numerous vessels and frigates. During the War of the League of Augsburg, construction times were about eighteen months, whereas, a century later, it took a year on average — an achievement that proves the mobilization of trained workers. However, in the midst of war, and excepting contracts that were executed inside arsenals, subcontracting employed labor from the trading ports, insofar as there was any left because the three categories of workers available — maintained, domiciled or conscripted[23] — had generally been taken by the Navy. While the identity of the workers in subcontracting shipyards in the seventeenth century is uncertain because of the lack of

[19] The first technical description of a French war ship dates from a contract of 1639 signed with the Dutch manufacturers at Indret, downstream from Nantes; BNF — *État des dépenses et autres pour la Marine*, 1629-1640, Ms Fr. 6408 fl. 504.
[20] BNF — *Mélanges Colbert 176*, fl. 376, Rochefort, 9 octobre 1670.
[21] The project was handicapped by financial difficulties and a lack of supplies. Laurent Hubac finally succeeded in building five of the ten vessels ordered and the Navy freed him from his commitment in 1667 after the launch of the *Lys* and the *Lionne*, BNF — *Mélanges Colbert 143*, fl. 9, 3 janvier 1667.
[22] ACERRA, 1993: 105.
[23] The «maintained» are those workers listed permanently on the rolls of the arsenal, as against the two other categories who were temporary employees. The «domiciled» workers were those who lived in the town where the arsenal was located and who were recruited whenever the degree of activity so required; in the event of long conflicts, the Navy used conscripted workers living in nearby ports.

precise documentation, this is no longer the case for the eighteenth century. It is worth noting the ability of this civilian workforce to respond to military orders, especially under emergency conditions. By this time, the difference in technical mastery between the arsenals and the civil ports presumed by scholars was in fact not so great.

A feature shared by both of the cases of subcontracting mentioned above, although occurring in different contexts, is that they were applied under the force of circumstances and were not always approved by all of the Navy's officers. On the eve of the American Revolution, the naval commissions set up by the Order of 1776 responsible for overseeing the management of arsenals were still arguing about whether to delegate the construction of naval vessels to contractors. While recognizing the virtues of this formula, and although he approved personally, the Naval Commander of Toulon, Mr. de Saint-Aignan, has left us an account of these debates:

> *In the report of the proceedings of the Naval Commission that I have recently convened and which will be sent with this same letter, you will find certain dissenting opinions from our proposal to contract out shipbuilding and refitting projects, as has already been done with all possible success, but although we are all driven by the same zeal for the good of the service it should come as no surprise that each individual tries to contribute by different means*[24].

This testimony, repeated by many contemporary writers, shows that subcontracting was not the natural choice for the Navy's Secretary of State. Moreover, this reluctance was shared by many other European navies. Even when the Royal Navy subcontracted the majority of its new ships in the second half of the eighteenth century, many of its administrators and officers continued to have reservations. The Earl of Sandwich, who was at the head of the British navy at the time of the American Revolution, stated that when a «vessel of war is subcontracted, a considerable sum is advanced to the shipbuilder […]; if he is not credit-worthy and reliable, he will put off your case and use your money for other purposes [translated here from the French]»[25]. In addition to these financial constraints, there were design faults in some of the vessels ordered from certain shipyards throughout the eighteenth century, and technical aspects that argued against the subcontracting of very large vessels — 100 or more guns — which led the Navy Board to keep the delegation to private contractors for maintenance and repairs to a strict minimum[26].

---

[24] AN — *Marine*, B3/632 fls. 5-6, M. de Saint-Aignan, le commandant de la Marine de Toulon, à M. de Sartine, le secrétaire d'État de la Marine, 7 janvier 1776.
[25] BARNES & OWEN, 1932-1938: vol. IV, 293 *apud* KNIGHT, 1998: 57.
[26] KNIGHT, 1974; WEBB, 1988.

In France, the reluctance, or even the hostility, regarding resorting to private enterprise compelled the Secretary of State for the Navy to take charge of the matter in the aftermath of the American Revolution and supervise it more closely. This determination can be seen in the awarding of many contracts for shipbuilding, repairs, and demolitions during the 1780s, followed very closely by the engineers in order to establish a standardized process for future years. This approach of optimization through subcontracting should be seen in the context of profound reforms to military shipbuilding through which the Navy homogenized its fleet by reorganizing its arsenals and establishing standard plans, drawn up by Borda, a scientist, and Sané, an engineer and builder[27]. At the same time, specifications for shipbuilding projects became far more detailed, especially as they would need to be passed on to private companies subcontracted to execute part of future naval programs. The decentralization of shipbuilding to secondary ports would only be effective if a set of technical documents governing the work of the future subcontractors had first been established. It was standard practice in the Navy to draw up different preliminary estimates, but these documents were for internal use for the staff responsible for shipbuilding and the offices of the Secretary of State, which accepted or refused the estimates along with the plans drawn by the engineer-builders.

The challenge was therefore to produce real construction sheets enabling the subcontractor to work without supervision, but by imposing certain materials and construction techniques. In addition, the cost of each model needed to be specified very precisely so that contracts could be awarded at the right price, making the undertaking attractive to both parties. This last point was just as important as the definition of the technical phasing: the Navy needed to be more reasonable than the candidates, who tended to lower their prices excessively in order to win contracts. Too low a price disadvantaged both parties; the subcontractors were unable to fulfil their commitment and at best went bankrupt, or at worst (for the State) might abandon the contract, obliging the Navy to take over the work unprepared with the resulting loss of time and money. In addition, these low prices were obtained in the only area where economies were possible: the construction work itself. The contractor would cut back on working time, inspections would not be carried out thoroughly, and they might not choose the best workers. Finally, many intendants and commissioners in the eighteenth century advanced a further argument: it was important to favor those who provided the State with the best service. A good subcontractor paid fairly tended to offer his services anew, so it was well worth maintaining a pool of partners of proven reliability who could be mobilized all the more easily because they were used to working for the Navy.

[27] ACERRA, 1992.

This unique relationship with private industry, based more on a constructive mutual understanding than on antagonism[28], was crucial for creating a new framework for subcontracting. While most of the new construction specifications were drawn up in 1783, they were considerably modified after the signing of many contracts between 1784 and 1787. The Navy took the opportunity of this period of peace to refine its procedures by relying on seasoned entrepreneurs who took most of the contracts for the smaller units while the ships, frigates, and maintenance work were subcontracted to groups of workers in the arsenals. There is little doubt that this subcontracting was experimental in nature, especially as it was the arsenals of Rochefort, Lorient, and Bayonne that served as laboratories. This meant that any difficulties arising during this type of subcontracting would have had little impact on construction after the American Revolution, because the needs for that war were mostly provided by the arsenals of Brest and Toulon, less affected by this experimental procedure.

In Bayonne, the Navy was involved in constructive talks with Jean-Jacques Casenove, a trader of the city who had been supplying timber to the Arsenal of Rochefort for nearly thirty years when he took on the construction of the *Goéland* and the *Mouche*, two avisos, and the prefabrication of frames for 74-gun vessels[29]. At the Arsenal of Bayonne, Casenove managed all the logistical aspects (supplies, organization of the shipyard), leaving the engineers to concentrate on the different stages of construction. By the end of the eighteenth century, the Navy had long phased the construction of its different models into 24 parts corresponding to a set of predefined tasks[30]. Henceforth, they needed to render this breakdown more intelligible to entrepreneurs, especially as subcontracting was becoming increasingly fragmented with a host of subcontractors behind the prime contractor. However, there were two sides to this optimization, which aimed both to improve conditions for the production of military vessels by third parties and to search for innovations in their construction, as shown in the experiments on prefabrication.

3.TECHNICAL OBJECTS AND SUBCONTRACTORS

From the 1660s and 1670s through to the end of the eighteenth century, shipbuilding contracts changed in form. The resulting documents provide technical and financial details that permit a second level of investigation of naval subcontracting and a closer view of the actors involved and the items manufactured. Before the construction

[28] The different types of relationship between the world of business and the Navy was complex throughout the eighteenth century, but it is clear that these relationships played an important role in naval innovation: PLOUVIEZ, 2014: 166-171.
[29] SHD — *Marine*, Rochefort, 2G[1] 14, 1787.
[30] For example, 1/24th and 2/24ths of the construction of a frigate are the following: 1/- Shaping of templates, positioning of keel blocks, work on parts of the keel and their scarphs, attaching the keel assembly to the keel blocks, shaping the bow rail. 2/- Creation, erection, carving of the bow with its apron, shaping and assembling forward main frames on land, shaping the rails for this part of the vessel.

of a ship was entrusted to a third party, a document with costed specifications was always drawn up before the contract, indicating the main characteristics of the vessel to be built. These texts progressively acquired new dimensions and shipbuilding instructions, resulting in a very thick document. This shows how much the Navy's knowledge of the industry was becoming formalized, and probably also a sign of a change in the pool of stakeholders likely to engage in this type of subcontracting. From the War of the League of Augsburg onwards, the «specifications estimate», which was already found in contracts between 1620 and 1640, was associated with a document called a «timbers list», which provided the contractor with information on the choice of raw materials and how to work them. For the seventeenth century, the specifications and timbers list are often the only documents that tell us anything about the work that was actually done, because very few images have come down to us. The exceptions are plans and drawings of details, such as those of the interior layout of the ship or its carvings, «which will be produced by the carpenters and by the arsenal's Master sculptor»[31]. Not until the eighteenth century were construction contracts systematically broken down into articles, starting particularly with the Seven Years' War. At the end of the Ancien Régime, the overall specifications estimate for a ship could consist of two to four separate sets of specifications, corresponding to specific phases of construction. In 1785, the specification for «awarding the labor for the timber and drilling work for the first part of the construction of the King's frigate *Gracieuse* with 26 twelve-pounders»[32] was followed by three others for the second part of the hull, the inner carpentry, and the rigging.

3.1. Naval Shipbuilding and Subcontracting: Interconnected in the Seventeenth Century

For the seventeenth century, it is difficult to assess the nature of the workforce in the shipyards because the documentation says very little about it. In the case of contracts at Toulon at the end of that century, the contractor had to undertake to «employ enough workers»[33] and provide «the days worked by all employees [*i.e.* pay them] for the carpentry, sawing, drilling & for nails and wooden pegs»[34], recurring clauses that are never supplemented with any other information. At first glance, it is easy to imagine that outside workers would be recruited for these subcontracted tasks, precisely to alleviate the burden on their counterparts employed on a regular basis by the arsenals. The civilian part of the port of Toulon had a pool of skilled workers ready to work for the State as long as they were paid. However, it is likely that the arsenal's own workers also participated,

[31] AD 83 — *Marché de construction pour deux vaisseaux*, 22 décembre 1689, 3^{E} 5/124 fls. 590-594.
[32] SHD — *Marine*, Rochefort, 2 G^{1} 12, *Adjudication de la main d'œuvre des ouvrages de charpente et de perçage nécessaire…*, 12 novembre 1785.
[33] AD 83 — *Marché pour deux brulots*, 6 septembre 1684, 3^{E} 5/119.
[34] AD 83 — *Marché pour deux brulots*, 6 septembre 1684, 3^{E} 5/119.

especially if that was where the construction took place — an aspect that is never mentioned in contracts at this time.

In addition, even though the workforce was little accustomed to the technical requirements of building military vessels, the presence of the naval shipbuilders among the contractors no doubt helped guarantee optimal management of each construction project. Out of all the contracts identified in a study by Pierre Arnaud, the Navy's own builders appear by name in nearly 50% of them in association with merchants or civilian counterparts. There is also no proof that they were excluded from the other projects. This finding is surprising, because while the Navy's own manufacturers were very often the successful bidders during the period 1630-1660, the various legislative texts, and in particular the Navy Ordonnance of 1689, subsequently banned this practice. Public servants, as these men were, could not become involved in naval business on their own account without the danger of a conflict of interest[35]. However, during the War of the League of Augsburg, this practice still seems to have been common as Blaise Coulomb, Laurent Hubac, and Joseph Ollivier, master-shipbuilders employed by the Navy, were bidders for subcontracts signed at Toulon.

When working as private contractors, these builders were not simultaneously responsible for overseeing the different stages of construction on behalf of the Navy. Thus, when Coulomb was «charged with overseeing the construction of a vessel» being built in Toulon in 1691, he had no financial interest in the work in progress. But was the quality of the ships delivered different in any way? With so few official manufacturers in each arsenal — rarely more than four or five — and in view of the pace of launches in time of war, it seems impossible to rule out collusion or little arrangements between colleagues who at one moment are contractors and the next naval constructors. It is hard to measure the implications of this overlapping between contracting authority and prime contractor, but one thing stands out throughout the seventeenth century: irrespective of the reasons for having recourse to subcontracting in this period, the contractor is a shipbuilder, either French or foreign, practicing this profession either on his own behalf or that of the Navy.

3.2. Entrepreneurship and Navy Supervision of Shipbuilding in the Eighteenth Century

In the eighteenth century, a clearer distinction arises between contractors and shipbuilders, although there were still many exceptions. This was the case with the Dunkerque-based Daniel Étienne Denys (1725-1800) who, while building small vessels for the Navy, in 1771 was granted an honorary title corresponding more or less to junior

[35] The Navy Ordonnance of 1689 indicates the total incompatibility of being both a Naval officer or technician and a business partner, and that any «collusion of interests between administrators and certain entrepreneurs should be avoided». This stipulation is repeated in the Royal Ordonnace of March 13, 1717.

engineer and then, in 1786, that of «ingénieur ordinaire» for the Navy[36]. Jean-Baptiste Lemarchand, a master carpenter from St. Malo, stood out for the quality of his work during the American Revolution and was named junior engineer by the Navy while also continuing to work on behalf of St. Malo shipowners and the State. In the same way, all contracts signed with the workers of the arsenals of Rochefort and Lorient during the 1780s, which are similar to those signed with the master shipbuilders of Toulon at the end of the seventeenth century, continue to blur the distinction between public officials and private enterprise. Nonetheless, most contracts for naval shipbuilding were won henceforth by merchants or businessmen and, while no specific profile emerges, the most effective ones were timber merchants. In Bayonne, Jean-Joseph Casenove had long had experience in timber when he submitted a bid for naval subcontracting. This was also the case for the Arnoul and Bourmaud families in Nantes[37] and La Brillantais--Marion at St. Malo, who «has wit and judgement; he thinks and reflects»[38] according to the engineer-builder Chevillard who oversaw the construction of his frigates. Under the French Revolution and the Empire, Éthéart in St. Malo and the Crucy brothers in Nantes also started their careers selling timber to shipyards or for urban building contracts. Bringing together a varied stock of timber, in which the carpenters were able to find the shapes they needed to create specific parts of the ship's architecture (deck beams, etc.), was essential for the success of a shipyard. It was no coincidence that La Brillantais--Marion managed to launch his frigates in record time while his competitors, all traders and shipowners and with greater financial resources, were regularly forced to interrupt construction for lack of wood of sufficient quantity and quality.

The central role these men occupied tends to push into the background all those directly involved in the actual shipbuilding. Except where internal company archives or correspondence with the engineers supervising the work are available, it is very difficult to get an idea of what the work itself involved. St. Malo's involvement in the American Revolution is a fortunate exception, since the letters and reports of the Naval Commissioner Guinot and the engineer Chevillard, as well as some of the exchanges with the entrepreneurs, enable us to track the day-to-day construction of seven frigates between 1777 and 1778. These documents identify the master carpenters employed on the project, and especially describe their role and their capacity for initiative and inventiveness, under the joint orders of the contractor and the official engineer. In the letters they sent to the Secretary of State for the Navy, Guinot and Chevillard describe their relationship with these men and also provide valuable details on how they worked and how they understood naval architecture. Jean-Baptiste Lemarchand seemed to be the most skillful master carpenter, with Guinot stating that «Master Chevillard has appointed one

[36] DECENCIÈRE, 2014.
[37] CAILLETON, 1999: 105-136.
[38] AN — *Marine*, B3/689 fl. 124, 23 février 1778.

Le Marchand as master shipwright on this contract, on the strength of his knowledge, his talents, his equanimity, his intelligence, his taste for exactitude and his skill in managing his workers»[39]. The identification of this second level of participants, those who are more closely involved in the actual construction, and an analysis of correspondence with the naval authorities, especially the engineers, is fundamental for getting an idea of the technical discussions that must have gone on between civilian and military shipbuilders and that optimized different phases of shipbuilding for the Navy. On this point, we must abandon the idea of insurmountable technical differences between the arsenals and the civilian shipyards. Patrice Decencière, in his study of the plans produced by Denys, argues that this assumption is not valid, as does Bruno Cailleton, who studied civilian shipyards in Nantes in the eighteenth century[40]. The rapid integration of scientific knowledge about shipbuilding by many «civilian»[41] participants and the implementation of solutions for optimizing construction techniques were no doubt of considerable benefit to the Navy when subcontracting. At St. Malo, Chevillard was fascinated by the procedure for launching frigates at low tide and informed the authorities at Versailles of his discussions concerning the use of certain species of wood in the construction, for which he seems to have recommended the practice followed in St. Malo.

Nevertheless, whatever transfers of technical knowledge may have resulted from these collaborative ventures and the acknowledged capabilities of the civilian shipyards, the Navy invested a great deal in supervising the shipbuilding projects it subcontracted during the eighteenth century, as can be seen in its instructions on the employment of the workforce and the visits of its engineers. As in the seventeenth century, the entrepreneurs were free to choose their workers but they were overseen by specialists drawn from Navy's own personnel and seconded to supervise the work. For the construction of two flutes in the port of Bayonne, the contract signed by Casenove stipulates that he:

> *will be given four good carpenters, and two piercers accustomed to the port of Rochefort, particularly to oversee the work and the binding of these flutes, under the supervision of the officers appointed for this purpose, who will ensure that the said plans and specifications are followed faithfully in every respect and will verify that the content of the said inventory is completed, when the said flutes are delivered to the King ready to take to sea*[42].

[39] AN — B3/679 fl. 25, 26 avril 1777.
[40] DECENCIÈRE, 2014; CAILLETON, 1999.
[41] As an example, at the beginning of the 1780s, Denys calculated the displacement of his vessels using a formula suggested five years previously by CLAIRBOIS, 1776.
[42] SHD — *Marine*, Rochefort, 2 G[1] 10, 10 août 1782.

These men assured optimal supervision of the workers recruited in Bayonne by Cazenove, who were generally unaccustomed to the requirements of military vessel construction, especially as the engineer-builders were not necessarily always on the spot once the plans and the specifications had been handed over to the contractor. The inspection procedures became very restrictive for the contractors but also for the Navy itself, which insisted, for example, on three verifications of the pieces shaped for the hulls. The raw timber had to be inspected before a second inspection following the initial shaping, and finally «after positioning each main part»[43]. When the shipyard was not located in an arsenal but in some distant port, there were not enough engineer-builders to carry out all these inspections, which then fell to the carpenters, drilling specialists, and caulkers seconded for the purpose. Moreover, they were empowered to make inspections at any time, as shown by one contract which specifies that:

> *The maintained master carpenters and the company foremen employed by the day shall follow, under the supervision of the officers appointed for this purpose, the work of the entrepreneurs as regards the accuracy of the work and its robustness, and to ensure no damage is done to the materials used, whose use they shall report to the said officers*[44].

Certain phases of construction were extremely delicate, which increased the responsibility of each of these men accordingly. Where the inspection of the planking was concerned, the caulkers could slow down or suspend the project under way:

> *If, when the caulkers are testing the keel to identify any defects in the planking of the submerged part, they should find parts that need to be repaired, partially or entirely* […] *the contractor shall be obliged to perform this work at his own expense and without any right of redress, since he could always have avoided this expense by inspecting the planking more carefully before installing it*[45].

It is not clear how the master carpenters reported their work to the officers and it is assumed that there are no other documents that explain this technical relationship, which would have been extremely valuable in clarifying just how the subcontracting work proceeded. The registers about those workers, the career records, or the documents by the engineer-builders giving their opinions of the workers would have provided ways of understanding the actual work of these men, whose importance should

[43] SHD — *Marine*, Rochefort, 2 G[1] 12, *Soumission pour la main d'œuvre de la première partie de la construction d'une frégate portant 26 canons de 12 livres de balle à exécuter au port de Lorient*, 29 septembre 1785.
[44] SHD — *Marine*, Rochefort, *Adjudication de la main d'œuvre de tous les ouvrages de charpente…*, 10 février 1787.
[45] SHD — *Marine*, Rochefort, 2 G[1] 11, *Construction à l'entreprise pour la main d'œuvre de charpentage et de clouage d'une frégate portant du 18*, Brest, 27 octobre 1784.

not be underestimated. In the final analysis, they had much of the responsibility for the proper management of the project, along with the engineers designing the ship, during the construction and especially at the end of the contract, when a visit was systematically organized to judge whether the construction was «good, accurate & of solid execution»[46].

The desire to have a pool of experienced workmen both in the arsenals and in the secondary ports is reflected in the subcontracting documents signed from the 1770s onwards, by which the contractor was obliged to recruit one apprentice for every ten carpenters employed on the project. In addition, for the contracts carried out inside the arsenal, Saint-Aignan, the Commander of the Navy in Toulon during the American Revolution, states that «the contractor should also be required to employ from the Arsenal the good workers, average workers and beginners, which form a source of supply deserving of the utmost care and constantly providing the State with excellent workmen of all kinds»[47]. This condition, found repeatedly in contracts, demonstrated a strategic ulterior motive on the part of the Navy, which hoped to extend the principle of subcontracting to all the ports of the kingdom. The apprentices had the opportunity to work alongside their elders but also with the men seconded from the arsenals who had been brought in to supervise the execution of the work. In this way, the Navy organized the transmission of knowledge at the least cost in preparation for the future.

After this overview, it is clear that the subcontracting of warships in the seventeenth and eighteenth centuries was significant and should be included in any general study on French naval mobilization. While the recourse to subcontracting fitted well with the different imperatives of the period, it can also be said that it organized the technical and business relationship between the Navy and its partners. Before any attempt to analyze this phenomenon, it is essential to historicize this relationship, not only to understand the objects constructed and how the tasks were distributed between the civilian and military participants, but also to identify how know-how might have been exchanged. Whether for hulls launched unfinished, complete ships, or their parts (rigging, interiors, etc.), the administration's choice to build such and such an item was made for a reason. This also provides important information about its ability to respond to the war effort and about the capacity of civilian shipyards to undertake this work. Nevertheless, as we have seen with Toulon during the War of the League of Augsburg and with the circulation of workers from the arsenals in the civilian ports in Bayonne during the 1780s, the borders between public and private shipyards were highly permeable. In addition, it is necessary to compare the objects produced by subcontracting on the European scale. At this stage of research, the low level of interest in this issue among scholars outside France

[46] SHD — *Marine*, Rochefort, 2 G[1] 14, *Ouvrages à exécuter pour monter* […] *les pièces de quille, étraves, étambot, membrures et lisses du vaisseaux l'Aquilon de 74 canons*, 10 août 1787.

[47] AN — *Marine*, B3/632 fls. 5-6, M. de Saint-Aignan, le commandant de la Marine de Toulon, à M. de Sartine, le secrétaire d'État de la Marine, 7 janvier 1776.

is still a handicap. Little distinction is made between complete ships and parts thereof, to the extent that it is difficult to assess the degree of delegating and to make comparisons. The exceptional preservation of the archives of the British Navy Board, which was responsible for managing construction contracts, should make it possible to answer this question as regards the Royal Navy. In France, an approach to subcontracting via construction contracts alone has limitations that need to be overcome through the use of the Navy's archives of day-to-day events, consisting of letters between intendants, commanders in the ports, engineers, and central offices. If we extend the study to the French Revolution and the Empire, a few valuable collections from private companies should help us approach subcontracting from the point of view of civilian participants, which is much more difficult concerning the Ancien Régime where this type of archive no longer exists.

Finally, while the technical issues are central, a history of subcontracting, whether military or not, must not neglect the economic aspects. What is the financial advantage for a principal to subcontract all or part of an object that it previously manufactured on its own? This aspect has been deliberately set aside at this stage of investigation due to the lack of documentation. There are two difficulties inherent in studying this issue. First, we need to assess the production cost of building a ship in the arsenals and the cost of subcontracting, both in times of peace and of war. Second, we must analyze the productivity of the shipyards: during the American Revolution, the construction time in the State shipyards and in those of the civilian ports were substantially the same despite very different workforces. While the arsenals were able to mobilize brigades of perhaps a hundred carpenters for the construction of frigates, there were only about thirty per ship at St. Malo. In spite of the lacunae in the Navy's accounting records and the complete lack of any for the construction companies, it is still possible to study costs from the reports drawn up by the engineer-builders and administrators, at least from the second half of the eighteenth century.

PRIMARY SOURCES

Archives Départementales de Seine-Maritime
AD 76 — 2^{E} 70-190.
AD 83 — 3^{E} 5/124, fls. 590-594.
AD 83 — 3^{E} 5/119.

Archives Nationales
AN — *Colonies*, F^{3} 158.
AN — *Minutier central des notaires parisiens*, XCVI-14.
AN — *Minutier central des notaires parisiens*, LXXXVI-309, fls. 1-6R.
AN — *Marine*, B3/632, fls. 5-6.
AN — *Marine*, B3/689, fl. 124.
AN — B3/679, fl. 25.

Bibliothèque Nationale de France

BNF — Ms. Fr. 6408, fl. 504.

BNF — Ms. Fr. 6408, fl. 503.

BNF — *Mélanges Colbert 176*, fl. 376.

BNF — *Mélanges Colbert 143*, fl. 9.

Service Historique de la Défense

SHD — *Marine*, Rochefort, *Adjudication de la main d'oeuvre de tous les ouvrages de charpente*…, 10 février 1787.

SHD — *Marine*, Rochefort, 2G[1] 11.

SHD — *Marine*, Rochefort, 2G[1] 10.

SHD — *Marine*, Rochefort, 2G[1] 12.

SHD — *Marine*, Rochefort, 2G[1] 14.

EDITED SOURCES

ACERRA, Martine (1992) — *Les arsenaux français de marine à la fin du XVIII[e] siècle*. In *Fleurieu et la Marine de son temps, Actes du Colloque de la CFHM, juin 1989*. Paris: Economica, p. 179-189.

_____ (1993) — *Rochefort et la construction navale française, 1661-1815*. Paris: Librairie de l'Inde, 4 vols.

BARNES, G. R.; OWEN, J. H., *ed*. (1932-1938) — *The private papers of John, Fourth Earl of Sandwich, 1771--1782*. London: Navy Records Society, 4 vols.

BELLAMY, Martin (1997) — *Danish naval administration and shipbuilding in the reign of Christian IV (1596-1648)*. Glasgow: University of Glasgow. Phd dissertation.

_____ (2006) — *Christian IV and His Navy: A Political and Administrative History of the Danish Navy 1596--1648*. Leyde: Brill.

BOWEN, Huw V.; GONZÁLEZ ENCISO, Augustín, *eds*. (2006) — *Mobilising Resources for War: Britain and Spain at Work During the Early Modern Period*. Pamplona: EUNSA.

CAILLETON, Bruno (1999) — *La construction navale civile dans l'amirauté de Nantes au XVIII[e] siècle*. Nantes: Éditions Hérault.

CASTAGNOS, Pierre (1989) — *Richelieu face à la mer*. Rennes: Éditions Ouest-France.

CLAIRBLOIS, Vial (1776) — *Essai géométrique et pratique sur l'architecture navale*. Paris: A Brest. Available at <https://gallica.bnf.fr/ark:/12148/bpt6k34138720.image>.

CONWAY, Stephen; TORRES-SÁNCHEZ, Rafael, *eds*. (2011) — *The spending of states. Military expenditure during the long eighteenth century: patterns, organisation and consequences, 1650-1815*. Saarbrücken: VDM Verlag.

DECENCIÈRE, Patrice (2014) — *L'élaboration des plans de navire par le construction marchand Daniel Denys à la fin de l'Ancien Régime*. «Neptunia», n.º 275, p. 28-34.

GLETE, Jan (1993) — *Navies and Nations. Warships, Navies and State Building in Europe and America, 1500--1860*. Stockholm: Almqvist & Wiksell International, 2 vols.

_____ (2010) — *Swedish Naval Administration, 1521-1721. Resource Flows and Organisational Capabilities*. Leyde: Brill.

GOODMAN, David (1997) — *Spanish naval power, 1589-1665: Reconstruction and Defeat*. Cambridge: Cambridge University Press.

KNIGHT, R. J. B. (1974) — *The performance of the Royal Dockyards in England during the American War of Independence*. In *Proceedings of the 14th Conference of the International Commission for Maritime History*. London, p. 139-144.

_____ (1998) — *Construction et entretien de la flotte anglaise durant les guerres anglo-françaises (1688-1815)*. In ACERRA, Martine; MERINO, Jose; MEYER, Jean, *eds.* — *Les marines de guerre européennes*. Paris: PUPS, p. 47-62.

LAVERY, Brian (1993-1994) — *The Ships of the line*. London: Conway Maritime Press, 2 vols.

LLINARES, Sylviane; HRODEJ, Philippe (2010) — *La mer et la guerre à l'époque moderne.* «Revue d'Histoire Maritime. La recherche internationale en histoire maritime: essai d'évaluation», n.º 10-11, p. 317-356.

MALOUET, Pierre-Victor (1790) — *Rapport sur la dépenses et le régime économique de la Marine*. Paris: Baudoin.

MORRISS, Roger (1983) — *The Royal Dockyards during the Revolutionary and Napoleonic Wars*. Leicester: Leicester University Press.

ORDONNANCE de Louis XIV pour les armées navales et arcenaux de marine. Paris: Estienne Michallet, 1689.

PLOUVIEZ, David (2013) — *Les dynamiques portuaires militaires dans le golfe de Gascogne du XVII^e siècle au Premier Empire*. In MARNOT, Brunot; FERNANDEZ, Alexandre, *ed.* — *Les ports du golfe de Gascogne. De Concarneau à La Corogne (XV^e-XXI^e siècle)*. Paris, PUPS, p. 47-60.

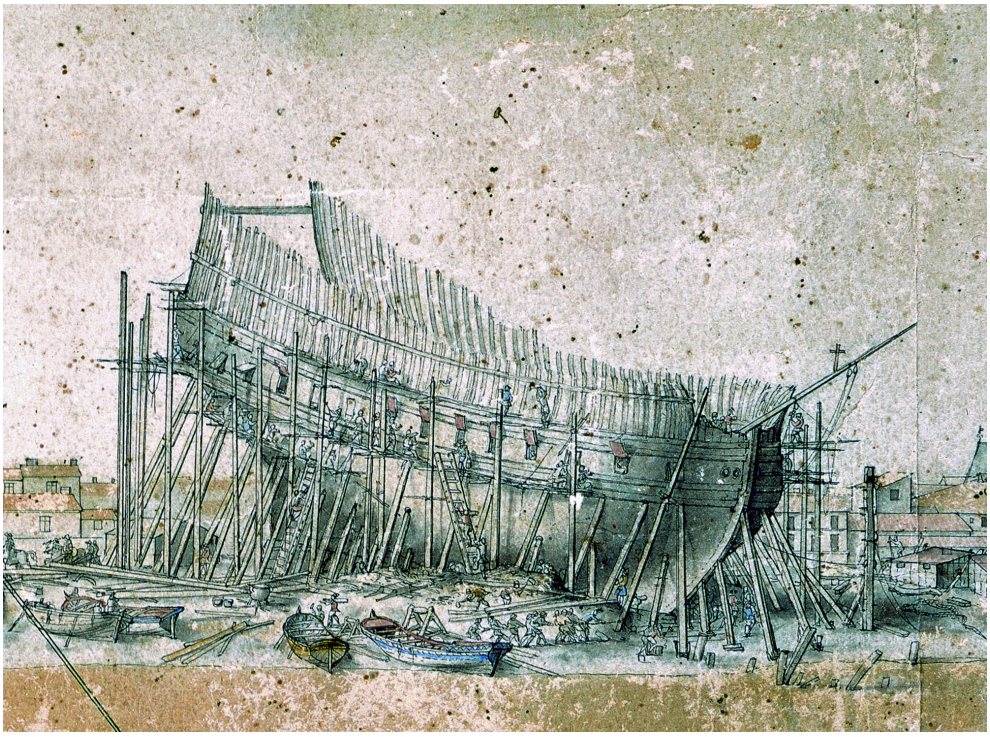
_____ (2014) — *La Marine française et ses réseaux économiques au XVIII^e siècle*. Paris: Les Indes savantes.

_____ (2016) — *Introduction*. «Revue d'Histoire Maritime. L'économie de la guerre navale», n.º 22-23, p. 17-26.

THÉVENARD, Antoine (1790) — *Mémoires relatifs à la Marine*. Paris: Laurens.

TORRES-SÁNCHEZ, Rafael (2007) — *The Triumph of the Fiscal Military State in the Eighteenth Century. War and Mercantilism*. In TORRES-SÁNCHEZ, Rafael, *ed.* — *War, Sate and Development Fiscal--Military States in the Eighteenth Century*. Pamplona: Ediciones Universidad de Navarra, p. 13-44.

WEBB, Paul (1988) — *Construction, repair and maintenance in the battle fleet of the Royal Navy, 1793-1815*. In BLACK, Jérémy; WOODFINE, Philip — *The British Navy and the use of Naval Power in the Eighteenth Century*. Leicester: Leicester University Press, p. 207-219.



Appendix 1. Detail of a vessel under construction. A view of the shipyard of Rochefort, showing both vessels and galleys, Nicolas Berquin, 1690. Drawing in pen and black ink, brown and grey wash, watercolor highlights, marouflaged paper on canvas. Source: Musée d'Art et d'Histoire, Rochefort