TECHNOLOGICAL DEVELOPMENTS IN THE OTTOMAN NAVY DURING THE REIGN OF SELIM III

by

Tuncay Zorlu

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Title: TECHNOLOGICAL DEVELOPMENTS IN THE OTTOMAN NAVY UNDER THE REIGN OF SELIM III

The reign of Selim III witnessed technological novelties in the Ottoman navy. Thanks to the access to ample sources for naval construction and wisely navigated channels of information, the systematic construction of new types of sailing warships was adopted in this period.

One of the striking breakthroughs of the period was the adoption of copper sheathing for the hulls and bottoms of Ottoman naval ships, from 1207/1792-93 onwards. The construction of the first dry-dock in the Golden Horn was another important development in the period. Furthermore, at the beginning of the nineteenth century the first negotiations with Great Britain regarding the purchase of a steam engine, which the Ottoman authorities intended to use in emptying the dry-dock were initiated.

Among other significant technological developments were the construction of an anchor house (*lengerhâne*); the building of a measuring house (*endâzehâne*), the adoption of new mast machines, fire conduits, a new ship launching method; the beginning of the keeping of navigational log books; and the introduction of a new kitchen and provisioning system.

While, foreign missions, especially French, Swedish and British ones, played important roles in training Ottoman shipbuilders and contributed to the modernisation of the Ottoman naval technology with services they rendered in the shipbuilding sector and naval warfare, they constituted the first instances of technological dependence of the Ottoman State on Europe in the long run.

Atatürk İlkeleri ve İnkılap Tarihi Enstitüsü'de doktora derecesi için Tuncay Zorlu

tarafından Kasım 2004'te teslim edilen tezin kısa özeti

Başlık: III. SELİM DÖNEMİNDE OSMANLI DONANMASINDAKİ

TEKNOLOJİK GELİŞMELER

III. Selim dönemi Osmanlı donanması açısından birçok yeniliğe şahit oldu. Gemi inşası için gerekli zengin hammadde kaynakları ve haber alma kanalları sayesinde, yeni tarz yelkenli gemiler benimsenmeye başlandı.

Dönemin en önemli teknolojik atılımlarının başında, 1207/1792-93 yılından başlamak üzere, su zararlılarına karşı korumak ve daha süratle yol almalarını sağlamak amacıyla, gemilerin karinalarının bakırla kaplanması işlemi gelmektedir. Haliç'te İsveçli mühendislerce inşa edilen ilk kuru havuz da önemli bir teknolojik katkıdır. Ayrıca ondokuzuncu yüzyılın hemen başlarında, savaş gemilerinin yanaştıkları bu kuru havuzun sularını tahliye için bir buhar makinesinin satın alımı konusunda ilk defa İngilizlerle müzakerelere başlanmıştır.

Diğer önemli gelişmeler arasında, gemi demirlerinin yapıldığı lengerhâne ve gemi plan-projelerinin çizildiği endâzehâne atölyelerinin inşası, yeni gemi direği monte makinelerinin ve ateş tulmbalarının ihdası, yeni gemi indirme metodunun benimsenmesi, ilk defa gemi jurnali ya da seyir defteri tutulmaya başlanması, gemilerde yeni bir mutfak ve iaşe sisteminin kurulması sayılabilir.

Her ne kadar Fransız, İsveç ve İngiliz mühendisler ve askerler, Osmanlı gemi ve havuz yapımcılarının yetişmesinde ve yeni savaş taktiklerinin tanıtılmasında önemli roller oynadıysalar da, uzun vadede Osmanlı Devleti'ni teknolojik bağımlılığa götüren sürecin de habercileri konumundaydılar.

CURRICULUM VITA

NAME: Tuncay Zorlu
PLACE OF BIRTH: Erzincan, Turkey
DATE OF BIRTH: 22 April 1971

GRADUATE AND UNDERGRADUATE SCHOOLS ATTENDED:

Boğaziçi University (1999-2004)
İstanbul University (1995-1998)
Boğaziçi University (1989-1994)

DEGREES AWARDED:

Doctor of Philosophy, the Atatürk Institute for Modern Turkish History,
2004, Boğaziçi University.
Master of Arts, Department of History of Science,
1998, İstanbul University
Bachelor of Arts, Department of History,
1994, Boğaziçi University.

AREAS OF SPECIAL INTEREST:

History of Ottoman science and technology
History of Ottoman naval technology
History of Ottoman medicine and medical institutions
Ottoman palaeography
Ottoman language and literature

PROFESSIONAL EXPERIENCE:

Instructor of History, Fazilet Men's College, İstanbul, 1994-1995.
Researcher in Istanbul Archaeology Museums Library (as a part of a project organized by the Department of History of Science, Istanbul University, for the classification of the books in the Ottoman language regarding science and technology in the libraries in Turkey), 6 months, 1995.

GRANTS:

Unified Doctoral Scholarship for research in the UK.

PUBLICATIONS:

Zorlu, Tuncay. "Süleymaniye Tıp Medresesi." Master's Thesis, Istanbul University, Bilim Tarihi Bölümü (History of Science Department), 1998.

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Finally, I would like to acknowledge warmly the spiritual, material and intellectual support of my wife, family and friends, specifically Mustafa Üstün, Yusuf Tuna and Hasan Birkan: without them, this work would have never been produced. And I would like to apologise in advance should anyone have been omitted inadvertently.

To my son, Berâ

TABLE OF CONTENTS

BOA. Cevdet-Bahriye, no. 5136
BOA. Cevdet-Bahriye, no. 5850
BOA. Cevdet-Bahriye, no. 6336
BOA. Cevdet-Bahriye, no. 6381
BOA. Cevdet-Bahriye, no. 7163
BOA. Cevdet-Bahriye, no. 7274
BOA. Cevdet-Bahriye, no. 7472
BOA. Cevdet-Bahriye, no. 7753
BOA. Cevdet-Bahriye, no. 8085
BOA. Cevdet-Bahriye, no. 8709
BOA. Cevdet-Bahriye, no. 9297
BOA. Cevdet-Bahriye, no. 9362
BOA. Cevdet-Bahriye, no. 9418
BOA. Cevdet-Bahriye, no. 9981
BOA. Cevdet-Bahriye, no. 10123
BOA. Cevdet-Bahriye, no. 10252
BOA. Cevdet-Bahriye, no. 10895
BOA. Cevdet-Bahriye, no. 11461
BOA. Cevdet-Bahriye, no. 12383
BOA. Hatt-ı Hümâyûn, no. 3446-e
BOA. Hatt-ı Hümâyûn, no. 6086
BOA. Hatt-ı Hümâyûn, no. 8024
BOA. Hatt-ı Hümâyûn, no. 8083
BOA. Hatt-ı Hümâyûn, no. 8168
BOA. Hatt-ı Hümâyûn, no. 8537
BOA. Hatt-ı Hümâyûn, no. 8686
BOA. Hatt-ı Hümâyûn, no. 9080
BOA. Hatt-ı Hümâyûn, no. 9210
BOA. Hatt-ı Hümâyûn, no. 9644-A
BOA. Hatt-ı Hümâyûn, no. 9646
BOA. Hatt-ı Hümâyûn, no. 9658
BOA. Hatt-ı Hümâyûn, no. 9792
BOA. Hatt-ı Hümâyûn, no. 10011
BOA. Hatt-ı Hümâyûn, no. 10560
BOA. Hatt-ı Hümâyûn, no. 11264
BOA. Hatt-ı Hümâyûn, no. 11282
BOA. Hatt-ı Hümâyûn, no. 14011
BOA. Hatt-ı Hümâyûn, no. 14076
BOA. Hatt-ı Hümâyûn, no. 14141
BOA. Hatt-ı Hümâyûn, no.14486
BOA. Hatt-ı Hümâyûn, no. 55529
BOA. Hatt-ı Hümâyûn, no. 56625
BOA. Hatt-ı Hümâyûn, no. 57599
BOA. Kâmil Kepeci, no. 5734
BOA. D. BŞM-TRE, no. 15328
BOA. Cevdet-Darphâne, no. 241
BOA. Cevdet-Darphâne, no. 2921
BOA. Cevdet-Darphâne, no. 59.
Public Record Office, Foreign Office, no. 78/46 (11 December 1805)

Tables

PREFACE

The notion of "technology" might lead people to seek a kind of anachronism or a retrospective approach when it is linked with that of an historical entity such as "empire." It may also cause academics who are unfamiliar with the subject to have a tendency to perceive it, within the boundaries of the notion "the idol of origins," as an attempt to search for new idols in the trajectory of national history in order to legitimize the present via the glorious past.

The technological assessment and analysis of the Ottoman Empire, which is probably one of the most neglected pursuits, no doubt, will pave considerably the way for understanding the less-known aspects of the Ottoman Empire. It will also be conducive directly or indirectly to the socio-economic, cultural and political studies presently in the limelight. This work takes a step towards prospective studies to draw attention to one of the most important gaps of the history in Ottoman technology: naval technology, which has been taken up so far only as an incidental field within the broad spectrum of economic history, or as an extension of heroic narrations or tales of pirates and glorious captains. It also aims to show the shift from classical ships and shipbuilding technology to the relatively more modern ones.

Special focus will be given to Selim III's efforts (1789-1804) to create a new Ottoman navy as an extension and climax of the modernisation attempts in the aftermath of the Çeşme Incident (1770), with reference to the new ship-building methods inspired by both native dynamics and foreign drives (especially French, Swedish and British). The foreign engineers, technicians, soldiers and men of other classes who contributed to the naval modernization of the Ottoman state will also be examined as far as the evidence and data available allow. This work, considering the rising importance of interdisciplinary studies in history throughout the world, also aims to provide historians studying the history of Ottoman modernization with new types of data, with its technical terminology and *sui generis* jargon.

The literature dedicated to the eighteenth century-naval technology of the Ottoman Empire, unfortunately, is far from satisfactory in terms of quantity and quality. Several factors may be credited for this situation. The first may be found in Turkish historians' unwillingness to or lack of self-reliance, on the pretext of being incompetent and unfamiliar with the field, in delving into the so called "technical issues," which they feel should be examined by engineers or those who have backgrounds in such quantitative sciences as mathematics, physics, architecture, and civil engineering. Although this excuse seems tolerable to some extent, it appears to be mostly an academic pretext when compared with the work undertaken by their European colleagues dealing profoundly with technical aspects of history, in other words, the history of technology. This problem seems to stem mostly from the lack discussion of the discipline of the history of technology both in in the national educational program and in the curricula of Turkish universities, excluding a few.

The second factor, which is directly bound up with the first one, is the traditional belief that the humanities and quantitative sciences are two completely different, intransigent and impervious areas of study never interfering in each other's well protected domains. Thanks to the interdisciplinary approach put forward by the Annales School in different time periods and by various scholars, an academic current inclining to create mutual interaction between two or more separate traditional academic disciplines was attained in academic circles throughout the world. For the last two decades, this influence has been felt among Turkish intelligentsia as well. History and mathematics, history and statistics, history and psychology, history and culture, history and development/underdevelopment studies are just a few examples of the disciplines incorporated. In spite of the increasing number of interdisciplinary academic studies, whose pace is promising, it is difficult to say they fulfil the present need.

The third factor is related to the difficulties in accessing and the assessment of primary sources and archival documents. Ottoman archival documents, especially those in the Ottoman Prime Ministry Archives, are rich in terms of material and variety with respect to naval technology. However, their assessment and deciphering remain one of the most important obstacles before naval technology students, stemming more from its peculiar jargon and terminology than from the Ottoman language itself. Those with a good command of Ottoman Turkish, which is a vital qualification *per se*, often suffer from difficulties in understanding and analysing the texts and documents in the face of technical words and terms of foreign origin, written with different spellings even on the same page. The same problem appears regarding the spelling of the names of the foreign engineers and officers employed, for instance, in the service of the Imperial Naval Arsenal. Actually terminological difficulties are not peculiar to Turkish documents, but are a common problem of academic circles throughout the world. The publication of technical maritime dictionaries and illustrated books seems to have gained momentum in order to solve the problem. To exemplify, *Lingua Franca* is an irreplaceable guidebook and a dictionary in serving students of Ottoman maritime power as well as those of the entire Levant.

Apart from archival documents, manuscripts and chronicles are also important sources for providing insight into the technological aspects of the Ottoman Empire. Unfortunately, this area, which is likely to provide the greatest contribution, remains far less researched in comparison with others. Considering both archival and manuscript sources, one of the most important as well as the most ignored factors is the lack or insufficiency of drawings and charts illustrating the mechanical tools, types of ships, cross-sections and plans reflecting the technology of the time in which they were created. Finally, the insufficiency of guide books, dictionaries of historical technical terms, bibliographical and biographic books as well as scientific literature sources are obstacles in front of the students of the history of technology, and especially naval technology.

Having outlined the obstacles before the prospective student of the history of naval technology, next is the assessment of the available sources, starting with archival documents. Archival documents are important since they offer primary information about the machinery of naval technology in the eighteenth century. Therefore, the Ottoman Prime Ministry Archives (*Başbakanlık Osmanlı Arşivleri*) is the first place to visit for academics studying not only naval technology, but every other area of the Ottoman Empire as well. The naval documents relating to the period preceding the abolition of the post of the Grand Admiral *(Kapudan-ı Derya)* are kept in the Ottoman Prime Ministry Archives while those from 1867 up to the Republican period are kept in the Archives in the Naval Museum in Beşiktaş. A glance at the catalogues within the body of the Ottoman Prime Ministry Archives, the *Cevdet-Bahriye Tasnifi* (Cevdet's Catalogue of the Navy), covering 1606-1807, is a source dedicated solely to naval matters of all kinds. In addition to it, certain parts of the *Maliyeden Müdevver Defterleri* (Fiscal Registers) and the *Tersâne Emâneti*

(Dockyard Aministration) covering the dates 1529-1849 in the *Kâmil Kepeci Tasnifi* (Kâmil Kepeci's Catalogue) are very important in such matters as the raw materials used in naval works, their costs, and accounts. Three sections, the *Kalyonlar Kâtibi* (Naval Scribe), covering 1763-1828; the *Tersâne Zindanı* (the Prison at the Naval Arsenal), covering 1648-1802 and *Tersâne Emini* (the Director of the Naval Arsenal), covering the years 1571-1837, within *Bâb-ı Defterî-Baş Muhasebe Kalemi* (the Register of the Chief of the Accountanting Department), generally focus on the economic, fiscal and administrative aspects of the navy.

The *Ingiliz Sefine Defterleri* (Registers of British Ships) in the *Düvel-i Ecnebiye Defterleri* (Registers of Foreign Countries) is a catalogue of the commercial, legal and diplomatic relations between the Porte and England. The *Dîvân-ı Hümayûn İzn-i Sefîne Kalemi* (an administrative unit in charge of the administration of the passages of foreign ships through the straits), covering 1616-1823, within the *Bâb-ı Âsâfî Dîvân-ı Hümâyûn Kalemleri Katalogları* (Catalogues of the Imperial Council), dwells upon such issues as the passage of the foreign merchant ships through the straits, and their legal and diplomatic dimensions.

In addition to the above-mentioned catalogues, which are directly related to naval and maritime commercial activities, are some other catalogues, such as *Cevdet-Askeriye* (Cevdet's Catalogue of Military Affairs), *Cevdet-Darphane* (Cevdet's Catalogue of the Imperial Mint), *Cevdet-Hariciye* (Cevdet's Catalogue of External Affairs), *Cevdet-Maarif* (Cevdet's Catalogue of Educational Affairs), *Cevdet-Maliye* (Cevdet's Catalogue of Fiscal Issues), and *Hatt-ı Hümayun Tasnifi* (Catalogue of Imperial Edicts), all of which contain scattered, but important issues with respect to naval affairs. To sum up, these catalogues are rich in information on almost every aspects of the naval technology, administration and machinery of the Imperial Naval

Arsenal, ship building expenses, raw materials, foreign officials, engineers employed in the Naval Arsenal and so on. The *Başbakanlık Osmanlı Arşivi Katalogları Rehberi* (A Guidebook to The Ottoman Prime Ministral Archives), published in Ankara in 1995 by the Başbakanlık Devlet Arşivleri Genel Müdürlüğü (the General Directory of the Ottoman Prime Ministral Archives), is the first to undertake a thorough study of archival documents for newcomers and experts alike.

As for the primary sources constituting a sound background for students of eighteenth century naval technology, three important books of the sixteenth century, Pîrî Reis' famous *Kitâb-ı Bahriyye* (the Book of the Sea), and Seydi and Ali Reis' *Muhit* (the Ocean), and *Mirâtu'l Memâlik* (the Mirror of Countries) focus on oceonography and the art of navigation. *Tuhfetu'l Kibâr fî Esfâri'l Bihâr* (the Present of Noble Men: The Story of the Campaigns on the Sea) by Kâtip Çelebi (known as Haji Khalife to Europeans), covers the Ottoman navy and naval wars from the conquest of Constantinople to the author's own time, the seventeenth century. It is an invaluable authority on naval wars, types of vessels, their construction, sources and maintenance, chronological lists of Ottoman admirals, geographical conditions, especially of the Balkan Peninsula and the Black Sea, dock yards, foreign navies, naval terminology, and so on.

De Truguet's *Traité de Manoeuvre et de Tactique Pratique* (Treatise of Manouever and Practical Tactics), which was translated into Ottoman Turkish as *Usûlü'l-ma`arif fî vech-i Tasfif-i Sefâyin-i Donanma ve Fenn-i Tedbîr-i Harekâtuha,* was published in 1787 by the press founded by the French ambassador Choiseul-Gouffier within the French Embassy. The book focuses on the maneuvers and tactics of the ships during naval wars, and the skilled use and the administration of sails, anchors, cannons and other tools and equipment of war. The striking features of the book is that it was wrtitten by a French instructor who taught several courses in the Naval School and that it includes thirteen plates, including drawings of ships in various maneuvers.

As for secondary sources on eighteenth century-Ottoman naval technology, the most recent work dedicated to the Ottoman oared and sailing navy is Ahmet Güleryüz's big-size book, *Kadırgadan Kalyona Osmanlıda Yelken ve Mikyâs-ı Sefâin* (Ottoman Sailing Ships from Galleys to Galleons and Particulars of Ships and Their Equipment). The book consists of two main sections first of which contains colored illustrations of oared and sailed ships used in navy and commerce as well as the general account of the Ottoman ships from the earliest periods to the end of the nineteenth century. The second section, *Mikyâs-ı Sefâin* (measurements of the ships) that is more important in originality, since it was a translation by Diyarbekirli Abdülhamid into Ottoman Turkish, most probably in the beginning of the nineteenth century. The second section includes original tables showing the sizes, equipment, rigging, and types of ships in detail.

Sinan Yakay's well-documented book *Kdz. Ereğli'de Tersaneciliğin Tarihi ve Tersaneci Ağalar*, is another recent work dealing mainly with the shipbuilding activities and *Ayans* (local notables) worked as naval ship constructors in Ereğli between 1800 and 1843.

Ismail Hakkı Uzunçarşılı's *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı* (Ottoman Central Government and Naval Organisation) is a widely used general reference book primarily dealing with the Ottoman navy as an administrative and institutional unit. Afif Büyüktuğrul's four-volume work, *Osmanlı Deniz Harp Tarihi ve Cumhuriyet Donanması* (History of Ottoman Naval Wars and the Navy of the Republic); Hayati Tezel's *Anadolu Türkleri'nin Deniz Tarihi* (the Naval Histroy of

Anatolian Turks); H. Şehsuvaroğlu's *Deniz Tarihimize Ait Makaleler* (Articles on Our Maritime History), despite being general semi-academic narratives of Turkish naval history, cannot be skipped as academic studies since they offer detailed chronological accounts of almost every subject of the Ottoman navy from the very beginning to the end of the Republican navy. Considering the use of archival evidence, Enver Ziya Karal's article, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar" (Documents of Ottoman Navy during the Reign of Selim III) and his two other books, *Selim III'ün Hatt-ı Hümayunları-Nizam-ı Cedit- 1789-1807* (Selim III's Imperial Edicts-New Order-1789-1807), and *Selim III'ün Hatt-ı Hümayunları* (Selim III's Imperial Edicts) are among the leading works for the naval technology student of the late eighteenth century.

Stanford Shaw's early article, "Selim III and the Ottoman Navy," the reviewed version of which later constituted one of the parts of his book, *Between Old and New: The Ottoman Empire under Selim III (1789-1807),* is another important source. Technological changes in the Ottoman navy in the eighteenth century are given within the general framework of the modernization movement of Selim III and mostly fed by rich foreign archival documents in the PRO in London, *Archives des Affaires Étrangères*, *Archives Nationales* in Paris, and the *Haus-Hof- und Staats-Archiv* in Vienna as well as the archives in Istanbul.

Mahmud Raif Efendi's *Tableau des nouveaux réglements de l'Empire Ottoman* (Tables of New Regulations in the Ottoman Empire), which was translated and edited by Arslan Terzioğlu and Hüsrev Hatemi as *Osmanlı İmparatorluğu'nda Yeni Nizamların Cedveli* (Tables of New Regulations in the Ottoman Empire), and its revised and criticized version, *Mahmud Râif Efendi ve Nizâm-ı Cedîd'e Dâir Eseri* (Mahmud Raif Efendi and His Work on the New Order), which was translated and edited by Kemal Beydilli-İlhan Şahin, constitutes a perfect source written by an eyewitness elucidating Selim III's reforms, including military and naval technology. Seyyid Mustafa's *İstanbul'da Askerlik Sanatı, Yeteneklerin ve Bilimlerin Durumu Üzerine Risale* (A Treatise on the Art of War and the State of Skills and Sciences in Istanbul) is another important monograph dealing with the military and naval technology written by another eyewitness.

The first academic book, and probably the first Ph.D. dissertation done in Turkey on the Ottoman navy, is Ali Ihsan Gencer's *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezareti'nin Kuruluşu (1789-1867)* (Modernisation Movements in the Ottoman Navy and the Establishment of the Ministry of Navy, 1789-1867). Despite the fact that it covers such areas as naval administration, ship building dockyards, and foreign officials, it is an institutional history rather than a history of naval technology. Nevertheless, it presents rich archival evidence and is an important reference book with an easy-to-follow style. Selim Sırrı Altıer's *Osmanlı Bahriyesinin Yelken Devri ve Türk Korsanları* (Period of Sailing Ships in the Ottoman Empire and Turkish Corsairs), Nejat Gülen's *Şanlı Bahriye (Türk Bahriyesinin İkiyüz Yıllık Tarihçesi 1777-1973)* (Glorious Navy: The Two Hundred Year Story of the Turkish Navy, 1777-1973) despite covering much important information, both institutional and technical, are non-academic works in terms of references, methodology and narration.

Another academic work providing great background to the eighteenth century is Colin Imber's article "The Navy of Süleyman the Magnificent," in *Archivum Ottomanicum*, which is a revised version of his Ph.D dissertation entitled *The Administration of the Ottoman Navy during the Reign of Suleyman I, 1520-1566.*

The article constitutes the most elaborate study done on almost every aspect of the navy of Suleyman I. It also handles the Ottoman archival sources skillfully.

Despite covering the seventeenth century rather than eighteenth, Idris Bostan's *Osmanlı Bahriye Teşkilatı: XVII. Yüzyılda Tersane-i Amire* (Ottoman Naval Administration: The Naval Arsenal in the Seventeenth Century) is a reliable and well-documented book previously prepared as a Ph.D. dissertation. This painstaking work presents a detailed picture of the Imperial Naval Arsenal in terms of its administration, types of ships, ship building materials, and personnel. Therefore, it is an indispensable source providing excellent background for students of eighteenth century naval technology. Regarding the same scope, Eser Tutel's "Tersâne-i Amire" in *Dünden Bugüne İstanbul Ansiklopedisi: From Past to Present*), is a general account of the Naval Arsenal rather than one covering a specific period. Like Bostan's other articles dedicated to naval technology, "Osmanlı Bahriyesinde Modernleşme Hareketleri I: Tersanede Büyük Havuz İnşası (1794-1800)" (Modernisation Movements in the Ottoman Navy I: The Construction of the Big Dry Dock, 1794-1800), takes up the construction of the dry-dock in the Imperial Naval Arsenal, which is much more an article on the history of naval technology when compared to his above-mentioned book. Bostan seems to have been inspired by the two pioneering articles "The Drydocks of the Istanbul Golden Horn Shipyard" and "An Eighteenth Century Dry Dock in Istanbul" that were presented at two different conferences, one in Istanbul, the other in Stockholm, by Ergün Toğrol and İ. H. Aksoy, both with engineering backgrounds.

As for context, Aksoy's *İstanbul'da Tarihi Yapılarda Uygulanan Temel Sistemleri* (Foundation Systems Applied to Historical Monuments in Istanbul), and "Osmanlı Döneminde Kullanılan Eski Su Boşaltma ve İnşaat Araçları" (Old Water

Evacuation and Construction Equipment Used in the Ottoman Period) focus on the construction of the dry-docks, their geographical properties, and the water evacuation systems used in the Ottoman dry-docks. Two important articles by Murat Çizakça deal mainly with the economic and industrial aspects of shipbuilding in the Ottoman realm and specifically those at the *Tersâne-i Âmire*, the Imperial Naval Arsenal. The first one, focusing on the sixteenth to seventeenth centuries and titled "Ottomans and the Mediterranean: An Analysis of the Ottoman Shipbuilding Industry as Reflected by the Arsenal Registers of Istanbul, 1529-1650" appears in *Le genti del mare Mediterraneo,* while the second one, entitled "The Ottoman Empire: Recent Research on Shipping and Shipbuilding in the Sixteenth to Nineteenth Centuries" appears in *Research in Maritime History* and covers a wider period, from the sixteenth to the nineteenth centuries. Yavuz Cezar's "Osmanlı Devleti'nin Mali Kurumlarından Tersâne-i Amire Hazinesi ve Defterdarlığı'nın 1805 Tarihli Kuruluş Yasası ve Eki" (Establishment Law of an Ottoman Fiscal Institution: the Treasury of the Naval Arsenal Dated 1805 and Its Supplement) in *Istanbul Universitesi İktisat Fakültesi Mecmuası* (Istanbul University Magazine of the Faculty of Economics) is a pioneering work assessing the establishment of the treasury of the naval arsenal and its administration.

Wolfgang Müller Wiener's *Die Häfen von Byzantion, Konstantinupolis, Istanbul* (Harbour in Byzantium, Constantinopol and Istanbul), which was translated into Turkish as *Bizans'tan Osmanlı'ya İstanbul Limanı* is one of the important work dedicated to the port of Istanbul. It covers many subjects pertaining to naval technology, the Imperial Naval Arsenal, ships, dockyards, foreign technicians, industrial development, and so on. The account of the port of Istanbul is given in chronological order, from Byzantium to the end of the Ottoman period, supported with visual material.

As for the *Tersâne-i Âmire*, Salih Özbaran's "Galata Tersanesinde Gemi Yapımcıları 1529-1530" (Shipbuilders at the Galata Dockyard 1529-1530), focusing the shipbuilders in the Galata Naval Arsenal, and Rhoads Murphey's "Tersane-i amire muhasebe icmallerinden seçilmiş Osmanlı gemi inşasına ait belgeler," (Documents of Ottoman Shipbuilding, Selected from the Accounting Registers of the Imperial Arsenal) constitute short but inspiring works in the way of assessing the *Maliyeden Müdevver Defters* (Fiscal Registers) in the Ottoman Archives with respect to naval technology. İbrahim Güler's, "XVIII. Yüzyılda Sinop'ta Gemi İnşa Teknolojisinin Altyapı, İstihkâm, İstihdâm, Üretim ve Pazarlama Sorunu" in *1. Türk Bilim ve Teknoloji Tarihi Kongresi Bildirileri (15-17 Kasım 2001)* (Proceedings of the the First Congress of Turkish Science and Technology, 15-17 November 2001), deserves mention since it draws attention to subjects such as the infrastructure, fortification, employment, production and marketing issues of shipbuilding sector in the eighteenth century at Sinop, a strategic shipbuilding site of great importance, in the north of Turkey. Ahmet Demir's *Türkiye'de Gemi Yapım Sanayiinde Kuruluş Yeri* (The Question of Construction Site in the Turkish Shipbuilding Industry) emphasizes the need for large investments in the shipbuilding sector and enumerates the economic, geographical and managerial factors in the construction of shipbuilding sites.

Günhan Danışman's article "Anadolu Enerji Teknolojileri Tarihçesi ve 18. Yüzyıl Sonunda Osmanlı Yönetiminin Sanayileşmede Kaçırdığı Fırsatın Yeniden Değerlendirilmesi" (The History of Anatolian Energy Technologies and the Reassessment of the Opportunity that the Ottoman Administartion Missed in

Industrialisation at the End of the Eighteenth Century), despite being indirectly related to naval technology, deserves attention with its original thesis and the results it presents. Danışman points out that in the second half of the eighteenth century, and specifically in the reign of Selim III, the Ottomans made wide use of water energy in a modern way and met almost all the prerequisites for industrialisation. He further enumerates the fertile settings, saying that the Ottomans had an infrastructure which was the precondition of energy technology; the Ottoman administrative cadres had the political determination for industrialisation; the Ottoman central administration was open to technology transfer and was in search of rapid modernisation in such areas as mining, transportation, and military technology; and there were individual entrepreneurs ready to make investment in secondary fields of industry such as weaving and machine parts. He concludes that the Ottomans failed to take advantage of this fertile atmosphere and spurned the opportunity of industrialisation, due mainly to the Ottoman bureaucracy's insistent preference for import-substitution and foreign loans. In addition to this factor, the Serbian and Wahhabite revolts as well as the rebellions started by such local administrators as Pasvantoglu, Tepedelenli, Tayyar Pasha and Cezzar Ahmed Pasha were influential, but of secondary importance.

As for foreign influence in naval modernisation in the eighteenth century, Celalettin Yavuz's *Osmanlı Bahriyesinde Yabancı Misyonlar-Çeşme Faciasından Birinci Dünya Harbine Kadar Osmanlı Bahriyesi'nde Çağdaşlaşma Gayretleri* (Foreign Missions in the Ottoman Navy:Modernisation Efforts in the Ottoman Navy from the Çeşme Disaster to the First World War), is the product of a study that started as a Ph. D. dissertation in 1993 and then was enlarged with German archival documents during the writer's tenure in Germany as a naval attaché. While the first part of the book is weak both in terms of documentation and originality, the second part covering the route towards WWI is relatively assertive since it was written using documents in the *Acta Politisches Achiv* and *Geheime Akten.*

İdris Bostan's article "Osmanlı Bahriyesi'nin Modernleşmesinde Yabancı Uzmanların Rolü (The Role of the Foreign Missions in the Modernisation of the Ottoman Navy)" is an important work with its rich documentation and account focusing mainly on the Swedish and French missions. Kemal Beydilli's articles, "Ignatius Mouradgea D'Ohsson (Muradcan Tosunyan)" and İlk Mühendislerimizden Seyyid Mustafa ve Nizâm-ı Cedîd'e Dair Risalesi" (Seyyid Mustafa, One of Our First Engineers, and His Treatise on the New Order), and his well-documented voluminious work, *Türk Bilim ve Matbaacılık Tarihinde Mühendishane, Mühendishane Matbaası ve Kütüphanesi 1776-1826* (The Engineering School, Its Press and Library in the History of Turkish Science and the Press) are also of great value with respect to the data and interpretations they contain.

Among other works referring to the exchange of naval officers and technicians is Fatma Müge Göçek's *East Encounters West: France and the Ottoman Empire in the Eighteenth Century*; Gündüz Akıncı's *Türk-Fransız Kültür İlişkileri (1701-1859) Başlangıç Dönemi* (Turkish-French Cultural Relations, 1701-1859, Initial Period); Ahmet Refik's "Onsekizinci Asırda Fransa ve Türk Askerliği" (France and Turkish Military in the Eighteenth Century), Çağatay Uluçay and Enver Karatekin's *Yüksek Mühendis Okulu* (High Engineering School), which provides information on various naval institutions and foreign engineers and supported by visual data composed of 107 pictures, fourteen tables and graphics; Max Roche's *Éducation's Assistance et Culture françaises Dans L'Empire ottoman* (French Educational Assistance and Culture in the Ottoman Empire); Pierre Pinon's "Un

Episode de la Réception des Progrès techniques à Constantinople: L'Échec de la Mission Ferregeau, Ingénieur des Pots et Chaussées (1796-1799)" (An Episode from the Reception of Technical Progress in Constantinople: The Failure of the Mission of Ferregeau, the Engineer of Ponts et Chaussées [1796-1799]); and Frédéric Hitzèl's "François Kauffer (1751- 1801): Ingénieur-cartogaphe français au service de Selim III" (François Kauffer (1751- 1801): French Engineer-Cartographer in the Service of Selim III) can be mentioned.

A different approach to the subject is suggested by Rossitsa Gradeva. In her article "War and Peace along the Danube: Vidin at the End of the Seventeenth Century," she points out that there was also a Christian contribution to the Ottoman fleet stationed on the Danube. From early on, local Christian craftsmen played an important part in its maintenance.

One of the most intellectually prepared articles is Jonathan Grant's "Rethinking the Ottoman Decline: Military Technology Diffusion in the Ottoman Empire, Fifteenth to Eighteenth Centuries." Grant rejects the "decline rhetoric" and suggests a new model instead. Regarding the slowness of the Ottomans' transition from galley to galleon, he discusses the impact of such factors as the geography in which the Ottomans operated and the long rivalry with neighboring Venice.

William Thompson and George Modelski's *Seapower in Global Politics, 1494-1993* suggests a new model with respect to sea power and attributes to the Ottoman Empire a certain role in this sense. As far as the model is concerned, global seapower and world powers are two different things and they are characterized by criteria, such as being a world power, for instance. A global power's share must be equal to fifty percent of the total warships of the global powers. In order to be qualified as a global power, a state must have a minimum share of the world's naval capabilities, which corresponds to five percent of the total naval expenditures of the global powers, or ten percent of the total warships of the global powers. Moreover, the navy of the state must carry on ocean-going activities rather then a regional ones and coastal defense. A state chould be regarded as having global power status in the years between global wars if they had met the criteria at the end of the preceding global war. However, if the preceding global war predated the development of any naval capabilities or the emergence of the state, the global power status could only be considered following the satisfaction of these prerequisites. A state's global power status continued as long as it was defeated or exhausted in the global war.

In this context, Thompson and Modelski suggest that both Venice and the Ottoman Empire failed to achieve prerequisites to be world powers, since they were unable to adapt to the political and economic transformation that developed independently from the Mediterranean during the fifteenth and sixteenth centuries. The Ottomans were a regional power that failed to carry out ocean-going activities or to obtain blue water capability. The book divides the development of warships into four time periods. The first period, called "the pre-ship of the line warship era," covers the years 1494-1654, corresponding to a period characterized by the decline of the galleys as the mainstay of some navies and the emergence of sailed warships specifically in the Atlantic. The Ottomans, according to the theory put forward by the authors of the book, declined in terms of naval power, due to their refusal to give up their galleys and their geographical circumstances in the Mediterranean.

Five biographical works, one of which is a document, another of which is an article in an encyclopaedia, two of which are magazine articles, and the last of which is a book deserve mention. Safvet's article, "Mezemorta Hüseyin Paşa" is based on official documents; J. H. Mordtman's "Hüseyin Paşa (Küçük)," in *İslam*

Ansiklopedisi (Encyclopedia of Islam) and Nejad Göyünç's "Kapudân-ı Deryâ Küçük Hüseyin Paşa," in *İstanbul Üniversitesi Tarih Dergisi* offer good accounts of the lives and activities of some important naval figures, supported by rich primary and secondary sources. İ. Hakkı Uzunçarşılı's "Cezayirli Gazi Hasan Paşa'ya Dair" (On Gazi Hasan Pasha of Algeria) in *Türkiyat Mecmuası* (Turkiyat Magazine), and Muzaffer Polat's relatively recent work, *Kaptan-ı Derya Cezayirli Gazi Hasan Paşa* (Grand Admiral Gazi Hasan Pasha of Algeria), offer detailed accounts of another leading naval character who played an important role in naval modernization. Mehmed Hafîd's *Sefînetu'l Vuzerâ* (The Ship of Viziers) gives a short account of Ottoman admirals from the conquest of Constantinople to the author's own time. İ. Parmaksızoğlu's article "Kaptan Paşa" in *Islam Ansiklopedisi* offers important biographies as well.

Focusing on *levends*, an important naval and land class, Mustafa Cezar's *Osmanlı Tarihinde Levendler* (Levends in Ottoman History) sheds considerable light on how the Ottoman navy was manned. It is a military, naval and social account supported by rich primary sources.

Daniel Panzac is an important historian with articles on Ottoman maritime trade and manning. His "Négociants ottomans et Capitaines français: La Caravane Maritime en Crete au XVIII Siècle" (Negotiations between Ottoman and French Captains: the Maritime Fleet in Crete in the Eighteenth Century), and "XVII. Yüzyılda Osmanlı İmparatorluğu'nda Deniz Ticareti" (Maritime Trade in the Seventeenth Century Ottoman Ermpire) in *Tarih İncelemeleri Dergisi* (Magazine of Historical Research) are important papers on the maritime trade in the seventeenth and eighteenth centuries. Two other articles, "Armed Peace in the Mediterranean 1736-1739: A Comparative Survey of the Navies," and "The Manning of the

Ottoman Navy in the Heyday of Sail (1600-1850)," focus on naval issues such as types of ships, their geographical distribution, and manning. "Un Prologue Aux Tanzimat La Modernisation des Forces Navales Ottomanes Empire, Maghreb, Egypte (fin XVIIIe – début XIXe siècle)" (Modernisation of the Naval Forces of the Ottoman Empire, Magreb and Egypt in the Tanzimat Period during the Eighteenth and Nineteenth Centuries) deals with the modernisation of naval forces of the Ottoman Empire, Maghreb and Egypt in the eighteenth and nineteenth centuries. His articles, which put the Ottoman Empire within a framework of global thinking, inspire the researcher to assess the events from a broader perspective.

In addition to Panzac, Robert Mantran's *L'Empire ottoman de XVIe au XVIIIe siècle: Administration, economie, société* (the Ottoman Empire from the Sixteenth to the Eighteenth Centuries: Administration, Economy and Society); "XVIII. Yüzyılda Osmanlı İmparatorluğu'nda Deniz Ticareti ve Ekonomi" (Maritime Trade and Economy in the Ottoman Empire during the Eighteenth Century), and "XVII. Yüzyılın İkinci Yarısında Doğu Akdeniz'de Ticaret, Deniz Korsanlığı ve Gemiler Kafileleri" (Trade, Privaterring and Ship Fleet in the Second Half of the Seventeenth Century in the Eastern Mediterranean) are important works about maritime trade. Elena Frangakis-Syrett's "Izmir and the Ottoman Maritime World of the Eighteenth Century," which is an abridged version of her book *The Commerce of Smyrna in the Eighteenth Century (1700-1820)*, draws attention to the rise of Izmir to become both the most important port of the Ottoman Empire and one of the major ports of the Mediterranean. The article, "Early Turkish Naval Activities" by Kate Fleet, the curator of the Skilliter Center for Ottoman Studies at Newnham College, Cambridge, considers the possibility that there existed an Ottoman fleet from an early date, as opposed to merely a collection of pirate vessels used by the Ottoman rulers when need arose. She regards the existence of such an early fleet as a natural dictation of the geographical position of the Ottoman Empire. Her article is supportive of the earlier thesis in her book *European and Islamic Trade in the Early Ottoman State: The Merchants of Genoa and Turkey*, in which she suggests that there were trade links between European merchants and their Muslim counterparts from the beginnings of the Ottoman Empire to the fall of Constantinople in 1453. Therefore, this article is important in tracing the Ottoman maritime and naval activities in preceding centuries.

In another article "Monks and Sailors under the Ottoman Sultans," Elizabeth Zachariadou suggests that Greek Orthodox monasteries played a role in the formation of a Greek merchant fleet in the Ottoman Empire. Another work that can be included in the maritime trade and transportation is Necdet Ertuğ's *Osmanlı Döneminde İstanbul Deniz Ulaşımı ve Kayıkçılar* (Istanbul Maritime Transportation and Caique Owners/Operators in the Ottoman Period). He deals with the sector of transportation of goods and people by caiques, related regulations, wages, and describes types of caiques, wharfs and some other technical aspects of the sector in Istanbul during the Ottoman period as well.

As for works on naval history and warfare, Mehmed Şükrü's *Esfâr-i bahriye-i Osmaniye* (Ottoman Naval Campaigns), Süleyman Nutki's *Muharebât-ı bahriye-i Osmaniye* (Ottoman Naval Wars), Aksaraylı Mehmed's *Fenn-i harb-i bahrî* (the Science of Naval War), Fevzi Kurtoğlu's *Türklerin Deniz Muharebeleri* (Turkish Naval Wars), Fevzi Kurtoğlu and A. H. Alpagut's *Türklerin deniz harp sanatına hizmeti* (Turkish Contribution to the Art of Naval Warfare), *1768-1774 Türk-Rus Harbinde Akdeniz Harekatı ve Cezayirli Gazi Hasan Paşa* (The Mediterranean Action in the 1768-1774 Turko-Russian War and Gazi Hasan Pasha of Algeria), Aziz

Samih's *Şimali Afrikada Türkler* (The Turks in North Africa), A. H. Alpagut's *Denizde Türkiye* (Turkey in the Sea), which is a narrative account of the Turkish navy from the beginning of the Turkish naval power to the end of the time of Barborossas, and *Marmarada Türkler* (Turks in the Marmara Sea) are worth note. J. Mitchell's History *of the Maritime Wars of the Turks,* which is a translation of *Tuhfetü'l Kibâr* (Present of the Noblemen), and R.C. Anderson's *Naval Wars In the Levant (1559-1853)* are two important reference books dedicated to the naval wars in which the Ottomans were involved directly or indirectly, and which is still used widely by academics. Among other accounts of significance are Robert F. Marx's *The Battle of Lepanto 1571*, and William C. Chapman's "Prelude to Chesme."

Gemi Topçuluğunun Geçirdiği Safhalar (Stages of the Naval Gunnery) translated by Ethem Ziya into Ottoman Turkish is one of the rare books dedicated to naval artillery. Although it is a general book describing the story and historical stages of naval cannons throughout the world, it provides insight into the state of the Ottoman navy with respect to the guns used on the Ottoman man-of-wars operating in the late eighteenth century. It is difficult to find a well-versed book or article about naval guns, with the exception of John Francis Guilmartin's "The Early Provision of Artillery Armament on Mediterranean War Galleys," which is an account of naval guns on galley type ships rather than any of the galleons, frigates, corvettes and other eighteenth century ships constructed under Selim III. Additionally, Muzaffer Erendil's *Topçuluk Tarihi* (History of Gunnery), Tahsin Esencan's *Türk Topçuluğu ve Kaynakları* (Turkish Artillery and Its Sources), and Salim Aydüz's "Ateşli Silahlarla İlgili Türkçe Matbu Eserler Bibliyografya Denemesi (1727-1928) (A Study of Bibliographical Works on Fire Arms, Printed in Turkish)," and "Osmanlı Devleti'nde Tophâne-i Âmire'nin Faaliyetleri ve Top

Döküm Teknolojisi, XIV-XVI" Yüzyıllar (Activities of the Imperial Cannon Foundry and Cannon Moulding Technology in the Ottoman Empire, Fourteenth through Sixteenth Centuries), which was prepared as a Ph.D. dissertation, contain short sections dedicated to naval gunnery. Kahraman Şakul's "Ottoman Artillery and Warfare in the Eighteenth Century" was prepared from *Hatt-ı Hümayuns* (Imperial Decrees) and foreign sources as an M.A. thesis.

Some scattered information can be found in articles. Mustafa Kaçar's "Osmanlılarda Deniz Torpidoları Hakkında İlk Tercüme Eser: E'r-Risaletü'l Berkiye fî Alâti'r- Ra`diye" (First Translation Work about Naval Torpedos among the Ottomans: A Treatise on Lightning of Thunderclap Device) gives information on the first Turkish treatise, compiled and translated by Ishak Efendi, on naval torpedoes; and Ebru Ademoğlu's "Yahya Naci Efendi ve Fırlatılan Cisimlerin Hareketleriyle İlgili Eseri: Risale-i Hikmet-i Tabiiyye (1809)" (Yahya Naci Efendi and His Work on the Motion of the Projectiles: A Treatise on Natural Physics, 1809), dealing with the theoretical aspects of projectiles, are among this type of works. Mücteba İlgürel's "Osmanlı Devleti'nde Ateşli Silahlar" (Firearms in the Ottoman Empire) and H. İnalcık's "The Socio-Political Effects of the Diffusion of Firearms in the Middle East," and V.J. Parry's "Materials of War in the Ottoman Empire" are of importance, with some indirect references to naval guns. Gábor Ágoston's "Merces Prohibitae: The Anglo-Ottoman Trade in War Material and the Dependence Theory" discusses the issue within a theoretical framework. He challenges the classical dependence theory whereby the Ottomans are seen as dependant on western war supplies and puts forth that it was neither the presumed inferiority of the Ottoman military technology suggested by traditional Euro-centric historiography, nor the Ottomans' supposed difficulty in the supply of weaponry and munitions which caused the

Ottomans' military failures. Instead the root causes of these weaknesses lay in the less efficient system in which these weapons and resources were mobilised, supplied and used. In other words, the backwardness was institutional rather than technological.

Birol Çetin's *Osmanlı İmparatorluğu'nda Barut Sanayi 1700-1900* (the Gunpowder Industry in the Ottoman Empire 1700-1900) is another important secondary source. Prepared from rich archival and secondary sources, the book provides information about the establishment of modern gunpowder works, for instance, in Azadlı, which was also an important gunpowder source for the guns used by the Ottoman navy.

Andrew C. Hess' "The Evolution of the Ottoman Seaborne Empire in the Age of the Oceanic Discoveries, 1453-1525," and Palmira Brummett's *Ottoman Seapower and Levantine Diplomacy in the Age of Discovery*, despite being limited to for the most part the fifteenth and sixteenth centuries, constitute a perfect background to the students of eighteenth century Ottoman navy, especially with Brummets's horizon-broadening approach taking up the Ottoman sea power as a unit within a global picture. By the same token, Brummett's article "The Ottomans as a World Power: What We Don't Know About Ottoman-Sea-Power" presents a well-versed and skilled assessment of the preconceptions encircling the Ottoman sea power, within a theoretical framework supported by reliable examples.

In his "The Human Landscape of the Ottoman Black Sea in the Face of the Cossack Naval Raids," Victor Ostapchuk focuses on the Cossack impact on the Ottoman Black Sea and criticizes the superficial Ottoman and the uncritical Ukrainian and Russian historiographical assessments of the Cossacks. With this critical approach it is an interesting article conducive to a revision of the preconception of the Black Sea as an Ottoman lake from the fall of Constantinople to the end of the eighteenth century. Molly Greene's "Ruling an Island without a Navy. A Comparative View of Venetian and Ottoman Crete" focuses on the navy's role comparatively in the Venetian and Ottoman struggle for control of Crete. She suggests that the Ottomans wrested the island of Crete from the Venetians in the late seventeenth century, a hundred years after they had supposedly turned their backs on the sea. She seeks to explain how in a time of maritime weakness, the Ottomans managed to hold onto this large island.

Considering the works and articles dealing with the naval schools, Mehmed Şükrî's *Bahriyemizin Tarihçesi* (Short History of Our Navy), Fahri Çoker's *Bahriye Mektebimiz Deniz Harp Okulu ve Lisesi* (Our Naval School, Naval War School and Lycee) and *Deniz Harp Okulumuz 1773* (Naval War School 1773), Fevzi Kurtoğlu's *Deniz Mektepleri Tarihçesi* (A Short History of Naval Schools), Ruhi Devellioğlu'nun *Deniz Mektepleri Tarihçesi* (A Short History of Naval Schools), M. Orhan Kızıldemir's "Memleketimizde Denizcilik Okullarının Tarihçesi" (A Short History of the Schools of Seamenship), Emin Yakital's "Bahriye Mektebi" (Naval School), Kazım Çeçen's "Mühendishâne-i Bahri-i Hümâyûn" (The Imperial Naval School) are worth mention.

In addition, Kemal Beydilli's aforementioned *Türk Bilim ve Matbaacılık Tarihinde Mühendishane, Mühendishane Matbaası ve Kütüphanesi 1776-1826*, Mustafa Kaçar's dissertation *Osmanlı Devleti'nde Bilim ve Eğitim Anlayışındaki Değişmeler ve Mühendishânelerin Kuruluşu* (Changes in the Understanding of Science and Education in the Ottoman State and the Establishment of Engineering Schools), and his later articles "Osmanlı İmparatorluğu'nda Askeri Teknik Eğitimde Modernleşme Çalışmaları ve Mühendishanelerin Kuruluşu (1808'e Kadar)"

(Modernisation Efforts in the Military Technical Education in the Ottoman Empire and the Establishment of the Engineering Schools, up to 1808), and "The Development in the Attitude of the Ottoman State towards Science and Education and the Establishment of the Engineering Schools (Mühendishânes)" are also among important works.

Kenan Sayacı's *Deniz Harp Okulu Tarihçesi* (A Short History of Naval War School), Bahri S. Noyan's "Bahriye Mektebine Dair" (On the Naval School), Emin Yakıtal's "Bahriye Mektebi" (Naval School), Haluk Y. Şehsuvaroğlu's "110 Sene evvel Kasımpaşa'da açılan ilk Bahriye Mektebi" (The First Naval School Opened in Kasimpasha 110 Years Ago), Ali İhsan Gencer's "Özel Bahriye Mektepleri Hakkında Bir Genelge (1851)" (A Regulatory Bill About Private Naval Schools), and "Sakız Adası'nda Açılan Özel Bahriye Mektebi" (Private Naval School in the Island Sakiz), Coşkun Güngen's "Bahriye Vekâleti'nden Denizcilik Bakanlığına" (From the Naval Vezirate to the Ministry of Seas and Seamenship), Ali Rıza Seyfioğlu's "Yüz Sene Evvel Kasımpaşa Zabit Mektebinde Hayat" (Life in the Kasimpasha Officer School A Hundred Years Ago," Muzaffer Polat's *Kuzey Deniz Sahra Komutanlığı Karargâh Binası/Bahriye Divanhanesi* (The Headquarters Building of the Command of the North Sea Area) , Kazım Çeçen's "Mühendishâne-i Bahri-i Hümâyûn" (the Imperial Naval Engineering School), and Çağatay Uluçay-Enver Karatekin's *Yüksek Mühendis Okulu* (High Engineering School) are among other important sources dedicated to the naval schools.

Regarding dictionaries and terminological studies devoted to naval technology, *The Lingua Franca in the Levant*, by Tietze, et al., is an irreplaceable source prepared with painstaking research. It is a technical dictionary, an encyclopedia, and a piece of Turkish literature covering every technical, social and administrative aspect of the Ottoman sea power in comparison with those of other Mediterranean countries. A more limited but very important work of terminology is the article by Kahane et al., "Turkish Nautical Terms of Italian Origin," in the *Journal of the American Oriental Society*. Svat Soucek's article "Certain Types of Ships in the Ottoman-Turkish Terminology," is another important work deserving mention.

Coşkun Güngen's *Türk Denizcilik Tarihi Bibliyografyası* (Bibliography of Turkish Nautical History); three volumnious work from IRCICA publications, *Osmanlı Astronomi Tarihi Literatürü* (History of Astronomy Literature During the Ottoman Period), *Osmanlı Coğrafya Literatürü Tarihi* (History of Geographical Literature during the Ottoman Period), and *Osmanlı Askerlik Tarihi Literatürü Tarihi* (History of Military Art and Science Literature during the Ottoman Period); M. Seyfeddin Özege's *Eski Harflerle Basılan Türkçe Eserler Katalogu* (Catalogue of the Turkish Books Printed in Arabic Letters); *Türkiye'de Bilim, Teknoloji ve Tıp Tarihi Çalışmaları (1973-1998)* (Bibliographical Studies in the History of Science, Technology and Medicine in Turkey), edited by Feza Günergun; Aykut Kazancıgil and V. Solok's *Türk Bilim Tarihi Bibliyografyası* (Bibliography of Turkish History of Science); Aykut Kazancıgil's other work, *Osmanlılarda Bilim ve Teknoloji* (Science and Technology during the Ottoman Empire); Salim Aydüz's article, "Ateşli Silahlarla İlgili Türkçe Matbu Eserler Bibliyografya Denemesi (1727-1928) (A Study of Bibliographical Works on Fire Arms, Printed in Turkish);" *Risâle-i Mevkûte-i Bahriye (Naval Periodical), Deniz Mecmuası (Magazine of Sea), Donanma Dergisi (Naval Magazine), Deniz Kuvvetleri Dergisi-Makaleler Listesi* (Magazine of Turkish Naval Forces: the List of Articles), prepared by Hüseyin Yıldırım, are among significant bibliographical sources. In the last book prepared by

Yıldırım, articles, which began to appear from 1889 onward in the above-mentioned magazines published by the Naval Administration, are introduced with some quotations and examples, which provide researchers with bibliographical data. However, the articles, mostly written by naval officers and composed of a few pages, are still difficult to find in the libraries and archives. *Bahriye müzesi katalogu* (Catalogue of the Naval Museum) is also an important source for the names of old types of ships and their parts.

There are some other useful foreign and Turkish dictionaries as well. In this context, A. Jal's *Glossaire nautique* (Nautical Glossary) includes many Turkish nautical terms, while William A. Thompson's *Handbook of Nautical Terms and Technical and Commercial Phrases in English, Italian, French, and Turkish* is among the most reliable sources. Süleyman Nutki's *Istılâhât-ı Bahriyye* (Nautical Terms) is an important work as well. *Kâmus-ı Bahri* (Naval Lexicon) is a complete nautical dictionary. Among relatively recent dictionaries worth mention are Lütfi Gürçay's *Gemici Dili* (Language of the Sailors), and A. R. Barkinay's *Türkçeden İngilizce'ye ve İngilizce'den Türkçe'ye ufak gemicilik lügati* (A Small Nautical Dictionary, from Turkish to English and from English to Turkish).

In addition to the dictionaries, books containing information about seamanship as well as nautical regulations are Ismail Hakki's *Gemicilik Fenni* (Science of Seamenship), on the art of navigation and *Bahriye kanunnamesi* (Naval Regulations), covering dockyards, salaries, sanitary service, drill, and professional education are important works. *Kanunname-i bahriye-i cihâdiye* (Lawbook of the Navy of Holy War), dealing with the regulations of the navy of holy war; Safvet's *Filâsâlar* (Rope Yarns), including shipbuilding regulations of 1831-32, *Nizamnâme-i* *bahriye* (Naval Regulations), *Ganâim-i bahriye kavâidi* (Regulations on Prize) are other important works.

Having considered all the evaluations above, this dissertation utilizes mainly archival documents in the Ottoman Prime Ministeral Archives in Istanbul and the Public Record Office in Kew Gardens, London. These primary sources providing factual data are supported by a large spectrum of secondary sources, including recent publications and periodicals. Therefore, it aims to introduce the field to the academic community and to provide substantial data to prospective students of Ottoman naval technology.

As for the structure of the paper, the first chapter starts with an introduction covering one of the main themes of Ottoman sea power, the transition from oared to sailed ships, since it was the beginning of the shift in traditional shipbuilding ways.

The second chapter, which covers technological developments in terms of shipbuilding methods, naval institutions, raw materials, tools, equipment and gunnery used by the Ottoman navy constitutes the most intensive part of the dissertation.

The third chapter describes the role of foreign missions in Ottoman naval technology. In this context, mainly the French, Swedish and English missions and their contributions to the Ottoman navy are evaluated. The leading foreign engineers, technicians, architects, officers and officials who were employed in the naval arsenal and other shipbuilding sites are assessed as far as sources allow. In addition to the foreign missions of the aforementioned states, some others of various countries and the leading Ottoman shipbuilders working with foreigners are also dealt with to a lesser degree.

The fourth chapter starts with a part covering the literary evaluation of the ship names in a comparative way, which is suggestive of a piece of literature rather than technology. The aim is to show the mutual interaction between the name of a ship and its functions or physical features. The main focus of the chapter is on the types of ships, their physical features, and ones constructed, purchased, captured or given as presents to the Sultan.

The fifth chapter, which is the concluding part, suggests that all the technological developments indicate the Porte's willingness to keep abreast of the developments in the naval technology in Europe and the Ottomans achieved this goal to some extend in the end of the century during the reign of Selim III.

In a nutshell, Selim III's time is a transition period in terms of technology and modernisation. However, this period has not drawn attention it deserves so far. Therefore, this work attempts to draw a technological portrait of the late eighteenth and early nineteenth centuries, using mainly primary sources, in order to take a step to bridge the gap between political and technological history of the time, contributing to prospective researchers to overcome terminological difficulties of naval technology.

CHAPTER ONE

INTRODUCTION

EVOLUTION OF THE OTTOMAN NAVAL TECHNOLOGY UP TO THE REIGN OF SELIM III

The Transition to Sailing Vessels: Reasons and Consequences

Ottoman sea power is a subject of study encircled by prejudices and biases, which are difficult to sort out and can lead the student of naval history to confusion and incorrect results. One of them appears in a bid to limit the Ottoman sea power to a short period between Pîrî Reis and Barbarossas, representing the intellectual and ignorant/illegitimate aspects of the Ottoman sea power, respectively. The second one tends to show the Ottoman Empire as a land-based military power, ignoring the importance of the navy and attributing to it a secondary role. The assessment of the sea power in connection with naval campaigns only and the exclusion of maritime trade constitute a third bias. The final prejudice envisages that the Ottomans never adapted to or developed the technology necessary to become a sea power.[1]

It is beyond the capacity of this work to clarify all these concerns raised by Brummet. What we intend is, keeping all these points in mind, to help elucidate the state of naval technology of the time.

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[1] Palmira Brummet, "The Ottomans as a World Power: What We Don't Know about Ottoman-Sea-power," Kate Fleet (ed.), *The Ottomans and the Sea* (Cambridge: Skilliter Center for Ottoman Studies and Istituto Per L'Oriente C. A. Nallino, 2001), pp. 1-21.

In order to obtain a more accurate picture of the technological assessment of the Ottoman sea power, one should first deal with the question of the transition from oared to sailed ships, which is a widely discussed question within academic circles. There is no doubt that the Ottomans did not abandon their classical ships all of a sudden. They followed a course of naval modernization that was conservative and slow in some periods while rapid in others. In this context, the Ottomans' first attempts at the construction of sailing warships dates back to the time of Mehmet the Conqueror, who ordered a galleon of 3,000 tons in imitation of similar vessels in the Venetian, Genoese and Aragonese navies. Unfortunatelly, this vessel sank at launch. In the following centuries Ottoman shipbuilders made attempts at building sailing ships, which failed mostly due to the lack of technological know-how. In the reigns of Bayezid II, Selim I and Süleyman I, galleons similar to Venitian caravels were built, but later abandoned because of their impracticability in the absence of wind.[2] Although the appearance of the first galleons in Istanbul is said to have occurred as early as the 1580's by some historians, it is most probable that ships constructed before 1644 were mostly hybrid vessels such as *kalite, göke* and *burton*, with both oars and sails and originally employed to protect the convoys, functioning as transporters or corsairs, and cruising against enemy ships.[3]

The first Ottoman galleon planned as a battle ship was constructed in 1644.[4] In May 1648, in the fourth year of the Crete campaign, the Ottomans seemed to have

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[2] C. H. İmber, "The Navy of Süleyman the Magnificent," *Archivum Ottomanicum* 6 (Belgium, 1980), pp. 212-214.

[3] A. H. J. Prins, "Mediterranean Ships and Shipping, 1650-1850," *The Heyday of Sail: The Merchant Sailing Ship 1650-1850*, ed. Robert Gardiner (London: Conway 1995), p. 78.

[4] Idris Bostan, *Osmanlı Bahriye Teşkilatı: VII. Yüzyılda Tersane-i Amire* (Ankara: T.T.K., 1992), p. 94.

begun to realize the importance of galleons and somewhat hesitantly discussed their advantages over galleys.[5] However, the systematic construction of galleons was initiated under the grand vizier Merzifonlu Kara Mustafa Pasha and Kapudân-ı Deryâ Gazi Hasan Pasha.[6] It would not be an exaggeration to say that the galley type of oared ships, which had been the backbone of the Ottoman navies throughout the sixteenth and in the first three quarters of the seventeenth centuries came to be replaced by large sailing ships in the last quarter of the seventeenth century. However, the period between 1682, the year referring to the beginning of the systematic adoption of sailing ships, and 1770, the year marking the devastating defeat of the Ottoman fleet at Çeşme, witnessed the symbiosis of the oared and sailed technologies. In the period, the Ottomans occasionally left the new sailing ships, preferring the traditional oared ships. This hesitation and indecision lasted until 1770.

In the aftermath of the defeat, the balance tilted considerably in favour of sailing ships as a part of the modernization process accelerated by Cezayirli Gazi Hasan Pasha and culminated with the reign of Selim III, thanks to the developments in naval warfare, artillery and technical know-how in navigation throughout the world.

By the late eighteenth century, oared ships had become obsolete and almost disappeared, leaving their place to new types of ships for good. The number of

[5] Katip Çelebi's account depicts well the Ottoman's quest for a navy to measure up with enemy fleets composed of galleons. As it can be remembered, on the above-mentioned date in a meeting headed by the Grand Vizier Koca Mehmet Pasha and taking up naval matters, some present mentioned the difficulty of withstanding the enemy galleons aided by wind and said that the Ottomans had to adopt galleons as well. Then Katip Çelebi was invited to the meeting to share his advice. He drew attention to the glorious naval battles the Ottomans had won with galleys against galleons in the past and suggested that if some people still insisted on the use of galleons as a necessity, then there should be no problem to build them, complete the artillery and provisions as well as recruit expert soldiers and gunners. Kâtip Çelebi, *Tuhfetu'l Kibâr fi Esfâri'l Bihâr*, ed. Orhan Şaik Gökyay (Istanbul: Milli Eğitim Basımevi, 1973), pp. 124/125.

[6] I.H. Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı* (Ankara: TTK, 1988), p. 470.

galleys fell to fifteen in 1701 and remained at this level until the 1760s. Eventually, their previous functions as the backbone of the Ottoman navy was abandoned and their duties were restricted to scouting, patrolling the coasts and the islands of the Aegean and sometimes towing the sailing-vessels.[7]

Although we are deprived of the full account of the motivations and rationale behind the reluctance of the Ottomans to adopt sailing ships, several factors such as the supply of shipbuilding materials, the Ottomans' long rivalry with neighboring Venice, and geographical conditions might supply a satisfying explanation.

First of all, it is important to realize that the ship building sector, regardless of any specific period, has an important shortcoming: slow change. The reason behind this is multi-dimensional. To begin with, naval technology requires huge investments in construction, equipment and personnel that could be achieved only by state power to a great extent, leaving other entrepreneurs outside. Second, the high costs required for training personnel in new equipment and technologies is a formidable undertaking. Finally, difficulty in finding suitable construction sites delays the adoption of new technology. Most of these obstacles seem to be surmountable by today's huge firms, whereas they were almost impossible to overcome by any power but strong states, themselves. Therefore, this aspect of the sector should be taken into consideration while assessing its development in the past.

The matter of the supply and availability of materials, for example, timber, required for building a ship was of major importance. It is true that the amount of

[7] Panzac, "The Manning of the Ottoman Navy in the Heyday of Sail (1600-1850)," *Arming the State Military Conscription in the Middle East and Central Asia 1775-1925*, ed. Eric J. Zürcher, (London and New York: IB. Tauris, 1999), pp. 41-57.p. 45.

ocaklık[8] timber was dramatically reduced in Kocaeli province towards the end of the seventeenth century due to the intensive harvesting during the sixteenth and seventeenth centuries. The timber available from the Kocaeli region fell from the amount required to construct ten galleys to seven. However, timber sources still existed in the inner regions of Anatolia.[9] Although the thesis suggesting that reduced timber supplies was one of the reasons behind the Ottomans' reluctance to adopt galleons[10] before the seventeenth century seems to be reasonable in the centuries in question, it is not much so in the period under question. Kocaeli or Iznikmid and the surrounding areas were still the main sources of timber supply for the intensive naval construction movements in the aftermath of the Çeşme Incident and in the reign of Selim III. Ottoman documents are full of accounts regarding the correspondences between the authorities of the *Tersâne-i Âmire* (The Imperial Naval Arsenal) and local administrators in the mentioned regions.

The Kocaeli region was not the only source of timber for ships. Midilli, Kazdagi, Canik, Taşoz, Rumeli, Megri, Rhodes, Kidros, Cide, Misivri, Ahyolu, Segen, Ayna Island, Gemlik, Gümülcine, Karaağaç, Bolu, Mudurnu, Âbâd Yaylası, Elmacık Dağı, Sarı Ot Dağı, Samsun, Sinop, Inebolu, Meset, Faacas, Bartın, Akçahisar and other areas were also active in supplying timber for shipbuilding. Towards the end of the eighteenth century, Ottoman lands and specifically Albania and the Black Sea region,[11] with their ample and high quality oak wood, came to be

8 See the Glossary, Appendix S.

9 İdris Bostan, *Osmanlı Bahriye Teşkilatı: VII. Yüzyılda Tersane-i Amire* (Ankara: TTK, 1992), p. 103.

10 Rhoads Murphey, "Osmanlıların Batı Teknolojisini Benimsemedeki Tutumları: Efrenci Teknisyenlerin Sivil ve Askeri Uygulamalardaki Rolü," *Osmanlılar ve Batı Teknolojisi*, ed. E. İhsanoğlu (Istanbul: İstanbul Üniversitesi Edebiyat Fakultesi Yay., 1992), pp. 7-20.

centres of attraction for England and Russia, in addition to providing timber for the Ottoman navy.[12] Therefore, it is difficult to say that reduced timber supplies were a determining factor in the tardiness of the Ottoman adoption of sea-going galleon construction.

The second factor in the Ottomans' slowness in adopting galleons involved the Porte's prolonged rivalry with Venice. Venice was a major naval and commercial rival sharing the same geography with the Ottomans. The Porte had fought its first sea war against Venice in 1416.[13] Even in the sixteenth century, the Ottoman and Venetian naval arsenals had much in common.[14] Operating in the same geography compelled them to observe each other closely and to seek ways to have a greater share of the benefits of the competition. It was also the cause of their technological similarities. Long wars, commercial and technological exchanges, being obliged to cope with the difficulties of the same geography made them similar in many respects. It was difficult for either to change its well-rooted galley tradition regardless of the possible negative outcomes, as doing so might have put it into a disadvantaged position in the face of its rival. In addition, adopting new technology meant new expenses, know-how and expertise. All these factors caused them to cling to the

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[11]Paul Walden Bamford, *Fighting Ships and Prisons: The Mediterranean Galleys of France in the Age of Louis XIV* (Minnesota: the University of Minnesota Press, 1973), p. 14.

[12] For more information about the timber sources of the Ottoman State and their attractiveness to foreign countries, see "The Main Materials Used in the Construction of Ships in the Late Eighteenth Century Ottoman Empire" below.

[13] Jonathan Grant, "Rethinking the Ottoman Decline: Military Technology Diffusion in the Ottoman Empire, Fifteenth to Eighteenth Centuries," *Journal of World History* 10 (1999), p. 187.

[14] Salih Özbaran, "Galata Tersanesinde Gemi Yapımcıları 1529-1530," *Güney-Doğu Avrupa Araştırmaları Dergisi* 8-9 (İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayını, 1980), p. 97.

traditional vessels, which seemed more practical within the geography in question. This prudent attitude continued until this relatively peaceful geography was disturbed by the naval forces of the Atlantic powers in the seventeenth century.[15]

In dealing with the transition question, a problematic approach emerges in the overestimation of galleys in the face of glorious galleons irrespective of the geography and time in which they operated. This attitude tends to oversimplify and to ignore the complex web of conditions intertwined in accounting for the Ottomans' reluctance to give up their oared vessels. In this context, the third factor suggests that the preference of traditional oared vessels stemmed, to a great extent, from the circumstances of their physical geography rather than from their rivalry with neighbours. The Ottoman Empire was surrounded by seven seas when it reached its zenith in the sixteenth century. The Black Sea and the Sea of Marmara were almost under absolute control. The Aegean, eastern Mediterranean and Red Seas were effectively controlled, but occasionally challenged. Finally, the Persian Gulf and the Indian Ocean were zones of conflict in which Ottoman influence was evident.[16]

Under these geographical conditions, galleys had many advantages, making them practical and economical. First of all, they were powered by oars, which freed them from dependence on fair wind on calm days. Galleys also served, in mixed fleets, consisting of oared and sailed ships alike, as tow vessels when galleons became becalmed and crippled. Another advantage of the galleys was their speed and maneuverability. They were able to operate close to the shore and were not visible from a great distance, thanks to their low structure in the freeboard and shallow

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[15] Grant, p. 187.

[16] Murat Çizakça, "The Ottoman Empire: Recent Research on Shipping and Shipbuilding in the Sixteenth to Nineteenth Centuries," *Research in Maritime History*, no. 9 (December 1995), p. 213.

draught. These were important features for the ships of the period, considering that their crews worked as pirates as well.

In addition to these advantages, the Ottoman Mediterranean fleet was superior to its rivals in its ability to draw on the vast human and material resources of a geographically united empire. It was also under the control of a centralized, military government that could exploit them efficiently.[17] When it is considered the Ottoman ships, war and merchant vessels alike, mostly functioned or preferred to operate in the seas under their full control, their preference of oared vessels up to the late seventeenth century seems reasonable. This geography naturally brought about some constraints imposed by such phenomena as tides, prevailing winds and other natural forces, which defined the role of the Ottoman State in this respect. Therefore, war galleys rather than galleons remained the most suitable vessels to wage naval wars and to gain possession of the bases and islands that would lead their masters to control the sea routes.[18]

The practicality of oared vessels in naval warfare was another reason behind their long dominance. During sea battles, the Ottomans were skilled at the time-tested techniques of ramming and boarding, for which galleys were well suited. Therefore, it was difficult for the Ottomans to give up these vessels for new ones,

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[17] İmber, p. 215.

[18] John H. Pryor, *Geography, Technology and War: Studies in the Maritime History of the Mediterranean 649-1571* (Cambridge and New York: Cambridge University Press, 1992), p. 177. William Thompson and George Modelski suggest that in the period they call "the pre-ship of the line warship era," 1494-1654, corresponding to a period characterized by the decline of the galleys as the mainstay of some navies and the emergence of sailed warships specifically in the Atlantic, the Ottomans declined in terms of naval power, due to their refusal to give up their galleys and due to the and geographical location. See *Seapower and Global Politics, 1494-1993* (London: Macmillan, 1988), p. 50. Braudel draws attention to the importance of the sea routes in the Mediterranean and major sea battles between Christians and Muslims, like Lepanto in 1571 and Navarino in 1827. Therefore, such places as the Adriatic, Sicily, and the Dardanelles were important geographical locations for both the Ottomans and Venetians. Fernand Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II*, trans. Sian Reynolds (New York: Harper and Row, 1972), pp. 124-127.

which would require a whole new way of maneuvering in battle. Above all, galleys were amphibious forces, using their ordnance against targets ashore, covering landings, debarkations, re-supplying missions, and functioning as siege batteries against coastal fortresses.

For sound technological and tactical reasons, heavy ordnance was used effectively from the bows of galleys before it was from the broadsides of sailing ships. Large cannons could be accommodated on the earliest main centerline mounts on war galleys. Being simple in construction, these mounts did not require any major modification of the galley's hull. However, the addition of bow artillery made war galleys even better suited than before for amphibious raids and skirmishing. In the course of time, galleys had assumed a role as floating siege battery. In economic and geographical terms, galleys stood for the efficient use of good heavy ordnance. The Mediterranean rulers of the early sixteenth century were not faced with the choice between the war galley and sailing ship, but with how to get the most out of a limited quantity of good artillery.[19]

Another important point regarding the transition from oared galley to sailing galleon is offered by Guilmartin, who suggests that the transition was directly bound up with economic factors. The earlier galleons of relatively small size fell short in the course of time in transporting the increasingly large amounts of goods, and therefore, the first Ottoman galleons were used for transporting large amounts of merchandise rather than for naval campaigns.[20]

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[19] John Francis Guilmartin, *Gunpowder and Galleys: Changing Technology and Mediterranean Warfare at Sea in the 16th Century* (London: Cambridge University Press, 1980), p. 39. For more information about galleys, see Robert Gardiner (ed.), *The Age of Galley, Mediterranean Oared Vessels since Pre-Classical Times* (London: Conway Maritime, 1995); J. E. Doston, "The Economics and Logistics of Galley Warfare," in Gardiner. pp. 213-223.

[20] John Francis Guilmartin, "The Early Provision of Artillery Armament on Mediterranean War Galleys," *The Mariner's Mirror: The Journal of the Society for Nautical Research*, 59 (London:

Another factor that worried the naval circles was of economic and psychological origin. War galleys provided useful employment for about 600-700 oarsmen, and 250-300 seamen/soldiers.[21] The adoption of galleons would necessitate the employment of foreign technicians, which would lead to the unemployment of a great number of crew and arsenal workers knowledgeable in constructing, rigging and using oared ships. This, in turn, would cause the falling out of favour of the traditional Muslim sailors, who had contributed greatly to the glorious naval victories in the past and were respected by the common people.[22]

It is true that the galleys had some shortcomings both as a type of ship *per se* and in comparison with sailing vessels. Their elongated forms and shallow draughts made it difficult for them to withstand storms. Therefore, as a rule, the Ottoman imperial fleet did not put to sea until *nevruz*, the vernal equinox, and returned to its base in October or the beginning of November. Another disadvantage of the galley was the inverse proportion between the size of the ship and number of crew on it. There were about 200-300 crew and six to ten officers on an average galley. Hence, the consumption of victuals reached enormous amounts, which created storage problems. Since space was limited on a galley, victuals had to be limited accordingly, which led to their early exhaustion. In order to compensate for this shortcoming, the Porte arranged for separate ships to go to pre-arranged coastal points to fetch supplies. However, this was not an efficient solution when distances were great and the sea route was insecure. This system accounts for the failure of the

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Greenwich National Maritime Museum, Society for Nautical Research, 1973), pp. 257-280; *Gunpowder and Galleys: Changing Technology and Mediterranean Warfare at Sea in the 16th Century* (London: Cambridge University Press, 1980).

[21] Ibid., pp. 257-280.

[22] Ali Haydar Alpagut and Fevzi Kurtoğlu, *Türkler'in Deniz Harp Sanatına Hizmetleri* (İstanbul: Deniz Matbaası, 1936), p. 9.

Ottoman navy to dominate the western Mediterranean. Additionally, the use of green and unseasoned timber as well as undersized adzes used to cut and shapen timbers were technical disadvantages impairing the ships.[23]

The Ottomans were not completely ignorant of the galleon tradition. They had been in contact since the mid-sixteenth century with Algerian sailors,[24] who had long used sailed vessels as well as oared ones.[25] During the first half of the seventeenth century, Ottoman North Africa made a substantial contribution to the imperial navy, participating in its campaigns with sailing vessels.[26] It is known that the Grand Vizier, Merzifonlu Kara Mustafa, asked the North African corsairs for information about sailing ships in the early 1680s. Also it is claimed that it was the North Africans who might have suggested taking on a Muslim convert shipbuilder from Leghorn who, in 1682, launched the first Ottoman sailing ship at the *Tersâne-i Âmire.*[27] Another indicator supporting the Ottoman's early contact with sailing ships was their Indian Ocean policy, resulting in a virtual withdrawal from that ocean. Between 1517-1554, the Ottomans confronted Portuguese sailing ships in the Indian

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[23] İmber, p. 216.

[24] For a detailed account of Algerian maritime history, see Moulay Belhamissi, *Histoire de la Marine Algérienne (1516-1830).* 3 volumes (Algiers: E.N.A.L., 1983).

[25] Andrew C. Hess suggests that Muslim corsairs on the frontier in the North Africa learned this technology from English and Duch privateers. See "The Evolution of the Ottoman Seaborne Empire in the Age of the Oceanic Discoveries, 1453-1525," *American Historical Review* 75 no. 7 (December 1970), p. 1918; Hess, "Firearms and the Decline of Ibn Khaldun's Military Elite," *Archivum Ottomanicum,* 4 (1971), pp. 173-201; Afif Büyüktuğrul, *Osmanlı Deniz Harp Tarihi ve Cumhuriyet Donanması,* 2 (Istanbul: Deniz Basımevi, 1982), p. 166.

[26] Alpagut, pp. 8-14.

[27] Panzac, "The Manning of the Ottoman Navy," p. 44.

Ocean. Some sources report the construction of twenty large sailing ships as preparations for the campaign.[28]

As for the short and long term consequences of the transition question, many changes took place in such areas as shipbuilding technology and economy, naval warfare, the role of the human factor and so on.

The shift from classical oared to sailed ships changed and re-defined the role of the human factor as well, as the transition called for the exchange of oarsmen for sails and warriors for guns. In Cipolla's words, "it meant the exchange of human energy for inanimate power."[29] However, this did not mean the disappearance of men on board. The changing factor was the manning strategy. Oarsmen were replaced by free sailors, Janissaries and ironsides (*cebeliler*) with marines and a new body of naval and petty officers. The crews on Ottoman warships consisted of Janissaries, Muslim rowers and sailors, Christian oarsmen and sailors, prisoners-of war, and convicts. According to the recruiting system, when manpower was needed for ships, judges sent a portion of this requested manpower from the provinces. Some others were provided from among imperial slaves and convicts, and finally from labour markets in return for a payment called *bedel-i grifte* (payment for the hired men). The minimum cost for hiring a man was at least 1,500 *akçes* for a season. The number of Christian crew was much greater than that of Muslims. However, Muslims earned more than Christians (318 vs. 242 *akçes* per campaign), leading to wage discrimination based on religion, while it did not exist in the Arsenal. This can

[28] Svat Soucek, "Ottoman Naval Policy in the Indian Ocean," *X. Türk Tarih Kongresi, 22-26 Eylül 1986, Kongreye Sunulan Bildiriler* (Ankara: TTK, 1993), pp. 1444-1445. See also Salih Özbaran, "Osmanlı Imparatorluğu ve Hindistan Yolu," no. 31 (Mart 1977), p. 96.

[29] Carlo Cipolla, *Guns, Sails and Empires (Technological Innovation and the Early Phases of European Expansion 1400-1700)* (New York: Pantheon, 1965), p. 81.

account for the relative scarcity of Muslim sailors and insecurity about Christian crew during naval campaigns.[30]

Contingent upon the increase in the number of the sailing-ships and their growing size, the following years witnessed an increase in the number of crew as well. For instance, the number of crew on a flagship increased from six to eight hundred in 1699 to 1,470 in 1738 and 1,207 in 1815.[31] This last figure, e.g., 1,200 crew on the three-decked *Selimiye*, was during the reign of Selim III.[32] Then new manning system imposed by these huge warships shifted the classical tasks and division of labour on the oared-vessels as well.

The limited number of tasks on the oared vessel was replaced by a great number of different duties and functions on board the sailing ship. These new ships had to be sailed and fought on simultaneously, which was a complicated matter requiring a great number of skilled men and a complex division of labour. Among the various occupations were steering, administration, victualling, gunnery, craftsman (carpenters, caulkers, sail makers, etc.), religious leaders (*imam*), surgeons, longboat crews, mariners, sailors and so on.[33] The manning strategy, beside its advantages, placed a new economic burden on the navy. The victualling and accommodation of the increasing number of skilled crew and salaries of naval and petty officers meant new expenses that were aggravated by the increasing

[30] Çizakça, p. 221.

[31] Panzac, "Manning of the Ottoman Navy," p. 46.

[32] E. Ziya Karal, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar," *Tarih Vesikaları* I, no. 3 (1941), pp. 203-211.

[33] Panzac, "Manning of the Ottoman Navy," p. 46.

employment of foreign technicians, engineers and officers in the naval works, especially from the 1770s onwards.

The development of firepower was probably the most determining consequence of the transition. The beginning of the widespread use of cannons on ships in the sixteenth century was a watershed with respect to its revolutionary impulse in the course of naval warfare and technology. Earlier naval wars had been in the form of land wars waged on floating ships. With the introduction of galleons, naval warfare came to be a battle between ships instead of between individual soldiers. Fighting powers shifted their focus from killing or wounding the adversary to smashing the hulls and rigging of the adversary ships. Galleons could mount whole rows of huge cannon on several gun decks along each side. The weight of one alone would have capsized the lighter galleys. Therefore, the appearance of heavy artillery in Mediterranean naval battles soon made the galley obsolete. Despite their slowness, galleons could stand off and pound the relatively fragile galleys to pieces at long range before the galleys could even get in close enough to fire their small cannon, let alone grapple and board.[34]

In a nutshell, galleys played an important role in naval battles both in the Mediterranean and the Black Sea in many ways. There was a rooted tradition of galleys that shaped the whole range of naval and maritime activities. This tradition shaped the labour force in galley building, the seaman on galleys, the recruiting system and so on. This tradition was a direct consequence of the geographical conditions as well as of the rivalry with foreign naval powers using similar vessels. Ample sources were also an important factor facilitating the Ottomans, who had easy

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[34] Robert F. Marx, *The Battle of Lepanto 1571* (Ohio: The World Publishing Company, 1996), p. 32.

access to raw materials. Although galleons seemed to be useful vessels outside the traditional campaign period, starting with the vernal equinox until the beginning of November, they were impractical and lacked manoeuvrability. The Ottomans' long attachment to galleys was replaced by an incipient inclination towards galleons. Destructive firepower was the fundamental motive behind it. The tilting of the balance in favour of galleons was a hesitant process starting in the first half of the seventeenth century, but which came to be systematized by 1682.

The State of the Ottoman Navy from the Çeşme Incident up to the Ascension of Selim III to the Ottoman Throne

The year 1682 marked the systematic adoption of galleons by the Otoman Sate. Thanks to the reforms of Grand Admiral Mezzamorto Hüseyin Pasha, several imperial edicts and regulations were promulgated in 1701 that referred to the organizations of the sailors and mariners. The most important aspect of them was the creation of a new kind of post: *Kapudâne*, which corresponds to Grand Admiral. The *Kapudâne* held the first rank in the command of a sailing ship before the *Patrona* (naval official second in command) and the *Riyâle* (naval officer third in command). Their appointments and dismissals were regulated by strict rules according to meritocracy. These reforms soon proved successful.

Ottoman galleons achieved success in the second Morean War in 1714-18. They maintained their superiority in the Mediterranean Sea until the outbreak of hostilities with Russia in 1769. About a fifty year period between the second Morean and Russian wars were free of any serious naval involvement.[35] However, these peaceful years were the harbinger of the decay in the Ottoman navy.

The destruction of the Ottoman fleet by the Russian one consisting of fifteen *kapaks*, six frigates and other small crafts in the bay of Çeşme on 6 July 1770 had exerted a shocking impact on the Ottoman navy. The cost was huge: eleven ships of the line, six frigates, six three masters, seven galleys and thirty-two others were burnt by Russian fleet; a sailed ship and five galleys were captured; out of 15,000 to 17,000 men, 5,000 to 6,000 were captured, wounded or killed. Although this defeat has been attributed by scholars to the weakness of the Ottoman fleet, it was actually caused by the tactical, administrative and startegic mistakes made by Grand Admiral Hüsameddin Pasha, who, despite the opposition of Cezayirli Hasan Bey (later Pasha), locked the fleet into a narrow bay at anchor side by side, allowing the enemy to attack with fireships.[36]

Ironically, in the long run the Çeşme disaster contributed greatly to the awakening of the Ottoman reform movement in naval affairs. It also drove the naval authorities to search for the basic causes of the decay. The reform movement started with the appointment of the energetic Gazi Hasan Pasha as Grand Admiral. Barracks (*Kalyoncular Kışlası)* were built at Kasımpaşa in order to train, and discipline unruly sailors. The men were paid a certain amount of salary. These efforts paved the way for the emergence of the *Kalyonculuk* as a seperate corps in the Naval Arsenal. Foreign naval engineers were employed in naval works. Under the guidance of French shipbuilders such as Le Roy and Durest, new ships were constructed on

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[35] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, pp. 498-501.

[36] M. Münir Aktepe, "Çeşme Vakası," *TDV Islam Ansiklopedisi*, 8 (İstanbul: TDV, 1993), p. 289; Uzunçarşılı, p. 500; Panzac, p. 48. For a detailed account of the war, see R.C. Anderson, *Naval Wars in the Levant (1559-1853)* (Liverpool: Liverpool University Press, 1952), pp. 277-307.

European lines. In order to provide technical training to naval officer candidates, the *Hendesehâne/Hendese Odası* (Chamber of Mathematics) was established at Tersâne-i Âmire on 29 April 1775. Baron de Tott, Campbell Mustafa Aga, and a Frenchman named Kermovan played important roles in the formation of this institution. On 5 November 1784, this school moved to a new building composed of a few rooms around Tersâne Zindanı, which was constructed by Ataullah Efendi, the Superintendent of the Naval Arsenal, expanded into a full-fledged school for naval engineers with both native and foreign teachers.[37]

Thanks to these reforms, the Ottoman navy began to develop rapidly. However, foreign observers tended to overestimate the power of the Ottoman navy, some describing a general picture based on individual examples, others portraying in numbers. For instance, Joost Frederic Tor, the secretary to the Duch ambassador Van Dedem in1785, mentioned the deplorable state of the Ottoman navy. Citing the example of a ship on the stocks on the island of Lesbos, that had been waiting for repair for one and a half years. He also described the uselessness of the Ottoman transport vessels at Çanakkale and the ruinous condition of the Dardanelles fortresses.[38] Alhough these comments might have been true to some extent, when compared with the Ottoman and other European sources it is clear they were biased and inaccurate. Examples contradicting Tor's claims can be checked against the reports and observations of travellers and ambassadors, of which mention of a few

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[37] Mustafa Kaçar, "Osmanlı İmparatorluğu'nda Askeri Teknik Eğitimde Modernleşme Çalışmaları ve Mühendishanelerin Kuruluşu (1808'e Kadar)", *Osmanlı Bilimi Araştırmaları II* (İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayını, 1998), pp. 82-93.

[38] Jan Schmitd, *Per koets naar Constantinopel: De Gezatschapsreis van Baron van Dedem van de Gelder naar Istanbul in 1785* (Zutphen: Walburg Press, 1998) (English summary).

will suffice. M. Bonneval's report of 22 April 1784 presented concrete data and threw considerable light on the conditions of the Ottoman Navy at the time.[39]

Table 1. Condition of the Ottoman Navy (22 April 1784)

Rates of the ships	In good condi-tion	In bad condi-tion	Confirmed ships (Rigged-out)	Un-confirmed ships (not rigged out yet)	On stocks	Construc-tion site
Line- of-the battle:						
2 of 74 guns		1	1		1	Istanbul
12 of 64 guns	8	4	4	8		10 Istanbul 1 Rhodes 1 Bordeaux
10 of 54 guns	8	1	4	5	1	
24	*16*	*6*	*9*	*13*	*2*	

Source: PRO. FO 95/8/14 (25 April 1787), pp. 862-863.

As shown in Table 1, the line-of- the- battle ships and frigates were the main contemporary forces while old galleys were still effective. In the following years, the replacement of these galleys by various man-o'-war ships would be witnessed. The following three tables indicating the state of the Ottoman Navy on 25 April 1787 refer to the above-mentioned transition.[40]

[39] Karal takes this list from M. Bonneval's report of 22 April 1784. This Bonneval is not Kont De Bonneval, but one who came to Istanbul to conduct technical research on behalf of the French government and stayed there in 1770-1784. Bonneval's report describes the plight of the Ottoman Navy. See Enver Ziya Karal, "Osmanlı Tarihine Dair Vesikalar," *Belleten* 4, no. 14-15 (1940), p. 181.

[40] PRO. FO 95/8/14 (25 April 1787), pp. 862-863.

Table 2. State of the Ottoman Navy (25 April 1787)

Type of Ships	*Their Number*
Galleys	6
Bomb ketches	8
Gun-boats carrying a 24-pounder and a mortar of 10 inches	21
Ships of the line	9 from 70 to 76 guns 10 from 60 to 66 guns 7 from 50 to 54 guns Total 26
Frigates	14 from 32 to 40 guns 10 from 24 to 30 guns Total 24
Sloops	10 from 16 to 20 guns 30 from 8 to 12 guns Total 40
Of all types	*25*

Source: PRO. FO 95/8/14 (25 April 1787), pp. 862-863.

Table 2 clearly shows that classical Ottoman galleys had become obsolete, leaving their place to sailed ships with bigger gun and fire capacity. Another striking point can be observed in the increase in the types of ships.

Table 3. Types of Ships on the Stocks and Their Gun Capacity (25 April 1787)

Type of Ships on the Stocks	*Their Guns*
Ships of the line	2 of 74 guns 2 of 64 guns 2 of 54 guns
Frigates	2 of 40 guns
Total	*8*

Source: PRO. FO 95/8/14 (25 April 1787), pp. 862-863.

Table 3 indicates that the gun capacities of the ships were almost same for the years 1784 and 1787. It seems that 40-74 guns were preferred with respect to the manouverability of ships. This range was common in the navies of the world during the period.

As for the geographical distribution of ships, Istanbul appears as the leading place, with fifty-six ships; the Mediterranean as the second, with thirty-nine ships; and finally the Black Sea with thirty ships. The striking point in Table 4 is the increasing number of sloops. Forty in number, these small sailing warships, which indicates that the Ottomans planned to benefit from their manouverability in battle. Finally, these 125 naval ships were the harbinger of the deterrent Ottoman naval force of the future.

Table 4. Geographical Distribution of the Ottoman Navy (15 April 1787)

Repartition of the Ottoman Navy			
Type of the ships	*The Mediterranean*	*The Black Sea*	*Istanbul*
Ships of the line	10	5	11
Frigates	5	8	11
Sloops	20	4	16
Bomb-ketches	2	2	4
Gun-boats	2	11	8
Galleys			6
TOTAL	*39*	*30*	*56*
Of all Denomination	125		

Source: PRO. FO 95/8/14 (25 April 1787), pp. 862-863.

In 1789, when Selim III ascended the throne, the Ottoman navy consisted of eighteen galleons, twenty-four frigates, six *kırlangıç*, ten *şehdiye* (a type of two to three masted sailing warship of twenty-three to thirty-five *zira* in length), eight *şalope* (sloop), twenty-four *bülbülce*, *çamlıca* (a type of *şehdiye*), *kerpe* and *Rum* *tırhandili* (a type of Greek light boat), all amounting to ninety irrespective of the active, inactive or size. On the biggest galleons were 600-750 crew who had mainly been transferred from merchant ships[41] and were far from being properly trained and therefore were backward in comparison with the contemporary technology.[42]

Having outlined the story of transition from oared to sailed ships and the developments in the pre-Selim III period; the next chapter is about the basic novelties and milestones in the shipbuilding technology in the late eighteenth and early nineteenth century.

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[41] Nejat Gülen, *Şanlı Bahriye (Türk Bahriyesinin İkiyüz Yıllık Tarihçesi 1777-1973)* (Istanbul: Kastaş Yayınları, 2001), p. 35.

[42] Safvet, "1205'de Donanmamız," *Tarih-i Osmanî Encümeni Mecmuası*, Year 4, vol. 3 (İstanbul, 1331), pp. 1300-1377.

CHAPTER TWO

DEVELOPMENTS IN OTTOMAN SHIPBUILDING TECHNOLOGY IN THE LATE EIGHTEENTH AND EARLY NINETEENTH CENTURIES

The development of a sound naval technology required a powerful administration, a well-organized division of labour, plentiful material and skilled human sources, suitable geographical conditions, technical know-how, and efficient channels of information. As of the context, the ways and methods through which the Ottomans followed and adopted the European naval technology and know-how in order to develop their own are of utmost importance. Among the main channels of technological information espionage were primary among techniques, sending ships to assess enemy harbours, count the anchored ships, and observe the state of their rigging, construction and repair facilities.

Accounts of travellers and merchants were also important sources of information, though their accuracy was debatable. Diplomatic and consular representatives and their paid agents, foreign officers, engineers and technicians working for rival countries constituted the official and relatively more reliable sources of information.

In addition to these methods, the information of which was provided mainly by human agents, there were more accurate sources providing direct information about enemy ships and technologies such as captured ships, ships offered by foreign countries as gifts,[1] and wreckages. There is no doubt that this last category allowed the Ottoman naval technicians to examine the technical properties of the enemy fleets in order to create their own ones or overcome the shortcomings of their shipbuilding and navigational technologies.

The Ottomans, like other peoples in the world, used these channels to gather information. The geography in which they lived was generous enough to provide the raw materials required for naval technology. There was a well-organized division of labour starting from the felling and transportation of timber to the construction and launching of a ship. Foreign technicians, engineers and officers served in cases when the domestic technical know-how was insufficient.

This chapter examines some of the more important technological developments in the Ottoman navy. The main materials used in the construction of ships in the late eighteenth century, the process of ship-building, the introduction of copper sheathing of ships, the introduction of new tools, equipment and machines used in naval works, the construction of new ship-building structures and auxiliary forms, and developments in naval gunnery in the time in question are among the leading themes taken up here.

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[1] When Sidney Smith arrived in Istanbul in 1799, he presented Selim III with gifts from King George III. Among these gifts were a model of a ship of the line, the *Royal George*, twelve portable brass three-pounder cannon for carrying on camal-back, and paintings of naval battles. See Tom Pocock, *A Thirst for Glory: The Life of Admiral Sir Sidney Smith*, (London: Pimlico, 1998), p. 81.

The Main Materials Used in the Construction of Ships in Late Eighteenth Century Ottoman Empire

The main materials for shipbuilding generally were supplied in two ways. First, the provinces that were rich in some materials delivered the required amounts to the Naval Arsenal in Istanbul to be stored for future use, or these provinces sometimes constructed one or two ships as part of their tax. This kind of tax was called *avârız*, while the method was named *ocaklık.* Second, the Ottomans also had recourse to the method of purchasing these materials from traders and producers during the preparations for naval campaigns. Among the main materials required for the construction of ships as well as other naval works were timber, iron, copper, lead, oakum, nail and bolts, sailcloth, hemp, paint, heath, pitch and tar, tallow, resin, rope, wire, sulphur and ballast. While other materials could be added to this list, we will focus on the ones mentioned here.

Timber (*Kereste*)

Wood was the most important construction material for a sailing ship in the eighteenth century, as it had been in the preceding centuries. Until the second half of the nineteenth century, wood continued to dominate as the main construction material as metals had not assumed much importance yet.

Timber was not used in its freshly cut form, since insufficiently dried pieces rotted quickly. The wood had to be drained of its sap by submerging it in water and then letting it dry for a long time in the open air. Plentiful supplies of wood were necessary in order to have well-drained planks approximately ten years old, which included the time for soaking and drying.

A three-rated vessel (mounting sixty-five to seventy-nine guns), for instance, in England cost roughly 1,000 pounds per gun, so a seventy-four gun vessel, for example, cost about 70,000 pounds. Half this figure was for timber, one-tenth for masts, one-seventh for the sail and rigging. Thus, the price of building lumber was of primary importance: its scarcity and cost were the determining factors in naval construction.[2]

There were other kinds of timber used in the hulls of British ships before 1804. Elm was used consistently in most ships during the period, but the nature of the wood limited its availability to the portions of the hull below the waterline, near the keel. Only the strongest oak could withstand intermittent exposure to moisture and air, but in places where air was excluded, elm could keep the keel preserved. Beech was even more limited in its adaptability for naval construction. Like elm, it could be used for for planking only below the waterline, but unlike elm, it was not strong enough for use in the keel.

Another principal timber was *Pinus Sylvestris*, Scotch pine, or, as it was more generally called, fir. This tree was most versatile in its applicability to naval construction, for an entire ship from keel to topmasts could be built of it. This tree will be discussed shortly in connection with its important function as mast material. As a material for hulls, it was used only occasionally by the navy in times of emergency or shortage. Fir had several advantages over oak as a ship timber. It was capable of rapid application, for it contained resin instead of sap, and required less time for seasoning.[3] It was a softer wood, and could be more easily pressed into

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[2] Daumas Maurice and Paul Gille, "Ships and Navigation," *A History of Technology and Invention*, trans. Eileen B. Hennes (London: J. Murray, 1979), pp. 322-324.

[3] From the moment that the tree is felled, its timber starts to lose moisture, and the process of seasoning or drying begins. As the wood loses water, air moves in to fill the emptying spaces of its

form. Fir vessels were lighter and consequently faster. The reason for building the original fir frigates in 1757 is said to have been the desire to match the superior speed of the French frigates. As for the disadvantages of fir, first of all, it was far less durable, and it splintered much more freely in the battle. It was an admittedly inferior substitute for English, if not for Baltic, oak.[4]

It seems that the Ottomans, with their ample timber sources, were luckier than most of the northern states, which were forced to look for overseas timber sources in order to carry out their maritime trade and wage war against their enemies. The Ottoman archives provide information about the timber sources, its transportation to the construction sites, its various types and quantities, as well as some domestic and foreign transactions for its supply.

The construction of new ships in an unexpectedly short time after the destruction of the Ottoman fleet at Lepanto (*Inebahtı*) in 1571 and in Çeşme in 1770 cannot be accounted for by anything but the ample timber sources and well-organized timber administration. Ottoman sources, in general, indicate that the types of timber used in shipbuilding and related naval works were mostly oak (*meşe*), pine (*çam*), elm (*karaağaç*), fir (*köknar*), larch (*melezçam*), chestnut (*kestane*), hornbeam (*gürgen*), ash tree (dişbudak), *kayacık* tree, lime tree (ıhlamur), *gökez* and pırnar/pırnal (Quercus ilex, holly oak, holm oak, a kind of oak) trees.

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cells, and so it becomes lighter in weight, but it also becomes harder and substantially stronger and shrinks a little. The easiest way to season wood is to stack it, out of doors or in an open-sided shed, so that air can flow freely around every plank or piece. This natural process takes a long time. For prime oak or ash plank this process may take a whole year or even longer. For more information, see Herbert L. Edlin, *What Wood Is That? A Manual of Wood Identification* (London, n.p. 1969), p. 19.

[4] Robert Greenhalgh Albion, *Forests and Sea Power: The Timber Problem of the Royal Navy 1652-1862* (Connecticut: Archon Books, 1965), p. 25.

European countries such as France, England and Russia,[5] suffering from shortages of timber, sought ways to acquire this material from the Balkans and the Black Sea. France, in order to secure the timber for masts from the Black Sea, which had been an attempt prevented so far by the Porte, followed a cunning policy and eventually succeeded to some extent by commissioning some French technicians and engineers in the construction of ships in the Naval Arsenal.[6] On the other hand, the British government is seen to have asked for permission from the Porte in order to cut oak trees in the forests in Albania.[7]

Regarding the British interest in Albanian oak, it is known that Aldair, the British minister to Istanbul, began to make applications to the Porte with respect to supplying of timber for ships. Considering the financial crisis the Porte suffered, he proposed to the Grand Vizier a loan providing that Turkey permit the export of oak for the British navy. The consent was eventually secured.[8] In the following years,

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[5] "*Bundan akdem Korfa cânibine azîmet edecek Rusya beylik sefînelerinden bir kıtası Karadenizde azim fırtınaya tesadüf edüp direkleri şikest ve fenapezîr olmağla tersâne-i âmire havuzuna idhal ile tamiri muktezası olduğunu Rusya elçisi bir kıta takririyle inha ve iktiza eden kerestenin itasıyla tersâne-i âmire halifelerinden bir nefer halife tayini hususunu istida etmekten nâşi menzur-ı şahaneleri buyrulmak içün takrir-i mezkur maruz-ı havz-ı alileri kılınmağla sefîne-i mezkureye lazım gelen kereste bahasıyla ita olunarak tamiri hususuna iktiza eden iânetin icrasına mübaderet olunacağı malum-ı şahaneleri buyruldukta emr... Yapulsun lakin kereste bahası alınmasun.*" See BOA. Hatt-ı Hümâyûn, no. 4563 (1207/1792-93).

[6] Paul Walden Bamford, *Forests and French Sea Power 1660-1789* (Toronto: University of Toronto Press, 1956), p. 204.

[7] The letter dated 30 May 1801 (from the Earl of Elgin to the Secretary of State) says that " ...I also received instruction in England, to solicit from the Porte, an exclusive right to cut timber in Albania. A Right might be obtained, and with a promise that it should be exclusive. But I find it were absurd, to expect that this would be against a French intrigue. I wish therefore to know whether I am to make the demand under this circumstance." See PRO. FO 78/32 (30 May 1801).

[8] Robert Greenhalgh Albion, *Forests and Sea Power: The Timber Problem of the Royal Navy 1652-1862*, p. 332-333. For later developments about the British bid to secure the Albanian oak, see Patricia K. Crimmin. "A Great Object with Us to Procure This Timber...: The Royal Navy's Search for Ship Timber in the Eastern Mediterranean and Southern Russia, 1803-1815," *International Journal of Maritime History* 4, no. 2 (December 1992), pp. 83-115.

British interest in and need for Albanian oak seems to have continued. This is clearly understood from a letter dated 1 August 1804, stating the richness of the Porte's timber sources and the possibility of their exploitation by the British navy.[9]

Among the timber sources of the Ottoman navy in the late eighteenth century were Midilli, Kazdağı (*koğuşluk* pine),[10] the province of Canik,[11] Taşoz (oak, elm), Rumeli (oak, elm),[12] Megri, sixty miles from Rhodes, Biga province (pırnar tree/tree nail/*kavilya*[13]), Iznikmid (hornbeam/*gürgen lata, kemerelik lata-i kebîr-i çam, piraçol-ı kebîr-i meşe,*[14] *felenklik* and *kızaklık*[15]), Kidros, Cide (timber for masts), Misivri, Ahyolu, Segen, Ayna adasi (oak),[16] Gemlik,[17] Domaniç (large pine

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[9] PRO. FO 78/43 (1 August 1804). For the letter, see Appendix P.

[10] BOA. Kamil Kepeci, no. 5734 (28 Safer 1213/11 August 198).

[11] BOA. Cevdet-Bahriye, no. 9360 (18 Zilkade 1206/8 July 1792).

[12] BOA. Cevdet-Bahriye, no. 1310 (29 Ramazan 1211/28 March 1797). For felling the trees in question properly and in accordance with the given measures and diameters two *mubaşir çavuş* (superintendants) and two *dağ mimarı* (architects in charge of felling trees according to the specific measures) were commissioned at 250 *kuruş* akçes each, amounting to 1,000 *kuruş* in total.

[13] There were ample sources for pernar trees in the mountains of Biga province in 1211/1796-97. See BOA. Cevdet-Bahriye, no. 1796 (19 Receb 1211/18 January 1797).

[14] BOA. Cevdet-Bahriye, no. 8705.

[15] For the launching requirement of a frigate of 53 *arşun* (a unit of legth equal to 1 *zira*, 1 French pic) under construction at the *Tersâne-i Âmire*, ten timber for slipways (*kızaklık*) and 100 for cross pieces of timber laid down as part of the ways for a ship (*felenks*). See BOA. Cevdet-Bahriye, no. 10895 (25 Rebî'u'l-evvel 1211/26 September 1796).

[16] BOA. Cevdet-Bahriye, no. 1905. As far as the document (1211/1796-97) is concerned, for use in the construction of the dry-dock, the necessary oak from Ayna island wharf was transferred to the Imperial Arsenal by a certain Yorgaki's *çekeleve* (a kind of light transport vessel with two short masts that lean forward) and quality timber from Kidros by ships of such *zimmis* (non-Muslim Ottoman subjects) as Kosta and Napalon as well as *hornbeam lata* from Iznikmid by Yani and Yorgi Reis' *Çenber Sefines* (a kind of transport vessel). The total expense for the transportation and storage (*icâre-i hammâliye*) of the timbers by porters is shown as 3,185 *kuruş*. Another document of 1211/1796-97 shows that 2,000 pieces of *kanatlık tahta* (timber for the wings) out of the 3,000 stored

timbers for *kemerelik* and *lata-i kebîr*), Gökâbâd (timber for *lata-i kebîr*, *mangatsa* and *kemerelik*),[18] Gümülcine, Karaağaç,[19] Bolu, Mudurnu, Âbâd Yaylası, Elmacık Dağı, Sarı Ot Dağı (oak for *koğuş* and *lata* timber),[20] Seferihisar, Mihaliçcik, Günyüzü, Gökçedağ, Beypazarı, Bergama, Tuzla, Ayvalık, Karahisar, Kurupazarı, Kozak, Soma, Kırkağaç, Akyazı, Darıçayrı, Sarıçayır, and Bidayic.[21]

A document dated 12 March 1803 states the timber sources of the Porte. The best and cheapest timber, both for shipbuilding and other purposes, came from the Black Sea region, from Samsun and Sinop and several other places down to Akçahisar. In the two first places there were regular dockyards belonging to the Sultan. The best markets therefore for the purchase of timber were Inebolu, Meset, Faacas, Bartın, and Akçahisar. These places were frequented by Russian ships, laden with iron, an article much in demand along that entire coast.

From the same document, it is learned that timber also came from Galatz in Rumelia, particularly in quantities suitable for masts. The fir of Asia was of a

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for the construction of the big dry-dock were bought from Bartin ships, with a cost of 20 *akce* per each timber, amounting to 3,665 *kuruş*. The ones bought were stored in the *Kirpashâne* (Sailcloth house) in the old naval arsenal. See BOA. Cevdet-Bahriye, no. 1169 and 9501.

[17] BOA. Hatt-ı Hümâyûn, no: 9706/A-B (1206/1791-92); and see also, PRO. FO 78/12A (24 December 1791), p. 211. The document says that the Porte established a naval arsenal at Gemlik in the Gulf of Mudanya, abounding with fine timber.

[18] 297 large sized pieces of *kemerelik* pine timber, 17, 18, 19 and 20 *ziras*, were provided from the mountains of Domaniç for the deck beams of a three-decked galleon under construction at the *Tersâne-i Âmire* at the end of Rebî'ul'evvel 1210/14 October 1795. A total of 3,175 *kuruş* (600 *para* each) was paid for the expenses of felling and the transportation of the mentioned timbers. See BOA. Cevdet-Bahriye, no. 10694.

[19] BOA. Hatt-ı Hümâyûn, no. 12356 (date, 1210).

[20] 100 big pieces of timber for *lata* and 400 pieces of pine timber for *koğuş* were urgently demanded in the year 1216/1801-02, from the administrators of the above-mentioned places for the construction of galleons at the *Tersâne-i Âmire* and drydock. See BOA. Cevdet-Bahriye, no. 2413.

[21] BOA. Hatt-ı Hümâyûn, no. 8775 (14 Rebî'u'l-âhir 1206/14 December 1791).

superior quality and cheaper than that which grew in Europe, but it was harvested in smaller quantities due to the difficulty of floating rafts from the Asian coast against the winds and current, both of which were favourable to the transportation of timber from the Danube to the Bosphorus.

For foreigner states, the purchase of timber was at all times more efficient with the assistance of a *firman* (imperial decree) from the Porte, but it was possible to get it done without such aid, by forging understandings with the different Turkish commanders, and by making regular payments to them. As the newly admitted foreign ships were to be exempted from custom house visits, the timber trade in large spars and masts could be carried on independent of the Ottoman government.[22]

The size of the timber changed according to the size of the ship. To give an example, sixty large timbers of forty, thirty-four, and thirty-two *zira* (seventy-five cm) for masts were required for a three-decker under construction in the Naval Arsenal on 15 Rebî`u'l-âhir 1211/18 October 1797. The local authorities were odered to search for and provide these masts from Kidros and Cide,[23]

Timber was used in a variety of works related to shipbuilding. In addition to its use in the construction of masts, yards, planks,[24] keels, knees, hulls, broadsides, rudders, tillers, and water barrels, timber was also used for the production of pulleys.

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[22] PRO. FO 78/39, p. 85.

[23] According to the measures required, masts of forty *zira* in length had to be ten to eleven *karış* at the bottom and six to seven *karış* on the top; the ones of 34 *zira* in length had to be 8-9 *karış* at the bottom and five to six *karış* on top; the ones of thirt-two *zira* in length had to be seven to eight *karış* at the bottom and five to six *karış* on top. See BOA. Cevdet-Bahriye, no. 6188.

[24] Timber in planks was also used in covering or cladding certain parts of the ships. To give an example, for a three-decker being constructed at the Naval Arsenal, 2,500 pieces of oak timbers were demanded from Ahyolu and its surrounding area in 1212/1797-98. *'Tersane-i amirede inşa olunan üç anbarlu kalyon-ı hümayunun kaplaması içün* (for cladding a three-decked galleon under construction in the Naval Arsenal)*'* See BOA. Cevdet-Bahriye, no. 4512.

Especially ash tree (*dişbudak*), *kayacik* and elm trees (*karaağaç*) were needed for that purpose.[25] Additionally, timber was essential in the construction of tools and equipment used in naval works and drydocks. In 1210/1795-96, certain amount of *teknelik elvah-ı ıhlamur kalas* (timber for hulls), *sütun orta çap meşe* (oak for average columns), *kanatlık elvâh-ı çam* (pine plates for wings), a sack of *ambar sandal* (timber for boats), *kumluk sakadiye* and some others were provided from the *mahzen-i çûb* (timber store) for the construction of two workbenches (*destgâh*), a wheel with a clamp (*mengeneli çarh*) and some other tools.[26] Furthermore, timber for producing yards (*serenlik kereste*) was used in the production of cannon molds in Hasköy at the beginning of Rebiulevvel 1210/September-October 1795.[27] There is evidence indicating that 500 pieces of elm tree provided from the province of Selanik were needed for the production of gunstocks to be used on the three-deckers, galleons and frigates in 1211/1796-97.[28]

Timber was named in many ways. The regions from which it was supplied and the part of the ship in which it was used were two important references in naming the timber. In a register book (*defter*) dated 2 Rebî`u'l-âhir 1218/22 July 1803, showing the timber bought from a certain Kosta, we come across following names: *Kara sağir, çam tahtası* (pine wood), *çifte kanatlık, bostan oluğu, çifte bordalık, çifte çam tahtası, çifte kalas, on iki arşın lata* (thinnish board of twelve

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[25] BOA. Cevdet-Bahriye, no. 7720 (18 R 1217/18 August 1802).

[26] BOA. Cevdet-Bahriye, no. 9981.

[27] BOA. Cevdet-Bahriye, no. 6336.

[28] The timbers were seven *zira* in length, twenty-three *kana* in width and twenty-one *parmak* in thickness. BOA. Cevdet-Bahriye, no. 2407.

zira),[29] *on iki arşın kebir çam* (twelve pieces of large size of pine timber), *çifte mane, kestane agacı tahtası* (timber of chestnut tree), *Rumeli omurgası* (timber for the keel from Rumelia), *Kidros omurgası* (timber for the keel from Kisros), *Bartın kanatlığı, Karasu tahtası* (timber from Karasu), *Fındıklı dolabı,*[30] *Fıstıklı koğuşu*[31] and so on. In addition to these types were the following ones used in Sinop: *asdar* (pine), *barbelik, barbe-i kebîr, baryalık-ı kebîr, bedel koğuş kablı, bedel koğuş çam kablı, çubuk çam, diyame-i sağîr* (any tree), *diyame-i kebîr* (any tree), *döşek, döşek mişe kütük* (oak), *ecnâs-ı çam* (pine), *felenk, fındık çubuğu* (*tecne çubuğu*), *katene, kazıklık* (hornbeam for stakes), *kızak, koğuş* (pine), *koğuş-ı çam* (pine), *kütük* (log), *kütük-i mişe* (oak log), *iskelelik* (timber for building wharves), *ırğad-ı sağîr* (elm for pulleys), *ırğâd-ı manula, latakına, levm-i yar, makaralık-ı kebîr* (big sizes of elm log for pulleys), *makaralık-ı sağîr* (small sizes of elm), *makas direk* (fir for masts), *mertanlık kürek, mülk, omurga* (keel), *tahtalık* (pine wood), *tahtalık-ı çam* (pine wood), *taslak kürek, tiyame-i sağîr, üsküce, küyeşte, varyozluk* (elm for the production of heavy hammer), *varyalık, yarpalık, seren direği* (*gökez* tree for yards), and *seren-i sağîr* (timber for small yards).[32]

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[29] "Lata" (lath) is a long, narrow, thinnish board made of pine timber. See *The Lingua Franca in the Levant: Turkish Nautical Terms of Italian and Greek Origin* (İstanbul: ABC Kitabevi, 1988), pp. 272-273; and Şemseddin Sami, *Kâmus-ı Turkî* (Istanbul: Bedir Yayinevi, n. d.), p. 1233. Lata was also used in the construction of the big drydock at the Naval Arsenal. It is understood that 1,2601 *kuruş* were paid for the felling and transfer of fifty-five pieces of lath timber supplied from Iznikmid through Nuh Bey in 1211/1796-97. See BOA. Cevdet-Bahriye, no. 1585.

[30] BOA. D.BŞM-TRE, no. 15412.

[31] "Koğuş" was generally made of pine tree and used for covering the distance between ports (*lumbar aralıkları kaplamasi içün*) in 1215/1800-01. See BOA. Cevdet-Bahriye, no. 4511.

[32] İbrahim Güler, "XVIII. Yüzyılda Sinop'ta Gemi İnşa Teknolojisinin Altyapı, İstihkâm, İstihdâm, Üretim ve Pazarlama Sorunu," *1. Türk Bilim ve Teknoloji Tarihi Kongresi Bildirileri (15-17 Kasım 2001)*, eds. Emre Dölen and Mustafa Kaçar (İstanbul: TBTK and IRCICA, 2003), p. 33.

Most of these types are mentioned in a document dated 22 Ramazan 1211/21 March 1797 as well, with some additions including *Tırhandil-i kebr-i çam, yeke-i dümen, ser kütük, çatal bükme, çatal kazık, kemerelik lata-i kebir-i çam* and so on.[33] To give an idea about the required timber and its types for a new galleon of 55.5 *zira* and constructed on 19 Zilhicce 1197/15 November 1783, some 500 pieces of timber were needed. Among them were *bodoslama-i baş, bodoslama-i kıç, pare-i bodoslama-i baş, asdar-ı bodoslama-i baş, asdar-ı bodoslama-i kıç, akreb-i baş, kanad-ı kalyon, pare-i kanad-ı kalyon, pıraçol-ı akreb-i kıç, karina, asdar-ı karina,* and *bükme çatal.*[34]

As for the system of measurements used in the wood trade and in the building of naval ships, *zirâ, arşun, kadem, karış, kulaç,* and *umk* were the basic units. Out of these measures, *zirâ* and *arşun* were equal units of length while *kadem* was for width. In measuring the width of the timbers *karış* and *kulaç* were used, while *umk* was used for depth.[35] It is important to note that some French measures of length were also used. For instance, at the end of Mahmud Raif Efendi's book entitled *Tableau des Nouveaux Reglements de l'Empire Ottoman* (Tables of the New

[33] These types were taken from a register covering the required timbers and their number for a "*kapak kaldırır*" (a second rate, two-decked man-of-war with eighty to 110 guns and with two gun-decks below the spardeck) galleon of sixty-three *zira* and with eighty guns as well as a corvette of 36.5 *zira*, with twenty-six guns, both under construction at the *Tersâne-i Âmire*. The required timber was provided from Iznikmid. See BOA. Cevdet-Bahriye, no. 10896.

[34] BOA. Cevdet-Bahriye, no. 10252. For a full account of the timber features of this galleon, see Appendix A.

[35] Güler, p. 43.

Regulations in the Ottoman Empire*)*, pictures of ships constructed by French engineers were measured in French "pic" corrresponding to Ottoman *arşun/arşın.*[36]

Regarding the method of felling timber, a foreign document criticized the Ottoman's paying little attention in choosing the proper types of timber for naval construction. The Ottomans generally felled oak, fir, larch and other trees without any distinction and in any of the four seasons of the year, which was to the infinite detriment of the solidity and duration of the wood.[37]

Heath (*Funda*)

Consisting of various types of small trees, heath was burned to dry out boats, galleys and galleons when their hulls were first constructed. It was also used during the caulking process. Towns such as Üsküdar, Çengel, İstavroz and Kuzguncuk were among the main suppliers of heath.[38] There were more than 500 kinds.[39]

Raw Iron (*Âhen-i Hâm*)

[36] Feza Günergun says that the earliest comparisons of measures length between French and Ottoman were most probably realized at the end of the eighteenth century and adds that 1 Ottoman *arşın* equalled 1.176 French *kadem.* See "Osmanlı Ölçü ve Tartılarının Eski Fransız ve Metre Sistemlerindeki Eşdeğerleri: İlk Karşılaştırmalar ve Çevirme Cetvelleri," *Osmanlı Bilimi Araştırmaları II (Studies in Ottoman Science II)* (İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayını, 1998), p. 25.

[37] PRO. FO 78/15. (1794)

[38] Bostan, *Osmanlı Bahriye Teşkilatı: VII. Yüzyılda Tersane-i Amire*, p. 121.

[39] Katip Çelebi, *Kibâr fî Esfâri'l Bihâr*, ed. Orhan Şaik Gökyay (Istanbul: Milli Eğitim Basımevi, 1973), p. 308.

In the late eighteenth century iron, both raw and processed, was used in a wide spectrum of application in the Ottoman navy. Mostly coming from Samakoçak/Samakovcuk[40] and Ayna (or İne) Adası[41] it was generally stored in and delivered from the *mahzen-i surb* (store for metals and other equipment).[42]

The Imperial Mint (*Darphâne-i Âmire*) also stored, processed and delivered iron when the need arosed. Raw iron was mainly used in the manufacture of common anchors (*lenger*), warping anchors[43] (*tolos/tonos/tonoz demiri*), nails (*çivi*), hands/crank (*akrep/kol*), bolts/screws (*cıvata*), rings (*halka*), axes (*balta*), sledgehammer (*balyoz/variyoz*), sledgehammers for fids[44], (*variyoz-ı kaşkaval*), chisels (*keski*), shovels (*kürek*), torches (*meşale*), rings for water barrels (*çember-i*

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[40] BOA. Hatt-ı Hümâyûn, no. 12356 (1210). Samakoçak/Samakovcuk should not be confused with Samakov. They are two different places. The former was a village administratively attached to Midye district in 1086/1675 while the latter was a district of Bulgaria. The reaya (the tax paying Ottoman subject class, as distinct from the military calss) of Samakovcuk was responsible for preparing 350 *kantars* of raw iron for the *Tersâne-i Âmire* per year. They did so until the end of the seventeenth century when this amount was reduced to 200 *kantar*. On the other hand, Samakov provided 935.5 *kantars* and 20 *kiyyes* of raw iron from 1693 onwards. Raw iron supplied from Samakov followed the Samakov-Tekirdag-Istanbul route. See Bostan, pp. 122-123. Samakov was a source of raw iron not only for the Arsenal or *Tophane*, but also for some mosques and important buildings in Istanbul. At the beginning of Recep 1173 a decree was issued to the local authorities of Sofya and Samakov to send raw iron for the construction of the Laleli Mosque in Istanbul. On the same date Piravishte also provided iron for the same building. See Ahmet Refik Altınay, *On ikinci Asr-ı Hicrî'de İstanbul Hayatı (1689-1785)* (İstanbul: Enderun Kitabevi, 1988), p. 191.

[41] BOA. Cevdet-Bahriye, no. 2223 (1215/1800-01). In 1223/1808, 1,000 *kantars* of raw iron were purchased from Samakovcuk and Ine/Ayna Adası. Each *kantar* cost eleven *kuruş*, and half of the total cost (5,500 *kuruş*) was paid from the treasury of the *Tersâne-i Âmire*. See BOA. Cevdet-Bahriye, no. 9297 (5 Cemâziye'l-evvel 1223/29 June 1808).

[42] BOA. Cevdet-Bahriye, no. 3365 (1218/1803-04).

[43] It was also called "kedge anchor". It was a kind of anchor thrown from the stern to sea, attached to a wire in order to keep the ship in a certain direction. See Mustafa Zaloğlu, *Gemici Dili* (İstanbul: Türk Deniz Kuvvetlerini Güçlendirme Vakfı Yayınları, 1988), p. 373; Henry Kahane and Andreas Tietze, *The Lingua Franca in the Levant: Turkish Nautical Terms of Italian and Greek Origin* (Istanbul: ABC Kitabevi, 1988), p. 584.

[44] Fid or *kaşkaval* means a square bar to support the weight of the topmast. *Lingua Franca*, p. 130.

macana-i âb), axles *(mil*), forks (*çatal*), tongs (*maşa*), levers (*manivela*), augers/drills for guns (*burgu-i top*), hooks for gunports (*kanca-i lumbar*), hooks for threefold purchase[45] (*kanca-i firaşkon*), hooks for cat david/catheads (*kanca-i griva*), hooks for boats (*kanca-i sandal*), cannons (*top*), some joints and parts of gunstocks (*top kundaklarının bazı kısımları ve bağlantı malzemeleri*), common chains (*zincir*), chain plates of backstays (*landa-i pateraça*), hawses (*gomana*), stoves (*ocak*)[46] and some other equipment of the naval ships.[47]

In addition to the these uses, it was affixed, in plates, to the inner sides of the ship hulls in order to isolate fires from the broadsides of the ships[48] as well as to fasten joints in the construction and repair works.[49] 500 *kantars* of iron were needed for the construction of a fifty-four *zira* galleon in Rhodes.[50] Finally, iron imported

[45] It was used to lift very heavy objects. It mostly consisted of double blocks with three sheaves. See Zaloğlu p. 139; and in *Lingua Franca* it appears as "a tackle of one single and one double lock," "a tackle of one double and one triple block," "a tackle of two triple blocks," and "threefold purchase," p. 230.

[46] There are many documents referring to these materials. To mention some of them, see BOA. D.BŞM.TRE, no. 15211 (10 Cemâziye'l-evvel 1205/15 January 1791); Hatt-ı Hümâyûn, no. 10011 (1205/1790-91); Kamil Kepeci, no. 5724 (1205/1790-91); Kamil Kepeci, no. 5726 (1205/1790-91); Cevdet-Bahriye, no. 9418 (1212/1797-98), 2223 (1215/1800-18001), 2379 (1214/1799-1800), 2186 (1222/1807).

[47] 2,150 *kantars* of raw iron was spent for a fifty-one *zira* galleon built in Bodrum, 1,200 *kantars* for two galleons, fifty-three and fifty-one *ziras*, respectively in Sinop, 350 *kantars* for a fifty-five *zira* galleon in Gemlik and finally 770 *kantars* for a forty-five *zira* frigate constructed in Karabiga in 1206/1791-92. See BOA. Cevdet-Bahriye, no. 2194. On the other hand, 57 *lodra* of raw iron was provided by the *mahzen-i surb* (timber store) on 9 Rebî'u'l-evvel 1219/18 June 1804 for this purpose. See *BOA*. Cevdet-Bahriye, no. 7769.

[48] Shaw, *Between Old and New*, p. 56.

[49] BOA. Cevdet-Bahriye, no. 11461 (26 Safer 1207/13 October 1792).

[50] Şemim Emsen, p. 11.

from Samakov, Sweden and Hungary was also used in the production of steel in the Naval Arsenal by engineers.[51]

Nails and Bolts (*Mismâr* and *Civata*) Used in Naval Works

Nails and bolts were used almost in all work regarding naval ships. Nails were produced by ironsmiths by smelting a variety of substances. Wood, iron, copper and copper-zinc mixture might be used depending on the structure of the ship. For instance, copper nails were used to fasten the copper planks onto the bottoms and hulls of the ships. Under the conditions where the use of pure copper was not possible, nails produced from copper-zinc mixture were preferred in 1210/1795-96.[52] An Ottoman archival document dated 26 Safer 1207/13 October 1792 illustrates why certain materials were preferred for producing nails and bolts. According to a decree by Kapudân-ı Derya Küçük Hüseyin Pasha to Murâbıtzâde Hasan, the governor of Rhodes (Rodos *mütesellimi*), the nails and screws used in the fastening of the imperial galleons, since they were all made of raw iron, caused ships to be heavy as well as increased the consumption of iron. Moreover, iron nails rusted, demaging the timber of the ships' hulls. He recommended that, if, as was done on the ships of the Christian states, pegs called *kavilya* made from the *pırnar* tree were used instead of iron and if they were fastened the timber at certain intervals, the decay would be prevented. Being made of wood, the pegs would fit snugly into the timber of the hull of the ships. The document mentions that three sizes of wooden peg samples had been sent and that the production of ten thousand from each sample had been ordered

[51] BOA. Hatt-ı Hümâyûn, no. 9646 (1207/1792-93).

[52] BOA. Cevdet-Bahriye, no. 4437; BOA. Cevdet-Bahriye, no. 11461.

for the Imperial Naval Arsenal via ships.[53] Later correspondences in 1211/1796-97 between the authorities show that wooden pegs were preferred to iron nails and that it was noted that the mountains in the province of Biga were rich in *pırnar* trees.[54]

For the production of nails and some other iron tools to be used in the construction of frigates and galleons, *funda/fonda* coal (*funda kömürü*) and *hark-ı nâr* (a substance used in melting process) were used to melt and pour the raw iron into molds.[55] The cast nails were filed, when necessary.[56] In addition to nails, bolts were used in the construction of galleons as well. Pine coal was used by ironsmith for their production. This coal was provided from Midilli, Molva and Kalonya for a galleon being constructed in Midilli in 1208/1793-94 at its current value.[57]

In discussing the importance of nails for naval constructions it is important to note that the Swedish engineer Rhode was commissioned to construct a nail production workshop in Şa`bân 1220/October-November 1805. He and his translator were assigned a monthly salary of 750 *kuruş* in total.[58]

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[53] BOA. Cevdet-Bahriye, no. 11461.

[54] BOA. Cevdet-Bahriye, no. 1796.

[55] For the construction of a frigate of fifty-one *zira* in Gemlik, thirty ironsmiths (*demirci esnafı*) were received from Bursa in 1206/1791-92. See BOA. Cevdet-Bahriye, no. 4397. Sometimes Jewish ironsmiths were employed in the cutting of nails. In order to complete a galleon under constructing in Bodrum quickly, two Jewish ironsmiths were demanded on 15 Zilhicce 1206/4 August 1791 from the Kadi of Gelibolu and Ayan of Gelibolu Seyyid Mustafa, to replace the ones who had fallen ill. See BOA. Cevdet-Bahriye, no. 8070.

[56] The copper nails produced in 1210 according to the methods of Le Brune were different from previous ones, since they were smaller, needed filing after casting and therefore required more workmanship. BOA. Cevdet-Bahriye, no. 4436.

[57] BOA. Cevdet-Bahriye, no. 5747.

[58] BOA. Cevdet-Bahriye, no. 12603.

Among the types of nails and bolts produced were *mismâr-ı basdika-i sağîr* (nails for snatch blocks of small size), *mismâr-ı basdika-i kebîr* (nails for snatch blocks of big size), *mismâr-ı mesâmîr*, *mismâr-ı kostanyola*, *cıvata-i piraçol* (bolts for fastening knees), *cıvata-i karîne* (bolts for the bottom of a ship), *kavilye* (treenails, pegs), *mismâr-ı atîk* (the ones removed from old ships),[59] *mismâr-ı üstâdiye,*[60] *mismâr-ı yâş,*[61] and *mismâr-ı nühâs* (copper nails).[62] Beside them, others such as *mismâr-ı kalafat* (caulking nails), *şumârî*, *şayka*, *çubuk*, *Trabzon*, *Samakov*, *Lofça*, *Zağra*, *şişe*, *büzürk* (big size), *meyâne* (medium size), *bölme*, *pedavra*, *taş* (stone), *kalafat-ı tulumba* (for caulking conduits), *zevrak* (boat), *kayık* (boat), *baskı-i kayık*, *kalay* (tin), *mertek* (beam), *gevele-i tahta*, *gevele-i körpe*, *gevele-i kuşak*, *sağış-ı büzürk*, *sağış-ı meyâne*, *taban* (base), *çatı*, *sağrı*, *meyâne-i hurda* (scrap nails of average size) and *çâr-kûşe* (square) can be mentioned.[63]

Raw Copper (*Nühâs-ı Hâm*)

Copper was used in the construction and equipment of the Ottoman ships in a variety of ways. In the late eighteenth century, it was mainly used in the cladding of ships against shipworms, for the nails and some joints of the ships, and for onboard equipment[64] such as pots and pans and other kitchen utensils and the cans

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[59] BOA. Cevdet-Bahriye, no. 7013.

[60] BOA. Cevdet-Bahriye, no. 1261.

[61] BOA. Cevdet-Bahriye, no. 7021.

[62] BOA. Cevdet-Bahriye, no. 4436.

[63] Bostan, *Tersâne-i Âmire*, p. 125.

for storing gunpowder and paints. It was also used in the production of cannon loading tools such as cannon ladles (*kepce-i top*) and ramrods (*harbe*). Beside domestic sources, raw copper was provided from foreign locales. We know that it was occasionally purchased from Russian traders when the need arose.[65] It was processed in *haddehane* (processing house) before being used.[66]

Lead (*Kurşun*)

Lead was used in a variety of ways in the Naval Arsenal. Stored in the *mahzen-i sürb* (building where ship and shipyard equipment such as iron pieces, nails, copper pots, lead plates, hemp, cords, barrels, sail, awning, anchor, cannon, lamp and paper were kept and stored for future use), the *Cebehâne* (Armoury) or the Imperial Mint, it was used as raw lead, bullion or plates after being cast in molds and processed. To exemplify, it was mainly used in the making of the hawse holes of chain cables (*gomana delikleri*), as complementary material to the copper cladding of the ships, and in the making of tools and equipment, in producing the sets for naval flags, in the construction and mending of the outer gates of the big dry-dock, in producing the touchole of muzzle-loaders (*falye deliği*),[67] and in making bullets for rifles.[68]

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[64] For the equipment of naval ships 113 *vukiyyes* (a unit of weight equal to 1.283 kg.) of raw copper was provided from the *mahzen-i sürb* (a place where metals were stored) on 9 Rebî'u'l-evvel 1219/18 June 1804. BOA. Cevdet-Bahriye, no. 7769.

[65] 750 *kantars* of raw copper were purchased from Russian traders on 3 Rebî'u'l-evvel 1211/6 September 1796. See BOA. Cevdet-Bahriye, no. 9258.

[66] For more information about copper, its sources and uses in the Ottoman Empire and European realm, see the part related to the copper sheathing of the Ottoman ships below.

[67] BOA. Kamil Kepeci, no. 5724 (1205/1790-91).

A document of 1205/1790-91 illustrates the use of lead. In a petition Cebecibaşı stated the need for providing of 700 *kantars* of lead bullion from the Imperial Mint, to be used on the imperial galleons which would sail off for a campaign next year, and that were required for casting lead for the needs of the ironsmiths and sets for naval flags, since there was no lead bullion left in the arsenal of Enderun/the Palace School.[69]

In the sixteenth century lead was generally provided from Rudnik, Novo, Kratova, Serbrenice and Olowa in Rumelia as well as from Gümüşhane, Keban and Ereğli in Anatolia. In the seventeenth century, Üsküp emerged as one of the main sources of lead.[70]

Some shipbuilding materials, including ten lead plates were demanded for the Imperial galleons under construction on 18 Zilkade 1206/8 July 1792 from the Imperial Armoury (*Cebehâne-i Âmire*) via Kapucubaşı Altıkulaçzâde El-Hâc Hüseyin, who was the governor of Kastamonu and the official in charge of the construction of a galleon in Sinop.[71]

Lead plates were used in the holes of the chain cables (*gomana delikleri*) of galleons and frigates as well. For the lead plates to be used in this way on a galleon being constructed in the Imperial Naval Arsenal and on a frigate being built in

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[68] Bostan, p. 126.

[69] "*Cebecibaşı ağa kulları takdim ettiği bir kıta takririnde Enderun-ı hümayun cebehanesinde külçe kurşun kalmamağla sene-i atiyede seferber olacak donanma-yı hümayun kalyonları va bazı ser haddad lazıması ve liva-i şerif takımları içün dökülecek habbe kurşun içün Darphâne-i amire mevcudundan yediyüz kantar külçe kurşun efraz ve cebehane-i mamureye teslim olunması istida eder...*" BOA. Hatt-ı Hümâyûn, no. 11386.

[70] Bostan, pp. 126-127.

[71] BOA. Cevdet-Bahriye, no. 9360.

Rhodes, 1,000 *vukiyyes* of bullion lead were required on 21 Receb 1207/4 March 1793.[72] 3,023 *kiyyes* (eighty *akçes* per *kiyye*) of 200 lead plates were bought and delivered to the *mahzen-i surb.*[73]

Also we know that the Bozkır mines produced lead used in the Imperial Mint at the Imperial Naval Arsenal. Lead was transferred to the Alaiye wharf and then to the Arsenal via either imperial or private ships.[74]

Lead was needed and used as a complementary material in the copper sheathing of the ships as well. Thirty-two and thirty-four *vukiyyes* of large lead plates were demanded for the *Ejder-i Bahrî* (Dragon of the Sea) on 6 Rebîülahir1211/9 October 1796.[75]

In order to manufacture 156 lead plates for the use of the Ottoman navy, 4872.5 *vukiyyes* of raw lead provided from the *mahzen-i surb* were cast in molds by the *Kurşuncubaşı* (the chief official in charge of providing and processing lead) in 1212/1797-98. The cost for the casting process was 243.5 *kuruş* in total at six *akçes* per each *kiyye.*[76]

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[72] BOA. Cevdet-Bahiye, no. 7356.

[73] BOA. Cevdet-Bahriye, no. 1418.

[74] BOA. Cevdet-Bahriye, no. 1591. It is understood that 50,000-*kiyyes* of lead were ready on the Alaiye warf and 150,000 *kiyyes* on the way to the warf, to arrive in 20-30 days in 1211/1797-98.

[75] BOA. Cevdet-Bahriye, no. 5136.

[76] BOA. Cevdet-Bahriye, no. 2181.

Eighty-two large lead plates (2939 *kiyye* of raw lead) at six *akçes* per *kiyye* were provided by the *mahzen-i surb* via el-Hâc Mehmed Ağa, the chief lead provider, in 1212/1797-98 for naval ships.[77]

It is also known that lead was used in the construction and mending of the outer gates of the big dry-dock in 1215/1800-01.[78]

Regarding the casting of lead in the circular shapes (*göz kurşunları*) for the holes of chain cables (*gomanas*) of the naval galleons, 627 *kuruş* was paid as the casting cost for 9,947 *kiyyes* of lead in 1216/1801-02.[79]

In the year 1218/1803-4, 200 *kantars* of lead were demanded for the equipment and fitting out of of the three-decked *Mesudiye* galleon and some other ships. But considering the 140 *kantars* of lead (costing 3,542 *kuruş*) given in the previous year, this time 150 *kantars* of lead with at twenty-three *para* per *kantar* (total 3795 *kuruş*) were allotted to these ships[80]

Sailcloth (*Kirpas*)

Sailcloth was a type of cloth woven from canvas and used in the production of sails and awnings of sailing vessels. The province of Gelibolu, the Dardanelles (Çanakkale), İğriboz, Egypt, Eagean costs, Benefşe, and Cyprus were the main

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[77] BOA. Cevdet-Bahriye, no. 2325.

[78] BOA. Cevdet-Bahriye, no. 5791.

[79] BOA. Cevdet-Bahriye, no. 7274.

[80] BOA. Cevdet-Bahriye, no. 1295.

sources for the raw materials of sailcloth in the seventeenth and eighteenth centuries.[81]

It has already been discussed how the transition from the traditional oar-powered galley type ships to the galleon type sailing ships created a huge demand for sailcloth, which increased from 140,000 *ziras* in 1774 to 300,000 *ziras* in 1803. The following table, prepared by Genç, shows the position clearly.[82]

Table 5. The Amount of Sailcloth the Ottoman Navy Demanded from Sailcloth Manufacture

Years	*Amount (Zira)*
1774	140, 000
1777	222, 000
1781	118, 000
1782	196, 115
1783	182, 635
1791	160, 000
1801	200, 000
1802	250, 000
1803	300, 000

Source: Mehmet Genç, *Osmanlı İmparatorluğunda Devlet ve Ekonomi* (İstanbul: Ötüken, 2000), p. 251.

In order to meet this increasing demand for sailcloth production from the late of the seventeenth century onwards, the state established a large workshop (*Kirpashâne*) attached to the Naval Arsenal in 1709 and gave its management to an entrepreneur called *bezcibaşı* (chief official in carge of cloth production), who

[81] Bostan, *Osmanlı Bahriye Teşkilatı: VII. Yüzyılda Tersane-i Amire,* p. 154. Also see Mehmet Genç, *Osmanlı İmparatorluğunda Devlet ve Ekonomi*, p. 248.

[82] Ibid., p. 251.

undertook the supply of the navy in peace years with 30,000 *ziras* and in war years with 200,000 *ziras* of sailcloth. After 1750 the private weaving of sailcloth was prohibited and a monopoly granted to the *bezcibaşı* and it became a complete state monopoly after 1825/1240-1241.[83]

In some cases the Porte sought sailcloth material from Russia. To give an example, on 5 Rebî'u'l-âhir 1212/27 September 1797, the Porte purchased eighty-three rolls of thick Russian sailcloth from a Russian trader called Dimitri at a cost of 30 *kuruş* per roll. The total cost amounted to 2,490 *kuruş* and this money was paid from the alloted part of the Imperial Mint.[84] In 1218/1803-04 Aydın, Tire, Gelibolu, and Boğazhisar were the leading sailcloth providers.[85]

Selim III's reforms envisaged that all the sails, ropes and equipment belonging to frigates and other ships would be stored in hangars. Ship commanders were responsible for the proper sewing or fixing of sailcloth.[86]

Ottoman archival documents of the eighteenth century often mention the names and types of sailcloth. For instance, a document of 1205, with the title of *Der sefîne-i Trabago süvari-i Sinan oğlu Hasan Reis* (A Trabacco Ship Commanded by Sinan Oglu Hasan Reis), demonstrates that green sailcloth was used in the stern part of the ship. It is apparent from the same document that the ship in question carried forty used (*müstamel*) sailcloths as back up. Under the heading *Defter-i sefîne-i*

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[83] Çizakça, pp. 220-221.

[84] BOA. Cevdet-Bahriye, no. 2289.

[85] BOA. Cevdet-Bahriye, no. 2360. The document states that 500 *kantars* of hemp (*kendir*) at 20,000 *kuruş* from Tire, 6,350 rolls of sailcloth at a cost of 13,450 *kuruş* were to be purchased.

[86] *Mahmud Râif Efendi ve Nızâm-ı Cedîd'e Dâir Eseri*, trans. and eds. Kemal Beydilli and İlhan Şahin (Ankara: TTK, 2001), p. 56.

trabago süvari-i Salih Reis (A Trabacco Ship Commanded by Salih Reis), another type of green sailcloth used in the stern part of a ship as well as forty spare ones. Green sailcloth in the stern and forty spares appear also in *Sefine-i Trabago Süvari-i Ülgünlü Yusuf Reis* (A Trabacco Ship Commanded by Ülgünlü Yusuf Reis). In *Defter-i Pirgandi-i Mahmud Paşa Süvari-i Ahmed Reis* (The Register of Mahmud Paşa Ship Commanded by Ahmed Reis) is listed green sailcloth in the stern and two types of spare ones: five *kirpas-i bogaz* and ten *kirpas-i beyaz* (white sailcloth)[87]. Some other documents mention the use of sailcloth on ships. In *Defter-i Mühimmat-ı Cabbâr-ı Bahrî Süvari-i Fettah Kapudan* (The Register of the Inventory of the Ship Cabbâr-i Bahrî under Fettah Kapudan's Command) of 5 Za 1205/6 July 1790-91 are noted green sailcloth, and among the ship's spare equipment were sixty *kirpâs-i kârhâne*, ten *kirpas-i buhar*, thirty *kirpas-i beyaz* (white sailcloth) and thirty *kirpâs-i mustamel* (used sailcloth).[88]

Pitch and Tar (*Zift* and *Katran*)

Pitch and tar were among the materials necessary for caulking ships. They were mostly provided from Midilli as well as the Edremid and Gümrü regions of Kapudağı. It is understood that forty to fifty *kantars* of pitch and fifteen *kantars* of tar were urgently needed for a certain galleon under construction in the Midilli region in 1208/1793-94.[89] Sometimes pitch and tar were purchased from local and foreign

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[87] BOA. Kamil Kepeci, no. 5724.

[88] BOA. Kamil Kepeci, no. 5726.

[89] BOA. Cevdet-Bahriye, no. 5747.

traders at current market prices.[90] Sinop also provided these materials in the middle of the eighteenth century. Both pitch and tar were generally used in putting on the *iskarmoz/iskarmos/iskarmuz* (tholepin/futtock)[91] and the head of nails during the caulking process.[92]

The Ottomans also used Swedish tar. On 27 Safer 1211/1 September 1796, twenty barrels of Swedish tar (at a cost of 26 *kuruş* per barrel) and eleven barrels of red paint (at a cost of 25 *kuruş* per barrel) were purchased by Kapudan Pasha for the Imperial Navy. The total cost was 795 *kuruş*.[93]

Kazdağı, Alaylı and Ereğli appeared among the sources of tar in 1218/1803-04. In the time, for 2,500 *kantars* of tar from Kazdagi 7,500 *kuruş* was paid. At another time, payment was made for 1,587 *kantars* of tar from Alayli and Eregli regions, 4,760 *kuruş*, including the freight.[94]

Ottoman documents indicate the preparations for the construction of a pool for storing tar (*katran havuzu*) at the Liman Mahzeni at *Tersâne-i Âmire* on 18 Ra 1219/1804-05. The cost for such expenses as mounting the gate of the pool, and materials such as stakes (*kazık*), timbers, and the determination and examination of a

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[90] BOA. Hatt-ı Hümâyûn, no. 57599.

[91] It is a pin or thole inserted vertically into the sides of a boat to allow the oar to be fastened. See *Lingua Franca*, pp. 572-573. See also Şemseddin Sami, *Kâmûs-i Turkî* (İstanbul: Bedir Yayınları, n. d.), p. 110.

[92] Güler says that pitch and tar were mainly provided by people living in two villages, Kazık and Akçekenise, attached to the district of Saray in Sinop. See Güler, "XVIII. Yüzyılda Sinop'ta Gemi İnşa Teknolojisinin Altyapı, İstihkâm, İstihdâm, Üretim ve Pazarlama Sorunu," p. 35.

[93] BOA. Cevdet-Bahriye, no. 1297.

[94] BOA. Cevdet-Bahriye, no. 2360.

suitable place for laying the foundation was expected to be 7,553 *kuruş*. In order to meet the cost, 5,000 *kuruş* in cash was requested from the Hazîne-i Âmire.[95]

Paint (*Boya*)

Paint was used mainly in protecting certain parts of the ships from bad weather conditions and increasing their durability. Among the materials of paint in the seventeenth century were *sülügen-i İngiliz* (a British type of red paint which was put on newly placed iron sheets as a coating material), *senderus* (glue and oil extracted from the copal tree), *bezir yağı* (linseed oil), *jengâr* (poisonous green rust on copper), *istîfdâç/üstübeç* (white lead used to obtain the desired paint thickness) and *siyah tutkal* (an infusable elastic substance composed of gomelica, rubber and neft).[96]

It is understood that for the flags and banners of *Arslan-i Bahri* (Lion of Sea) boarded by Kapudan Pasha and some other ships, a certain amount of paint was needed. Expenses for paint, silk and sewing amounted to 1,339 *kuruş* in 1210/1795-96.[97] Eleven barrels of red paint were purchased from a Swedish ship in return at twenty-five *kuruş* per barrel in 1211/1796-97.[98]

Colored dyes were used for drawing some patterns and embroideries on the ships as well. The total money spent on *elvan boya* (colored dyes), *ruğan-i bezîr*

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[95] BOA. Cevdet-Bahriye, no. 1549.

[96] Bostan, *Tersâne-i Âmire*, p. 135.

[97] BOA. Cevdet-Bahriye, no. 6229.

[98] BOA. Cevdet-Bahriye, no. 1297.

(linseed oil), *altın varak* (golden sheets) and some other materials to be used in adorning and decorating the naval ships for three months amounted to 6,187 *kuruş* and nine *para* on 18 Receb 1217/14 November 1802.[99]

Tallow (*Don Yağı /Revgân-ı Pîh*)

Tallow was produced via melting and then freezing the internal hard fats of animals. It was mostly used for manufacturing candles and soaps as well as greasing ships during the caulking process.[100] It was used in a mixture together with soap to coat the hull during cleaning[101] and to light candles and clean the pitch from caulkers' hands.[102] In the late seventeenth century 600 *kantars* of tallow were provided from Boğdan as *ocaklık* (a method of collecting tax). Sometimes it was bought from tallow merchants.[103] In addition to these, Albania, Eflak[104] in the seventeenth century, Varna and Galatz[105] appeared among other sources of tallow at

[99] BOA. Cevdet-Bahriye, no. 5209.

[100] Bostan, p. 133.

[101] Chris Ware, *The Bomb Vessel: Shore Bombardment Ships of the Age of Sail* (Annapolis, Maryland: Naval Institute Press, 1994), p. 75.

[102] Imber, "The Navy of Süleyman the Magnificent," p. 235.

[103] Bostan, p. 133.

[104] Paul Rycaut, *The Present State of the Ottoman Empire* (London, n. p. 1668), p. 213.

[105] It is shown that 20,000 kintals of tallow was provided from Varna and Galatz on March 1803. See PRO. FO 78/39, from p. 25 onwards.

the turn of the nineteenth century. It is understood that tallow was used in greasing the ships and their slipways (*kızak*)[106] during the launching process. For this purpose, 500 *vukiyyes* of tallow was demanded on 15 Rebîul'âhir 1211/18 October 1797 for a galleon whose construction was almost complete in Bodrum, in return for a certain amount of money. During the launching of a frigate constructed in Limni, 293 *kuruş* was paid for 553 *vukiyyes* of tallow.[107]

Resin (*Reçine*)

Resin is a thick, sticky substance produced by pine trees. Regarding naval ships, resin was used for hardening the pitch, caulking, and spreading on the part of the ships below the waterline in a mixture with tallow. Resin was provided from Mediterranean islands such as İskiri, İskolar, İşkeron and İşkopolos in the second half of the seventeenth and early eighteenth centuries. In 1114/1702-1703 people living on İşkopolos Island were ordered to prepare 1,000 *kantars* of resin per year to be used during the caulking process of the ships.[108] Beside these places, Eğriboz (the island of Negroponte, Evvoia) and Çamlıca produced resin.[109] On 3 Rebî`u'l-evvel 1207/19 October 1792, 3,000 *kantars* of resin were demanded from Eğriboz and

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[106] A slipway consists of inclined ways of timber or stone, running up from a sufficient depth of water to the reqisite height above high water level, upon which a series of rails is fixed. On this rails suitable carriages run, to support the ship, and are hauled up or lowered down by means of winding gear. See Francis Maurice Du-Plat-Taylor, *The Design, Construction and Maintenance of Docks, Wharves and Piers* (Great Britain: Richard Clay and Sons, 1933), p. 170.

[107] BOA. Cevdet-Bahriye, no. 2643.

[108] Bostan, p. 135.

[109] Hayati Tezel, *Anadolu Türkleri'nin Deniz Tarihi*, vol. I (İstanbul: Dz.K.K. Deniz Basımevi, 1973), p. 612.

neighboring areas. The judge (*kadı*) of Eğriboz sent 800 *kantars* of resin on the ship of a foreign merchant. When it arrived in Istanbul, forty-four *kantars* were missing. The remaining 750 *kantars* of resin were put into the *mahzen-i sürb*. 150 *kuruş* was paid for 750 *kantars* of resin.[110]

Raw Hemp (*Ham Kendir*)

Raw hemp was used mostly for producing rope (*ispavli*). The Aydın region was an important supplier of raw hemp. 2,500 *kantars* of hemp were ordered from the governor of Aydın, Hüseyin Bey, on 6 Receb 1207/17 February 1793.[111] Raw hemp coming, for instance, from Aydın, was processed in a place called *Darağacı* (Gallows) by workers called *resenci* and *alatcı esnafi* (rope makers) and then was sent to the specified storage facilities on 3 Rebî`u'l-evvel 1209/28 September 1794.[112] In addition to the Aydın region, Tire also supplied raw hemp for the Imperial Naval Arsenal. It is recorded that for 3,500 *kantars* of raw hemp 20,000 *kuruş* was paid in 1218/1803-04. Sinop appears among the suppliers of hemp and wire in the late seventeenth century.[113] In addition to these sources, Russian traders provided raw hemp for the Arsenal.[114]

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[110] BOA. Cevdet-Bahriye, no. 2494.

[111] BOA. Cevdet-Bahriye, no. 6056.

[112] BOA. Cevdet-Bahriye, no. 4398.

[113] Güler, "XVIII. Yüzyılda Sinop'ta Gemi İnşa Teknolojisinin Altyapı, İstihkâm, İstihdâm, Üretim ve Pazarlama Sorunu," p. 34.

[114] BOA. Cevdet-Bahriye, no. 2360.

Rope (*Resen/İp/Urgan/Halat*), Wire (*Tel*) and *İspavli*

There was a class of artists dealing with the production of rope in the Imperial Naval Arsenal. They usually worked in the empty sheds near *Darağacı* and processed raw hemp and other raw materials to produce various kinds of rope for the ships.[115] As understood from a document of 1212/1797-98, ropemakers (*resenci*) were paid a further 3,000 *kuruş* in addition to the previously paid 2,000 *kuruş* in return for their production of Frank wire (*tel-i Frengî*) and rope.[116]

Wire was generally produced in Canik or bought from traders. A document of 1207/1792-93 says that *ocaklık tel* (wire obtained through the method of indirect taxation) was a bit thicker and not good of quality, while that of the traders was thin and of good quality. When the reason for this difference was asked, the workers cited the low wages. Therefore, the authorities ordered the balancing of the wages between the producers of the two types in order that wires be durable.[117]

Sulphur (*Kükürt*)

Sulphur was one of the chemical substances used in greasing ships. It was usually stored at the *mahzen-i sürb*. On 7 Cemâziye'l-evvel 1204/23 January 1790

[115] BOA. Cevdet-Bahriye, no. 4398.

[116] BOA. Cevdet-Bahriye, no. 2246.

[117] BOA. Cevdet-Bahriye, no. 6056.

there were 33,000 *vukiyyes* of sulphur in the Imperial Armory (*Cebehâne-i Âmire*).[118] Likewise, for the greasing of ships, sulphur was demanded from the *mahzen-i sürb*. Having learned that there was no sulphur left there, 2,000 *vukiyyes* of sulphur were demanded from the Imperial Armory instead on 24 C 1212/1797-98[119].

Oakum (*Üstübî*)

Oakum, among the materials used by caulkers, consisted of flax, hemp and pieces of worn-out rope and was used to fill gaps between the timbers of hulls before the process of tarring and applying pitch.[120] In addition to the storage facilities at the Imperial Naval Arsenal,[121] Cairo, Egypt, was one of the most important sources of oakum in the late eighteenth century. In 1206/1791-92 the Porte demanded from Egypt 250 *kantars* of oakum for the construction of a galleon in Bodrum.[122] Mahmud Raif Efendi also pointed out the importance of oakum for caulking. Because of negligence in previous years Ottoman ships had constantly taken in water. Threfore, Kapudan Paşa had 200 trained caulkers brought from Egypt. He had a large barracks constructed for them and supplied them with food and clothes. This remedy appears

[118] BOA. Cevdet-Bahriye, no. 1337. This document also says that in the mid-Rebiulevvel of the previous year, 5,000 *vukiyyes* of sulphur had been transferred to the *mahzen-i surb*.

[119] BOA. Cevdet-Bahriye, no. 4513.

[120] *The Lingua Franca in the Levant*, pp. 577-578; Bostan, p. 146; Zaloğlu, p. 385.

[121] For the demand of oakum from the *Tersâne-i Âmire* on 18 Zilka`de 1206/8 July 1792, see BOA. Cevdet-Bahriye, no. 9360.

[122] "*Üstübi cemi zamanda Mısır Kahire'den olunageldiği beyanıyla,*" see the document dated 16 Rebî'u'l-evvel 1206/13 November 1791 in BOA. Cevdet-Bahriye, no. 2229. Another document dated 12 Z 1206/1 August 1792 shows that 100 *kantars* of oakum were not enough for the upper deck of a galleon and 2,500 *kantars* of more were demanded from Egypt and Hire. See BOA. Cevdet-Bahriye, no. 12193.

to have been successful, since the ships stopped taking in water, even if they stayed at sea for three to four years.[123]

Ballast (*Safra*)

Ballast is a load of such materials as stone, sand and mine that is put into the bilges of sailing ships to provide balance. In Ottoman times it was loaded on and emptied from the holds of ships through a porthole called a *safra lumbarı.*[124] Ballast was removed from ships before they were taken into the docks for caulking and repair in order to reduce the weight.[125] Ballast consisted of a layer of loose stones, called shingle, spread on the top of flat blocks of iron called "pigs." This weight kept the ship upright and balanced. However, it also posed a health risk, because everything drained into it. On some French ships, dead men were buried in the ballast.[126] In some extreme cases, in addition to stones and soil, big cannons or even men were put into the holds of galleons.[127]

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[123] *Mahmud Râif Efendi ve Nızâm-ı Cedîd'e Dâir Eseri*, p. 57.

[124] Mehmet Zeki Pakalin, *Osmanlı Tarih Deyimleri ve Terimleri Sözlüğü*, vol. 3 (Ankara: MEB, 1993), p. 90.

[125] Plat-Taylor, *The Design,* p. 169.

[126] Richard Platt, *Man-of-War* (London: Conway Maritime, 1993), p. 11.

[127] There are many different cases regarding ballast. According to one of the cases, some ships, as they came near landing place, threw out their ballast at the entrance of Gelibolu harbour, and therefore they were warned and prevented from this action; another case referring to 1656 says that on every ship stones were put as ballast, according to its capacity. Whenever they needed to do so, they emptied this, and in its place loaded freight. In addition to these two cases, a third case of the eighteenth century, but referring to an event of 1651, states that people came to attend the launching of the galleon. Instead of ballast, workmen and lookers-on, close to 200 people, crowded on her; and as a last case referring to 1654 it is reported that five big cannons were found as ballast in the hold of conquered ships. For these examples see, *The Lingua Franca in the Levant*, p. 562.

Ballast was thus an important material for Ottoman galleons. Low quality ballast could cause a ship to corrode and sink. Therefore, some imperial edicts were issued to forbid the use of low quality ballast and encourage the supply of high quality materials. For instance, an imperial edict of 9 Cemâziye'l-evvel 1207/23 December 1792 addressing the notables of Pravişte, Drama and some other places, noted that since the ballast used on imperial galleons consisted of stones and soil, when it met with rain, it became mud and and caused the corrosion of the ships which had been built at high cost. It was decided that the soil to be put in the ballast areas on ships should be cast and made from mines of local origin in order to prevent hazards and increase efficiency. 300,000 *vukiyyes* of ballast stone would be cast and produced in compliance with the samples sent to the above-mentioned places. Ballast made of *helon* would be prepared in three classes by the sample: twenty *vukiyyes*, thirty-one *vukiyyes* and forty *vukiyyes*, at a price of five *akçes* per *vukiyye* and twenty-five *akçes* for each 100 *vukiyyes*. The prepared ballast would be transferred step by step to Kavala wharf first, then to Istanbul via ship.[128]The total cost and freight were planned to amount to 13,000 *kuruş*. Half of this cost was to be paid after delivery.

The Process of Ship-Building in the Late Eighteenth Century

In the first half of the eighteenth century, a general apathy throughout the world and particularly in Europe was felt towards improving the means of water-transport. Such technology, which is closely connected to mechanical laws and

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[128] BOA. Cevdet-Bahriye, no. 8008.

technical education, seemed confined by the capacity of uneducated seamen. In the second half of the century, new ideas began to stir in the minds of mechanics and philosophers, although it wasn't until the nineteenth century that remarkable changes occurred.[129] Therefore, the eighteenth century can be considered to have been period of incubation rather than creativity. Another important aspect of the eighteenth century was the lack of harmony between emerging theories and practice.

Traité du navire, de sa construction, et de ses mouvements (A Treatise on Ship, its Construction and its Movements) (1746) by M. Bouguer, *Élémens de l'architecture navale ou traité pratique de la construction des vaisseaux* (1752) (Elements of Naval Architecture and a Practical Treatise on the Construction of Vessels) by H. L. Duhamel Dumonceau, and works written on the subjects by the Swiss mathematician Leonhard Euler (1707-1783) were among the first theoretical books in the context. However, shipbuilders ignored the theories and worked in the light of experience, which was the reason for the slow change and many little variations within narrow limits.[130] This ignorance, conservatism or apathy can be explained by the difficulty of abandoning the long-established practices and the lack of the proper driving force required for change. Actually, trade and wars were the main motives behind the existing drives. The imitation and examination of trading ships or of ones captured from enemy were the common ways of of keeping abreast of developments in other countries. However, this interaction was limited to the imitation of ship designs rather than the development of new engineering or technical specifications.

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[129] George Naish, "Ship-Building," in *A History of Technology*, eds. Charles Singer, E.J. Holmyard, A.R. Hall and Trevor I. Williams, vol. 4 (Oxford: Claredon Press, 1958), pp. 574-75.

[130] Ibid., pp. 577-578.

Having discussed the general trend of the eighteenth century, a general sketch of the most common stages of the construction of sailing ships in the eighteenth century around the world will shed light on the developments in naval construction of the Ottoman Empire considering its close interaction with the outer world through ambassadors, technical know-how and help by foreign missions, the examination and imitation of purchased and captured ships as well as those submitted to the Porte as gifts.

As for the common stages of ship construction, the most important thing was a sufficient supply of timber. By and large, in order to build a warship of an average size (e.g. third rate, with sixty-five to seventy-nine guns on board), about 2,000 trees, each needing a century to reach maturity,[131] were required. Different kinds and shapes of wood were needed for different parts of a ship. For the keel, elm was preferred because of its property to withstand best continuous immersion in water while maintaining its strength. However, the most common and valuable wood was oak. Beech could be used for for planking only below the waterline, but unlike elm, it was not strong enough for use in the keel. Another principal timber was the *Pinus Sylvestris* (known as *Sarıçam* in Turkey), the Scotch pine, or, as it is more generally called, fir. This tree was most versatile in its applicability to naval construction, for an entire ship from keel to topmasts could be built of it.[132]

The timber, in the required quantity, was sent to the dockyards. There, it first had to be seasoned in sheds for about a year. Depending on its future use, it was carefully stacked in certain positions and places. Later on, it was boiled and/or

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[131] The kind of wood that matured more quickly is unsuitable for ship construction because it splits easily. Also these trees (mostly oaks) cannot be grown on less than fifty acres of land, which would be left stripped. See Naish, p. 493.

[132] Albion, p. 25.

steamed to enable the shipwrights to bend it into desirable shapes. After the ribs and the skeleton of the ship were in place, it was usually left to season for another year before the planking was added.

Two layers of planking were attached to the frame, one on the inside and one on the outside, often to a thickness of a foot, thus giving some protection from enemy fire. Unless the ship was needed immediately she was left at this stage to season for up to two more years before the inner planking was added. When this process was completed, the decks were then built.

The ship's timbers were fastened together with wooden trunnels or treenails, which varied in diameter from one to two inches and in length from twelve to thirty-six inches. These pins were usually made of oak, free from knots or sap, and well seasoned. Holes were drilled, into which the trunnels were driven.

After the ship was launched it was towed to, and anchored alongside, the hulk of an old ship, which had been fitted with hoisting sheers. The latter was required to facilitate the fitting of masts, spars and the bowsprit. Masts were stepped directly on the kneel and raked at an angle using special chocks. Sometimes captains chose to change this angle while at sea to better serve the sailing characteristics of each particular vessel. Rigging was then installed, spars hoisted, secured and positioned at right angles to the mast ready to receive the sails. Under optimum conditions a ship had at least two distinct sets of the latter. One set was designed for general use; the other was cut from much heavier canvas for use during heavy weather.

In the eighteenth century, light was provided by candles generally. And, since an open flame could not be tolerated in the magazine, provision for appropriate illumination posed a problem. This problem was solved in a relatively simple way by constructing small, double-glazed windows in one wall. Then, a lantern containing a candle was affixed to a shelf directly in front of this window in such a way that the light was reflected into the magazine. In the unlikely event of a direct hit from enemy gunfire sufficiently strong to shatter the window, the lantern would fall to the floor outside the magazine. Since the candle was contained within the metal structure of the lantern, the chance of causing an explosion was reduced significantly.

Following the completion of a ship's construction, it was equipped with special navigational devices. In the eighteenth century, navigation was still largely an art rather than a science. At this time a relatively unsophisticated form of sextant had replaced the astrolabe and quadrant, which had previously been used to determine an approximate position. The ship's speed was measured by a log line knotted at nautical mile intervals. This line was then thrown overboard while the ship was under way. The number of knots, which went over the ship's rail during a timed interval, determined the rate of forward motion or "knots per hour."[133]

The General Physical Properties of an Eighteenth Century Man-of-War

An eighteenth century warship was composed of several decks: the poop deck, quarterdeck, forecastle, upper gun deck, middle deck, lower deck, orlop deck, and hold. The poop deck and the quarterdeck directly below it were located on the uppermost portion of the hull at the stern. They constituted the private domain of the captain. His bedroom, day room, wardroom and pantry occupied not only the entire

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[133] Marjorie Hubbel Gibson, *H.M.S. Somerset 1746-1778, The Life and Times of an Eighteenth Century British Man-O-War and Her Impact on North Africa* (Cotuit and Mass.: Abbey Gate House, 1992), pp. 1-7.

enclosed space on the quarterdeck, but also additional space on the upper deck, which was directly below. And, unlike those in other parts of the ship, the portholes in his quarters were glazed. The captain, like his officers, had to share his domain with a number of the ship's heavy guns.

The forecastle consisted of a single level compartment on the overhead of the upper deck in the bow of the ship. This space, like the captain's quarters, was enclosed and it too housed at least two guns trained to fire off the beam. Depending upon the captain's pleasure, this space might also include two bow chasers. These guns could fire in limited arcs ahead of the ship when in pursuit of another vessel. Nine or twelve pounders with longer barrels were the weapons preferred for this purpose, since they were more accurate than the heavier guns and had a greater range. Additionally, many of the ship's sails were controlled from here.

Although the major portion of the ship's topside was open to the weather, it was enclosed by chest high railings, which ran along each side between the quarterdeck and "forecastle." This open area was used for the storage of small boats, extra spars and related equipment. A considerable number of the ship's secondary battery was also mounted here.[134]

The next level down was called the upper deck. The officers' cabins and storeroom were generally located toward the stern. The galley with its brick floor, to reduce the risk of fire, was located towards the bow. In some ships there was a middle deck having the same functions. The lighter 24-pounder guns were fired from

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[134]Ibid., pp. 1-7.

here. The guns here fired small eleven kg balls, the size of a large grapefruit. There were generally fourteen guns on each side.[135]

The next deck down, called the lower deck, was the largest and strongest on the ship. It was here that the main battery was mounted. This deck also provided space for the gunroom –the ship's armoury for small weapons such as muskets, pistols, pikes, and cutlasses. Marine guards provided constant security in this compartment in order to forestall the illegal use of these weapons. Here too were the capstans, the crews' quarters and mess.

The orlop deck got its name from a Dutch word meaning "overlap," since the deck overlapped the hold.[136] It was directly over the hold, partly above but mostly below the water line. Headroom was extremely limited. The orlop provided living quarters for the midshipmen, master's and surgeon's mates. Amputations and other surgical procedures were performed here as well. Lanterns or candles were used for illumination.[137]

The hold section was located at the very bottom of the ship, farthest down beneath the waterline. The powder magazines were stored and guarded constatly here, since this area was regarded the safest from enemy gunfire. In order to forestall the possibility of sparks causing the powder to explode, the walls and floors of the magazine were lined with felt. In addition, the hold fuctioned as a big warehouse

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[135] Platt, p. 8.

[136] Ibid., p. 8.

[137] Gibson, pp. 1-7.

where all the food and dink as well as iron cannonballs, spare ropes, sails and repair materials were stored as well.[138]

As for the Ottoman case, the *Tersâne-i Âmire* on the Golden Horn was the main assembling center, where ships were constructed, completed, equipped and rigged. The dockyards in the provinces generally constructed only the hulls while other places furnished certain amount of ropes or sailcloth.[139] This was a general division of labour. The eighteenth century shipbuilding process throughout the world is, by and large, applicable to the Ottoman realm. Timber was felled and transferred, through local administrators, to the stores *(mahzen-i çub)* in the Naval Arsenal. Mainly, *çekeleves*[140] of traders or state were used for transportation. And it was carried out before the winter.[141]

Seasoning seems to have been an ignored or neglected process, although was a vital one for the longevity of a ship. Long lasting wars and the urgent need for a powerful navy in the late eighteenth were no doubt the occasional reasons behind this trend. Some foreigners, claiming that it would be to the infinite detriment of the solidity and duration of the fabric, criticized both the Ottomans' method of felling timber without paying the necessary attention to choosing the proper types of timber for naval construction and felling the timber in any of four seasons of the year

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[138] Platt, p. 8.

[139] *Lingua Franca*, p. 31.

[140] Çekeleve was light coastal vessel with spritsail whose prow and poop were alike. See ibid., p. 563.

[141] Since the winter season affects the felling of timber and its transportation activities negatively, the galleon *Tevfik-i Hudâ* was commissioned in Cemâziye'l-evvel 1211/November-December 1796 for the transfer of a large amount of timber for a three-decked frigate being constructed at the *Tersâne-i Âmire* before the winter. See BOA. Cevdet-Bahriye, no. 8709.

irrespective of the proper time.[142] This criticism, however, should be assessed with some reservation, considering the many Ottoman imperial edicts ordering local authorities to cut and send specific and high quality timbers as well as some foreign documents mentioning the high quality timbers.[143]

During the construction process before launching, different parts of the ships could be constructed by different masters regarding their skills. To give an example, engineer Mustafa Hace was commissioned in the construction of the cutwater (*talimar*) of the bow, caulking and building of the stern and the upper part of the stern of a galleon under construction on 13 Rebî`u'l-evvel 1212/5 September 1797. It is understood that he was given some measurements (*endâze*) to work with. After the completion of the required parts, other builders were employed in the launching. We learn that Nikola, an architect in Bodrum, and his brother Arem were temporarily commissioned in launching the galleon in question.[144]

The ships, completed on land to a great extent, were put on stocks or slipways for launching. The time between the putting of a vessel on stocks and the launch might depend on the supply of the required materials necessary for the completion of the ship in water.[145] Regarding the issue, a document dated 16 Rebîülahir 1214/14 December 1799 says that a galleon of 59 *zira* was constructed

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142 PRO. FO 78/15. (1794).

143 As the documents regarding timber issue will be submitted in the part of construction materials, we will not go in detail here to avoid repetition.

144 BOA. Cevdet-Bahriye, no. 3032.

145 In an edict (18 Zilhicce 1215/2 May 1801) addressed to the leading administrators of Cide and Amasra, the supply of necessary timber was ordered. See BOA. Cevdet-Bahriye, no. 1292.

and almost readied for launching on Rhodes by Hasan Bey, the mutasarrif of Rhodes. Following the launching, a considerable amount of money would be required in order to complete the construction of some unfinished parts.[146]

To sum up the process of shipbuilding in the Ottoman Empire, following the procurement of the required timber first sternposts, the second keel, and third planking were applied. After that, nails and screws were used to fasten and keep them firm. Painting and details of timberwork followed that. Construction process ends after the completion of flooring, interior furnishing and sails.[147] Ottoman man-of-wars, like the ones of Europe, were composed of several decks. These can be enumerated from top down as in the following sequence: Open deck (*açık güverte*), main deck (*palavra*), middle deck (*orta kat*), gundeck (*top ambarı*), orlop deck (*tavlon*), and lower-orlop deck (*kontratavlon*)[148].

As for the physical disadvantages attributed to the Ottoman man-of-wars by foreigners, it is said that they had intervals between decks higher than was usual in European ships in order to allow the crew to wear their high and elaborate headgear. This point is considered to have been a sacrifice to military fashion and rendered the vessels very high and thus less stable and unable to carry great quantities of sail without being in danger of capsizing.[149] The eighteenth century Ottoman vessels are also said to have been very cumbersome, massive and bulky with excessively high

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[146] It is understood that 85,900 *kuruş* were paid for the construction of the galleon and 41,346.5 *kuruş*h for engineers. See BOA. Cevdet-Bahriye, no. 2684.

[147] Jean Nahum, "Geleneksel Türk Kayıkçılığı ve Gemiciliği," (Graduation thesis, Robert College Engineering Department, İstanbul, 1971), p. 3.

[148] Hüsnü Tengüz, *Osmanlı Bahriyesinin Mazisi* (İstanbul: T.C. Deniz Kuvvetleri Komutanlığı, 1995), p. 24.

[149] Otto von Pivka, *Navies of the Napoleonic Era* (Newton Abbot: David and Charles, 1980), pp. 312-313.

poops, superstructures and riggings as well as to have had unsound structure. A violent storm could break up a ship due to the excessive distances between the principal beams. The use of soft wood and the failure in the application of regular caulking to the underwater planks were the main reasons leading the Ottoman ships to be unusually porous and prone to taking in water.[150] Therefore, in order to decrease these disadvantages, Cezayirli Gazi Hasan Paşa lowered their decks, rendered their sterns less lofty, raised their masts and provided better tackling and a more regular gunnery in the third quarter of the eighteenth century.[151]

The Introduction of Copper Sheathing of Ships

Despite its revolutionary character that has caused some scholars to consider it the most important technical innovation implemented by the British naval pioneers during the eighteenth,[152] the sheathing of ships' bottoms with thin plates of copper to protect against the penetrations of the destructive shipworm and to prevent the growth of weeds was not an entirely new idea even in the mid-eighteenth century, when the first practical trials began in British naval dockyards. Wooden sheathing had been used by some nations since the fifteenth century or earlier, and it had long been conjectured that any hard sheathing which was sufficiently impenetrable would

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[150] Shaw, *Between Old and New*, p. 151.

[151] Cipolla, p.103.

[152] R. J. B. Knight, "The Introduction of Copper Sheathing into the Royal Navy, 1779-1786," *The Mariner's Mirror: The Journal of the Society for Nautical Research*, 59 (London: Greenwich National Maritime Museum, Society for Nautical Research, 1973), p. 299.

be an effective barrier to "the worm" known as *teredo*, or shipworm.[153] Between the sixteenth and the eighteenth centuries various metals were tried to this end in Britain as well as in the continental Europe, but these early experiments encountered unpredictable side effects and were ultimately rejected as impracticable or uneconomical.

In peacetime, when the active fleet was scaled down and there was ample time for maintenance in the royal dockyards, the Navy Board and Admiralty felt no pressing need for this expensive innovation. But during the eighteenth century when the pressure of the wars was felt on the country's dockyards to keep the maximum number of vessels fit for battle, as well as the greatly increased number of vessels sent oversees to the West Indies, East Indies and Mediterranean, in waters where the shipworm thrived, it created the impetus for the navy to investigate the practicability and effectiveness of any measures promising to extend the service life of their ships, and decrease the need for frequent docking for maintenance. Among these measures were the sheathing of ship's bottoms, or parts of their bottoms, with copper, lead and brass, as well as renewed interest in traditional wooden sheathing.[154]

In 1671, an Englishman, Sir Anthony Deane, tried out lead sheathing, repeating the procedure practiced in Roman antiquity. However, this technique could not be carried out satisfactorily, and a sheathing of thin pieces of wood continued to

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[153] "It is actually a bivalve mollusc that can wreak terrible destruction on unprotected timber. The free-swimming larva makes a pinhole entry into timber and, once inside, metamorphoses into an adult that chews a tubular burrow along the grain of the wood. Externally, infested planks may appear perfectly sound. Its ideal habitat is in waters between 60 F and 80 F degrees: it was therefore a problem not encountered by the Royal Navy, on any scale, until English fleets began to venture into the Mediterranean in the second half of the seventeenth century, where they became infested with *terodo navalis*, the Mediterranean species." Randolph Cock, "The Finest Invention in the World: The Royal Navy's Early Trials of Copper Sheathing, 1708-1770," *The Mariner's Mirror: The Journal of the Society for Nautical Research*, 87, no. 4 (London: Greenwich National Maritime Museum, Society for Nautical Research, 2001), pp. 446-447.

[154] Ibid.., Cock, p. 446.

be used. Another technique, known as studding with covered the hull with iron nails with large, flat heads placed side by side, sometimes replaced this most inadequate protection. Rust eventually connected the heads and covered the hull, rough and resistant to movement, and, moreover, algae and sea animals were also to attach themselves to it easily. This technique of studding continued in use especially for stationary buoys, pontoons, and so on, which did not suffer from these disadvantages. In the third quarter of the eighteenth century copper sheathing experiments began. In 1764,[155] on the orders of the British admiralty, experiments were carried out with copper sheathing on a frigate, *The Alarm*, then on small ships, but without great success. Electrolytic reactions[156] between the copper and iron bolts, the nature of which was not yet understood,[157] made the cure worse than the disease. The iron fittings of the rudder, as well as the structurally vital iron bolts in the hull, rapidly eroded in the presence of copper, destroying the ship's ironwork, causing rust to drain down and spread over the surface.[158] In 1783, copper bolts replaced the iron ones as well as pins, and durable protection was achieved. From then on, copper was applied to large merchant ships that were to navigate in tropical waters.

The French had many difficulties in adopting copper sheathing. Although it was known in France that the English had made the practice general, trials in 1778

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[155] Henry Hamilton says that copper sheathing for ships bottoms seems to have been first used in 1761. *The English Brass and Copper Industries to 1800* (London: Longmans, Green and Co., 1926), p. 152..

[156] It was the galvanic action between metals of different electrical potentials immersed in an electrolyte (seawater). See Cock, p. 452.

[157] George P. B. Naish, "Ships and Shipbuilding" in *A History of Technology*, eds. Charles Singer, E. J. Holmyard, A. R. Hall and Trevor I. Williams, vol. 4 (Oxford: Claredon Press, 1958), p. 580.

[158] Cock, p. 452.

on the *Iphigénie* and in 1779 on the *Gentille* and *Amazone* were not encouraging. Examining captured English ships enabled the French to study their sheathing technique. Durable sheathings were finally developed with careful use of metals, nails, and application techniques. The great advantage of keeping hulls clean and protecting them against shipworms ultimately led to the general use of this technique.[159]

The copper sheathing of ships was not carried out during the actual construction process. It was done in the wake of the launching and after the ship was towed into a drydock, where copper sheathing then was added while other items of the ship's fitting out were completed. It was not a permenant process, since the copper plates tended to wear away or suffer from underwater knocks and scrapes. Therefore, they had to be renewed. Renewal was the most important part of the ship's periodic dockyard maintenance. Depending on the ship's condition, a simple patching of damaged plate or the costly removal of the existing coat and renewal of the whole plate could be needed. The copper generally was stored in the form of plates each measuring four feet long and fourteen inches deep, with varying grades of thickness. The thickest plates were used in bows, the mid sized ones in the hull section behind the bows, and the thinnest ones in the rest of the hull. While the covering was initially a foot below the waterline, it was extended to cover up to sixteen inches above the waterline in 1783. Thin copper nails of four inches in length were used to bolt the plates onto the wood. It allowed a small overlap of neighbouring plates to prevent the penetration of crustaceans. For the process of

[159] Maurice Daumas and Paul Gille, *A History of Technology and Invention*, vol. 3 (Translated from the French by Eileen B. Hennes. London: J. Murray, 1980), p. 326. For more information on copper sheathing of ships, see R. J. B. Knight, pp. 299-309; Cock, pp. 446-459.

covering the hull of a fifty-gun ship, over 2,000 copper plates were needed.[160] In the UK, 800 sterling was required for copper plates and their fixing in an 800 ton ship which cost 10,000 sterling around 1790.[161]

The Ottoman Experience with Copper Sheathing

As for the Ottoman experience with copper sheathing, the last quarter of the eighteenth century witnessed some structural changes with respect to developments in naval technology. In this context, the copper sheathing of ships was one of the novelties the Ottomans adopted to keep abreast of the European naval technology. They seem to have been aware that this technique, when it first appeared in Europe, had offered some significant advantages such as protection from wood-eating worm; providing a surface on which external weed and shellfish could not grow; an increase in sailing speed which not only reduced voyage times, but made navigation easier, since if a vessel could move in light winds it was less liable to drift on ocean current; the applicability of copper sheathing to any shape or size of hull; providing an outer skin of copper protected the hull to some extent; holding caulking materials in position; and reducing maintenance costs between voyages.

On the other hand, some disadvantages, such as high material and application costs, the risk of galvanic action and the deterioration of iron fastenings, and the fact that a coppered vessel could not be grounded in harbour without considerable risk to the sheathing and thus was restricted to harbours with water at

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160 Rif Winfield, *The 50-Gun Ship* (Great Britain: Caxton Editions, 1997), pp. 75-76.

161 Wolfgang Müller-Wiener, *Bizans'tan Osmanlı'ya İstanbul Limanı* (Istanbul: Tarih Vakfı Yurt Yayınları, 1998), p. 208.

all tides[162] could not prevent the Ottomans, as the Europeans, from adopting this technology. However, some of these disadvantages were unknown to the Ottomans initially. They learned about them as a result of their prolong naval experiences in the form of trial and error. Thanks to academic work from the 1950s onward, the nature, type and properties of the mollucs and crustaceans hazardous to the timbers in the seas surrounding Turkey have been identified.[163]

There is considerable evidence indicating the existence and application of this technology in ships built specifically in the reign of Sultan Selim III. The ships, which were determined to have been sheathed with copper between the years 1204-1216/1789-1802, were at least thirty-nine. They were mostly galleons, frigates, and corvettes. This figure must have been higher regarding the general technological tendency of the time. Considering the imperial edict issued in 1210/1795-96, we see that the application of copper sheathing to ships proved to bear good results and it caused the Sultan to order the authorities to try hard to outfit the remaining ships

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[162] Gareth Rees, "Copper Sheathing, An Example of the Technological Diffusion in the English Merchant Fleet," *Journal of Transport History*, New Series, vol. 1, no. 2 (September 1971), p. 93.

[163] Alaaddin Bobat refers to academic works showing the existence and hazardous effects of timber boring and fouling worms. He proves that two types, *lyrodus pedicellatus* and *teredo utriculus* are more effective in the Mediterranean Sea while *bankia carinata* less effective and *teredo navalis* was the only worm discovered in the Black Sea. Referring to other studies, he says that *teredo navalis* was found specifically in the depths of the Marmara Sea, the Eastern Black Sea and almost all over the Turkish seas. In addition, he mentions research indicating that Amasra, Beykoz, Akbaş (Çanakkale), İzmir, and Mersin harbors contain *nototerado norvegia* type of weeds densely and *limnoria tripunctata* and *chelura terabans* types in less quantity. See "Emprenyeli Ağaç Malzemenin Kapalı Maden Ocaklarında ve Deniz İçinde Kullanımı ve Dayanma Süresi," (Ph.D. dissertation, Karadeniz Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Orman Endüstri Mühendisliği Anabilim Dalı, Trabzon, 1994), pp. 23-25; E. Pınar, *Türkiye Limanlarında Fouling ve Boring Organizmalar, Antifouling-Antiboring Boyaların Bu Organizmalar Üzerine Etkileri* (İstanbul: Deniz Kuvvetleri Komutanligi Hidrografi Yayınları, 1979); M. Demir, *Boğaz ve Ada Sahillerinin Omurgasız Dip Hayvanları* (İstanbul: İ. Ü. Fen. Fak. Hidrobiyoloji Arş. Ens. Yayınları, no. 3, 1954); A. Berkel, "Istanbul ve Civarı Su İnşaatında Ağaç Malzemenin Kullanımı Hakkında İncelemeler,'" *İÜOF Dergisi*, Seri: B, 1, 11 (1961); O. A. Sekendiz, *Doğu Karadeniz Bölümünün Önemli Teknik Hayvansal Zararlıları Üzerine Araştırmalar* (Trabzon: KTÜ Orman Fak. Yayınları, no. 127, OF. Yayın no. 12, 1981).

with this technology.[164] *Firmans* ordering the copper sheathing of ships were issued repeatedly. For example, in a *firman* dated 1210/1795-96 copper sheathing and painting were ordered for *ince donanma gemileri* (river ships)[165] when they are at anchor.[166] Following the copper sheathing of *Arslan-ı Bahrî* (The Lion of Sea) and *Şehbâz-ı Bahrî* (The Hero of Sea), same application was ordered in 1795 for *Pertev-i Nusret* (The Beam of Victory), *Ejder-i Bahrî* (The Dragon of Sea), *Âsâr-ı Nusret* (The Sign of Victory), *Bahr-i Zafer* (The Sea of Victory), and another three-decked galleon under construction. It was estimated that the amount of raw copper required for all five ships would be around 60,000 *kıyyes*. Since this process required casting very thin copper sheets processed twice, the copper coming from Gümüşhane would not be suitable, instead, that from Kastamonu or Ergani would be needed. It seems that copper sheathing technology was limited with warships in the time.[167]

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[164] BOA. Hatt-ı Hümâyûn, no. 151210.

[165] They were vessels operating in not in seas but in relatively bigger rivers such as the Tigris and the Euphrates. They were generally oared vessels built in narrow and delicate forms. They had various functions such as the transportation of guns, soldiers, animals, construction materials, provisions; communication; escourting, guarding and as warship etc. See Cengiz Orhonlu, "Gemicilik," *Türkiyat Mecmuası*, 15 (İstanbul: İstanbul Üniversitesi Edebiyat Fakiltesi Yayını, 1969), p. 158. Among them were *karamürsel* (a kind of small transportaion vessel), *şayka* (a flat bottomed warship with three guns and of 17-33 *zira*), *işkampoye* (an oared vessel operating in Danube in communication), *üstüaçık* (a kind of transportation vessel), *aktarma* (it was used as escord ship or the name of captured ships from enemy), *çekeleve* (a transport ship used for the transportation of fruits and small sizes of timber), *celiyye* (it was used for the transportation of animals), *kancabaş* (it was used for the transportation of foodstuff, and military store), *palaşkerme* (a light sailed vessel), *at gemisi* (it was used for the transportation of horses and land forces together with their equipment), *taş gemisi* (it was used for the transportation of stones and timber to be used in constructions), *top gemisi* (it was used for the transportation of cannons), *borozan gemisi* (it was used in Danube for grain and wood transportation), *geç gemisi ve kayığı* (a kind of transportaion vessel with two masts), *tonbaz* (a kind of small sailing ship with flat bottom), *melekse* (it was used for the transportation of copper to be used in casting naval cannons), *at kayığı* (it was used for the transportation of horses), *ateş kayığı* (it was used for the transportation of fire conduits to extinguish fires), *menzil kayığı* (a boat used for communication), *dolap kayığı* (it was used for the cleaning of the harbour of Rhodes), *funda kayığı* (a small boat used for the transportation of heath), *sandal* (small boat on ships), and *filuka* (small boats on the warships). For a detailed account of them, see also Bostan, *Tersâne-i Âmire*, pp. 88-94.

[166] BOA. Hatt-ı Hümâyûn, no. 15212.

Mahmut Raif Efendi described copper sheathing in his account as well. He wrote that all the shipmen shared the idea that copper sheathing was the best way to protect ships. He noted that three ships, a three-decker of sixty-seven *zirâ* and six *kâne*, a frigate of fifty-five *zirâ*, a corvette of thirty-seven *zirâ* and a boat (*filika*) for the Sultan were launched in a single day, which was something unseen up to the date. In the previous year (1797) all of them had been sheathed with copper and more ships were to be sheathed in 1798.[168] Therefore, it would not be misleading to regard most of the ships, especially war ships constructed after 1210/1795-96 copper sheathed. Adding the ships bought and received as gifts from other countries or domains in the above-mentioned period increases this figure substantially.

During the reign of the Sultan Selim III, at least forty ships of various kinds, mostly war ships, were sheathed with copper. If the ships captured or received as present are taken into consideration, the figure is estimated to have been forty-five. The earliest document found during this study indicating the Ottoman's application of the copper sheathing technique dates back to 1207/1792-93[169]. In that year, the Ottoman government ordered the copper sheathing of a new galleon and

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[167] Emsen, p. 17.

[168] *Mahmud Râif Efendi ve Nızâm-ı Cedîd'e Dâir Eseri*, trans. and eds. Kemal Beydilli and İlhan Şahin. p. 57.

[169] Naval actions resulting in the establishment of the Republic of Seven Islands in 1800, explains Ottomans superiority over Russian navy in terms of the adoption of copper sheathing technology, maintenance of the ships, construction and design. The following quotation exemplifies this state. 'The Black Sea fleet (Russian) was short of funds for supplies and ships were in a bad state of repair. Most of the ships were veterans of the last Russo-Ottoman War of 1787-1791. All of the capital ships under Ushakov's command had serious construction flaws. Only a few of them had copper sheaths that protected the lower portion of the hulls so as to extend the period of service... During an inspection tour on 12 September, Ushakov realized that the Ottoman ships were superior to Russian ships in terms of design and construction materials although they were undermanned. They were built in the recent French design and equal in number and size to the Russian ships.' See Saul, N.E., *Russia and the Mediterranean 1797-1807* (Chicago and London: The University of Chicago Press, 1970), pp. 57-58, 67, 78-79, 88-89. I tender my thanks to my colleague, Kahraman Şakul from George Town University, for kindly letting me know about this information.

copper merchants were ordered to prepare copper planks on certain models. Once the copper sellers saw the model, they declared that the production of the model was different and would be more difficult than the one they used previously and therefore it would require more labour and money. Then the merchants were presented with lumps of unrefined copper by the state for the production of the copper plates for the sheathing of the galleon in question. They were given fifty-five *akçes* per *vukiyye*, whereas it had been thirty-five *akçes* in the past. However, since the new technique required the use of the copper nails that were expensive, they found a solution by producing a new type of nail made of raw copper and zinc (*rûy-i mâye*) mixed in equal proportions. In order to test the efficiency of the new nail they first produced five or ten test nails. After applying them to the copper plates, the authorities were convinced that the new method would work and therefore, copper merchants were commissioned to cast this mixture in return for fifty *akçes* per *vukiyye*. It is noteworthy that such a decision was taken with the collaboration of the port commander (*liman reisi*), the chief architect (*başmimar*), the chief augerer of the naval arsenal (*tersane burgucubaşısı*), and copper merchants (*bakırcı esnafi*). The raw materials were provided by the state from the *mahzen-i sürb.*[170]

On 14 Safer 1210/30 August 1795, 5,000 *vukiyyes* of raw copper from the *Darphâne-i Âmire* (the Imperial Mint) were demanded urgently[171]. On 12 Cemâziyelâhir 1216/20 October 1801, for the copper sheathing of a three-decked galleon under construction at the Naval Arsenal, 10,000 *vukiyyes* of raw copper were required. Since there was not enough copper at the *mahzen-i sürb*, it was provided by

[170] Bostan, p. 9.

[171] BOA. Cevdet-Bahriye, no. 1588.

the *Darphâne-i Âmire* two-thirds of it low quality and one-third high quality. The cost, 6,666.5 *kuruş*, was met by the *seferiyye akçesi.*[172]

It seems that copper sheathing caused further changes in the structure of materials used in the construction of the ships. A document dated 11 Ra 1211/14 September 1796 notes that it was a tradition that bearing pintles (*inecikler*) mounted on the rudders of the imperial galleons were made of iron. However, this traditional application was changed with an imperial edict ordering the introduction of copper sheathing of the ships constructed at the *Tersâne-i Âmire* and other sites outside of Istanbul. From then on, the former iron bearing pintles of the sheathed ships were replaced by ones made of bronze (*tunç*). Four *vukiyyes* of tin (*kali*), thirty-two *vukiyyes* of raw copper (*nühâs-ı hâm*) and sixty-four *vukiyyes* of zinc ferment or alloy (*rûy-i maye*) were needed for every 100 *vukiyyes* of bronze bearing pintles. Also one *kıyye* of *hark-ı nâr* was required for every ten *vukiyyes* of the product. It seems that new regulations were applied to a new frigate under construction at Limni on the same date. It was declared that eight bearing pintles for rudders (465 *vukiyyes*) would be produced by Dimitri the chief founder at the *Tersâne-i Âmire* on 29 Safer 1211/3 September 1796.[173] The Ottoman authorities continued the copper sheathing applications in the following years. On 12 Şevval 1220/3 January 1806, 30,000 *kıyyes* of copper were demanded from the *Darphâne-i Âmire* for the re-sheathing of five naval ships with copper plates (*nühas tahta*) and the repair of the copper elements of some other ships in the Naval Arsenal.[174]

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172 *Seferiyye akçesi* is a temporary treasury for wartime expenses. BOA. Cevdet-Bahriye, no. 1775.

173 BOA. Cevdet-Bahriye, no. 9362.

174 BOA. Cevdet-Bahriye, no. 4454.

The Supply of Copper for Sheathing and Its Process

As seen above, copper was an important strategic material. Its sale to foreign countries was forbidden. It was almost completely used by the state. The Imperial Mint (*Darphâne-i Âmire*), the Imperial Cannon Foundry (*Tophâne-i Âmire*) and the *Tersâne-i Âmire* were the main institutions using copper intensively.[174] The supply of enough copper for the sheathing of the ships was an important matter for the Ottoman navy. The Ottomans' main sources of copper were the mines in the regions of Ergani and Keban.[175] The raw copper was sent from these regions to storage facilities (*mahzen-i sürb*) within the body of the Imperial Naval Arsenal in Istanbul via land or sea routes. If the sea route was to be used, raw copper was first processed (*tabh ve tesviye*) in Tokat[176] before being transferred to the Samsun wharf via carriages provided from the province of Canik and its surrounding villages such as Kavak and Ezine Pazari, and then ships departed with copper bound for Istanbul. If the land route was to be chosen, then copper was sent to the Iznikmid port (today's Izmit) before being processed in Tokat and then transported to the special storage facilities at the Imperial Naval Arsenal in Istanbul via ships. The Ottoman government commissioned the local administrators such as *muhassıl* (tax collector), *maden emini* (superintendent of mines), *kadı* (judge), *ayans* (local notables), soldiers

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[174] Fahreddin Tızlak, "Osmanlı Devleti'nde Ham Bakır İşleme Merkezleri Olarak Tokat ve Diyarbakır," *Belleten* 59, no. 226 (1995), p. 651.

[175] BOA. Cevdet-Darphâne, no. 463. For more information about the copper mines, see Fahrettin Tızlak, *Osmanlı Döneminde Keban-Ergani Yöresinde Madencilik (1775-1850)* (Ankara: TTK, 1997).

[176] From the mid-eighteenth century, raw copper after first being processed in the mines in Ergani was made into pure copper. This raw copper was sent to *kalhane* (processing house) in Tokat to undergo its last process and to be given its last form. From this time on, Tokat came to be the leading city in the copper metallurgy. See Mehmet Genç, *Osmanlı İmparatorluğunda Devlet ve Ekonomi* (İstanbul: Ötüken, 2000), p. 288.

and other notables through imperial edicts to operate the supply system.[177] The Tokat-İznikmid route was used until 1795, after which the Tokat-Samsun-Istanbul route was preferred.[178] 60,000 *vukiyyes* of copper were allotted to the sheathing process as well as tools and equipment to be used on ships on 2 Cemâziye'l-evvel 1211/3 November 1796.[179] To have a general idea of the copper consumption, in 1797-98, it was decided that 800,000 *kıyyes* of copper per a year would be sent for the cannons to be constructed in Tophane and Haskoy and for galleons to be built at the *Tersâne-i Amire.*[180]

Mikyâs-ı Sefâin (Measurements of Ships), a book translated by Diyarbakırlı Abdülhamid in the beginning of the nineteenth century, shows that the number of copper plates of twenty-eight and thirty-two *vakiyyes,* for sheathing the careen of a three-decker galleon with 120 guns was 4,738. This figure was 3,850 for a three-

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[177] BOA. Cevdet-Darphâne, no. 95. A document dated 20 Zilhicce 1211/16 June 1797 explains this process. Yusuf Ziya Pasha was the *Maadin-i Humayun Emini* (Superintendant of the Imperial Mines) responsible for the supply of copper and administration of copper mines in the time while Es-Seyyid Hasan was the *nuhas emini* (superintendent of copper supply) in Tokat. The number of the carriages required for transporting the copper from Tokat to Samsun wharf was 500-600 *vukiyyes* and this was provided from Canik, Kavak and Ezine Pazari.

[178] Tızlak, "Osmanlı Devleti'nde Ham Bakır İşleme Merkezleri Olarak Tokat ve Diyarbakır," p. 650.

[179] BOA. Cevdet-Darphâne, no. 59. This documents shows the total copper requirements for the *Tophâne-i Âmire, Hasköy Furunları* and imperial naval galleons. It is understood that 380,160 *vukiyyes* of copper for the guns to be cast in *Tophâne-i Âmire,* 253,440 *vukiyyes* for the guns to be cast in Hasköy, 30,000 vukiyyes for *Cebehane,* 60,000 vukiyyes, 26,400 *vukiyyes* for unexpected needs were allotted. The total annual copper need appears to have been as 750,000 *vukiyyes.* Another document, dated 29 Zilka'de 1217/23 March 1803 (BOA. Cevdet-Askeriye, no. 48831), confirms the same sources and routes for copper supply for the Imperial galleons. It mentions 500/600 wagons to be provided from Ezine and Kovan to carry the copper in question as well as some other wagons and pack animals from Sivas, Tokat and Amasya.

[180] For this purpose an imperial firman wrote to the Governor of Erzurum and Meadin Emiri, vizier Yusuf Pasha. See BOA. Hatt-ı Hümâyûn, no. 10721.

decker *kapak* with eighty guns, 3,206 for a *kapak* with seventy-four guns, 1,390 for a frigate with twenty-eight guns, 1,463 for a corvette with eighteen guns.[182]

As it is judged from another document dated 27 Safer 1211/1 September 1796, for the ships to be covered with copper, seventy-nine *akçes* were to be paid per *vukiyye* and five *vukiyyes* of *hark-ı nâr* would be mixed with every one hundred *vukiyyes* of copper. These wages were limited to the copper to cover ships only and were not valid for copper to be used for other equipment.[183] To give an idea about the amount of copper needed for ships, a document gives significant information. Although it does not give specifically the amount necessary for a single ship, it gives the total amount for a group of ships. It is understood that for two galleons (the *Seddülbahir* and the *Kaplân-ı Bahrî*), a new frigate and a few new corvettes, 63,000 *vukiyyes* of raw copper were given from the Imperial Mint from Şevval 1213/March-April 1799 to Ramazan 1213/February-March 1799 during the time Seyyid Mustafa was the Superintendent of the Imperial Naval Arsenal. When this amount did not suffice, an additional 66,000 *vukiyyes* were given from the Imperial Mint between Şevval 1214/February-March 1800 and 1215/1801. Later on 10,000 *vukiyyes* more copper were also given on 14 Recep 1215/1 December 1800. The document states that this last 10,000 *vukiyyes* of copper cost 6,666.5 *kuruş*.[184] It also states that

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[182] Ahmet Güleryüz, *Kadırgadan Kalyona Osmanlıda Yelken, Mikyas-ı Sefain* (Ottoman Sailing Ships From Galleys to Galleons, Particulars of Ships and Their Equipment) (İstanbul: Türkiye Sualtı Arkeolojisi Vakfı TINA, Denizler Kitabevi, 2004), p. 107. The writer and his nationality is unknown.

[183] It seems that earlier on the wage per *vukiyye* was fifty *akçes* and every one hundred *vukiyyes* were added five *vukiyyes* of *hark-ı nâr*. On the copper merchants' complaint about the wages, they were increased to seventy-nine *akçes* from fifty *akçes*. BOA. Cevdet-Bahriye, no. 12216.

[184] BOA. Cevdet-Bahriye, no. 1860.

10,000 *vukiyyes* of copper and copper nails were needed for a galleon of sixty-three *arşın.*[184]

The need for copper for the production of plates continued in the following years, with the Imperial Mint as the main supplier. 20,000 *vukiyyes* of copper were demanded from there. The *Tersâne-i Âmire Treasury* met the total cost, 15,833 *kuruş.*[185]

The copper that arrived at the storage facilities was further processed in *haddehâne* (processing house) or some other places to obtain thin copper plates suitable for sheathing the bottom parts of ships, which were usually under the water line. Actually, the *haddehâne* was a very important place for the processing of raw copper. There were different tools used to produce thinner copper planks.[186]

The Ottomans were aware of the suitability of nails made of copper or copper-zinc (*rûy-i mâye*) alloy for fastening the copper plates onto the hulls of the ships. It seems that this consciousness stemmed from trial and error rather than the knowledge of electrolytic reaction, which was something unknown even to the European countries in the 1780s.[187]

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[184] Emsen, p. 10.

[185] BOA. Cevdet-Bahriye, no. 8267.

[186] A document dated 23 Şevval 1210/1 May 1796 indicates the establishment of a new *haddehâne* to process the copper to be fastened onto imperial ships' hulls. The document says that production and preparation of the copper had often been done in the *Humbarahâne* (Shell Production House) and then transferred to the foundry of the Imperial Naval Arsenal (*Tersane-i Amire Temurhanesi*) to be passed through the *hadde* in order to be processed. Considering the waste of copper in the *Humbarahâne*, it was decided to build a *Nuhashâne* (Copper Processing House) within the *Temurhâne* in order to prevent this. This new copper-processing house (Nuhashâne) was planned as a four-walled room with three furnaces. BOA. Cevdet-Bahriye, no. 1261.

[187] It is understood from a document dated 1210/1796 that the Ottomans learned through experience that nails made of copper-zinc alloy were superior to nails made of copper alone in fastening copper plates onto the hulls of imperial galleons. These nails were produced as two types, according to French shipbuilder Le Brune's measures and plans. The cost of the smaller ones was

Copper and brass for sheathing the hulls or bottoms of the ships and for the construction and production of some other materials and equipment were sometimes obtained from other countries. About the distribution of this imported copper and brass over the sectors, a general idea is possible of its overall trend, considering the copper sheathing movement in the Ottoman navy.

The following tables, prepared by John Glover, Pro Inspector General of the Imports and Exports of Great Britain on 21 March 1800 (Inspector General's Office, Custom House, London) refer to the year 1799 and denote the British copper and brass trade with other countries, including Turkey. The first one is an account of the quantity of wrought copper exported during that year. It shows the real and nominal value thereof, and distinguishes the countries to which the same has been exported.[188]

Table 6. The Quantity and Price of Wrought Copper Exported in the Course of 1799

Year: 1799	WROUGHT COPPER					
	Quantity			Nominal Value		
	Cwt.	q.	lb.	£	s.	d.
Denmark	147	1	-	780	8	6
Russia	115	-	-	609	10	-
Sweden	-	-	-	-	-	-
Poland	500	-	-	2, 650	-	-
Prussia	408	2	-	2, 165	1	-
Germany	3, 073	?	3	16, 290	17	6
Portugal and Madeira	4, 394	2	24	23, 292	3	6
Gibraltar	57	-	-	302	2	-

sixty-five *akçes* while that of the bigger ones was sixty *akçes* per *vukiyye*. It is important to note that the smaller ones needed more workmanship. BOA. Cedet-Bahriye, no. 4437.

188 *Great Britain Parliamentary Papers 1799-1800*, II (London: House of Commons, 1800), pp. 205-207.

Italy and Venice	5	-	-	26	10	-
TURKEY	*100*	-	-	*530*	-	-
Ireland	4,392	1	24	23,281	5	9
Isle of Man	87	-	-	461	2	-
Isles Guernsey, Jersey &c.	51	3	14	274	18	9
States of America	8,438	3	2	44,811	18	6
British Cont. Colonies	2,956	3	12	15,729	3	6
West Indies	30,880	1	12	163,797	17	4
Asia	38,296	2	-	202,971	9	-
Africa	3,220	2	-	17,068	13	-
TOTAL	*97,125*	*2*	*7*	*515,043*	-	*4*

Source: *Great Britain Parliamentary Papers 1799-1800*, II (London: House of Commons, 1800), pp. 205-207

In the table above, the average price of wrought copper exported in the course of 1799 appears, by the Declarations of the Merchants Exporters, to have been £. 6. 9s. per Cwt; and agreeably to that rate, the total value of the above copper amounted to Cwt. 97,125. 2q. 7lb. is £. 626,459. 19s. 6d. Turkey, as a wrought copper importer from the UK, is seen to have been above average.

The second table, prepared by the same person, shows an account of the quantity of brass and plated ware exported during 1799 and states the real and nominal value thereof, and distinguishes the countries to which the same has been exported.[189]

Table 7. The Quantity and Price of Wrought Brass and Plated Ware Exported in the Course of 1799

	BRASS						PLATED WARE		
Year: 1799	Quantity			Nominal Value			Nominal and Real Value		
	Cwt.	q.	lb.	£.	s.	d.	£.	s.	d.

[189] Ibid., pp. 205-207.

Denmark	525	2	10	2,365	2	11	173	-	-
Russia	617	3	-	2, 779	17	6	80	-	-
Sweden	9	3	-	43	17	6	7	-	-
Poland	715	-	-	3, 217	10	-	-	-	
Prussia	647	-	-	2, 911	10	-	-	-	
Germany	6, 941	-	-	31, 234	17	11	6, 188	-	-
Portugal and Madeira	1, 163	1	-	5, 234	12	6	1, 011	16	-
Gibraltar	271	3	-	1, 222	17	6	63	10	-
Italy and Venice	147	3	-	664	17	6	180	-	-
TURKEY	*122*	*1*	-	*552*	*2*	*6*	-	-	
Ireland	1, 104	-	17	4, 969	1	3	5, 760	13	-
Isle of Man	-	1	14	1	13	9	-	-	
Isles Guernsey, Jersey &c.	1	-	-	4	10	-	81	12	-
States of America	5, 908	3	3	26, 589	7	6	2, 109	11	-
British Cont. Colonies	2, 793	1	-	12, 569	2	6	436	1	-
West Indies	16, 221	3	14	72, 998	8	9	2, 009	17	6
Asia	34, 501	-	-	155, 254	10	-	10	-	-
Africa	5, 342	1	4	24, 040	5	8	61	7	6
TOTAL	*77, 033*	*3*	*16*	*346, 652*	*15*	*3*	*18, 172*	*8*	-

Source: *Great Britain Parliamentary Papers 1799-1800*, II (London: House of Commons, 1800), pp. 205-207

Here the average price of wrought brass exported in the course of the previous year appears, by the Declarations of the Merchants Exporters, to have been £. 7. 14s. 8d. per Cwt.; and agreeably to that rate, the total value of the above brass amounted to Cwt. 77,033 3q. 16lb. is £. 595,728. 15s. 5d. The plated ware being always entered by the merchants *ad valorem*, consequently the nominal value and the declared value were the same. In this second table, Turkey, as an importer of wrought brass and plated ware is seen to have been above average as well.

New Methods, Tools, Equipment and Machines Used in Naval Works

Until the second half of the seventeenth century, the galleons were constructed in hangars or sheds called *göz* or *çeşm* (shed) and completed on land and then launched to sea. This method required the launching of the completed ships into the sea and putting the ships needing repair on the stocks. Therefore, it was by nature a very hard process necessitating the employment of a great number of workers.[191] Apart from the economic disadvantages in terms of employment, the foremost disadvantage of this launching method was the fact that it caused the collapse of the buttoms of ships to as much as 7-8 *kanas*[192] due to the fact that during the launching process, the weight of the stern naturally was transferred onto the bow. French engineer Le Brun introduced a new method to overcome this problem. The method suggested the launching of the galleons after the completion of their hulls on stocks up to their gunports. The rest of the ship would be completed in the sea, thereby reducing the pressure on the timbers during launching. Actually, this was a good solution to the problem, although it still caused a collapse of 2-3 *kanas*, which had to be fixed while the ship was in the sea during the construction of the rest of the ship, from gunports upward. Le Brun applied this method first to a 59-*zira* galleon, most probably *Arslan-ı Bahrî*, on 9 Şa`bân 1209/1794-95, with the participation of the Sultan.[193] Le Brun's method was carried on for nearly forty years[194] and no doubt

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[191] İdris Bostan, "Osmanlı Bahriyesinde Modernleşme Hareketleri I: Tersanede Büyük Havuz İnşası (1794-1800)," *150. Yılında Tanzimat* (1992), p. 70.

[192] The word "*kana*" refers draught marks or an instrument of the wharf workers for measuring length. See *The Lingua Franca in the Levant*, p. 139. Cevdet Pasha says that 1 *zira-i mimari* = 24 *parmak*, and 1 zira (formerly used) = 24 *kana*, and *kana* is a little bigger than *parmak* because 1 *zira-i mimârî* consisted of 24 *parmak* = 75,8 cm = 37 *French pus*. And 1 *zira* (formerly used) consisted of 24 *kana* = 30 *French pus*. Therefore 1 *zira* (formerly used) is 3-*parmak* longer than the 1 *zira-i mimari* meaning 27 *parmak*. See Ahmed Cevdet, *Tarih-i Cevdet*, vol. 6, p. 144.

Sultan.[192] Le Brun's method was carried on for nearly forty years[193] and no doubt exerted a great influence on the modernisation of the Ottoman navy. As a result of the developments in launching technique, four ships were set to sea, a three-decker of sixty-seven *zirâ* and six *kâne*, a frigate of fifty-five *zirâ*, a corvette of thirty-seven *zirâ* and a felucca (*filika*) constructed for Selim III.[194]

The Introduction of the Logbook and New Navigational Instruments

The tradition of keeping logbooks (*seyir defteri* or *seyir jurnali*) started in 1211/1796-97. During this time, logbooks covering naval and navigational regulations (*kavâid-i bahriye*) were given to the ships. All the captains carried Pirî Reis' *Kitâb-ı Bahriye* (the Book of Sea) as a guidebook and they were responsible for completing and commenting on this precious book according to their own observations.[195] On the other hand, the crew of a warship had to carry navigational

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[192] First launching took place on 30 Saturday 1794. Although it was the beginning of the month of Ramadan, Selim III participated in the launching ceremony, took his place in a stand prepared on a galleon, and watched the launching. See Emsen, p. 15.

[193] Later on, this method was replaced by another one when it was understood that the real problem was caused by the fact that the bow of a galleon carried much more timber in comparison with the stern and when the bow first launched into the sea it raised up immediately and accelerated the immediate lowering of the stern into the sea and this tension and imbalance of weight caused problems. Ships began to be launched into the sea backward, and some cables and cords were used to keep them on balance. Following these developments ships were constructed and completed fully on land and then launched into sea. See Ahmed Cevdet, *Tarih-i Cevdet*, vol. 4 (İstanbul: Matbaa-i Osmaniye, 1309), pp. 143-144; See also Uzunçarşılı, *Merkez ve Bahriye*, pp. 502-503.

[194] *Mahmud Râif Efendi ve Nızâm-ı Cedîd'e Dâir Eseri*, trans. And eds. Kemal Beydilli and İlhan Şahin, p. 57.

[195] Alpagut and Kurtoğlu, p. 48. İ. Bülent Işın, *Osmanlı Bahriyesi Kronolojisi 1299-1220* (Ankara: Deniz Kuvvetleri Komutanlığı, 2004), p. 152.

equipment in order to find their route, geographical locations and sail ships into the intended country in safety. Among this equipment were compasses (*pusula*), sounding leads (*iskandil*) for measuring the depth of the sea[196] and hourglass (*saat-i rîk/kum saati*). Most of this equipment can be found in the inventory of a frigate that was led by Fettah Kapudan.[197] In addition to the above mentioned instruments and books, some other instruments were employed on the naval ships of the time. It is known that Kapudan Pasha ordered Alexan, a Russian trader, to provide newly invented maps, compasses and Frenk *fuğlas*[198] on 29 Zilka`de 1216/2 Nisan 1801. In order to meet the expenses, 4,001.5 *kuruş* were paid from the *İrâd-ı Cedîd Hazinesi.*[199]

Additionally, some tools and instruments left by the late Râtıb Efendi and bought by the state in order to put them into the service of the Mühendishâne Library on 17 Receb 1216/23 November 1801contain some navigational devices. On a list published by Beydilli, *rub' tahtası* (quadrant), *gemi pusulası* (ship compass), *gönye maa tahta* (set square with wood), *çâr kûşe pusula* (square compass), *pergâr-ı tâm* (a pair of compass), *musavver kebîr kürre-i semâ* (illustrated celestial globe of a big size), *akrebli ve ibreli basîte-i âfâkî* (elevation wood with hand and needle), *müteharrik nemçekârî pusula* (moving compass of Austrian type) and many other

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[196] Zaloğlu, p. 347.

[197] BOA. Kamil Kepeci, no. 5726 (5 Za 1205/6 July 1791).

[198] Fuğla means lookout post on the foremast. See *Lingua Franca*, p. 489. However, when it is spelled as *fula*, it means hand glass (a kind of sandglass). See *Gemici Dili*, p. 141.

[199] BOA. Cevdet-Bahriye, no. 10123. For newly invented compasses and oil lamb with rotating glass of English production (*İngilizkârî devir ayna camlı fânus*) all together cost 2223 *kuruş* and 30 para see BOA. Cevdet-Bahriye, no. 11181 (25 Şevval 1212/12 April 1798).

tools, and maps deliniating the fortified and strategic sites and books relating to navigation, shipbuilding and maritime commerce can be seen.[200]

The Introduction of a New Provisioning and Central Kitchen System

A new provisioning system, providing the cooks of ships with wood, salt, and oil sufficient for the entire voyage at the expense of the Treasury was first installed on a new ship of the line, the *Bahr-i Zafer* (the Sea of Victory), in 1794. All food was delivered to the captains and the old practice of delivering the rations for each voyage to the men in their own homes in advance of sailing was abandoned. In central kitchens and allotted dining quarters common meals began to be served at regular hours by cooks who were paid by the Treasury.[201]

Some writers say that this provision system was applied not only to the *Bahr-i Zafer* but also to the *Humây-i Zafer* (the Phoenix of Victory) at the same time, in 1208/1793-94.[202] This new system influenced future ships. There was a kitchen system on most naval ships that were launched in 1794. This system provided not only regular nourishment for the crews, but also eliminated the mess and disorder preventing cannons from efficient firing due to the private stoves (*maltız ocakları*) of the crew.[203] For this purpose, copper was adopted for general cookery, and the decks

[200] For a full account of the lists, see Kemal Beydilli, *Türk Bilim ve Matbaacılık Tarihinde Mühendishane, Mühendishane Matbaası ve Kütüphanesi 1776-1826*, pp. 374-377.

[201] Stanford J. Shaw, "Selim III and the Ottoman Navy," *Turcica: Revu d'Etudes Turques* I (1969), p. 220.

[202] Alpagut and Kurtoğlu, p. 48; Tezel, p. 622.

[203] Gencer supports Tezel, from a quotation from Halil Efendi. See Ali Ihsan Gencer, *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezareti'nin Kuruluşu (1789-1867)* (İstanbul: T.T.K. 2001), p. 44. Another important detail is stated by Beydilli. He focuses on Mahmud Raif Efendi's book entitled *Tableau des Nouveaux Reglemens de l'Empire Ottoman*, claims that Mahmud

were consequently cleared of an immense number of little independent fires contained in earthen pans, by means of which every man, or self-formed association, used formerly to prepare his own meals.[204] Additionally, in order to eliminate the risk of fire, iron plates were affixed to the inner sides of the ships where the common galley stoves were located. Moreover, the shops and stalls formerly established by individual seamen on lower gun decks rendered the cannon unmanageable and frequently inaccessible. This problem was also removed by the new system.[205] These developments and regulations were observed by foreign states and applauded. Especially the provision system was regarded as effective and close to the regularity in Christian navies.[206]

New Copper Nails and the Use of Copper Pots for Storing Gunpowder and Paints

A document dated 1210/1795-96 reports that the French shipbuilding engineer Le Brun gave the model picture of a new type of nail to the nail casters and explained how to cast the new nails. The sizes of the new nails were mostly smaller

Raif Efendi did not write the French version of the book, moving from the fact that the word 'maltız ocakları' in Turkish text written by himself, meaning the kind of stoves like brazier in which some stuff is fired for cooking, was wrongly translated as *Les Esclaves Maltois* (Maltese prisoners) in French version. Therefore, someone else must have translated the Turkish text into French, since it is impossible for Mahmud Raif Efendi to have written two unrelated words as synonyms in Turkish and French texts. This mistake continues in the Turkish and German translations made from the French version. For a detailed discussion of the issue, see Kemal Beydilli, pp. 155-159.

[204] FO 78/15, no. 31 (25 December 1794). See also *Mahmud Râif Efendi ve Nızâm-ı Cedîd'e Dâir Eseri*, p. 57.

[205] Shaw, *Between Old and New*, p. 56.

[206] FO 78/15, no. 31 (25 December 1794).

than the previous ones so that *zimmî* (Christian Ottoman subject) Dimitri complained about the difficulty of processing them as well as the insufficiency of the money they received in return for their growing work. Upon the complaint, the authorities increased wages. Labour for big nails became sixty *akçes* per *kiyye*, while it became sixty-five *akçe*s for the small ones.[207] The wooden barrels formerly used to store gunpowder and paint, were replaced by copper pots as a measure taken to lessen the danger of fires in the shipyard.[208]

New Mast Machines

Within the framework of the improvement works of the Ottoman navy in the aftermath of the Çeşme Incident, Baron de Tott led the construction of a 120-*kadem* workbench for masts in the Naval Arsenal. In Selim III's reign, two new mast machines were constructed and put into operation in the Arsenal in 1795. It is certain that it increased the speed and efficiency of the operations by which masts were prepared for ships.[209] This information is partly verified by Mahmud Raif Efendi's mention of a certain tool used for erecting masts into the ships and being in good working order in the Imperial Arsenal in 1798.[210] The information given by Mahmud Raif Efendi is in parallel with that in an Ottoman document dated 27 Rebî`u'l-evvel 1217/28 July 1802. The document tells about the need for repair of a crane (*macuna*)

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[207] BOA. Cevdet-Bahriye, no. 4436.

[208] *Mahmud Râif Efendi ve Nızâm-ı Cedîd'e Dâir Eseri*, p. 57.

[209] Shaw, "Selim III and the Ottoman Navy", p. 224.

[210] Mahmud Raif Efendi, *Osmanlı İmparatorluğu'nda Yeni Nizamların Cedveli*, trans. and ed. by Arslan Terzioğlu and Hüsrev Hatemi (İstanbul: Turkiye Turing ve Otomobil Kurumu, 1789), p. 29.

formerly used for fitting masts onto imperial naval ships. On the same date, the crane became worn out, its floor sank into the sea to the extent of one *zira* and the pillars of the crane collapsed. It was decided that refractory stone (*seng-i âteşî*) of one *zira* would be placed on the floor of the crane in order to get a solid footing. Plans were made to replace the pillars with massive, solid supports reinforced by iron and lead ties afer proper examinations. The estimated cost was 1,800 *kuruş*.[211]

Despite the information at hand, the types and working order of these machines is unknown, as is whether these machines were used in making masts or in erecting them only. However, it is known that Le Roy, a French shipbuilder in the service of the Ottoman Empire between 1784-1788, had established a structural design enabling the easy fitting of ship masts into their proper places with the aid of a lever when he worked in the capacity of ship building expert in the Pyrénées in 1765 before his arrival in Istanbul.[212] The machine described above might have been of the same kind.

European countries whose timber sources for big masts had been depleted began to search for new sources or to produce "composite masts" or "made masts." These masts were composed of a dozen or more separate pieces cut and fitted to form a single stick. They were then hooped with iron (driven on iron rings) and were more rigid and therefore inferior in flexibility. Since sap was lost in the process of cutting and piecing of their manufacture, they were less durable and more expensive.[213]

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[211] BOA. Cevdet-Bahriye, no. 3883.

[212] Mustafa Kaçar, "Osmanlı Devleti'nde Bilim ve Eğitim Anlayışındaki Değişmeler ve Mühendishânelerin Kuruluşu," p. 87.

[213] Paul Walden Bamford, *Forests and French Sea Power 1660-1789* (Toronto: University of Toronto Press, 1956), p. 207.

Although no evidence is available to back this claim, it seems reasonable to think that, the same method and hooping machines might have been used in the Arsenal, considering the practical and quick way of obtaining masts.

Newly Invented Fire Pumps/Conduits (*Ateş Tulumbası*)

Before the period under examination, fire pumps were used both on land and ships to put out fires. When they became worn-out they were repaired or renewed. In general, in addition to ships having pumps to discard the water that had penetrated the wooden-hulled ships,[215] there were many ships of the time that carried a pair of elm pumps placed just forward of the main mast. The suction principle was essential for the operation of these pumps, which drew water directly from an inlet at the side of the ship up through holes bored via single trunks of the elm tree. Hence, these pumps were not for removing water from the bilges, but to draw water from the sea, which was then delivered, under pressure, through outlets on the upper deck or the lower deck for putting out fires or washing the decks.[216] Most probably the Ottomans, much or less, used similar fire pumps in putting on their ships.

To examplify, in 1208/1793-94, fourteen fire pumps and fifteen hoses to be loaded on the Ottoman ships became worn-out in the course of time and some needed repair while others needed replacement through the agency of the *Tersâne-i Amire tulumbacıbaşısı* (the chief official in charge of supply and delivery of the

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[215] When they got old, wooden ships tended to strain and leak. Rainwater also penetrated the decks. Therefore, chain pumps were fitted to larger ships. Beside them common hand pumps mounted on the ships to supplement the chain pumps as well. Naish, "Ships and Shipbuilding" p. 484.

[216] Winfield, p. 101.

pumps and related equipment). Among the items of fifteen fire pumps were *prinç tas*[216] (brass bowl), *prinç çatal* (brass fork), *prinç burmalı mesarlar*, *prinç pulları* (brass washer), *lehim için nişadır ve kalay* (ammoniun sulfate and tin for soldering), *prinç ağızlıklar ve eklemeler* (brass mouthpieces and accessories), *kavisli* (curved hose), *demir-i ham* (raw iron), *kömür* (coal), and *sandık*[217] *ayak ve kolları* (legs and levers of coffer/pump). The total cost for the pumps and fifteen hoses was 3,269 *kuruş*.[218]

The authorities, anxious to avoid accidents, were opposed to using these different pumps in the place of one another. Therefore, the fire pumps formerly misused or that required repair were fixed, arranged properly and readied for an emergency on 18 Cemâziye'l-evvel 1212/8 November 1797. Fire pumps provided from the *Tulumbacı Ocağı*[219] in the Naval Arsenal only, not the ones on the ships or the ones required during the caulking process, were to be used in fires on land. The hoses and pipes were also to be fixed and renewed in need.[220]

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[216] This bowl was called "*yangın tası*," meaning, "fire bowl" and was used as a helmet for protection from fire. The *Tulumbacıbaşı*'s bowl was made of silver while the personnel's were of copper. See İ. Hakkı Uzunçarşılı, *Kapıkulu Ocakları I* (Ankara: TTK, 1943), p. 83. However, the above-mentioned document shows that the brass bowls seem to have been in use as well.

[217] Fire pump was called "*sandık*" among people who used the pumps. See Mehmet Zeki Pakalın, "Tulumbacı," *Osmanlı Tarih Deyimleri ve Terimleri Sözlüğü*, vol. 3, p. 532.

[218] BOA. Cevdet-Bahriye, no. 1913. For a detailed documentation, see Appendix B.

[219] The first fire department "*Dergâh-ı Âlî Tulumba Ocağı*" was established in 1132/1720 as a branch of the Janissary Corps. Historical sources indicate that the establishment of the fire department started with the fire pump/conduit designated by Davud Gerçek Ağa (d. 1146/1733), a French convert to Islam, in order to put out a fire that had broken out in Tophane. The department was naturally abolished after the abolition of the Janissary corps in 1243/1827. See Uzunçarşılı, *Kapıkulu Ocakları I*, pp. 83-85. On the other hand, documents show that even much earlier than the establishment of the fire department in 1720, there was men of pump in the Arsenal in the second half of the seventeenth century. They pumped out the water inside the vessel with pumps when a ship sprang a leak and water came in. See *Lingua Franca*, p. 448.

[220] BOA. Cevdet-Bahriye, no. 2421.

Documents show that the Ottomans were in search of new fire pumps to be used in naval services. They seem keen to adopt newly invented fire pumps from foreign countries. Engineer Selim (formerly Baily) was commissioned to go to England in 1803-04 by Kapudan Hüseyin Pasha and during the administration of the governor of the Imperial Naval Arsenal, Aziz Efendi, to learn the construction and manufacture of a newly-invented fire pump (*ateş tulumbası*), for the gates of the large dry-dock in the Imperial Naval Arsenal.[221]

Ottomans' First Inquiries about the Purchase of Steam Engines, Water Raising and Evacuation Pumps from England

One of the most important developments at the turn of the nineteenth century was the Porte's request in 1805 for a steam engine from England to be used in the dry dock at the Imperial Naval Arsenal. England's leading role, especially in shipyard construction, port technology and related branches, made England a technical exporter to the Ottoman Empire as well as to many other countries.[222] The first steam engine of the British Navy was installed at Portsmouth for emptying dry docks in 1797.[223]

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[221] BOA. Cevdet-Bahriye, no. 4010.

[222] England was a self-sufficient country and even an exporter of some technical skills such as steam engines, and port improvements from 1660s onwards. In contrast, before that time especially English port authorities leaned heavily on foreign advice and skill. For more information, see D. Swann, "The Engineers of English Port Improvements 1660-1830: Part I," *Transport History*, vol. 1, no. 2 (July 1968), pp. 153-168; "The Engineers of English Port Improvements 1660-1830: Part II," *Transport History*, vol. 1, no. 3 (November 1968), pp. 261-276.

[223] Jonathan G. Coad, "Historic Architecture of the Royal Navy, 1650-1850," Martine Acerra and José Merino and Jean Meyer (eds.), *Les Marine De Guerre européenne XVII-XVIII siècles* (Paris: Presses de l'Université de Paris, 1985), p. 17.

The Ottomans were aware of the developments in England and eager to acquire the technology. A British Foreign Office document (21 December 1805, Tarabya), written by Arbuthnot to the Secretary of State shows that the Ottoman government had requested from the British government a steam engine to be used in the Imperial Naval Arsenal to empty the large basins in which the ships of war were careened and repaired. The British authorities assessed and discussed this demand. They estimated that two of the basins were capable of containing a first rate ship in the Imperial Naval Arsenal, and there were no tides in the harbour of Istanbul, and there was a considerable depth of water close to the shore. An engine in all probability of thirty horse power would be sufficient for this purpose. It seems that the thing that occupied them most was the difficulties and expense attending the use of this engine. They thought that the difficulties would chiefly arise from the "ignorance of the Turks of the proper erection and management of mechanical powers and from their being total strangers to the use of all complicated machines." [225]

The British government requestioned information on how many and what kind of persons should be sent to Istanbul to oversee the erection, employment and repairs of the steam engine; for how long the Turkish government should agree to hire the steam engines; and what wages as well as what additional expenses would be occasioned by the sending out of a large supplying of spare screws, hikes, valves, and pistons. The correspondences show that the British carefully considered such matters as the legality or illegality and prohibition of the export of the steam engine and possible objections to the idea of instructing foreigners in the use of this machine.

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[225] PRO. FO 78/46, pp. 242-244.

From Mr. Hamilton's letter, dated 11 December 1805, it is also understood that the Porte's request for the steam engine dated back to December 1803, when the Porte had enquired into the possibility of buying a steam engine through Mr. Baily. Baily had furnished the British authorities with the specifications of the dry docks at Istanbul, such as the dimensions of the docks, the height to which the water would be raised and the expenses.[225] Baily had been commissioned to travel to England in 1218/1803-04 by Kapudan-ı Derya Huseyin Pasha and, during the administration of the governor of the Imperial Naval Arsenal, Aziz Efendi, in order to learn the construction and manufacture of a newly-invented fire pump (*ateş tulumbası*) for the gates of the big dry-dock at the Arsenal.[226] In 1803, the height to which the water would be raised was thirty-nine feet. The steam engine was prepared to work two pumps theree feet in length each. With such pumps twelve feet would be required to empty the docks. Hamilton's letter shows that the specifications given in 1803 were changed later on and the machine requested in 1805 turned out to be a different engine with different specifications.

As a result of the following correspondences between the British and Ottoman authorities, royal engineer Captain Squire explained the result of his enquiry into the specifications of the steam engine requested by the Porte.[227]

Dear Sir,

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[225] Ibid., pp. 242-244.

[226] BOA. Cevdet-Bahriye, no. 4010.

[227] PRO. FO 78/46, pp. 242-244.

I have made enquiry respecting steam engines as you desired, the result is, that a good engine of Boulton and Watts construction, of the power of 30 horses for pumping water, will cost about 1200, to which must be added the cord of pumps if of large diameter, about 700, (1200+700=1900).
A rotative engine of the same power, suited to other purposes than drawing water, will cost about 1700.
Ditto- of the power of 20 horses .... 1300.
The above price is for engines finished in the common way, but I suppose it would be right, considering it in all points, then it should be higher finished, and in some parts more expensively than common engines are, which may add from 1 to 200 to the expense. There will also be some difference in the price of the pumps, according to the height the water is to be thrown, and the diameter of the pistons.
The above price is exclusive of fixing – and I suppose a person from this country must be sent to fix it, and set it going-
I shall wait on General Morse this day, and at the same time call on Mr. Hamilton and leave ..., and hope I shall then so hoping as I fear it will be the only opportunity I shall have .....from the coast as I intend to set off on Tuesday .
Most Sincerely yours,
Captain Squire
Royal Engineer
Mr. J. Renmil
27. Stamford Street
S.... Road.

Mr. Hamilton, in his corresponding letter, points out the ensuing factors:

December 2nd 1805
Mr. Hobson
In the fore... paper Mr. Renmil states that the price of the steam engine required for the Porte would be £ 3222 delivered in London – In addition to which Mr. Renmil informed Mr. Hamilton that two persons should be sent with it to teach the use of it for at least one year at the expense of £ 250 for each: To this must be added the freight expenses.
The engine would be made in three months. The Mr. Bailey mentioned in Mr. Renmil's letter is a renegade Englishman, with a suffice knowledge of mathematics and mechanics to pass for a good mechanical engineer among the Turks: he is very much in confidence.
Mr. Hamilton

Unfortunately, the results of the correspondence and later developments to this end are unknown. However, it is possible to infer what happened by Tann's article on the international diffusion of the Boulton and Watts engine. Tann gives the lists of the orders and inquiries for the Boulton and Watt engine and says that it had not begun in, for example, Turkey, South Africa or Australia by 1825/1240-1241, although a basic knowledge of the technology of the engine had arrived.[228] Aksoy says that from 1856 onwards, steam driven pumps were put into operation to evacuate water from the dry docks. Until that date a kind of a chain pump was used in the construction of dry docks at the *Halic Tersanesi* (Golden Horn Dockyard).[229]

An Ottoman archival document shows that twelve mules (*ester*) were ordered from the *mîrâhur-ı evvel*[230] to operate the wheel to be fitted and adjusted in

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[228] Jennifer Tann and M.J. Breckin, "The International Diffusion of the Watt Engine, 1775-1825," *Economic History Review*, 2nd Series, 31 no. 4 (1978), p. 560.

[229] İsmail Hakkı Aksoy, "Osmanlı Döneminde Kullanılan Eski Su Boşaltma ve İnşaat Araçları," *Proceedings of the First International Congress on the History of Turkish İslamic Science and Technology,* 5 vols., vol. 3 (Istanbul: Technical University), p. 49; Aksoy, İstanbul'da Tarihi Yapılarda Uygulanan Temel Sistemleri, (Ph.D dissertation, İTÜ) (Istanbul: İnşaat Fakültesi Matbaası, 1982), p. 19.

It is known that in the eighteenth century, until the use of atmospheric and later on steam engine, several methods were tried to pump out water from dry docks. First of all, man and horsepower were harnessed. For instance, at Marseille, convicts were made to work small chain-pumps, at Rochefort an Archimedes screw was employed at first, but later on, this was replaced by a bucket pump powered by four horses that proved itself efficient, and at Karlskrona windmills were employed. These methods were neither economic nor humanitarian considering, for instance, in the Spanish case the continuous employment of thirteen chain pumps driven by 390 convicts, who were divided into three shifts and hard labour being described as the greatest form of punishment, which could be inflicted on human beings. See José P Merino, "Graving Docks in France and Spain Before 1800," *The Mariner's Mirror: The Journal of the Society for Nautical Research* 71 (London: Greenwich National Maritime Museum, Society for Nautical Research, 1985), p. 43.

Chain pumps were not only used in drydocks, but also on boards of ships. William Cole introduced the one fitted in ships in 1764. Experiments showed that the old pumps required seven men to pump out a ton of water in 76 seconds while the new pump would pump out the same quantity of water with four men in not much more than half this time. Therefore, Cole's pump was soon in common use. See G. J. Marcus, *Heart of Oak, A Survey of British Sea Power in the Georgian* Era (Oxford: Oxford University Press, 1975), p. 9.

[230] He was an official charged with the administration of the institution concerning the palace animals, their harnesses, feeding, raising and training. He was also charged with the personnel, which consisted of the servants of imperial stables, *sarrac*s (man who produces harness), *yedekçi*s, *sarbans*

order to evacuate water through a temporary gate (*âriyet kapusu*) excavated for the new drydock under the construction in 1223/1807-8.[232] Therefore, we can deduce from this information that the Ottomans had used animal power to evacuate water from the drydocks preceeding the use of steam power. The memoirs of a leading British engineer, who came to Istanbul in 1839, support this point. According to him, the dry docks in the *Tersâne-i Âmire* were emptied through elevators operated by animal power instead of modern pumps.[233]

Consequently, the Porte's search for and enquiries into the steam engine, which was then a fresh innovation in the third quarter of the eighteenth century, can be regarded as an attempt to keep up with the Western technology. It also shows that the traditional water emptying methods used by Ottomans fell short of meeting the urgent needs of the navy, since the early and quick evacuation of a dry dock was vital for the caulking, maintenance and construction of ships. It was closely related to the effective use of the fleet against adversary fleets. In general, the capacity of the earlier pumps used in the dry docks was low and the time taken to clear a graving dock of water was often as long as six to eight hours, the water above tide level being first run off through culverts.[234]

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dealing with Sultan's camels, mule raisers called *harbende* as well as with groves and stud farms. See Pakalın, p. 542.

[232] BOA. Cevdet-Bahriye, no. 4077.

[233] Wolfgang Müller-Wiener, "15 -19. Yüzyılları Arasında İstanbul'da İmalathane ve Fabrikalar," in *Osmanlılar ve Batı* Teknolojisi, ed. Ekmeleddin İhsanoğlu (İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayını, 1992), p. 77.

[234] Du-Plat-Taylor, p. 1170

The Construction of a Stone Furnace for Casting Bronze Bearing Pintles and Sheaves

An order was issued in 1211/1796-7 that bronze bearing pintles (*tunç inecikler*) and sheaves (*tunc zebanlar*) that were used for imperial galleons to be sheathed with copper were to be melted in a pot and manufactured in a hearth (*ocak*) where copper planks were produced.[235] Because of the lack of a separate furnace (*furun*) peculiar to this process, they were first cast in the form of a few pieces and then assembled and manufactured in the above-mentioned hearth located at the Imperial Naval Arsenal. It is said that these equipments proved dangerous in use and the new galleon of three-deckers under construction was quite a large one and therefore small bronze sheaves (*tunc makara zebanları*), which had been manufactured previously for smaller galleons would not fit into the big ones, necessitating the construction of a new separate stone furnace for a constant and perpetual application of the art of firing and destroying screen in the form of bulk pieces.[236] An examination book (*keşif defteri*) for the feasibility of the construction of the stone furnace was prepared after some research. In the book, the excavation of the construction site in question, the measures and specifications of the construction and seperate parts of the building, and the materials required for the construction were all stated in detail. The building was planned to have a brick roof, a wooden floor, a small storage area for tools and equipment, and stonewalls. Additionally,

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[235] Bronze sheaves required for the galleons were sometimes cast in the *Humbarahane* on 7 Muharrem 1204/27 September 1800. See BOA. Cevdet-Bahriye, no. 6792.

[236] BOA. Cevdet-Bahriye, no. 1354.

such materials as refractory stones (*seng-i ateşî*), *küfegî* stones, Swedish iron, slop, iron beams and Horasan lime were used in the construction of the furnace.[236]

Newly Invented Furnaces (*Furun*) and Hearths (*Ocaks*) for the Imperial Galleons

A document dated 25 Rebî`u'l-âhir 1216/4 September 1801 indicates some copper equipment and other tools to be used in the newly invented furnaces (*furun*) and hearths (*ocaks*) which were put in order and delivered to the allotted places via Liman Reisi and Kapudan Pasha for the requirements of the imperial galleons. It says that the cost of the production of the equipment and tools was 9,656 *kuruş*, exclusive of the raw iron provided by the *mahzeni sürb.*[237]

Newly Invented Iron Equipment (*Âhenî Çilingirkârî Mühimmat*)

Relating to the equipment of the imperial navy, a document dated 1218/1803-04 refers to newly invented equipment made of iron and its manufacture. It says that the total cost was 7,468 *kuruş*, excluding the raw iron consumed from *mahzen-i surb* and cost 1,971 *kuruş.*[238]

Newly Produced Steels

[236] BOA. Cevdet-Bahriye, no. 11292 (16 Cemâziyelâhir 1212/6 December 1797). For the specifications of the construction, see the original document in Appendix C.

[237] BOA. Cevdet Bahriye, no. 6872.

[238] BOA. Cevdet-Bahriye, no. 3365.

From a *takrir* (official petition) dated 1207/1792-93 by Mustafa Reshid Efendi, it is understood that a certain engineer (*mühendis beyzâde*, probably the French shipbuilder Le Brun) produced a kind of steel from the Samakov, Swedish and Austrian (*Nemçe*) iron. When introduced to the Ottoman experts, it turned out that the ones produced from Swedish iron were handier and superior to the others because of the toughness of the Swedish iron.[240]

Newly Invented Ground Gunstocks, Mechanical Cranes, New *Darağacı* Structures and Blocks/Pulleys

A document dated 1215/1800-01 reveals that an urgent need had emerged for the construction of a mechanical crane (*macuna/maçula maa cerr-i eskâl*) to rise and lower the newly-invented ground gunstocks (*zemîn kundakları*), which were used in transporting the cannons cast at the Imperial Cannon Foundry (*Tophâne-i Âmire*) and the Hasköy Cannon Foundry (*Hasköy Tophânesi*) to the Corps of Bombardiers (*Humbaracı Ocağı*) as well as used in lifting from the wharf and transferring the big shell mortars (*humbara havanı*) of sixty-five and thirty-six diameters, and loading the same mortars (*havan*) on the gunstocks (*kundak*). It seems that the authorities believed that this construction would lessen the transport cost paid for the porters as well as make the process easier. The same document shows that an English-made mechanical crane,[241] which had been formerly received by the Porte, had been taken as an example in the construction of this new one. There are

[240] BOA. Hatt-ı Hümâyûn, no. 9646.

[241] It is known that there was a new crane of 120 *ayak* (c. 40 meters) in height with a single crank in 1770. See, Müller Wiener, p. 80.

reported to have been two other cranes, which had been built by Ragıp Efendi in 1213/1798-99.[241] Mahmud Raid Efendi wrote that the construction of a *maçuna* with perfect wheels had been started and its completion was expected soon.[242]

For the constructıon dates of earlier cranes, various dates are given for various cranes. According to the the information given in *Hadîkatü'l Cevâmi* (The Garden of Mosques), the construction of pillars called "*macuna*" was started by the middle of the month of Muharrem, 1189/ 1775 down at the shore of the *Tersâne-i Âmire*, in a straight line with the *Zindan* (prison) and completed on 24 Rebiu'l-âhir 1189/1775 under the supervision of Hasan Pasha.[243] As understood from an inscription of Yesârîzâde Mustafa Izzet's, Hasan Pasha's crane had soon become useless because its legs began to rot in water. A *darağacı* was constructed in the time of Küçük Hüseyin Pasha, in 1209/1794-95. Earlier cranes had been called *darağacı* in the Naval Arsenal[244]and ships, after being launched into the sea, were towed beneath them for rigging out.[245] Earlier *darağacı* structures had been made of wood, and had needed renewing or fixing every eight to ten years. This meant high costs.

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241 Ragıp Efendi was in charge of constructing carriages at the *hâcegân-ı divan-ı Hümâyûn humbaracılar kışlası demirhanesi* (iron foundry at the barracks of the bombardiers of the Imperial Council) in 1213/1798-99. It is understood that the total expenses (raw iron, timber, blocks with bronze sheaves and others) spent for the construction of two cranes (*macuna/macula*) amounted to 986 *kuruş*h. Regarding the types of timber used in the construction of the two cranes, bent brace made of oak (*eğri meşe kemer*) and box for gundstoçks (*kundaklık dolap*) were used. BOA. See Cevdet-Bahriye, no. 2172.

242 *Mahmud Râif Efendi ve Nızâm-ı Cedîd'e Dâir Eseri*, trans. And eds. Kemal Beydilli and İlhan Şahin, p. 57.

243 *Lingua Franca*, p. 283.

244 Ali Haydar Alpagut, *Marmarada Türkler* (Istanbul: Deniz Matbaası, 1941), pp. 137-141.

245 Tezel, p. 619. In architectural terminology, Darağacı refers to the elevated scaffolding on which a pulley/block stays in order to raise the drop hammer used for hitting the piles. See Pakalın, "Darağacı," *Osmanlı Tarih Deyimleri ve Terimleri Sözlüğü*, p. 393.

Therefore, towards the end of 1794, all of the former *darağacı* structures were pulled down and three new stone ones for caulking were constructed side by side.[247] Another source indicates that *darağacı*, which was a three-legged flitch beam used for transferring the heavy materials of ships such as guns and rigging as well as for tilting the ships hulls sideways during the maintenance of the bottoms of the ships, was replaced by a new *darağacı* composed of three leggs of iron pipe on 2 August 1794.[248]

French engineer Le Brun is reported to have built two new cranes having hands as well. However, they are said to have been old-fashioned, operated with big pulleys.[249]

Tezel, without giving any date, but most probably referring to middle of the eighteenth century, says that there was a crane and a crane machine (*macuna makinesi*) in front of the Camialtı building. He adds that a crane was thought to exist in the late eighteenth century.[250] Tutel notes that the crane in Daragaci at the Camialtı Arsenal was built in 1790.[251]

Regarding the blocks (*makara*) used on the Ottoman ships to lift heavy materials, they were mostly made of the trunks of ash (*dişbudak*), *kayacık* and elm

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[247] *Mahmud Raif Efendi ve Nizâm-ı Cedîd'de Dair Eseri*, p. 57. See also Şemim Emsen, "Selim III devrinde Osmanlı donanması," undergraduate thesis in History, İstanbul Üniversitesi Kütüphanesi, no. 1118.p. 15.

[248] Işın, p. 151.

[249] Müller-Wiener, pp. 83-84.

[250] Tezel, p. 655.

[251] Eser Tutel, *Gemiler...Süvariler...İskeleler..* (İstanbul: İletişim, 1998), p. 152.

trees (*karaağaç*).[252] The same types of trees were used in Europe in block making. The parts of the block were the shell of elm or ash; the pin of lignum vitae (*peygamberağacı*), greenheart or iron; and the wheel of lignum vitae.[253] Various types of blocks with Santo sheave[254] were purchased from Galata traders to be used on the Ottoman galleons, for instance, the *Bâdi-i Nusret* (the Sailing Ship of Victory) in 1212/1797-98.

The number of blocks used on ships changed between 940 and 399 depending on their size. For example, this number was 940 for a three-decker galleon with 120 guns, and 848 for a frigate with 28 guns and a corvette with eighteen guns[255].

A register book of various kinds of blocks with Santo sheave, which had been purchased from Galata traders via Idris Kapudan, elucidates the technical aspects and types of the blocks. Among eighty-seven blocks of different types costing a total of 283 *kuruş* were *demir sabanlı üç dilli makara* (three-sheave block with iron stroop), *demir sabanlı iki dilli makara* (two-sheave-block with iron stroop), *iki dilli kancalı makara* (two-sheave block with hook), *kancalı torno makara* (single block with hook), d*emir sabanlı makara-i bastika* (snatch block with iron stroop), *kancalı makara palanga-i güverte* (hooked block of deck tackle), *üçer dilli makara-i vasat* (middle block with three sheaves), *ikişer dilli makara-i vasat* (middle block with two sheaves), *makara-i torno* (single block), *iskota makara* (sheet block), *palanga-i*

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252 BOA. Cevdet-Bahriye, no. 7720.

253 George Naish, pp. 581.

254 Ismail Ferruh Efendi says that sheaves for pulleys (*makara dilleri*) in England were made of a tree called Limbo Santo, which was provided from America only. He further says that Limbo Santo was useful in manufacturing pulley equipment (*makara takımı*). See BOA. Hatt-ı Hümâyûn, no. 6085 (1214/1799-1800).

255 Ahmet Güleryüz, *Kadırgadan Kalyona Osmanlıda Yelken, Mikyas-ı Sefain*, p. 108.

borina-i makara (bowline tackle block), *makara-i bastika* (snatch block), and *makara-i mütenevvia* (miscellaneous blocks).[256]

In addition, sheaves for pulleys were mentioned in correspondences with England. To exemplify, a document dated 1208/1793-94 and showing the list of military stores requested from England by the Ottomans included 10,000 sheaves for pulleys made of wood called "Legno Sato." 2,000 out of this amount was requested in the largest size, 3,000 in middle size and 5,000 in small size. Regarding the price, it is understood that as this article had never been brought for sale from England, before an evaluation would be made and a price fixed on arrival. It seems that the Porte wanted to have the sheaves either as ready-made, or in return for a sufficient quantity of wood to be fabricated in the Arsenal.[257] This information is very important for determining the date the first sheaves for pulleys were imported from England. As illustrated above in the Ottoman documents regarding the mechanical crane, it seems that the trade of sheaves for pulleys and mechanical cranes from 1793 onward was lively between the two countries.

We come across information of sheaves for pulleys ordered from England in 1214/1799-1800 as well. Ottoman documents refer to Ismail Ferruh Efendi's report about the Porte's demand for sheaves for pulleys from England. It is understood from his report that in England sheaves for pulleys (*makara dilleri*) were made from a tree called Limbo Santo, which was found only in America and was useful in manufacturing pulley equipment (*makara takımı*). Ismail Ferruh Efendi

[256] BOA. Cevdet-Bahriye, no. 2287. For details see the translation of the original document in Appendix D.

[257] PRO. FO 78/14, p. 78.

advised and discussed the ways of transporting the material to Istanbul. In this context, he also mentioned possible insuring for secure transportation.[257]

As for the block/pulley making technology used in England in the years in which the Ottomans were in close contact to locate for and purchase the required products, it can be said without any hesitation that it was a very important sector for the sailing navy. Towards the end of the eighteenth century, the inspector-general of naval works, Sir Samuel Bentham (1757-1831), made a study of the problem of wood-working by machinery and registered a patent, which included planing machines with rotary cutters to cut on several sides of the wood at once; the preparation of dovetail joints together by means of conical cutters; and veneer-cutting, mortising, and molding machines. Considering the approximately 10,0000 pulley blocks required for the Admiralty per year, Bentham was involved in the organization of the manufacture of pulley blocks. This method was costly, because it was made by hand apart from the initial roughing out the shells with a circular saw and the turning of the sheaves on the lathe. In the following years Sir Marc Isambard

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[257] "*... Makara dili yaptıkları Limbo Santo nâm ağaç Amerika'dan gelmekle gayrı mahalde bulunmayup fil vâki makara takımı imalinde dahi bunların mahareti müsellem görünür, her ne ise memuriyyet-i bendegânem üzre cümlesi bir an akdem tedarik ve irsal olunmasına aleddevam vas'-ı âcizânemi sarf ve peyder pey isticâl ederim, lakin bimennehi teâlâ lede't-tekmil ol tarafa gidecek beylik sefineleri zuhur edüb ona vaz ettirlir ise yahut tüccar sefinesi isticâr ve ona tahmil iderler ise nime'l matlub ve illa tersanelerinden gelüb takdim-i hazret-i devletleri kılınan cevab-ı mütercimin siyak ve sibakından fehm olunduğuna göre sefine isticârı uhde-i âciziye kalur ise gerçi devletlerinin ve kulunuzun isticarında fark yoktur ki bazirgâncada hariç olamaz, lakin sefine ..... kumanya ve alel hesab bir miktar meblağ taleb ederler mi mühimmat-ı mezkureyi sigorta etmek iktiza eder mi ne vechile olacağı henüz mechul-ı bendeganem olmaktan naşi kıdem-i bendeliğime mağruren hariç ez edeb hasbel iktiza teveccühle hareket edeceğimi yalnız efendimden istizan zımnında tasdia cesaret ...şimdilik hemen efendimin malum-ı devletleri olub bu suretle emr ve tenbih buyrulur ise ol babda lutuf ve ihsan emr u ferman velinimetim efendimindir.*" Ismail Ferruh Efendi's use of the word *"sigorta etmek/to insure" is interesting for the time.* See BOA. Hatt-ı Hümâyûn, no. 6085 and 6086 (27 C 1214//1799-1800).

Brunel (1769-1849) and other ship-builders, bridge builders and engineers developed this technology to have more complicated and mechanized systems.[259]

The Cleaning and Deepening of the Samsun Harbour

A British letter dated 14 April 1781, by Sir Robert Ainslie (1766-1838), the British Ambassador to Istanbul to the Secretary of State, the Earl of Hillsborough, notes that a ship of fifty guns, and a frigate of thirty-two had been loaded with machines, and left Istanbul carrying workmen and engineers to be employed in cleaning and deepening Samsun Harbour as well as in building piers to make it capable of receiving and sheltering ships of war. The document says that this was a thing much desired, as there was not a single harbour for that purpose on the Asian coast of the Black Sea. Ainslie reported that he had heard that the above-mentioned group had discovered the foundations of ancient piers which had existed in the Roman era, and that after examination they were judged to be perfectly sound.[260]

The method and the machines used in this work are unknown. However, it is understood that dredgers were used in the cleaning of Kağıthane and Sütlüce passes in the Golden Horn in the eighteenth century.[261] Actually the dredging machines, a bucket wheel for the cleaning of the port, went back to as early as the forteenth century. In the course of time, these machines were perfected, and by the seventeenth century were found in almost every port. They had a scoop at the end of

[259] K. R. Gilbert, "Machine Tools," in *A History of Technology*, vol. 4, ed. Charles Singer, E. J. Holmyard, A. R. Hall and Trevor I. Williams (Oxford: Clarendon Press, 1958), pp. 426-427.

[260] PRO. FO 78/2, p. 111.

[261] İsmail Hakkı Aksoy, *İstanbul'da Tarihi Yapılarda Uygulanan Temel Sistemleri*, Ph.D dissertation, İTÜ (İstanbul: İTÜ İnşaat Fakültesi Matbaası, 1982), p. 12.

a long shaft. This was the power shovel, which remained in use until nineteenth.[262] Applications by the contemporary European states show similarities. Regarding the methods of deepening rivers, canals, and harbours various techniques and machines were used. Among them were the removal of silt in suspension, the use of scoops, ladle-dredgers, grab-dredgers, wheel-dredgers, chain-dredgers or bucket-dredgers.[263]

The Construction of New Shipbuilding Structures and Auxiliary Forms

The Extension of the Area of the Naval Arsenal

Regarding the Imperial Naval Arsenal (*Tersâne-i Âmire*), in 1217-1218/1802-1803, following the collapse of the old walls surrounding the Tersâne, which had been nothing but a barrier before development, a great part of the area formarly included in Aynalıkavak Kasrı was added to the complex through work carried out by Küçük Hüseyin Pasha. Thanks to this development and the pulling down of the seaside buildings of Aynalıkavak Kasrı, the Tersâne obtained the area urgently required for new improvements. This also facilitated the relations between the workers in the Tersâne and the sailors in Kasımpaşa.[264]

The Construction of the *Nühashâne*, *Haddehâne* and New *Haddes*

[262] Daumas and Gille (eds.), p. 408.

[263] G. Doorman, "Dredging," in *A History of Technology*, vol. 4, ed. Charles Singer, et al., (Oxford: Clarendon Press, 1958), pp. 629-643.

[264] Müller-Wiener, p. 84.

Regarding the copper sheathing of the ships, mention had already been made of a document dated 23 Şevval 1210/1 May 1796, the establishment of a new copper-processing house (*Nühashâne*) within the body of *Temurhâne* to process the copper to be fastened onto the hulls of the ships' as well as to prevent the waste of copper formerly prepared in the *Humbarahâne*. This new copper-processing house was planned as a four-walled room with three furnaces. The process of the exploration and determination of the construction site was carried out by the chief architect (*Mimar aga*) on the instructions of the *Tersâne-i Âmire Emini*. It can be traced through the construction notebook (*keşif defteri*) of 21 Şevval 1210/29 April 1796, written by Mehmed Arif Bey, *Ser Mimarân-ı Hassa*. The site chosen was near the *Temurhâne*. The building was surrounded by stonewalls on three sides, and had a perfect roof. There was a high room inside the building for the residence of the workers. Beneath the ground floor there was a shop and a coal cellar. The building had a large gate as well as the necessary tools and components. There were two foundry workshops between the *Nühashâne* and the *Temurhâne*. Its estimated cost was 4,470 *kuruş*.[264]

A document dated 10 Rebî'u'l-evvel 1218/30 June 1803 gives information about the *haddehâne* near the *Âlât Meydanı* (the Rope Square) in the Imperial Naval Arsenal the chief gunpowder expert, Arakel, manufactured a pair of newly invented large iron *haddes* to level copper plates for sheathing the imperial galleons in the time of Kapudân-ı Derya Huseyin Pasha.[265] Although the use of the first *hadde*

[264] BOA. Cevdet-Bahriye, no. 1261. For details see the document in Appendix E.

[265] *Hadde* is the name of the machine used to produce thin plates and wire out of raw copper and iron. The first *hadde* was ordered from abroad in the reign of Mahmud II. See Pakalın, *Osmanlı Tarih Deyimleri ve Terimleri Sözlüğü,* vol. I, pp. 698-699. A *haddehane* operating by steam-power was established in 1834 in order to produce copper sheet mills. See Müller-Wiener, p. 85.

machines is generally ascribed to the reign of Mahmut II, those manufactured by Arakel might be considered to have been the prototypes of the later machines. Additionally, information showing that Arakel finished the *hadde* wheels to be used for gunpowder production at the Azatli Baruthanesi in 1218/1803 supports this idea.[266] Unfortunatelly it is unknown if these *haddes* were fully manual, as in previous years, or semi-mechanical.

The document also mentions later operations concerning the foundation of this *haddehane* building. An excavation was carried out, and the foundation was reinforced with new pillars of washed black *küfegi* stones (*yunmalı seng-i siyah-ı küfegî*). New tools and wheels were constructed for better use of the *haddes*. The total cost was 8,828,5 *kuruş*. The same document mentions the reconstruction of the foundry, which was in dispair. In the foundry, near the *Âlât Meydanı*, a stone hearth (*kârgir ocak*) had collapsed. Therefore, under this stone foundary, a stone-grilled-quay (*kârgir ızgaralı rıhtım*) of two *ziras* was filled and encircled by a wooden fence on three sides. Its interior walls of refractory stone (*seng-i ateş*) were connected with iron beams. Brick, pure mortar, and whitewashed copper were applied. Its measures were three *ziras* in length, two ziras/60,000 in area, seven *ziras* in height and two *ziras* in foundation. In the same foundry, a small furnace (*ocak*) for casting bronze nails was constructed. The structure was encircled with walls of refractory stone (*seng-i ateş*) and whitewashed with slop (*çömlekçi çamuru*), and its measures were two *ziras* in length, 2/7,200 in area and 1.5 *zira* in height. It is understood that the 480 columns and 600 units of woods for the construction of a roof over the mentioned furnace were required. In the same foundry roof tiles, new rafters

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266 Birol Çetin, *Osmanlı İmparatorluğu'nda Barut Sanayi 1700-1900* (Ankara: Kültür Bakanlığı, 2001), p. 27.

(*mertek*), and girdle (*kuşak*) were provided and a balcony (*balkovan*) was fixed. Expenses for porterage, the transport crane, and other expenses were 6,000 *kuruş*.[267]

New Shipbuilding Forms and New Sheds for Gunboats

Two new shipbuilding forms were built at Hasköy and two at Ayvansaray, allowing the construction or repair[268] of nine large ships at the same time in Istanbul and its vicinity. New sheds were also constructed at Kağıthâne to store the gunboats and other small craft of the fleet and protect them from the elements when they were inactive.[269]

The Construction of the Sailhouse (*Kirpâshâne/Yelkenhâne*)

As a natural result of the transition from oared to sailed ships, at the beginning of the eighteenth century, a sailhouse or *kirpashâne*, was established within the body of the *Tersâne-i Âmire* in order to make high quality and quantity sailcloth for the Ottoman galleons, whose number had increased darmatically. This facility underwent repairs and restorations in the 1760s, and was enlarged in 1770.[270]

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[267] BOA. Cevdet-Bahriye, no. 1888.

[268] Actually it is unknown how often, to what extent and what type of ships were repaired in the late eighteenth century. However, we learn from a document (1214/1799-1800) that there were seven boats (*çifte piyade kayığı*) with the Kapudan Pasha on board needed for a wide range of repair and furnishing, because of overuse and wear. When the superintendent of the Naval Arsenal expressed this need, he was told that there would be no repairs before a four-year period had passed. See BOA. Cevdet Bahriye, no. 6506.

[269] Shaw, "Selim III and the Ottoman Navy," p. 224.

[270] Genç, p. 249.

During the reign of Selim III a new and larger sailhouse was constructed by İsmail Hulûsî Efendi in 1210/1795-96 in Darağacı in the Imperial Naval Arsenal.[271]

The Construction of the *Endâzehâne* (Measuring and Drawing House)

A document dated 6 Muharrem 1215/30 May 1800 states the establishment of an *endâzehâne* (measuring house)[272] for the purpose of determining the measures and drawings of galleons to be constructed in the big drydock, and storing the related materials. One out of the three rooms of the granary (*zahire ambarı*) near the drydock was allotted to the *endâzehâne* while the remaining two constructed were to be used for storing foodstuffs as before. The vice-chief architect (*mimarbaşı vekili*) and Tersâne Emini Efendi carried out the examination of the buildings and measurements and they decided that if the room alloted to the *endâzehâne* was separated, being three *ziras* higher than the roof from the room next to it via a stone wall of fifteen *arşın* in heigth and one *zira* in width, it would be protected from all the other stores. In addition, the boxes for foodstuffs in the room would be collapsed and a higher floor with three small rooms underneath for the engineers would be made. Additionally, large windows and doors would be fitted for the construction of two stores if needed. The debris of the boxes of foodstuffs and the columns under

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[271] Işın, p. 153.

[272] *Endâze çıkarmak* meant to take a mold of a ship according to drawings by means of thin pieces of pine. The expression *Endazeden çıkmış* was used for the ships put on stocks after their sternposts and broadsides had been raised, leveled, braced and formed. Ships whose construction came to this stage were called "kafes halinde" (in the form of a cage). Finally, the term *Endâze Güvertesi* was used for the wide and flat floors on which the pictures of the ships to be constructed were drawn and their molds taken according to these drawings. See Pakalın, p. 533.

them would be used to lessen the possible cost. The total cost was expected to amount to 5,665 *kuruş*.[273]

The Construction of New Stone Caulking Places

The caulking of ships was an important matter. There was no class of caulkers peculiar to the Naval Arsenal. Ships took in because of the lack of care. To overcome this serious problem, Kaptan Pasha brought two hundred skillful Arabic caulking masters from Cairo. Large barracks were constructed behind the Arsenal, where they were fed, clothed and accommodated well. As a result of their work, the ships became stronger so that they did not take in water despite three to four years sailing in the sea. To further improve the system, a second caulking place was constructed so that more than one vessel could be caulked at the same time. Both structures were made of wood, and required renewal or fixing eight to ten years, which was expensive. Around 1798, both wooden structures were pulled down and three stone (*kârgir*) caulking platforms were constructed in their place.[274]

The Construction of an Anchor House (*Lengerhâne*)

Anchors were, most often, forged in the naval dockyards, and made up of pieces of iron scrap iron, welded together. These pieces were heated to a white heat, and then beaten into a solid mass, initially with manual sledgehammers, later by

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[273] BOA. Cevdet-Bahriye, no. 5850.

[274] *Mahmud Râif Efendi ve Nızâm-ı Cedîd'e Dâir Eseri*, trans. and eds. Beydilli and Şahin, p. 57.

mechanical drop hammers. Separate pieces were then shaped into the shank of the anchor. The flukes were prepared in the same way, and welded to the arms before the latter were married to the shank. The large iron anchor ring having been forged and shaped would be rove through the head of the shank and welded into it. Bands to secure the two parts of the wooden stock would be prepared in a smaller forge.[275]

In the Imperial Naval Arsenal, the Ottomans kept equipment such as cordages, wire, sails, and casting cannons in storage areas for prospective naval campaigns. Anchors were among this equipment. In connection with the completion of the equipment of the galleons, frigates and corvettes constructed in the Imperial Naval Arsenal, and in Midilli, Bodrum, Limni, Rhodes, Sultaniye, Gemlik, Sinop, Eregli and Sohum, seven anchors were needed for each ship. Four would be mounted on the front parts of the ships for the usual usage on 9 Cemâziye'l-âhir 1211/10 December 1796. Others were kept in the stores for future use.[276]

Documents show that the Ottomans purchased anchor cable, also called *gomana,* of which every galleon had to have a supply,[277] from foreigners beside domestic sources in the late eighteenth century. They made a contract with a Russian merchant called Alexandre for anchor, sailcloth, cordage and some other supplies for the imperial galleons on 22 Muharrem 1211/28 July 1796.[278] Also on 7 Muharrem 1215/31 May 1800, a British citizen named Thomas Thornton[279] (Toranton in the

[275] Betty Nelson Currier, *Anchors* (London: Chatham, 1999), pp. 62-63.

[276] BOA. Cevdet-Bahriye, no. 7212.

[277] Kahane and Titze, *The Lingua Franca in the Levant*, pp. 251-253.

[278] BOA. Cevdet-Bahriye, no. 7825.

[279] Thomas Thornton, who was probably a member of the British Thornton House, acquired some advantages and privileges first from Russia and the Porte later on in trading in naval stores. In a

Ottoman document) residing in Istanbul had six new high quality anchor cables. The Ottomans, considering it suitable for their galleons, wanted to purchase it. They reached an agreement of 4,55,5 *kantars* of anchor cable, for fifty *kuruş* per *kantar* amounting to 22,775 *kuruş*.[280]

Anchors for the ships were generally produced in anchor houses called *lengerhane*. In 1708, Ali Usta from the Humbaracı corps constructed the first anchor workshop/house and the big anchors that had long been procured from England began to be produced there. Soon the production of anchors of 70-80 *kantars* took place in this workshop.[281] In the late eighteenth century a new anchor house was

Foreign Office document dated 22 March 1799/Lloyd Coffee House, Spencer Smith demanded permission from the British government to undertake the execution of a contract for certain naval and military stores (cordage, guns, shot shell and gunpowder) brought by a British trader residing Thornton. See PRO, FO 78/21, p. 226. He is also reported to have assumed the representative of Levant Company for fourteen years. See Virginia H. Aksan, "Breaking the Spell of the Baron de Tott: Reframing the Question of Military Reform in the Ottoman Empire, 1760-1830." *The International History Review* 24, no. 2 (June 2002), p. 269. On the other hand, it is understood that Thomas Thornton had a mission to transmit secret information of the Porte's defense system and military state to England. The following letter dated 6 April 1807 shows his activities clearly:

" Sir, I have taken the liberty to direct the engraver to strike off and send to you a copy of a plan of Constantinople, which although imperfect and unfinished in several essential particulars, may yet serve to convey you an idea of the defenceless state of that capital; as, besides a few field pieces, which are exposed on the wharf of the Seraglio, there is only one battery of six or eight guns – an the north side of the harbour on the spot marked gun-wharf. I have the honour to be his, your most obedient, humble servant Thomas Thornton." (PRO, FO 78/59, p. 25). Also he mentions the state of Ottoman finances and its military in a book entitled *The Present State of Turkey: or, A Description of the Political, Civil and Religious Constitution, Government, and Laws of the Ottoman Empire; the Finances, Military and Naval Establishments; the State of Learning, and of the Liberal and Mechanical Arts; the Manners and Domestic Economy of the Turks and Other Subjects of the Grand Signor, etc,* 2 vols. (London, n.p. 1807.) He şays, "The finances ...are incapable of being improved, so as to be sufficient for support of a regular army, by any constitutional means, or by any means which the people, instigated by turbulent and ambitious leaders, would not efficaciously oppose." For the quotation see Avigdor Levy, "Military Reform and the Problem of Centralization in the Ottoman Empire in the Eighteeth Century," *Middle Eastern Studies* 18 (1982), p. 239.

From the first half of the eighteenth century onwards, through the Anglo-Russian treaties, English merchants acquired economic, judicial, and social advantages that were denied French and other foreigners. Thanks to these advantages, it is not surprising that nearly the whole of the export trade in such commodities as timber, masts and some other naval stores became concentrated in the hands of British merchants. The British merchant houses Morrison, Spenser, Thornton, Collins, and Wale-Pierson at Riga and Took at St. Petersburg became inseparably connected with the British navy's timber supply. See Bamford, pp. 141-142.

[280] BOA. Cevdet-Bahriye, no. 5891

needed. The following document, dated 10 Rebî'ul'evvel 1211/13 September 1796, describes the *lengerhane*'s construction. The existing *lengerhâne* had ten furnaces, which were deemed insufficient, ten more were needed. After the plan of this new construction project was presented to the Porte, an imperial edict was issued ordering that it be done. The chief architect Ismail Efendi examined the construction site and a cost estimate of 12,188 *kuruş* was given. He was commissioned to undertake the project.[282]

The *Lengerhane* sometimes provided iron for the construction of equipment such as rings and nails for ships when the need arose. On 5 Ramazan 1214/31 January 1800, the *lengerhane*, together with some *İrâd-ı Cedîd* (a treasury established by Selim III) stores, provided 1,000 *kantars* of raw iron for the equipment of the imperial galleons. The total cost was 14,000 *kuruş*, meaning fourteen *kuruş* per *kantar*, and was met by the *Siham Muacelatı* (urgent expenses treasury established for campaigns within the *İrâd-ı Cedîd* Treasury).[283]

Ine (Ayna) Island was a traditional source of iron for anchors. In 1215/1800-01, 1,000 *kantars* of iron, at eight *kuruş* per *kantar* were provided by this island and Samakovcuk. The cost was met by the *Siham Muacelatı.*[284] In 1217/1802-03, a spring campaign loomed on the horizon. On inspection, it was determined that there was iron on hand for anchors and other iron equipment in the Imperial Naval

[281] Ship anchors, especially ones for galleys, came Samakov in Bulgaria. Five anchors were needed for a galley. Anchors were made of 7-16 *kantars* of iron. See Uzunçarşılı, *Merkez ve Bahriye Teşkilatı*, p. 453.

[282] BOA. Cevdet-Bahriye, no. 3359.

[283] BOA. Cevdet-Bahriye, no. 2379.

[284] BOA. Cevdet-Bahriye, no. 2223.

Arsenal, which shows the Porte's preparatedness for any emergency.[285] It is also know that the Imperial Naval Arsenal provided anchore iron even for *tombaz* boats (flat-bottomed river vessels without decks). In 1222/May-June 1807, seventy *tombaz* vessels being constructed at Ruscuk and Silistre needed some equipment, including anchor iron.[286] The following table shows the equipment:

Table 8. Equipment Including Anchor Iron Need for Ship Construction at Ruscuk and Silistire

	Ruscuk	Silistire
Lenger demiri beheri 2 kantar	35	35
Gomana beheri 40 kulaç	35	35
Gomana-i ırgat beheri 120 kulac	1	1
Irgat maa takım	1	1
Makara-i pranga	2	2
Yarma makara	2	2
Alat-ı makara	3	3

Source: BOA. Cevdet-Bahriye, no. 2186.

Construction of the First Dry Dock in the Imperial Arsenal

A dry dock is a structure that allows a ship to be repaired, fitted out, or otherwise worked on when completely out of the water. It has closed sides that allow the ship to enter through a gate that can be closed to seal it from the outside water. The structure can then be emptied of water, allowing the ship to settle on wooden blocks positioned on the floor of the dock to fit the configuration of the ship's hull.

[285] BOA. Hatt-ı Hümâyûn, no. 14076.

[286] BOA. Cevdet-Bahriye, no. 2186.

Drydocks may also be used for the construction of ships that are then launched by merely flooding the dry dock.[287]

When a ship was about to enter a dock she was disarmed and unloaded in order to reduce her weight and thus her draught. Therefore, over and above the actual cost of repaires allowance had to be made for the cost and time required for these extra operations. It seems that this problem was also solved by the end of the eighteenth century.[288]

Geographical conditions are very important in the construction of dry docks. For instance, it was easy to construct and use docks in Atlantic and English Channel ports because of the strong tides, while it was difficult in the Mediterranean due to the absence of tides. Therefore, the construction of the first dry dock was of a special technical significance leading the way for the construction of others in the Mediterranean.

In 1774, the port of Toulon had no dock at which ships could be careened and reconditioned. In fact, every maritime nation had facilities for maintaining vessels, but since such facilities depended on the tides, they could be used only at high tide (that is, ten to twelve days out of the month), and even less in the case of a 90- or 100-gun ship. The problem in the Mediterranean appeared to be insoluble: an attempt to build a dock at Cartagena had been extremely costly and had resulted in failure.

A French engineer, Groignard, offered a project, which was to be approved by the state in February 1774. Actually, the same plan had been applied to a wall at

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[287] Robert J. Winklareth, *Naval Shipbuilders of the World: From the Age of Sail to the Present Day* (London: Chatham Publishing, 2000), p. 362.

[288] José P. Merino, "Graving Docks in France and Spain Before 1800," *The Mariner's Mirror: The Journal of the Society for Nautical Research* 71 (London: Greenwich National Maritime Museum, Society for Nautical Research, 1985), p. 49.

Toulon and to Westminster Bridge in 1750 as well as at some other locations. The plan involved constructing the dock in a vast, watertight wooden caisson[289] grounded on the ocean floor. The contract for the project was signed on 7 April 1774. The resistance of the dredged and levelled floor was checked every three square feet with a ram weighing 6,600 pounds. The 300-foot-long and 100-foot-wide caisson was built on rafts, then submerged and fixed in place on the floor by 120 pilings. Six months later, it showed no signs of either disintegration or deformation. Construction was not completed until 1778. The first ship to enter the dock for repair was the *Souverain.* The project cost three million livres, which was much cheaper than, for example, the one Cartagena, which had cost twelve million. This achievement brought Groignard a considerable amount of fame throughout the world.[290]

The construction of the dry dock at Toulon was followed by the development of Odessa, increasing the importance of the eastern Mediterranean and the Balkans.[291]

As for the Ottoman case, the need for new docks for the Ottoman navy was first voiced in the 1780s. Among the intentions of the French mission was to construct wet and dry docks within the Imperial Arsenal.[292] Several negotiations were carried out between French and Ottoman authorities during the time of Grand Vizier Damad Melek Mehmed Pasha and Kapudan-ı Derya Küçük Hüseyin Pasha. It

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[289] A caisson is a kind of huge airtight box used for laying undersea foundations. See Tutel, p. 140.

[290] Daumas and Gille (ed.), pp. 281-282.

[291] Merino, p. 49.

[292] PRO, FO 261/1, no. 22. (9 October 1784).

was argued that the ships careened and caulked at the European docks were more durable and could serve forty to forty-five years while those of the Ottomans served fifteen years at most. Construction of a dock was decided, but the Porte, upon learning that such as project would cost 1,000-1,500 purses of *akçe* and would take three years, rejected the proposal considering the present state of the Ottoman treasury. However, the project came back on to the agenda of the Porte later on and was approved. Küçük Evkaf Muhasebecisi Cânib Mehmed Salih Efendi was appointed, with a salary of 750 *kuruş*, as the construction administrator (*bina emini*) to oversee the course of building, provide the required materials and equipment as well as organize the salaries of the workers.[293]

Its construction was undertaken as a kind of international tender, taking into consideration the projects and methods presented by French and Swedish engineers. In 1796 French and Swedish dock engineers presented their projects to the Ottoman naval authorities consisting of Kapudan Pasha, Tersâne Emini Mehmed Reşid Efendi, former Tersâne Emini Osman Efendi, Mimar Agha and some other construction experts.[294] The French plan, as mentioned in the case of Groignard, involved submerging a construction caisson after preparing the required channel by dredging and underwater blasting. The water inside the caisson would then be pumped out to allow the construction of the quay walls. A caisson of very large dimensions was required in this kind of project.

The Swedish engineers proposed driving sheet piles in order to seal the working area, and to make both excavation and construction in a dry pit. After the

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[293] Idris Bostan, "Osmanlı Bahriyesinde Modernleşme Hareketleri I: Tersanede Büyük Havuz İnşası (1794-1800)," *150. Yılında Tanzimat* (1992), p. 71.

[294] Ibid., pp. 69-90.

assessment of the two projects, the French proposal was 2.2 times more expensive than the Swedish one. Naturally the Swedish plan seemed favourable to the Porte. The head of the Swedish engineers, Rhode,[295] ordered the digging of test pits at the shipyard in order to determine the proper place for the construction of the dry dock. The pits were eighteen by eighteen meters with a depth of 10.50 meters. In these pits Rhode inspected the soil strata and carried out pumping tests to check the suitability of his equipment. Understandably, he searched for a location that would allow his structure to be placed on shale bedrock.[296]

Following the assessment of the preliminary tests carried out between 1 Muharrem-5 Şaban 1211/ 7 June 1796- 3 Şubat 1797, construction was consigned to Rhode on 4 Şa`bân 1211/ 2 February 1797. Within this period workbenches and pumps had been manufactured, excavation of the specified area for the drydock completed, and a new gate, railing, and stone pavement constructed. Also, stone breaking had been carried out in the sea in front of the İncili Köşk to allow for space. For this entire works 5,448,5 *kuruş* and fifteen *paras* were spent. The construction of the drydock started on Saturday, 6 Şa`bân 1211/ 4 February 1797, in a place next to the *Zâhire Ambarı* (granary) at the Naval Arsenal.[297]

As for the materials used in the construction of the dry-dock, it seems that the main building elements were timber from Kidros (pine), Cide (pine), Misivri

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[295] Detailed information about Rhode will be given in chapter 2, in the section titled entitled "Foreign Missions."

[296] Ergün Toğrol and İ. H. Aksoy, "Drydocks of Istanbul Golden Horn Shipyard," *Proceedings of I. International Congress on the History of Turkish-Islamic Science and Technology, İTÜ, 14-18 September 1981* (İstanbul, 1981), pp. 58-59.

[297] Idris Bostan, "Osmanlı Bahriyesinde Modernleşme Hareketleri I: Tersanede Büyük Havuz İnşası (1794-1800)," pp. 74-75. An Ottoman document dated 10 Rebî`u'l-âhir 1211/13 October 1796 mentions the names of two specific regions providing *boçlana* for the big dry dock: Covitya and Kanam. The spelling of the names should be regarded with some reserve. See BOA. Cevdet-Bahriye, no. 2320.

(oak), Ayholu (oak), Iznikmid (hornbeam); stone from the quarries in Istinye (black, unhewn and roughhewn stone blocks[298] from Balta Limani); lime mostly from Pendik; and iron. Also *boçlana* (a type of soil) was used in the construction. This was a type of soil provided from Italy,[299] the Santron Islands and Değirmenlik in the Mediterranean.[300] Aksoy says that *puzzolane* mortar/soil, which was a durable material for underwater constructions, was used in the drydock. It must have been the same material as *boçlana*. Puzzolane mortar (*puzolan harcı*) was composed of *puzzolane* and lime. It quickly hardened under water. Actually this material (also called Roman cement) had long been used widely in underwater construction before the introduction of cement,[301] especially in European hydraulic architecture during the eighteenth century.[302]

The front side of the determined construction site was cleaned via drag at the *Halic Tersanesi*. Wooden sheet piles were driven into the shore to prevent the seawater from entering the construction pit, which was dug in 37.50m by 75.00m and 10.50m in depth. Water was constantly pumped out to work in dry conditions.[303]

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[298] For the extraction of *tomruk taşları* (roughhewn stone blocks), mining (*lağım*) with gunpowder was required. Therefore, the necessary gunpowder was provided from the *Cebehâne-i Âmire* (the Imperial Armory) in 1210/1796. See BOA. Cevdet-Bahriye, no. 1683.

[299] Bostan, pp. 76-78.

[300] BOA. Cevdet-Bahriye, no. 10103.

[301] Aksoy, *İstanbul'da Tarihi Yapılarda Uygulanan Temel Sistemleri*, p. 73.

[302] Merino, p. 47.

[303] Aksoy, p. 72.

Although at the beginning of the construction, the sea front was sealed to prevent the water coming inside, water began to seep from the sides and front into the excavated area, caused by the muddy and loose soil under the buildings used by store administrators (*ambar eminleri*) on the landfill. An imperial edict was issued ordering the demolition and rebuilding in another place of these buildings. Additionally, plans were made to build two wooden wells on the two sides of the drydock. One of them was completed easily, while the second one required careful work during the foundation excavations not to cause any demage to the collapse of the nearby wall of the granary. Following the completion of the main building, a wall was built around it and new storage areas (*mahzen*) were constructed. Expenses amounted to 800,967 *kuruş* (1,617 purses of *akçe* and 467 *kuruş*), which was a far smaller figure than the estimated cost, 3,000 purses of *akçe*, at the beginning of the project. The construction of the first drydock in the Ottoman Empire started in Şa`bân 1211/ February 1797 and was completed in Zilhicce 1214/ May 1800.[304]

Later, a ladder was constructed in the big drydock at the *Tersâne-i Âmire*. The cost of stone and other materials required for the construction of the ladder, amounting to 613 *kuruş*, was met by the *Tersâne-i Âmire Hazinesi.*[305]

Aksoy says that a kind of underwater glass (*sualtı dürbünü*) was manufactured and used by Rhode for observing the construction activities under water. Considering Rode's earlier tuteledge under Thunberg, whose use of underwater glass and later on his invention of a diving tube into which a man could

304 Bostan, pp. 78-79.

305 BOA. Cevdet-Bahriye, no. 5315.

go and observe underwater life, support this thesis.[306] Aksoy writes that two wells fitted with treadmills were constructed at the two sides of dry-docks (including the one constructed later on in the time of Mahmud II) in the Golden Horn and water was emptied via them. A type of chain pump (*sonsuz ipli kovalı tulumba*) was used in the construction of the dry docks at the Imperial Naval Arsenal, since such as device had been in use in the eighteenth century dry-docks in Europe. The use of chain pumps in the constructions of the dry docks in *Haliç Tersanesi* continued until 1856, after which time, steam driven pumps were used.[307] Correspondence between the Porte and England about the specification of a steam engine to be used in the dry dock at the Imperial Naval Arsenal in 1805 is an important indicator showing that at least the knowledge of a steam engine had reached the Ottoman Empire in the beginning of the nineteenth century.[308]

Regarding the physical structure of the dry dock, Toğrol and Aksoy say that the floor slab and sidewalls of the dry dock were made of good quality building

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[306] Aksoy, p. 15. The original statement in the document referred to by Aksoy is "*deniz dürbinlerinin zîrine vaz' olulan iskele ve ücret-i kadem: bahâ-i tel, ücret-i kadem and baha-i câm 1100 para.*" The document also mentions *mismâr, ağaç, kırmız, şem-i sorh, şem-i ruğan, sancaklık, ıhlamur yeke, tunç boru* etc. among the tools and equipment purchased for the construction of a model drydock and underwater glass and gives the total cost as 3,220 *paras* (*Havuz resmi ve deniz dürbinleri inşası lazıması içün mübayaa olunan eşya bahası). Additionally, the cost for *kürek-i âhen* (iron shovel) and *örs-i âhen* (iron anvil) to be used in *Demürcü Ocağı* re-constructed in Âlât Meydanı was 2,600 and 3,010 *paras*, respectively. For the travel allowance of Said Çavuş commissioned to bring *boçlana* soil from Değirmenlik and Santron Adaları, 6,000 *paras* were paid. The *Demürciyân-ı Tersâne* and *Demürciyan-ı Françelû*, who worked in the production of iron tools and equipment for the dry dock, received 12,780 *paras*. Materials such as *seng, çelik, seng-i bileği* and *eğe-i kol* were used by the *demürciyân* for the production of iron tools and 400, 5192, 400 and 232 *paras* were spent, respectively. The *lağımcıyân, ser-lağımcıyân, çavuş, mutemed, rençberân, hammâlân-ı kereste, neccâr Manol* and his assistant were employed in the construction of the gates of the drydock on 14 Safer 1210/30 August 1795 and they received 32,635 *paras* in total. Beside these workers, there were *Tavşan* and *Nakkâşân* working in the manufacture of the modal drydock and underwater glass, who received 22,640 *kuruş* and 80 *paras*, respectively. In a nutshell, it seems that the total cost for all kinds of expenditures amounted to 2,255 *kuruş* and 9 *paras* on 14 S 1210/30 August 1795. See BOA. Cevdet-Bahriye, no. 10103.

[307] Aksoy, "Osmanlı Döneminde Kullanılan Eski Su Boşaltma ve İnşaat Araçları," vol. 3, p. 49; and see also Aksoy, *İstanbul'da*, p. 19.

[308] PRO. FO 78/46, pp. 242-244. Discussion of the steam engine will be taken up below.

stones from the Istinye quarries in Istanbul. This particular stone was used extensively in marine works. The thickness of the floor slab was 0.75 meter (75 cm), mostly resting on bedrock. The sidewalls had stepped faces and vertical backs. Calculating the stability of the dry dock and the pressure acting on the walls and foundations in dry and flooded conditions reveals the distinct features of a successful design. The stresses acting on the masonry were within allowable values, and pressure distribution seems to have been nearly uniform.[309] The leading feature of the dry dock was that it was constructed with intricate stonework, without use of any mortar.[310]

The dry dock underwent some reparations and maintenance over the course of time. A document dated 1215/1800-01 gives the details of this process, beginning with a summary of previous repairs. The outer gate of the drydock had come to be damaged and worn and seawater had begun to leak in. Due to damaged rocks, seawater had leaked from inside the dock as well. For its repair, quality timber, nails, lead and copper plates, and some materials had been provided. Several hundred workers had been employed and the whole process had required twenty to thirty days. Next, the document talks about and inquires into the necessary steps for a second repair for the same problem. The document estimates that the repair would probably be expensive, considering the cost of the previous one and the uncertainty of the repair method. The real cost would appear on the construction register after the completion of the construction.

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[309] Toğrol and Aksoy, "Drydocks of Istanbul Golden Horn Shipyard," pp. 58-59.

[310] Eser Tutel, "Tersâne-i Amire," *Dünden Bugüne İstanbul Ansiklopedisi*, vol. 7 (Istanbul: Türkiye Ekonomik ve Sosyal Tarih Vakfı, 1994), p. 255.

The document describes the difficulties of the exploration and its feasibility, stating that it was still uncertain if the construction would be done like the previous one or with iron wings and lead due to the rocks, some on the sea surface and others in the sea. It is understood that there was a belief that no problem would appear with respect to the wages of divers (*sömbeki*), workers, as well as tools and equipment such as pontoons (*tombaz*) and drags (*tarak*). The workers, sellers and the payment required were to be provided by the construction administrator (*bina emini*). The supply of the required oak and hornbeam suitable for use as stakes did not seem possible from Istanbul, would have to be provided from the countryside. The construction administrator was to pay the wages and the *Tersane-i Amire* was to help with the felling and transportation process.

It seems that it was intended that the construction work would be finished within the summer months, since it would be very difficult for divers to carry out their work during the winter months. The *Hububat Nazırı* (the Granary Mimister), thanks to his previous experience and knowledge, was appointed to oversee the process and a secretary was hired to keep the register of the construction. Other specialists were ordered to help him if needed. Rhode, the builder of the drydock, was also consulted during the exploration process. The estimated cost was thirty to forty thousand *akçes.*[311] Regarding the timber required for the outer gate of the big drydock, an urgent need appeared in the year 1221/1806. The required timber with

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[311] BOA. Cevdet-Bahriye, no. 5791. For the related part of the original document, see Appendix F.

specific propotions was ordered from the Iznikmid timber superintendent, Mehmed Ağa.[313]

The drydock underwent another reperation in 1814. Wall stones tended to set in 0.75-1.5m towards the inside part of the dock. Besides, there was water leakage. In order to solve these problems the place by the demaged area was dug to some extent, wooden stakes were driven in and *puzolan* mortar and rubble were poured onto the stakes. Reperation was completed covering the top with flat and wide stones.[314]

Consequently, the construction of the first drydock (today known as *3 nolu kuruhavuz*)[315] between 1797 and 1800 was an important watershed for the Ottoman naval technology. Not only dit it become the base for the construction of various kinds of ships in the reign of Selim III, but also it was taken as a model in the construction of two later drydocks. This drydock was later enlarged towards landside in 1874-1876 by Vasil Kalfa. The next dry dock (today known as *2 nolu kuruhavuz*) was completed between 1821-1825 by the chief engineer Abdulhalim Efendi, who was a teacher in the *Muhendishane*, and Manol Kalfa, who had been employed in the construction of the first drydock as well. Finally, the last drydock (today known as *1 nolu kuruhavuz*) was constructed during 1857-1870 by Vasil Kalfa. The constructions of the last two drydocks were carried out under the supervision of the people who had worked on the previous jobs. During the project, referance was made to the construction registers and notebooks of the previous drydocks in order to apply

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313 Timber would be used for the revolving parts of the gates (*kapının devri içün*), the spindles of the gate (*kapının milleri içün*) and for the spine of the feet of the gate (*kapının ayakları içün omurga*). See BOA. Cevdet-Bahriye, no. 2155.

314 Aksoy, *İstanbul'da Tarihi Yapılarda Uygulanan Temel Sistemleri*, p. 73.

315 Geographical order extending from Azapkapı towards Kasımpaşa is essential rather than construction date in present day enumeration of the drydocks. See Tutel, p. 137.

the same techniques and designs. All three drydocks had dimensions and measurements similar to those in other parts of the world at the same time as well.[316]

Developments in the Naval Gunnery

Naval warships have fuctions such as sinking, capturing and destroying enemy ships; protecting coasts from enemy attacts; escorting convoys of ships and specifically of merchant ships; blockading enemy ports; impressing seamen off of other ships as needed; serving as secure places to hold impressed seamen before their assignment to other ships; and intimidating a populace and keeping them subdued.[317] From the very beginning of naval history, warships have assumed one or more of these functions together. In fact, the use of the types of cannons used on ships in land warfare began few centuries earlier than in naval warfare.[318] The first substantial evidence about shipboard ordnance dates from the fifteenth century, coinciding with the first use of gunpowder ordnance on land with decisive effect. By the mid-1400s, wrought iron ordnance, mostly small pieces firing from the castles and upper decks, was common on European ships. Bronze guns seem to have seen less sea service, probably due to their greater cost and concentration in siege trains. By and large, the larger guns threw balls of cut stone while the smaller ones fired balls of cast iron and the smallest pellets of lead, depending on the internal ballistic considerations.[319]

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[316] Aksoy, *İstanbul'da...*, pp. 71-82.

[317] Gibson, 8; and see Daumas and Gille, p. 413.

[318] Muzaffer Erendil, *Topçuluk Tarihi* (Ankara: Genelkurmay Basımevi, 1988), p. 23.

The introduction of heavy artillery to sailing ships changed their designs, structures and tactics to a great extent. This change appeared in the introduction of new types of mounts, watertight gun ports and naval tactics.[319] Loading cannons on ships was realized via capstans powered by crew using heavy wooden capstan bars. Once on board, they were secured and fixed with various cables and ropes, since a loose cannon was as dangerous as enemy fire. When the ship rolled, the cannon rolled too and would crush anything in its path. Following each firing, the cannons were cleaned and sparks were damped down in order to prevent an explosion during realoading. Cannons were loaded with shot and gunpowder. Crew inserted a quill filled with powder as a fuse. Handspikes and and ropes were used to lever the cannons into position and a roll of the ship in water was used to point the cannons up, to shoot at the enemy's rigging, or down, to aim at its hull. When the fuse was lit, the men jumped out of the way and covered their ears. The violent explosion blasted the cannons backwards into the ship and reloading started.[320]

In the eighteenth century, naval guns were like those of the seventeenth century in general, but they were manufactured with greater care. The distance between cannonballs and barrel was designed as 1/20. Cannons made of iron replaced those made of bronze on the ships during salvo fires. Cannons were named

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[318] Robert Gardiner and Richard Ugner (eds.), *Cogs, Caravels and Galleons: The Sailing Ship 1000-1650* (London: Conway Maritime Press, 1994), pp. 144-146.

[319] John Francis Guilmartin, "The Early Provision of Artillery Armament on Mediterranean War Galleys," *The Mariner's Mirror: The Journal of the Society for Nautical Research*, 59 (London: Greenwich National Maritime Museum, Society for Nautical Research, 1973), pp. 257-280. Guilmartin says that external ballistics of shipborne ordnance, the mass and velocity of the projectiles thrown, remained essentially unchanged from the early sixteenth century into the early nineteenth. See John Francis Guilmartin, *Gunpowder and Galleys: Changing Technology and Mediterranean Warfare at Sea in the Sixteenth Century* (London: Cambridge University Press, 1980), p. 38.

[320] Platt, pp. 17-18.

after the weight of their cannonballs. Their real weight of a cannonball was based on the way it was made, of the iron dross and small pieces after casting. The general length of the cannons on the lower decks was three meters while that of the ones on the upper deck were two meters. Cannons of seventeen were eighteen inches in diameter while the ones of nine s/m were, depending on the location they would mount, twenty to thirty inches in diameter.[321] During the eighteenth century, the gunports[322] were enlarged and the lower ones moved upward. Gunstocks came to be handier. They were equipped with tackles to enable the movement of the cannons forward to and backward from the gunport, or change their direction. The movement of the guns was confined with a cable fastened on the broadside. The use of the cartridge bag made the loading of the cannons simpler. Cannons of fifteen s/m were used by fifteen men and those of 10.5 s/m by six men. If the number of the guns on the ship was high, then all the crew could load the ones on one board only. During the firings from both boards the crew were divided into two groups.[323] In 1774 an English cannon factory in Linlithgow County, Scotland cast a very modern cannon that would come to be named "carronade." It was invented by the English general

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[321] Ethem Ziya, *Gemi Topçuluğunun Geçirdiği Safhalar* (Istanbul: Deniz Matbaası, 1934), pp. 24-30.

[322] The cutting of gunports into the hull of ships was an important innovation at the beginning of the sixteenth century, enabling guns to be mounted not only on the upper deck or on the castles, but also on the main deck. Therefore, it meant the increase of armament on the bigger ships without imperiling the stability of the ship. Cipolla suggests that this innovation began in 1501 and was attributed to a Frenchman. See Cipolla, p. 81. Benson says that this Frenchman was Descharges from Brest. See Brian Benson, *Gemiler* (İstanbul: Remzi Kitabevi, 1987), p. 10. However, some other sources claim that the ship in whose sides the first gunports were cut was the *Mary Rose*, in 1513, and that the traditional inventor of the "broadside" was James Baker. See W. H. G. Armytage, *A Social History of Engineering* (London: Faber and Faber, 1976), p. 67. On the other hand, a Turkish source (*Fetihnâme-i Inebahtı ve Modon*) suggests that Kemal Reis cut gunports in the hull of his *göke* type ship *en route* to the Burakadası war 1498 and was criticized by Turkish sailors at the time. This information needs further research. However, it shows the Ottomans' leading role in this innovation any way. See Alpagut and Kurtoğlu, p. 38.

[323] Ziya, pp. 24-30.

Melville and produced by Gascoyne. It was an iron cannon with a short and light gunbarrel that was based on an English 24-pounder. Thanks to its characteristics, the carronade had only moderate recoil that could be stopped by a short breech tackle.[324] It could be fired with relatively a little amount of gunpowder and a flintstone. Its firing speed was three times faster than average cannons, its weight was quite low and it was more effective at short distance firing. In 1780 two men could fire a carronade.[325] Carronade was first used against French ships in 1779. Despite its advantages, its range was short and its powers of penetration were poor. But in close range fighting, especially at sea, it was magnificient. Therefore, they became so popular in the Royal Navy that by January 1791 they had been mounted on 429 ships.[326]

The French began to cast cannons imitating carronades in 1793 only. Towards the end of the eighteenth century big three-deckers could carry up to 120 cannons on each deck and the upper deck. But the handiest war ships were two-deckers with 74 cannons. In 1756 the French abandoned cannons of nineteen s/m and also the British stopped using cannons of seventeen s/m in 1779 on the ships. This shows that the number rather than the diameter of the cannons was considered important in that time. The maximum range of a cannon was 300 meters in seventeenth century, whereas it was 600 meters during the second half of the eighteenth century.[327]

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[324] Maurice Daumas and Gille (ed.), pp. 406-407.

[325] Ziya, pp. 24-30.

[326] H.C.B. Rogers, *A History of Artillery* (Secaucus and New Jersey: Citadel, 1975), p. 64.

[327] Ziya, pp. 24-30.

From Seven Year's War, 1756-1763 onwards, a new method of exercising naval guns was introduced. The method consisted of fourteen orders. Following the first order "silence!" the crew was to pay attention. This was followed by "cast loose the guns!" meaning lashings off and then "level your guns!" to raise the breeach end and insert the coin beneath. In the fourth order, "take out your tompions!" wooden plugs blocking the muzzles of the pieces were removed and left hanging from the muzzle by a lanyard. After the order "run out your guns!" the tackles were laid alongside the gun in neat fakes. "Prime!" followed that order and cartridge was pierced with priming wire down the vent, the vent and pan were filled with priming powder from the powder horn and the horn was hung from the deckhead. The coin was first adjusted until the elevation was correct after "point your guns!"

Following "fire" order, a lighted slow match was placed on the priming power above the vent, or the lock lanyard was jerked by the gun captain who stood about 6 feet back out of range of recoil, if it fitted with a flintlock. In the next order, "worm and sponge!" a sponge was rammed down the barrel and twisted to extinguished any traces of fire, then removed and struck against the outside of the gun to shake off any matter. This process was followed by the orders "load with cartridge!" and "shot your guns!" after which cartridge removed its box, was now place in the muzzle seam downwards and a shot and wad were placed in the muzzle. Following the "ram home shot and wad!" command, they were rammed down to the cartridge and then given two forcible strokes before the rammer was withdrawn. Exercise finished with last two commands, "put in your tompions!" and "house your guns!" This new method was used up to 1817; the date first printed instructions of gun drill were issued by the Admiralty.[328]

Ottoman Experience of Naval Gunnery in the Late Eighteenth Century

The first time cannons were used on Ottoman ships was during the siege of Constantinople to hit the city walls from the sea.[330] Guilmartin, however, tells about a contemporary Turkish sketch preserved in Topkapı Palace showing two Ottoman siege bombards in action and he suggests that this may represent the very earliest type of gun mount regularly used aboard galleys, considering the similarity to a German woodcut depicting the port of Venice and illustrating a book published in 1486. This woodcut shows a bombard, made of wrought iron or bronze cast in 'hooped' form, mounted on the bow of a galley tightly pinioned between heavy horizontal timbers lying alongside the barrel and supported by a much heavier vertical post to absorbe the recoil.[331]

If we take a look at Ottoman ships carrying cannons, irrespective of the century in which they were used, we see that among the ones powered with oars were galliot (*kalite*), brigantine (*perkende*), saika (*şayka*) with three guns, mahone (*mavna*) with twenty-four guns, galley (*kadırga*) with thirteen guns and *baştarda* with three heavy guns and several light guns. Among sailing ships carrying guns were sloop (*şalope*) of twelve guns, brig (*brik*), *ağribar* with over thirty guns, corvette (*korvet*) with twenty to thirty guns, *barça* with over eighty guns, galleon

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[329] Peter Padfield, *Guns at Sea: A History of Naval Gunnery* (London: Hugh Evelyn, 1973), p. 103. For more informationa about naval guns used in naval battles, see Len. Orttzen, *Guns at Sea: The World's Great Naval Battles* (London: Wiedenfeld and Nicolson, 1976); and William Dawson, *Naval Guns, and Mounting and Working Heavy Guns at Sea* (London: Mitchell and Co., 1872).

[330] Erendil refers to Muneccimbashi Ahmed Dede for this information. See Erendil, p. 83.

[331] John Francis Guilmartin, "The Early Provision of Artillery," p. 261.

(*kalyon*) with sixty to eighty guns, three-decked galleon (*üç ambarlı kalyon*) with 80-120 guns, frigate (*firkateyn*) with thirty to seventy guns, *kaypak/kapak* with eighty to one hundred guns, *uskuna* with sixteen guns.[331]

In the sixteenth and early seventeenth centuries, beside warships, merchant ships were observed to have guns as well. Guns required for the merchant ships owned by the state were generally provided from the Tophâne-i Âmire,[332] while the ones for the private non-military ships were purchased or hired in return for a certain amount of money.[333]

Considering the galleons constructed following the systematic adoption of sailing ships in 1682, we see that four out of ten galleons were fifty *zira* and had eighty bronze guns while the remaining six were fourty-five *zira* and had sixty guns. These sizes seem to be comparable to the ones of Europe.[334]

At the beginning of the eighteenth century, 130 guns were required for a big galleon "*kebîr kalyon*" constructed in 1113/1701 and 112 guns for a three-decker built in 1112/1700. The sizes of these guns were between three and sixteen *kıyyes*. Broken guns or the ones needed to change were transferred to the Tophâne-i Âmire (the Imperial Cannon Foundry) in order to be replaced with new ones. Broken ones were melted down to be cast into new guns.[335]

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[331] Erendil, p. 87.

[332]For a detailed account for the activities of Tophâne in XIV-XVI centuries, see Salim Aydüz, Osmanlı Devleti'nde Tophâne-i Âmire'nin Faaliyetleri ve Top Döküm Teknolojisi, XIV-XVI. Asırlarda, Ph. D. dissertation, İstanbul Üniversitesi, İstanbul: 1988).

[333] Ibid, p. 412.

[334] Alpagut and Kurtoğlu, p. 40.

[335] Bostan, *Osmanlı Bahriye Teşkilâtı*, p. 175.

Looking at the first, third, fourth and fifth rate Ottoman ships between 1736-1739, it is seen that the *Çift Aslan* (Double Lion), a first rate ship, could carry 108 guns of 8-112, 22-48, 2-24, 30-18, 28-12, 18-8 pounder. The *İki Bağçeli* (Double Gardened) and the *Büyük Gül Başlı* (Big Rose-Figureheaded), two third-rate Ottoman ships, had sixty-six guns on board each. Sixty-six guns of the *İki Bağçeli* consisted of 4-112, 24-48, 2-18, 28-12, 8-8 pounder while had a 28-24, 2-18, 28-12, 8-8 for the *Büyük Gül Başlı*. A fourth rate ship, the *Yaldızlı Şahin* (Gilded Falcon) carried sixty-two guns of 26-18, 28-12, 8-8 pounder; another fourth rate ship, the *Mavi Aslan* (Blue Lion) had fifty guns of 22-12, 28-8 pounder. The *Mavi Firkata* (Blue Fregate), another fifth rate ship could carry thirty-six guns of 8 and 4 pounder.[337]

These were not the only ships, of course, of the period in question. Panzac, in addition to the gun capacities of the ships between 1736 and 1739 as mentioned above, focuses on the ones operating in a more limited time period.

To give the gun capacity of some other ships between 1737-1738, the following names can be mentioned: the *Çift Kaplan* (Double Tiger) with 102 guns, the *Sipah-ı Bahr* (Army of the sea) with ninety-eigth guns, the *Malika-i Bahr* (Owner of the sea) with ninety-eigth guns, the *Yaldızlı Hurma* (Gilded Date) with seventy-two guns, the *Deve Kuşu* (Ostrich) with sixty-eigth guns, the *Şadırvan Kıçlı* with sixty-eigth guns, the *İspinoz* (Chaffinch) with sixty-eigth guns, the *Küçük Gül Başlı* (Small Rose-Figureheaded) with sixty-six guns, the *Akrep Başlı* with sixty-six guns, the *Beyaz At* (White Horse) with sixty-six guns, the *Al-qasr* (the Palace) with sixty-

[337] Panzac gives this statistical information. He says he obtained the information from a French document titled *Etat de la Marine du Grand Seigneur,* drawn up in the years 1736-39 by the ambassador of France at Constantinople on the occasion of the tension between Venice and the Ottoman Empire. See Daniel Panzac, "Armed Peace in the Mediterranean 1736-1739: A Comparative Survey of the Navies," *The Mariner's Mirror* 84, no. 1 (London: Greenwich National Maritime Museum, Society for Nautical Research, February 1997), pp. 44-45.

two guns, the *Zülfikar* (Double-headed sword of Ali) with sixty-two guns, the *Selvi Bağçeli* with sixty-two guns, the *Yaldız Bağçeli* (Having a gilded garden) with fifty-eigth guns, the *Ejder Başlı* (Dragon-Figureheaded) with fifty-six guns, the *Yıldız Kıçlı* (Star-sterned) with fifty-four guns, the *Ay Bağçeli* (Moon-gardened) with fifty-four guns, the *Sarı Kuşaklı* (Yellow-belted) with fifty-four guns, the *Kırmızı Kuşaklı* (Red-belted) with fifty-two guns, the *Yaldızlı Nar* (Gilded pomagrenade) with fifty-two guns, the *Baba Ibrahim* (Ibrahim the father) with fifty-two guns, the *La Premiere* with forty-six guns, the *La Seconde* with forty-six guns, the *Küçük Şahin* (Young Falcon) with forty-six guns, the *Serçe Kuşu* with forty-four guns, the *Beyaz Şahin* (White Falcon) with tirty-eigth guns, the *La Bleue* with X? guns.[337] The following table by Panzac gives a general idea of the rates of the ships and the number of the guns on the ships in five different leading powers of the world.

Table 9. Size of Navies Available for the Mediterranean 1735-1740

Rate	Guns	Ottoman	Venice	France	Britain	Spain
1st	90 & over	4		1	6	1
2nd	80-90				10	2
3rd	65-79	11	9	12	33	9
4th	50-64	12	2	25	54	31
5th	31-46	6	2	8	17	2
6th	20-30			3	20	4
Total		*33*	*13*	*49*	*140*	*49*

Source: Daniel Panzac, "Armed Peace in the Mediterranean 1736-1739: A Comparative Survey of the Navies," *The Mariner's Mirror* 84, no. 1 (London: Greenwich

[337] Panzac, "Armed Peace in the Mediterranean 1736-1739," p. 55.

National Maritime Museum, Society for Nautical Research, February 1997), pp. 44-45.

According to the table, the Ottoman navy consisted of thirty-three ships. Twenty-seven ships of the line of which four were three-deckers with 98-108 guns, twenty-three were two-deckers, six were ships of the fifth rank.[338]

In the second half of the eighteenth century, as the oared ships began to disappear completely, giving way to sailing ships such as the galleon, three-deckers, frigates and corvettes, the number of cannons on the ships began to increase as well. Therefore, parallel to the increasing need, the manufacture and order of new cannons and ammunition increased. Ottoman documents often mention correspondance between authorities about the urgent need for the manufacture of cannons to be used on galleons and other types of ships.[339] It became routine for new ships to be equipped with cannons and shells cast and manufactured, and processed in the shell works and the *Humbarahane* within the *Tersâne-i Amire.*[340]

The Ottoman authorities, including the Sultan Selim III, were aware of the deficiencies of the naval ships in terms of gunnery. Selim III was so interested in contemporary war techniques and weapons that he wrote a treatise (*risâle*) on the subject. The second part of the treatise was on flares (*fişekler*), and the third part on

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[338] Panzac, referring to Çelebizade, says that the first three-deckers of the Ottoman fleet were built in 1725 during the reign of Ahmed III. Panzac, "Armed Peace in the Mediterranean 1736-1739," pp. 42-43.

[339] BOA. Hatt-ı Hümâyûn, no. 8168. *"Donanma-yi humayun kalyonlari lazimasi içun"* in 1208/1793-94. See also Hatt-ı Hümâyûn, no. 14076 (1217/1802-03).

[340] We know that such a process was carried out for two galleons, one built at the *Tersâne-i Âmire* and the other in Sinop, as well as new sloops in 1204/1789-90. See BOA. Cevdet-Bahriye, no. 5832. In the same year (1204/1789-90) newly cast twenty cannons were loaded onto the ships in 1204/1789-90. See BOA. Hatt-ı Hümâyûn, no. 56099. and two new cannons were planned to be tested and installed on ships in 1205/1790-91. See BOA. Hatt-ı Hümâyûn, no. 57562-krt. 329.

cannons (*toplar*). It seems that Kapudan Pasha checked the treatise and stated that Ottoman naval ships were deprived of these fireworks and cannons and ordered the procurement of these weapons.[341]

Types of Naval Cannons in the Ottoman Navy

In the time of Selim III cannons began to be cast out of iron. On 19 Ramazan 1220/12 November 1805, the Hasköy Tersânesi was attched to the Naval Arsenal in order to cast naval guns.[342]

Some needs voiced by the ship captains and crew give an idea of the types of cannons used on them. In a document written by Rahtuvânî Hasan Aga, dated 8 Safer 1205/17 October 1790, a quantity of cannons capable of throwing shells of seven, five and three *kiyyes* were ordered for sixty sloops, twenty *dubas plenks* in Tuna.[343] Additionally data exists on the use of newly invented cannons. A document from 1205/1790 tells about newly invented *beş çakmaklı ve beş mehtaplı* (cannons with five flints and cartridges) cannons fired at Kağıthane. An imperial edict ordered these cannons mounted on the appropirate galleons and frigates. In the document, the preparation of chained cannonballs (*zincirli gülle/plankete*) was also ordered.[344] In another document, dated 1214/1799-1800, referring to the previous year, it is said

[341] Kemal Beydilli, *Türk Bilim ve Matbaacılık Tarihinde Mühendishane, Mühendishane Matbaası ve Kütüphanesi 1776-1826*, p. 181.

[342] Alpagut and Kurtoğlu, p. 45.

[343] BOA. Hatt-ı Hümâyûn, no. 9792.

[344] BOA. Hatt-ı Hümâyûn, no. 11753.

that for the requirements of galleons, two mortars[345] twenty-two in diameter (throwing a projectile of twenty-two pound) and four mortars of fourteen in diameter were needed. In 1214/1799-1800, the number of English shells to be used on the galleons amounted to three hundred.[346]

Some cannons were used in land wars only, while others were used in naval wars and on ships. *Şâhî, cehrin, saçma/çarha, misket, eynek/enik, darbzen, prangı* (mortar), *bacaluşka* (basilisco), *kolomborno* (culverin) and *şayka* (battering gun) appear among naval cannons as well as land ones.[347] Some of these guns were already in use in navies of the fifteenth and sixteenth centuries. For instance, *şayka, baş topu* (guns fitted into the prow), *darbzen, kebîr* (big size), *sağîr* (small size), *prangı* (mortar) were among the guns used on such ships as *barça* (bargia), *ağribar, kadırga* (galley), *kalyata* (galete) and *kayıks* (caique) in 893/1488. The total number of guns given to these ships was 137. It is striking that eighty-three out of this number were for *barça* and twenty-nine for *ağribar*, both of which were warships.[348] Also, Selman Reis' fleet in the Red Sea in 1526 had a powerful artillery of seven *bacaluşka,* thirteen *yan-top* (side cannons), twenty *darbzen,* twenty-nine *şayka,* ninety-five iron pieces and ninety-seven *prangı.*[349]

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[345] "A mortar was a short piece with a large bore and a chamber, and was primarily intended to fire shells from a high angle. The principal parts of the mortar were the reinforce (which was a wide belt about the middle of the piece with dolphins on it), the chase (which was the short length of barrel between the reinforce and the barrel), and the breech (which was the rounded end behind the reinforce). The trunnions were at the breech end of the piece." See Rogers, p. 63.

[346] BOA. D.BŞM-TRE, no. 15328.

[347] Bostan, *Osmanlı Bahriye Teşkilatı: VII. Yüzyılda Tersane-i Amire*, p. 177. See also Aydüz, p. 416.

[348] Aydüz, p. 415.

Darbzen, a light gun with a small diameter, seven *karış* (span, a unit of length) in length. It could fire small projectiles (50-100 dirhem/160 gram). The weight of the gun was 56.5 kg. It was relatively quick despite its small diameter and cannonball. It was also used on ships.[350] It is reported that two huge *darbzens* firing iron cannonballs of twenty-seven *okkas* (a measure of weigth equal to 1.288 kg) each were prepared at the Imperial Cannon Foundry (*Tophâne-i Âmire*) and mounted on *mauna* ships in 1517.[351] *Bacaluşka* (basilisco) was the metaphorical name given to the large cannons widely used in the Mediterranean in the sixteenth century, which witnessed extensive use of this type of gun on ships.[352] Being bigger than *prangi* it was a siege gun. They fired iron shots of seldomly four, generally eleven, fourteen, sixteen, eighteen, and twenty *okkas* in weight, ranging in length between nine to ten and eighteen to twenty spans, and made of wrought iron at the beginning of the sixteenth century, but mainly of cast bronze in the wake of the reign of Suleyman the Magnificient.[353]

*Prangı*s were generally used in siege wars as both field and naval cannon. They were often mounted on small ships such as *şayka* (saika) and *firkate* (fregate) operating on rivers. The term p*rangı* appears as *deve prangısı* in some sources.

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349 Halil Inalcik, "The Socio-Political Effects of the Diffusion of Firearms in the Middle East," *War, Technology and Society in the Middle East*, eds. V. J. Parry-M. E. Yapp (London: Oxford University Press, 1975), p. 203.

350 Erendil, p. 70; see also Bostan, p. 84, 85, 96 and 174.

351 Şahabeddin Tekidağ, "Haliç Tersanesi'nde Yapılan İlk Osmanlı Donanması ve Cafer Kapudan'ın Arizası," *Belgelerele Türk Tarihi Dergisi*, no. 48 (January, 2001), p. 28.

352 *Lingua Franca*, pp. 99-100.

353 Gabor Agoston, "Ottoman Artillery and European Military Technology in the 15th to 17th Centuries," *Acta Orientalia Academiae Scientiarum Hungaricae* 47 (1994), pp. 39-40.

Among the military supplies provided by the Cebehâne-i Âmire on 23 Cemâziye'l-âhie 928/21 May 1522 to a ship heading probably for Rhodes under the command of Mustafa Pasha, was sixteen *deve prangısı* with gunstocks (*prangı-ı şütur ma'a kundak*).[354] *Kolomborno*, on the other hand, had a long gunbarrel. Thererfore, it was used in navies when a need for a horizontal projectile path appeared. It was usually mounted on the bow or on stern gunports. It could fire cannonballs of 3, 5, and 7 *okkes*. *Şayka* was the name of the big boats with a flat bottom operating on the Danube and other rivers. The cannon in question took its name from the ships upon which it was mounted. *Şayka* was used both on ships and land wars during the siege of fortresses, and came in small, middle and large types. There were the ones with sixteen- *karış* gunbarrel length capable of throwing cannonballs with twenty-two *okkes* (29 kg.) in weight.

Other types of cannons formerly used in land wars were also in operation in the Ottoman navy.[355] In addition to these cannons, *poca/boça* appears as a missile used in naval artillery in both the seventeenth and eighteenth centuries.[356]

Some others such as *kebir, obus,*[357] and *balyemez*[358] were also used on the galleons built at *Tersâne-i Amire*, Rhodes and Gemlik, Sinop, Bodrum, Kemer, and

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[354] Aydüz, p. 417; also see Erendil, pp. 70-71.

[355] Ibid., pp. 70-71.

[356] *Lingua Franca*, p. 110.

[357] As understood from the regulations for *Humbaraci* class in 1207/1792-93, newly invented *obus* guns were to be used to fire projectiles during military campaigns when there was no proper location to manufacture *humbaras* (mortars). See Tahsin Esencan, *Türk Topçuluğu ve Kaynakları* (Ankara: As. Fabrikalar Basımevi, 1946), p. 62. It is understood from an edict dated 18 Rebî'u'l-evvel 1205/23 March 1791 for trabago and some other ships constructed at the *Tersâne-i Âmire,* casting of fifty *obüs* and *sürat* guns in the *Tophâne-i Âmire* (the Imperial Cannon Foundry) was demanded. And for casting these guns, seventy-two *kantars* of *kali-yi İngilizî* (British tin) were required. See BOA. Cevdet-Bahriye, no. 1454.

the Danube. Cannons weighing between three and forty-four *kiyyes* and being between eight and sixteen *karış* in length were used in 1206/1791-1792. The length of the galleons to be equipped with the above-mentioned cannons was between thirty-five and fifty-five *zira.* Another important piece of information that can be deduced from an archival document is that these cannons were cast and manufactured at the Hasköy cannon foundary and the Tophâne-i Âmire Kârhanesi. For casting cannons, raw copper, tin and raw iron were needed. In the same year, for eighty-one *obus* and *balyemez* cannons, 2,320 *kantars* of raw copper (*nuhâs-ı hâm*) and 232 *kantars* of tin (*kali*) were bought and 1,160 *kantars* of zinc (*ruy-i maye*), 120 *kantars* of which was provided from the Tophâne-i Âmire, 10,000 *kantars* from the *Tersâne-i Âmire*, and twenty-nine *kantars* of raw iron were provided from the Cebehâne-i Âmire to cast cannons in the foundaries for the galleons. The total cost was 29,000 *kuruş.*[359]

The Ottoman navy, and especially the galleons under construction and those whose completion was close, often demanded cannons from the *Tersâne-i Âmire/Mamûre Kârhânesi.* Sixty-eigth cannons were demanded on 20 Cemâziye'l-evvel 1212/1797-98 for a three-decked galleon under construction at the *Tersâne-i Âmire*. Chief founder *Ismail Ağa* was in charge of casting these cannons. The cost of casting sixty-eigth cannons amounted to 33,440 *kuruş*. 27,500 *kuruş* out of this amount was paid up to the above-mentioned date. The remaining 5,940 *kuruş* was to be paid earlier.[360]

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[358] It was a long range-battering gun. 300 *kantars* of copper were needed to make this cannon in 1782. This cannon was also made from bronze and could fire balls of twenty-four *okkes* each in 1694. See *Lingua Franca*, pp. 99-100.

[359] BOA. Cevdet-Bahriye, no. 1474. For detailed information, see Appendix G.

Regarding the calibres of the cannons to be mounted on the galleons, a document of 1204/1789-90 reports that Kapudan Pasha was going to go aboard the new galleon *Bahr-i Zafer*. Therefore, it was ordered that four big cannons of sixty-six *vukiyye* calibres each that had been cast, manufactured and readied at the *Tophâne-i Amire* be mounted on the ship.[361]

Projectiles

The projectiles fired from muzzle loaded guns were usually composed of solid cast iron balls. There were other kinds designed for particular uses. Chain shot (two balls connected by a small length of chain), and bar shot (two balls connected by an iron bar) were used to destroy rigging. When fired they would spin end to end, literally chopping through spars, masts, and cordage. Cannons could be loaded with grapeshot, small cast iron, or lead balls in a cluster that spread into a cone shape or a canister that consisted of a number of one-pound balls or musket balls contained in net bags. These last were effective only against groups of men at close range.[362] Additionally, fireballs, still far from satisfactory, were still in use. Heated untill it became white, the fireball was inserted in the mouth of the cannon and after plugging wet pieces of old clothes into the front of the gunpowder in order to avoid an early firing was aimed and fired immediately. However, unlike the ones on the land, the hearths for heating the fireballs were not suitable for ships and the system was

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360 BOA. Cevdet-Bahriye, no. 12282.

361 BOA. Hatt-ı Hümâyûn, no. 55529.

362 Gibson, p. 10; and see Daumas and Gille, p. 413.

abandoned quickly.[363] There was also an incendiary projectile known as a "carcass." A container made of layers of paper was filled with a composition that was heated, poured into it in liquid form, and then allowed to harden. The container was pierced with a few holes so that the flash of the charge could ignite it. They were only fired from howitzers and mortar launchers.[364]

Various shells, shots and cannonballs made of different materials were used in the cannons on Ottoman galleons. Most of them were manufactured in the shell and shot works at the Arsenal. However, the basic cannon and shell factory for the Ottoman navy was at Hasköy. The Galata Tophanesi contributed to the navy as well. Some of the iron shells were cast in the foundry by the pits of the iron mine around Pravişte in Balkans. Marble shells were generally provided from the Marmara islands. The required iron for shells was supplied from the Samakov (in Bulgaria) as well as Pravişte mines.[365] Marble continued to be one of the most widely used projectiles. This would appear as one of the leading reasons of the failure of the Ottoman navy in wars against the British fleet in the Marmara Sea in 1806. In that war, the British fleet used iron projectiles against the Ottoman ships, while the Ottomans fired marble shells.[366]

Marble,[367] granite[368], and heavy stones,[369] and metal shells (*mâdeni yuvarlak*),[370] chain shots/shots joined together by an iron chain (*madenî plankete*)[371]

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[363] Ziya, p. 26. For types of projectiles, see also Cipolla, p. 151.

[364] Rogers, p. 72.

[365] Tezel, pp. 618-619.

[366] Emsen, p. 47.

[367] In 1205/1790-91 it is understood orders were given to stone masons in the Marmara region to cut, prepare and send of 610 large marble cannonballs for naval guns. 550 *kuruş* was paid just for

and bar shot/iron bars (*two balls joined together by an iron bar*), cartridge bag/ grape shot (*salkım*) or canister (*sakolya/sakuleta/sakulta*), shells with five holes/carcass (*beş delikli paçavra*)[372] and scissors of metal shells (*maden toplu mikrazlar*)[373] were used as projectiles in the cannons of Ottoman ships. We come across almost all these types of projectiles in 1205/1790 among the ammunition on three seperate *trabago* ships led by Ülgünlü Yusuf Reis, Salih Reis, and Sinan oglu Hasan Reis as well as a

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workers in return of the cutting marbles. See BOA. Cevdet-Bahriye, no. 6143. Additionally it is known that marble shells with diameters of 65, 44, 22 were demanded from the Marmara islands in 1207/1792-93 to be used on the new galleons whose construction nearly came to be completed at the *Tersâne-i Amire*. The document says that 200 marble shells from each of the above-mentioned diameters were needed. See BOA. Cevdet-Bahriye, no. 5848.

368 It is reported that during the British expedition under the command of Duckwoth to pass through the Dradanelles in 1807, the Ottomans used mortars able to throw huge cannonballs made of marble and granite. These cannonbals are said to have been made from the columns of Greek and Roman temples. One of the cannonballs was brought back to Posrtsmouth as a trophy due to the epic quality it associated. For example, a stone ball of 800 pounds cut through the mainmast of the *Windsor Castle* and another, two feet and six inches in diameter, caused a fire and explosion in the *Standard*, killing eight and wounding forty-seven. See Tom Pococ, *A Thirst for Glory: The Life of Admiral Sir Sidney Smith* (London: Pimlico, 1998), pp. 203-204.

369 The Ottomans, for instance, used them during Napoleon's siege of the town of Acre on 9 May 1799. See Nicholas Tracy (ed.) *The Naval Chronicle; The Contemporary Record of the Royal Navy at War*, vol. 2 (1799-1804) (London: Chatham Publishing, 1998), p. 24.

370 In addition to these marble shells of different diameters, metal shells of eighteen, nine and five diameters were also used in naval cannons. The document dated 21 Cemâziye'l-evvel 1207/4 January 1793 shows that the manufacture and cast of 200 metal shells from eighteen diameters, 400 from nine diameters, and 400 from five diameters, which amounts to 1,000 as total, were demanded from the *Humbarahane* and the *Tersâne-i Atik* for a galleon almost completed. See BOA. Cevdet-Bahriye, no. 6381.

371 BOA. Hatt-ı Hümâyûn, no. 11753.

372 In a document dated 21 Rebî'u'l-âhir 1215/11 September 1800 the manufacture of shells with five holes, common shells, and grape shot was ordered by an imperial edict. See BOA. Cevdet-Bahriye, no. 7163.

373 As is revealed by a document of 1216/1801-02, scissors of metal shells (*maden toplu mikrazlar*), which were made of mortar metal were also used in the cannons of Ottoman ships. It is understood that stocks of mortar metal run out in the *Humbarahane of the Tersâne-i Amire*. Because of the urgent need, 300 *kantars* were provided from the *Humbarahane of Haskoy*. See BOA. Cevdet-Bahriye, no. 3609.

prigandi called *pirigandi-i Mahmud Pasha,* led by Ahmed Reis[374]and on a frigate called *Cabbâr-i Bahri,* led by Fettah Kapudan[375] and finally on a frigate bought from England and led by Osman Kapudan.[376] Iron bars, and shells with five holes (*beş delikli paçavra*), shells with two bars or rings, howits/howitzer[377] shells, grape shells, common shells, round shot also appear in the list of ammunition to be purchased from England in 1793. The list seems to have been prepared by the Ottoman authorities according to the contract signed between the two countries.[378]

This above-mentioned contract and list given to the British Ambassador for shells, shot, mortar, mortar beds, carriages, gunpowder, tin, fire-locks, anchors and other things for the use of the artillery and arsenal,were to be of the best qualities, agreeable to the lists given by the Grand Admiral Hüseyin Pasha, and the preceding Mustafa Efendi, the same being decreed by an Imperial *Hatt-ı Şerîf*/order in the Sultan's own handwriting and ordered by a command of the Sublime Porte on 26 Receb 1207/9 March 1793. On arrival of any part of the above warlike stores, the amount would be divided into six payments, the first of which would be paid on

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[374] BOA. Kamil Kepeci, no. 5724.

[375] BOA. Kamil Kepeci, no. 5726.

[376] BOA. D.BŞM-TRE, no. 15211.

[377] "It was shomewhat akin to the mortar in construction. But it had its trunnions in the middle of the piece and unlike the gun they were level with the axix of the bore. Like the mortar, the howitzer was intended to fire shells. But whereas the mortar had a fixed quadrant elevation of 45°(the range being adjusted by altering the weight of the charge), the howitzer could be fired at variable elevations and horizontally against troops in the open. They were far more mobile than mortars but were approximately twice as heavy for the same bore." Rogers, p. 63.

[378] PRO. FO 78/14, p. 78. See Appendix H for the list.

delivery of the above articles and the rest month by month, the whole in six months.[379]

In 1793 there was close interaction between Great Britain and the Porte in terms of the trade of military supplies and especially cannons to be used on land and on ships. British military goods seem to have been in great demand by the Porte.[380] A foreign office document exemplifies this state. Written by Robert Ainslie in Constantinople to the Secretary of State in December 1793, the following document gives details of the Porte's demand for shells and other military supplies. The document includes some drawings of the shells as well as their descriptions both in Ottoman Turkish and English. It says "*Tersâne-i Amire trafindan verilen humbara daneleri çapıdır. İşbu daneler humbara danelerinin sath-ı zâhirîsi olub havanlarin çapı olmadığı haber verilur,*" meaning "these are the calibers of the shells given from the Ottoman Arsenal, that is to say the circles are the exterior measures of the circumferences of the shells." The inscription states that the thickness and proportions of the shells are the same as those made used by the British artillery. Each circle represents the circumference of the shell, and the pencil line the diameter. The large shells were to have ears the same as in the services mentioned above, the smaller ones, that is, all below the eight inches one not. The fuse holes were to be the same as those English shells without projections and of the same diameter. Each

[379] PRO. FO 78/14, p. 79.

[380] PRO. FO 78/14, p. 38. Letters and Papers from Robert Ainslie at Constantinople to the Secretary of State: with Drafts to him. From January 10th 1793 to December 31st 1793.

shell was to correspond to the diameter marked and to the weight expressed upon each line.[381]

This close interaction between the Porte and Great Britain was still lively at the beginning of the 1800s. A document of 29 January 1800 shows that the Porte, having met with such great disappointment and unfairness from Russian merchants that they would no longer procure these articles from the Black Sea, applied to England for military goods and artillery in a considerable amount. The estimated value was £150,000 sterling. The following table shows the summary of armaments drawn up by Hacı Ibrahim Efendi, the Minister of War.[382]

Table 10. Summary of Equipment, Drawn up by Hagi Ibrahim Efendi, the Minister of War (Istanbul, 29 January 1800)

Iron shot of five different sizes, at ten piaster a *kintal*, including charges	171, 000
Grape shot	200, 000
Shells of five different sizes	45,000
Pewter / if at 100 piaster per kintal/ kintals	1,000
Tin / at current price in England / cases	250
Tarpowling for guns, whole pieces	2,000
Paper for cartridges ...reams	1000
Muskets with bayonettes	8,000
Blades for swords	6000

Source: PRO. FO 78/28, p. 111.

The relations between the Ottomans and foreign countries in terms of the exchange of military equipment and especially projectiles can be followed through some books by Ottoman authors who were generally inspired by their contemporaries in France. Yahya Naci Efendi (d. 1824), one of the translators of the

381 PRO. FO 78/14, p. 78.

382 PRO. FO 78/28, p. 111.

Imperial Council (*Dîvân-ı Hümâyûn*) and a teacher of the sciences and French at the Imperial School of Military Engineering (*Mühendishâne-i Berrî-i Hümâyûn)*, wrote a treatise titled "Risâle-i Hikmet-i Tabiiyye" (A Treatise on Physics) in 1224/1809 on the motion of projectiles. The writer, who had previously studied physics in Europe, described the operational principles of artillery, such as the howitzer and gun. In addition, some physical and chemical principles were mentioned to explain the functioning of firearms. Such subjects as the motion of free falling bodies, circular motion, weight, attraction force and impulse, the chemical composition of gunpowder and its combustion in firearms were among the most important points mentioned in the treatise. The treatise was not a translation of a single book, but was prepared most likely by the study of several sources, with the author's peculiar style and emphasis. His work is also important with respect to the introduction of physical and chemical terminology to the Ottoman world.[383]

Another important work, entitled *Er-Risâletü'l Berkiyye fî Âlâti'r-Ra'diye* (A Treatise of Lightning on Thunderclap Device), was translated by Başhoca Hafiz Ishak Efendi, the chief instructor at the *Mühendishâne-i Berrî-i Hümâyûn* from Robert Fulton's *Torpedo War and Submarine Explosions* (New York, 1810). Fulton was famous for his invention of naval torpedos and the first submarines as well as the *Clemont*, the first steam ship. Ishak Hoca, declared that the Black Sea and the Straits would be better defended and that there would be no need for forts if these torpedos were adopted by the Ottomans. He described, for instance, how these weapons worked and could destroy a large sailing warship at anchor and then sail off . Ishak

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[383] Ebru Ademoğlu, "Yahya Naci Efendi ve Fırlatılan Cisimlerin Hareketleriyle İlgili Eseri: Risale-i Hikmet-i Tabiiyye (1809)," in ed. Feza Günergun, *Osmanlı Bilimi Araştırmaları* 4, no. 1 (İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayını, 2002), pp. 25-56.

Hoca's book, the first Turkish translation on naval torpedos, was a pioneering work for the development of the naval technology.[384] Ishak Hoca, as an important figure who had been educated in the engineering school in Istanbul and who worked in the capacity of translator of *Dîvân-ı Hümâyûn* (the Imperial Council) during his tenure in the US, was a product of the intellectual milieu during the reigns of Selim III and Mahmud II.[385]

Gunpowder for Naval Guns

As for the gunpowder required for the naval guns, an imperial edict dated 1204/1789-90 presents several important issues. First, it points out that each naval cannon was allotted fifty cartridges (*hartuc*). Second, both black gunpowder originating in Istanbul and Gelibolu as well as English gunpowder were used in the Ottoman and Algerian navies. The amount of black gunpowder given to the navy is known to have been 8,440 *kantars*. The amount of English gunpowder supplied to the navy was not cited in numbers, but referred to as "a certain amount." Furthermore, the document mentions that the present quantity of the English gunpowder in the Imperial Armoury (*Cebehâne-i Amire*) was said by *Defterdar Efendi* (Treasurer) to be 3,880 *kantars*. The document points out that despite the

[384] Mustafa Kaçar, "Osmanlılarda Deniz Torpidoları Hakkında İlk Tercüme Eser: E'r-Risaletü'l Berkiye fî Alâti'r- Ra'diye," *1. Türk Bilim ve Teknoloji Tarihi Kongresi Bildirileri (15-17 Kasım 2001)*, eds. Emre Dölen and Mustafa Kaçar (İstanbul, 2003), pp. 155-163.

[385] For a detailed account of Ishak Hoca, see Ekmeleddin İhsanoğlu, *Başhoca İshak Efendi, Türkiye'de Modern Bilimin Öncüsü* (Ankara: Kültür Bakanlığı Yay., 1989).

good quality of the Ottoman black gunpowder, it was not of as high a quality as that of the English type (*Ingiliz perdahti*).[386]

In 1207/1792-93, in order to store the amount of gunpowder required for the cannons on the galleons, copper pots were produced with copper of twenty *vukiyye* each and forty *akçes* was paid per *vukiyye*. *Hark-i nâr* (a kind of hot substance) was not inclued in this amount.[387] Copper for the cannons mounted on the ships came mostly from Ergani and Keban through Amasya, Sivas, Tokan, Samsun wharf and Iznikmid.[388]

Regarding the exchange of gunpowder between Ottoman and English navies, documents indicate that the English naval ships operating in the Mediterranean against French forces requested 500 barrels (250 *kantars* and each *kantar* for forty-five *kuruş*) of good quality Ottoman black gunpowder from the Porte in return for money. However, the Ottomans after considering the fact that England was an ally, decided to meet the demand free of charge. It is understood that the value of the gunpowder granted to the British fleet was twelve thousand *kuruş* (twenty-four to twenty-five purses).[389]

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[386] BOA. Hatt-ı Humayun, no. 8024.

[387] BOA. Cevdet-Bahriye, no. 2357.

[388] BOA. Cevdet-Darphâne, no. 2921 and Cevdet-Askeriye, no. 48831.

[389] '*... Elyevm bahr-i sefidde olan İngiltere beylik sefinelerininin barutları düşman-ı müşterek aleyhine sarf ile kıllet-pezir olub baruta eşedd ihtiyaçları olmağla miri fiyatı üzre âlâsından beş yüz varil barut-ı siyahın akçesiyle mübayaasına ruhsat verilmesi muharrer ve müstedâ olmağın bu babda esnâf-ı mesulüne müsaade lazımadan olduğundan başka beş yüz varil barut beher varili yarımşar kantar hesabıyla iki yüz elli kantar ve beher kantarı kırk beşer kuruştan on iki bin kuruş miktara baliğ olacağına binaen yirmi dört yirmi beş keselik bir madde olub meâli olmadığı ve elhaletu hazihi İngiltere devleti müttefik olub telif-i hatırları vesailine himmet mukteza-yı maslahat olduğundan ğayri barut-ı mezkurine ak denizde düşaman-ı müşterek aleyhime imal olunacağı hasebiyle akçesiyle verilmekten ise beher varili yarımşar kantar olmak üzere iki yüz elli kantar olarak beş yüz varil barutun baruthane mevcudından itası münasib mülahaza olunmağla ... ol miktar barutun defterdar*

Secondary Equipment Related to Naval Guns

The loading, mounting, manouvering and limitations of recoil of the guns on the ships required some tools and materials that were very important for the efficient use and firing of the guns. As far as Ottoman documents show, these secondary materials included cannon wagons (*top arabası*), hooked blocks or pulleys of deck tackle to lift and locate the guns (*ahen kanca-i makara-i palanga-i top*), and the iron rings of bolts and screws for these wagons (*ahen halka-i civata-i araba*), iron cordage for guns (*ahen paranga-i top*), ropes, iron hooks (*ahen kanca*) and rings (*ahen halka*) to secure guns on broadsides, iron hooks for lifting gunports during firing (*ahen kanca-i lumbar*), cartridge bags (*hartuc kağıdı*), copper funnels (*bakır huni*), wicks (*fitil-i mısri*),[390] gun levers (*manivela-i top*), halberds (*harbe*), white felt for cannons (*beyaz top keçesi*) scoops for loading gunpowder to guns (*kepce-i top*), and cannon drill (*top burgusu*) and such to load and clean the guns.[391]

Regarding the secondary equipment, some other needs appeared from time to time. A document declared that a new sheltered space (*sundurma*) for the protection of the cannon carriages (*top arabası/kundağı*) on the imperial galleons from rain, snow and other bad weather conditions; and a manual workbench (*çark/destgâh*) for the construction and manufacture of the tenon equipment of wagon axles (*araba dingili zeban takımları*) and a suitable place for this purpose

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efendi kulları marifetiyle bila baha itasına...' See BOA. Hatt-ı Hümâyûn, no. 1592 (1214/1799-1800) and 6644 (29 Muharrem 1214/3 July 1799).

390 Wick was provided from Egypt (Mısır) as *ocaklık,* therefore it was called *fitil-i mısrî* (Egyptian wick). See Alpagut and Kurtoğlu, p. 33.

391 See the tables in BOA. Kamil Kepeci, no. 5724 and no. 5726 and BOA. D.BŞM-TRE, no. 15211.

were urgently needed. A French engineer, possibly Le Brun, was commissioned to construct and manufacture the above-mentioned workbench and the tenon equipment of wagon axles. In an imperial edict, Kapudan Pasha ordered the *Liman reisi* (commander of the port of Istanbul), *mimar aga* (Chief Architect), *usta* (foreman), *kalfa* (assistant) and other relevant personnel at the Imperial Naval Arsenal to research the feasibility and conditions of proper places for this aim. Another document gives a list of the estimate costs for these operations following their research as well.[392]

Table 11. Estimated Cost for the Contruction of Furnace Sheds and Workbench

Fırın (Furnace)	5742 *kuruş* (both)
Top arabası kundağı için sundurma (Shed for the gunstock of cannon wagon)	
Araba dingili imali için tezgah ve uygun bir yer (Workbench and an appropriate place for the construction of wagon axle)	1,098.5 *kuruş* (considering its unfamiliar type, this figure could change)
	Total 6,346 *kuruş*

Source: BOA. Cevdet-Bahriye, no. 1354.

The furnace mentioned in the above table is related to the need for the manufacture of bronze sheaves (*tunc'zebanlar*) for the imperial galleons, stated earlier. In addition, four separate projects were planned, as far as can be understood from an inspection book of 16 Cemâziyelâhir 1216/24 October 1801. The first building was a shed in which the gunstocks of cannon wagons would be stored for protection. The second one was an appropriate place for the production of wagon

[392] BOA. Cevdet-Bahriye, no. 1354.

axles. The third one was a European type of annealing furnace (*tavlama ocağı*) with brick walls. The last was a workshop for the manufacture of workbenches and hand wheels for the production of iron pins and wagon axles with movable arms. Among the materials used in the constructions were stone, worn-out anchors, bricks, roof tiles, oak timber, iron screws, bolts and rings.[394]

Naval Artillery Personnel

Regarding the people responsible for the manufacture and use of cannons on Ottoman ships during naval campaigns, each cannon on a ship was under the responsibility of a person called a *sudagabu* (gunner).[395] Their number matched that of the cannons on board. They were paid *rub ulufe* (a salary of one forth) in 1210/1795-96 and were in great demand, especially during campaigns.[396] On each galleon were three gunners (one of which was the chief gunner of the deck/ *güverte topçubaşısı/sertopi*) and sixty-four *sudagabu*. On frigates there were two *sertopi* and thirty-two *sudagabu*. Among the auxiliary personnel were men who opened the gunports, directed the guns to the targets, moved the guns back and forth by means of ropes and cables, used levers, and loaded the guns with gunpowder and cannonballs. When the post of chief gunner fell vacant, *topçu kethüdası* (an official in charge of guns) was appointed to the post if he was competent. If not, a *sudagabu* who had

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[394] BOA. Cevdet-Bahriye, no. 11292 (16 Cemâziyelâhir 1216/24 October 1801). For details of the examination book, see Appendix I.

[395] The term *sudagabu* was an expression used in the second half of the eighteenth century. There is no evidence of earlier use. See Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 489.

[396] BOA. Hatt-ı Hümâyûn, no. 10560.

distinguished himself with his competence and knowledge of firing guns would be preferred for the post.[396]

On some occasions, field cannonners were employed or forced to serve on board of the ships of the Ottoman navy. Many documents note their complaints and reluctance to serve on ships. They often rebelled saying, "we will not serve on the ships![397]" This unwillingness can be explained by such factors as the physical difficulties and dangers of sea wars as well as the negative impact of being away from home for a long time on the psychology of the personnel.

When the need appeared, foreign personnel were employed on the galleons to deal with technical problems. In a document of 1212 /1797-98 Kapudan Pasha complained about the carelessness in the construction of gunstocks used on the galleons, leading to premature wearing out, breaking and constant need for repair during their operation. He pointed out that the gunstocks used on European ships were carefully made with the mixture of iron and therefore were long lasting and easy to use. For this purpose, a French ironsmith named (Casey?) was employed to manufacture the iron parts of the gunstocks to be used on one and three decked galleons and some other ships. The Frenchman was paid 125 *kuruş* per month, starting from Şa`bân 1212/1797-98.[398] The newly invented foreign cannon carriages and gunstocks were much in demand in the Ottoman realm. Already in 1208/1793-94

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[396] Selim Sırrı Altıer, *Osmanlı Bahriyesinin Yelken Devri ve Türk Korsanları* (Istanbul: Boğaziçi Yayınları), p. 28.

[397] BOA. Hatt-ı Hümâyûn, no. 10093, 10253, 10259, 10270, 10401.

[398] BOA. Cevdet-Bahriye, no. 9418.

the Ottomans used newly invented and constructed gunstocks and Austrian type carriages of ironwork both on land and during naval campaigns.[399]

The Ottomans suffered from a shortage of technical personnel to carry out cannon maneuvers in 1213/1798-99. According to an imperial edict a Russian translator named Fonton came to the office of the *Dîvân-ı Hümâyûn* translator and informed him that the Amiral of the Russian navy, as a prospective ally of the Ottoman State, had the intention to visit the Ottoman ships in order to observe their order and that of the soldiers and to view manufacture and use of the cannons on ships. Upon Kaptan Pasha's order, the Ottoman authorities made the necessary preparations to show Russian officers their cannons and the use of the cannons on an appropriate ship. The Russian officers were given 2,000 gold coins as a gift. The most important thing is Kaptan Pasha's words preceding the Russian visit. When his opinion was asked, he said "there is no one to carry out drills with cannons in our navy. Knowledgeable gunners are either in naval campaigns or in Vidin. Do not let this drill be a fiasco. Visiting the ships is enough for them. Let them finish their work before Wednesday and go. And 1,000 gold coins is a small amount, so give them 2,000 gold coins.[400]"

A foreign office document draws attention to the shortcomings of the Ottoman naval artillery, saying that Ottoman artillery personnel were unaware of the true principles of gunnery and that two or more cannon of an enormous size, carrying a ball of marble of from one to two hundred weights were used. The document notes

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[399] BOA. Hatt-ı Hümâyûn, no. 8168.

[400] "*Bizim donanmada top talimi idecek adam yoktur. Bilenlerin kimi donanmada kimi Vidindedir. Talim hususu bir rezalet olmasun. Yalnız gemileri gezdiği kifayet eder. Her ne yapılacak ise yapılub Çaharşenbe günü kalksunlar. Bin altun azdır, iki bin verilsün.*" See BOA. Hatt-ı Hümâyûn, no. 14638.

that there were no uniformity of cannons, and therefore, the danger and confusion arising from the incredible variety of artillery scattered without system on each deck was great.[401]

Foreign artillery personnel were employed in the educational institutions. In 1207/1792-93 Admiral Horatio Nelson, the famous British naval commander, recommended through the interpretor Pizani that a British artillery engineer with proper technical knowledge in artillery and various drawings employed at the *Muhendishane.*[402]

The late eighteenth century witnessed many changes in almost every aspects of naval technology. Danışman's thesis suggesting that in the second half of the eighteenth century and specifically during the reign of Selim III, the Ottomans had almost all the preconditions for industrialisation is to a great extent, valid for the shipbuilding sector of the time.[403] In this period, shipbuilding underwent a shift from a craft to a semi-scientific pursuit. The change can be called "semi-scientific," since it did not mark a watershed in terms of the full adoption of modern naval technology. However, it was a milestone in the sense that it paved the way for the beginning of a resolute transformation in the Ottoman mentality of naval technology. In order to observe a full change in the real sense, we should wait until the first half of the nineteenth century. Change in this sector was slow, and multi-dimentional. To begin with, naval technology required big investments, both in equipment and in personnel.

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[401] PRO. FO 78/15 (25 December 1794).

[402] Uzunçarşılı, "Ondokuzuncu asır başlarına kadar Türk-İngiliz münasebatına dair vesikalar," *Belleten* 13 (1949), pp. 583-584.

[403] Günhan Danışman, "Anadolu Enerji Teknolojileri Tarihçesi ve 18. Yüzyıl Sonunda Osmanlı Yönetiminin Sanayileşmede Kaçırdığı Fırsatın Yeniden Değerlendirilmesi," *1. Türk Bilim ve Teknoloji Tarihi Kongresi Bildirileri (15-17 Kasım 2001)*, published by Emre Dölen and Mustafa Kaçar (İstanbul: TBTK and İSKİ, 2003), pp. 95-113.

High costs, training the personnel in new tools and equipment, and difficulty in finding suitable construction sites slowed the adoption of new technology.

The systematic constructions of new types of sailing warships were adopted in this period. Two and three decked galleons, frigates, corvettes, sloops, gunboats, fireships and such came to domimant, rendering the galley type oared ships obsolete. These war ships were mounted modern cannons, which made the Ottoman navy a deterrent force in the Mediterranean.

Regarding the raw material required for shipbuilding and naval works, Ottoman sources do not record a shortage in many of them. On the contrary, in some raw materials such as timber, copper, rope, iron and lead, Ottoman sources seem to have been ample and adequate to meet the needs. However, there appeared some problems and delays in the procurement of, for instance, timber, in the cases that the Porte ordered the construction of several ships at the same time. On balance, the thesis suggesting that the Ottomans failed to adopt modern naval technology due to the difficulties in and constrains of raw materials is not convincing for the late eighteenth century.

One of the striking breakthroughs of the period was the adoption of the systematic copper sheathing of the hulls of Ottoman naval ships. The first noteworthy trials of this technology had taken place in Europe about thirty years earlier. This technology provided protection from wood-eating worms; an increase in sailing speed, which not only reduced voyage times, but made navigation easier; holding caulking materials in position; and reducing maintenance costs between voyages.

Another very important development of the time was the construction of the first drydock in the Golden Horn. This drydock, with its state-of-the-art structure designed by Swedish engineers, was the construction site for many Ottoman warships and is still in use today. In connection with the construction of the drydock, the Ottomans started negotiations at the very beginning of the nineteenth century for purchasing a steam engine from England to be used in the Imperial Naval Arsenal in emptying the large basins in which ships of war were careened and repaired. Although the results of the negotiations are unknown, it does indicate that the Porte was aware of the technology in question and willing to adopt it.

Among developments, those of a secondary importance were the construction of an anchorehouse (*lengerhâne*), measuring house (*endâzehâne*), the adoption of new mast machines, fire conduits, and the introduction of the new kitchen and provisioning system.

CHAPTER THREE

THE ROLE OF FOREIGN MISSIONS IN THE OTTOMAN NAVAL TRANSFORMATION

In all periods of Ottoman history, foreign missions and individulas found employment in one form or another. The *Taife-i Efrenciyân*[1] and non-muslim consultant physicians[2] employed in the Ottoman palace are just two examples. The unchanging factor in this policy was the willingness to possess knowledge of and follow developments in technology considered to be beneficial for practical purposes, rather than long-term targets. Therefore, it can be argued that the transfer of new technologies, sciences and concepts to the Ottoman Empire was to a great extent instrumental. The Ottomans were oriented mostly toward solving immediate practical problems. The entrance and acceptance of new knowledge was rapid as

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[1] *Tâife-i Efrenciyân* was a group of non-muslim technicians employed temporarily for a certain task or project in the Sultan's palace. Appearing in the list of the annual budget or recorded together with *ehl-i hiref tâifesi* (palace craftmen), they received their salaries in 4-month installments. They were employed in completing a certain project under the command of the Sultan. Historical records indicate that they were often employed as councillors to the Ottoman artillery corps. The cannon casting expert, Urban of Hungary, is an example for this group. For more information, see Rhoads Murphey, "Osmanlıların Batı Teknolojisini Benimsemedeki Tutumları: Efrenci Teknisyenlerin Sivil ve Askeri Uygulamalardaki Rolü," *Osmanlılar ve Batı Teknolojisi*, ed. E. İhsanoğlu (İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayını, 1992), pp. 7-20.

[2] For some non-muslim consultant phyiscians and scholars of other branches serving in the Ottoman palace, see the part under the title "Endülüs menşeli bazı bilim adamlarının Osmanlı bilmine katkıları," by Ekmeleddin İhsanoğlu, *Büyük Cihad'dan Frenk Fodullığuna* (İstanbul: İletişim, 1996), pp. 85-138 and 213-216.

long that knowledge could solve problems. Particularly, in such fields as military technology, firearms, mining, cartography, compasses and clock making, the Ottomans had a tendency to adopt and apply new developments efficiently without much time lapse. This adoption was realized through following technological developments by means of commissioning Ottoman ambassadors, technicians and other such travellers to observe and report what they saw abroad, and demanding technical missions from foreign countries to apply the new technology in the Ottoman lands and to educate Muslim technicians.[3]

Naval technology, as a part of military and economic technologies, became a matter of great interest for the foreign missions in Istanbul, starting from the late eighteenth century. In the aftermath of the Çeşme incident in 1770, which was the second most important disaster after the Lepanto of 1571 for the Ottoman State, the government engaged foreign officers, officials, engineers and workers. The main aim was, in the relatively earlier stages, to restore its naval power. In the wake of Selim III's rise to the power, this aim shifted considerably to transferring military and naval technologies from Europe and keeping abreast of the latest developments. Foreign powers, which fully understood the importance of this development, began to offer their services and raced to win a considerable share from this military market. The

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[3] For more information, see Ekmeleddin İhsanoğlu, "Ottoman Science in the Classical Period and Early Contacts with European Science and Technology," in *Transfer of Modern Science and Technology to the Muslim World* (Istanbul: IRCICA, 1992), pp. 1-49. Also, see E. İhsanoğlu "Osmanlıların Batıda Gelişen Bazı Teknolojik Yeniliklerden Etkilenmeleri," in *Osmanlılar ve Batı Teknolojisi*, ed. E. İhsanoğlu (Istanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayını, 1992), pp. 121-139; *Science, Technology and Learning in the Ottoman Empire: Western Influence, Local Institutions, and the Transfer of Knowledge* (UK: Ashgate Variorum Collected Studies Series, 2004). For more information about the Ottoman sources of Europe and some contacts, see Virginia H. Aksan "Ottoman Sources of Information on Europe in the Eighteenth Century," *Archivum Ottomanicum*, 11, 1986 (1988); Aksan, "Choiseul-Gouffer at the Sublime Porte 1784-1792," ed. Sinan Kuneralp, *Studies on Ottoman Diplomatic History* (Istanbul: The Isis Press, 1992); Aksan, *An Ottoman Statesman in War and Peace: Ahmed Resmi Efrendi, 1700-1783* (Leiden & New York & Köln: E.J. Brill, 1995); Aksan, *Savaşta ve Barışta Bir Osmanlı Devlet Adamı: Ahmed Resmi Efendi, (1700-1783),* trans. Özden Arıkan (İstanbul: TTV Yurt Yayınları, 1997).

Ottoman government, well aware of the intentions of the European powers, took this historic opportunity to follow a policy of balance despite its disadvantageous position. Thus, in many ways, Selim III, in Shaw's words, was the first ruler of an "underdeveloped country" to manipulate and take advantage of the rivalries of the great powers to secure assistance in the development of his country.[4]

These foreigners who came to the Empire for work can be divided into two main categories with respect to their fields of employment and channels of procurement. Regarding the first category, they were divided into four groups composed of engineers, officials or officers teaching the art of war, workmen skilled in various branches, and physicians and surgeons. In the second category were four groups as well: those procured via the ambassadors of the foreign countries in Istanbul, those procured as a result of the attempts of the notables of state, those procured by permanant ambassadors (*ikâmet elçileri*), and finally those who came on their own as workers without any mediator.[5] Foreign missions entering Ottoman service during Selim III's reign appear to have consisted mainly of the groups from France, Sweden, and Britain, and individuals from other countries.

Here, after an overview of foreign missions in earlier years, the discussion turns to those during the reign of Selim.

French Missions

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[4] Shaw, *Between Old and New*, p. 141.

[5] Kemal Beydilli, *Türk Bilim ve Matbaacılık Tarihinde Mühendishane, Mühendishane Matbaası ve Kütüphanesi 1776-1826*, (İstanbul: Eren Yayıncılık, 1995), p. 85.

From the 1780s onward, French mission activities began to permeate every area of Ottoman military technology. In 1784 and 1787, two French missions arrived at the Imperial Naval Arsenal in Istanbul and set to work as a result of bilateral agreements between two countries. The approaching Russian threat and their armament played a considerable role in their employment by the Porte, considering the mutual interests of the two countries.

The domestic and foreign documents related to French missions are plentiful enough to shed light on the intensity of the exchange. For instance, a document (from Robert Ainslie in Istanbul, 10 September 1784, to the Marquis of Carmarthen) states that in addition to some figures such as L'abbe de Lille and Monsieur de Villaison of the French academies, Le Comte de Charac, a Major General, and a number of other French officers, had come as travellers, several technicians, and artists for the services of the Porte, as well as six engineers, artillerists, and builders, had landed at Istanbul on 28 August.[6] Another document (from Robert Ainslie on 12 September 1784 to Alleyne Fitz Herbert in St. Petersburgh) reports that in the course of the previous fifteen days about a dozen French ship builders, founders and engineers had arrived in Istanbul from Marseilles, and that as many more in the company of a major general were expected. In addition, a French colonel, Mr. Brentanau, charged with a secret commission for the Porte, was soon expected from Versailles.[7]

Every event, military action and relation was observed carefully and reported by the foreign embassies. For example, a report written to the Marquis of

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[6] PRO. FO 261/1, no. 20 (10 September 1784).

[7] He was probably engaged in the same affair commenced there by *la Chalousiere* the previous April. PRO. FO 261/5, p. 260. (12 September 1784).

Carmarthen, 9 October 1784, mentioned that a scheme had been set into action by France to build a number of first-rate ships in the Arsenal, which was then under consideration. Accordingly, models of ships had been received by the Porte, amongst which was one to carry a hundred and ten guns. The French also sought to establish an iron foundry for casting cannon, shells, and bullets, and to establish wet and dry docks, for which nothing more was wanted, as all of their ships had been heaved down to careen. The foreign engineers and draftsmen were preparing plans and models of ships to be submitted to the Grand Admiral on his return there.[8]

In the following years, the number of Frenchmen employed in the Arsenal increased dramatically. In February 1787, a large group of artisans, workmen and sailors were assembled at the Arsenal. These men were employed fully in several areas, but most particularly at the naval arsenal, where a sqaudron of four ships of the line, two galleys, frigates, sloops, and gun-boats were fitted out in preparation to be stationed towards the entry of the Bosphorous in the course of March. The grand fleet, consisting of twelve ships of the line, four galleys, eight frigates, and sloops and bomb-ketchers, was ordered to be in readiness by the end of April.

Independent of these armaments, ship building continued with the greatest activity under the direction of the French builders. Among the ships under construction were two ships of the line of seventy-four and sixty-eigth guns, one frigate of thirty-six, a corvette of fourteen and ten gunboats, each to carry a twenty-four pounder, and a mortar of ten inches. About twenty others were ready at the arsenal. All were to be lanched in the spring, except for the ships of sixty-eigth guns. The two foundaries were busy casting brass canon, mostly field pieces, iron balls and shells, of which they had a very considerable supply. Orders had also been issued for

[8] PRO. FO 261/1, no. 22. (9 October 1784).

the preparation of complete trains of field carriages, tumbrels, pontons, and various field utensils, and for the provision of all materials and implements, which might possibly be wanted when the armies took field.[9]

In a nutshell, many French officers and engineers rendered services in various military branches to the Ottoman state. In the following, focus will be given to the engineers and officers employed in naval works and related subjects only.

Among these individuals was a Frenchman named Marc Antoine Chabaud. Born in 1727 in Nimes, France, Chabaud became a lieutenant in the Bourbon Regiments in 1746. He participated in two wars against Austria, and completed two years of education at the Royal Engineering School of Mézières. He was commissioned by the French government to serve at the French embassy in Istanbul, to gather information about the Russian threat, and to help the Porte in the fortification of the Dardanelles and Bosphorous Straits.[10] Chabaud, who went by the name Chevalier de Cerville, arrived in the Dardanelles on 25 September 1783. He was received into the presence of the Grand Vizier and commissioned, along with Sr. Eynard. Chaboud was removed from his position in 1784.

Sr. Eynard was an engineer of navigational geography, who took part in the American Independence War as an engineer of navigational geography. He was hired by the Ottomans to write reports on the forts of Oczakov and Hotin, and to prepare projects for the defense of the Dardanelles and the fort of Soğucuk/Soğucak. He recommended the strenghtening and increase of the Ottoman fleet as well.[11]

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[9] PRO. FO 78/8, pp. 30-31 (23 February 1787).

[10] Mustafa Kaçar, "Osmanlı Devleti'nde Bilim ve Eğitim Anlayışındaki Değişmeler ve Mühendishânelerin Kuruluşu" (Ph. D. dissertation, İstanbul University, 1996), p. 71.

[11] Ibid., p. 71.

Mathieu Dumas was sent on a clandestine mission by the French government to navigate the archepelago and examine the advantages of capturing the island of Crete.[12] Under the false name of M. de Vernon, he boarded the ship *Badine* at Toulon. The commander of the ship was Count de Bonneval. Together, Dumas and Bonneval completed their investigations of Crete and Morea and transported another engineer, Lafitte Clavé on 16 March 1784 to Istanbul. The three were invited to visit the fortifications in İstanbul in the company of an Ottoman official who seems to have been a stone mason rather than an architect. They examined these fortifications and prepared to send a report about the defense of the Bosphorus Strait. On 4 May, Mathieu Dumas left Istanbul on the *Badine* to continue his navigation of the costs of Morea. His mission and residence in Crete was described in a book[13]written by his son in 1836.[14]

Another Frenchman who served the Ottoman state was Lafitte-Clavé. He was born in 1740 in the city of La Bastide d`Ârmagnac, France, and educated at the Ecole Royale du Génie in Mézières. He became an engineer and was awarded the rank of lieutenant engineer.[15] He was sent to Istanbul to participate in the works carried out by Antoine Chabaut. Lafitte-Clavé boarded a French merchant ship in Marsille, along with a geographer, Poirot, and sailed to Izmir. From there he sailed

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[12] Candia was the Venetian name for the island of Crete, the city of Heraklion, and that part of the southern Aegean Sea lying between the Cyclades and Crete.

[13] The name of the three-volume book was *Souvenirs du lieutenant-général Comte Mathieu Dumas en 1770* (Paris, n.p. 1836).

[14] Ahmet Refik (Altınay), "Onsekizinci Asırda Fransa ve Türk Askerliği," *Türk Tarih Encümeni Mecmuası*, yeni seri 1, no. 4 (İstanbul, 1930), pp. 26-27.

[15] Kaçar, p. 73.

on the *Bodine*, with passengers Bonneval and Dumas, who were coming from their missions on Crete and Mora. They arrived in Istanbul on 16 March 1784. He was unable to find Antoine Chabaut there, since Chabaut had been sent back to France by the French ambassador due to some personal difficulties.

After examining the fortifications of Istanbul and preparing a report on the defense of the Black Sea strait, Lafitte-Clavé was commissioned with a new task on the Black Sea coast. In the company of Thomas-Laurent Madeline du Verne de Prel,[16] the officer (*mülazım*) of the *Badine*; M. Grégoire Miran (Kirkor Mihran) the interpretor; and the paymaster of the Grand Vizier, he visited Zonguldak, the ports of Anapa, Gelincik, Sinop and Amasra. Although he did not go ashore, he navigated ports such as Kırım, Kefe, Yalta and Sivastopol. He also examined the Dnieper, Oczakov, Kılburun, Varna, Mezembria and Burgas.[17] Following their journey, Lafitte and his assistant, the cartographer, Poirot, presented the Grand Vizier with an accurate map and survey of the coast of the Black Sea on 28 February 1785. The names were given in Turkish, taken from a chart made by them during the previous summer. Their report was received with great satisfaction. At their departure, the three officers and Mr. Fonton, their interpretor, were showered with ermine furs.[18] Their private interpreter, Grégoire Miran, received a robe called a *cheriachie*. In

[16] Thomas-Laurent Madeline du Verne de Prel was born in 1763 in the city of Giveny, France. He completed his education in La Flèche and joined in the navy in 1778. He journeyed to Istanbul along with Lafitte-Clavé. During the French Revolution he was imprisoned for high treason on the grounds that he was a royalist. He went to America in 1798 and returned to France in 1803. On his return, he was awarded the St. Louis medal by Louis XVIII. See Ibid., p. 74.

[17] Refik, "Onsekizinci Asırda Fransa ve Türk Askerliği", p. 27.

[18] The white winter fur of the stoat, used especially to decorate the formal clothes of judges, kings, etc.

addition, the officers each received a gold snuffbox valued at sixty guineas,[19] and one thousand piasters; an equal sum was given to Grégoire.[20]

Back in Istanbul, Lafitte Clavé began to give fortification courses on Mondays and Thursdays in a building belonging to the Naval Arsenal on the Golden Horn. As understood from his descriptions, the students were not lacking in intelligence and they tried hard to learn. However, he had little hope of their success. He wrote that he would consider himself successful if he was able to inspire confidence in the projects that he had prepared, and to teach his students how to assess the value of these projects, make comparisons and apply them.[21] Clavé's fortification courses at the *Muhendishâne* took place between 18 September 1784 and 5 April 1787.[22] On 17 September 1786, with J. G. Monnier, Gelenbevî İsmail Efendi and Kasapbaşı İbrahim Efendi, he participated in the preparation of a *nizamnâme* (set of regulations) aimed to encourage the attendance of the students and regulate the educational conditions at the *Mühendishâne.* This *nizamnâme* envisaged giving a certain number of students a stipend providing that they mastered the courses and later taught them to other students. All of students were given a *berat* (a kind of diploma) for the purpose.[23] During this period, Clavé wrote a book entitled *Eléments de Castrométation et de Fortification Passagère* (Method of Administering

[19] An old British gold coin or unit of money worth 21 shillings (= now £1.05).

[20] PRO. FO 78/6 (10 March 1785). See also Max Roche, *Éducation, Assistance et Culture françaises Dans L'Empire Oottoman* (Istanbul : ISIS, 1989), p. 18.

[21] Refik, pp. 29-33.

[22] Beydilli, p. 26.

[23] Kaçar, "Osmanlı İmparatorluğu'nda Askeri Teknik Eğitimde Modernleşme Çalışmaları ve Mühendishanelerin Kuruluşu (1808'e Kadar)," *Osmanlı Bilimi Araştırmaları II* (İstanbul: İstanbul Üniversitesi Edebiyat Fakultesi Yay., 1998), pp. 96-97.

Army and Temporary Fortification), which was translated into Ottoman Turkish by Kasapbaşızâde İbrahim Efendi as *Usûlü'l Maarif fi Tertîbi'l Ordu ve Tahsînihî Muvakkaten*. It was to be published in 1202/1787 by the French embassy's press in large format in two volumes.[24]

Another important part of Clavé's activities was the practical courses he offered together with Monnier in the vicinity of Aynalıkavak Kasrı, in addition to the theoretical courses at the *Tersâne Mühendishânesi*. In these practical courses he used fortification models. For instance, in a class held on 8 November 1785, he embarked on the construction of a model of fortification in the courtyard of Aynalikavak palace on a scale of 1/12 using clay and wood. He also prepared a relief drawing of this fortification plan.[25]

Clavé also appears to have rendered services during the attack of Kılburun[26] and received a gratuity of five hundred *zechine* from the Grand Vizier. After his return from that mission, he was given an estimated four hundred pounds to purchase a gold-hilted sword as acknowledgement for his trouble in overseeing the construction of pontoons.[27]

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[24] The word *tahsînihî* appears as *tahassunihî* in Gündüz Akıncı's book referring to the catalogue of British Museum. See *Türk-Fransız Kültür İlişkileri (1701-1859). Başlangıç Dönemi,* (Erzurum: Atatürk Üniversitesi Edebiyat Fakültesi Yayını, 1973), p. 43. Kazım Çeçen uses *tahsînihî* and gives 1786 as publication date. See "Mühendishâne-i Bahrî-i Hümâyûn," *Dünden Bugüne İstanbul Ansiklopedisi*, vol. 6 (Istanbul: Türkiye Ekonomik ve Sosyal Tarih Vakfı, 1994), p. 14; Adnan Adıvar, *Osmanlı Türklerinde İlim* (İstanbul: Remzi Kitabevi, 1971), p. 204.

[25] Kaçar, "Osmanlı İmparatorluğu'nda Askeri Teknik Eğitimde Modernleşme Çalışmaları ve Mühendishanelerin Kuruluşu (1808'e Kadar)," p. 94.

[26] PRO. FO 78/8 (10 November 1787).

[27] PRO. FO 78/8 (28 December 1787).

Lafitte received 1,500 franks per month, plus expenses, from the French government since he had come to Istanbul on a commission by France to carry out a mission in compliance with France's Levant policy. Clavé, along with two workmen attached to the French Corps of Artillery, departed on board a French ship for Suda, on the island of Candia, on 12 June 1788.[28] He was promoted to the rank of colonel on his return to France.[29] To sum up, Clavé was an important figure in teaching theoretical courses and practical activities in *Mühendishâne*. He and his assistants played important roles in training future teachers to be employed in this institution.

Captain Joseph Gabriel Monnier (1745-1818) was born in the French city of Bourge-en-Brasse on 29 March 1745, and attended the Royal Engineering School in Mézières, graduating 1768. He was first stationed at Toulon for four years, where he worked in the construction of the port and its vicinity. He travelled to Istanbul on 16 July 1784 to assist Lafitte. By the time he arrived in Istanbul, however, Lafitte was already surveying the Black Sea coast, as described above. While waiting for his return, Monnier went on an excursion in the company of the former *Mimar Ağa* (Chief architect) to check the construction of the fortifications at the entrance of the Bosphorous. Settled in Tarabya by means of the French embassy, Monnier drew up plans, maps and wrote reports, including a defence project covering the place and plans of Karaburun on the European side of the Bosphorous and old forts built previously by the Ottomans in the villages of Eski Fener and Feneraki. After

[28] PRO. FO 78/9 (15 June 1788).

[29] Kaçar, p. 100.

obtaining permission from the French ambassador, he left İstanbul for France on 6 September 1786 for personal reasons.[30]

Another Frenchman who served the Ottoman state in the period under examination was Laurent-Jean Francois Truguet. Truguet was commissioned to the French embassy in İstanbul as an attaché with the specific task of preparing maps of the Marmara[31] and Black Seas. He is also known to have been the commander (with the rank *binbaşı*/major) of the French frigate *Charleton* and to have taught *deniz tabyası* (naval maneuveres) courses at the *Tersâne Mühendishânesi* in 1197/1782 together with an individual named Tondu. With the introduction of these two courses, the educational scope of the school was extended, since only mathematics (*hisab*), geography (*coğrafya*) and cartography (*harita*) had been taught from the opening of the school in 1190/1776. These new courses offered by the French teachers were translated by Kirkor and Mihram Efendi into Ottoman Turkish and given to the students as textbooks. Truguet's course notes, entitled *Traité du Pilotage et de Navigation* and *Eléments de Géometrie* (Treatise on the Piloting and Navigation and the Elements of Geometry) were translated into Ottoman Turkish, but not published.[32] Truguet was also famous for a book on naval maneuvers and tactics. His *Usûlü'l-ma`ariff fi vech-i tasfîf-i sefâyin-i donanma ve fenn-i tedbîr-i harekâtuhâ*

[30] For more information of his life see Mustafa Kaçar, "Osmanlı İmparatorluğu'nda Askeri Teknik Eğitimde Modernleşme Çalışmaları ve Mühendishanelerin Kuruluşu (1808'e Kadar)", *Osmanlı Bilimi Araştırmaları II* (İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayını, 1998), pp. 92-93.

[31] PRO. FO 78/7 (24 July 1786). Document says that, "'the French corvette, commanded by Chevalier Truguet, has again been employed on a survey of the Sea of Marmara, from whence that officer returned a few days since, and, instead of entering the harbour, proceeded about a mile up the canal of the Black Sea. This unusul manoeuvere occasioned the passage for the French flag into the Black-Sea, now judged to have been premature."

[32] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 508; Tezel, p. 350.

(Traité de Manoeuvre et de Tactique Pratique) (*Treatise of Manouever and Practical Tactics*),[33] was published in 1787 by the press founded by the French ambassador, Choiseul-Gouffier.[34] The introductory pages of the book give important information about its aim:[35]

> The administration of various manouvers and and tactics of the naval ships is a science which explains the ways and methods with which warships are put in order during campaigns. Furthermore, it includes the administration of sails, anchors, cannons, and all war equipment.

The ninety-six page narrative part is supported by thirteen plates at the end of the book featuring drawings of ships in various maneuvers.

Truguet was active, travelling to several countries, transporting and accompanying some important personalities, officers, engineers, ship builders, gunners, founders, artisans and military articles and supplies. He is known to have commanded French frigates and corvettes running between Toulon, Alexandria,

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[33] The word *tasfif* (to be maneuvered) in the title of the book was and is still misread and written as *tasnîf* (classification) by many writers who have not have opportunity to see the original text or are content with quoting the same mistake from other writers. It seems that the slight difference between the letters *–f* and *–s* might have escaped their notice. For a few examples for this common mistake, see Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 508; Adıvar, *Osmanlı Türklerinde İlim*, p. 204; Niyazi Berkes, *The Development of Secularism in Turkey* (Montreal: McGill University Press, 1964), p. 59; Ali İhsan Gencer, *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezareti'nin Kuruluşu (1789-1867)*, p. 26.

[34] For more information about him, see Virginia H. Aksan, "Choiseul-Gouffer at the Sublime Porte 1784-1792," ed. Kuneralp, *Studies On Ottoman Diplomatic History* (Istanbul: The Isis Press, 1992)

[35] "*Sefâyin-i donanmanın vech-i tasfîfi ve harekât-ı muhtelifesinin fenn-i tedbîri tertîb-i cengî üzre musannaf olan sefâyinin harekât-ı mütenevvia'sını mübeyyin yâhud döğüşmeye tayin olunan malûmu'l mikdâr sefâyin ne tarz üzre tasfif olunacağı ve sefâyin-i merkûme hîn-i muharebede ne vechile amel ve hareket edecekleri müfessir bir fendir. Kaldı ki başka başka her bir sefine ne şekil hareket ve yelken ve demürlerini ne vechile idare ve topların ne vechile sefînelerde istimali hâvî olan kâffe-i âlât-ı harbiyyeyi ne tarz üzre isti'mâl ve a'le'l-husûs esnâ-yı muharebede tebeddülât-ı sufûf lâzım geldikte sefîne-i merkûme kendü saffını ne minval üzre tebdîl edeceğini fenn-i merkûmdan âşikâr ve nümâyân olur.*" On the cover of the copy (no. ŞK. 1666), in the Archeological Museum, it reads *min te'lîf-i de truke min rüesâ-i sefâyin-i devlet-i françe* (Written by Truguet, one of the capatains of French ships). And regarding the press, it says *mine't-tab'i'l-kâyin fî dâr-ı ilçi-yi françe fî kostantıniyye, sene 1202* (Published by Kayin Press at the French embassy in Istanbul, 1787).

Suez, India and Istanbul in February 1785[36] and the Dardanelles in April 1786.[37] At one point his ship careened in the harbour of Istanbul at the expense of the embassy[38] and at another to have waited for permission from the Porte to proceed through the Bosphorus.[39]

He served as the commander of a French brig and conducted the French ambassador de Choiseul's nephew to some of the islands of the Archipelago in April 1785, accompanied by French vessels.[40] In June 1786 he commanded a French corvette carrying the French ambassador on board, taking him to the baths at Bursa, and bringing him back by way of Mudanya. On the same corvette, he brought back Lady Craven and Colonel Vernon, who were highly pleased with their tour of the archipelago.[41] He was the captain of a French corvette that departed from Istanbul carrying Madam la Baronne d'Herbert with her four small children and their attendant to embark on a French frigate at Tenedos, which was to carry them as far as Malta.[42] In November 1788 as commander of a French corvette bound for Toulon, he accompanied Monsieur de Gaville on a leave of absence and Monsieur d Fleuri, the

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[36] PRO. FO 78/6 (25 February 1785).

[37] PRO. FO 78/7 (10 April 1786).

[38] PRO. FO 78/7 (10 October 1786).

[39] PRO. FO 78/8 (7 April 1787).

[40] PRO. FO 78/6 (8 April 1785).

[41] PRO. FO 78/7 (26 June 1786).

[42] PRO. FO 78/8 (25 September 1787).

private secretary to the Count de Choiseul, who was returning home to recover his health.[43]

Regarding his connection with trade, we know that on 27 January 1787 Truguet's brother brought him, a supply of provisions and other articles of which he was in want, on board a French sloop of war called *La Fleche* arrived from Toulon.[44] Moreover, the corvette commanded by Chevalier de Truquet, returned to Istanbul from an expedition to Candia, and then to Malta, on business with the French commodore, the Marquis de Nieul.[45]

Furthermore, he seems to have played an important role in carrying dispatches and helping correspondance between the French embassy in Istanbul and the France government or military circles, specifically in Toulon.[46] Later on, he was promoted to the member of the Council of State in the time of Napoleaon in France.[47]

As for Tondu, he was a French officer and astronomer serving the French embassy who taught astronomy and geometry courses at the *Mühendishâne.*[48] He is also reported to have taught cartography, the use of sea watches and graphometers as

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[43] PRO. FO 78/9 (8 November 1788).

[44] PRO. FO 78/7 (5 February 1787).

[45] PRO. FO 78/9 (22 September 1788).

[46] PRO. FO 78/9 (22 February 1788). He is known to have departed from Istanbul to transport Count Choiseul's dispathes to Toulon. See PRO. FO 78/9 (15 June 1788).

[47] A. Adnan Adıvar, *Osmanlı Türklerinde İlim*, p. 204.

[48] The name "Tondu" appears as "Tondule" in Çeçen's article. See Çeçen, p. 14; Refik, p. 30.

well as map drawing with compasses in the same school.[49] His book, entitled *Traité du Pilotage et de la Manoeuvre* (Treatise on Pilotage and Manouvers), was translated by Kapudane Hasan Efendi, but was not published.[50]

On 17 June 1785, another group of technicians and soldiers, including François Alexis Petolet, Jean François Tribouley, and Jean François Jobelaine, arrived in Istanbul and joined the previous French mission under St. Rémy.[51] Trained in casting and molding shells, they were accomodated in the workshops at the Tophâne-i Âmire and *Arabacılar Kârhânesi* (Workshop of the Cannon Wagon Corps). A two-year contract was signed with Petolet, who was then thirty years old. According to the contract, on 8 April 1785, he would be paid one hundred franks in return for his work in casting shells, mortars, and guns in the casting furnace.[52] The same contract was also given to Tribouley, twenty-nine, and Jobelaine, twenty-five,

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[49] See Kaçar, p. 95.

[50] Ibid., p. 96.

[51] Artillery captain Charles Alexandre Louis de Saint-Rémy (1746-1800) had already come to Istanbul together with his ten cannon founders in 1785 upon the request of Grand Vizier Halil Hamid Paşa and on the order of the French government. Among his staff were such names as Michel Mouy (sergeant-worker at 1500 franks), Pierre Rozet (artillery corporal, at 1200 franks), J. B. Parmentier (artillery staff, at 900 franks), Jean Fridelle, (worker staff, at 900 franks), Etienne Allegre, (chief gunner, at 1200 franks), Jean Dradelier (chief bombardier, at 600 franks), J. B. Goude (foreman, at 600 franks), J. Haibrault (foreman, at 600 franks), Nicolas Pescheur (foreman, at 600 franks) and Jean Naud (foreman, at 600 franks). He attempted to apply the French gun casting methods and worked in the construction of a new furnace at the Hasköy foundry, which would not function correctly. However, he was called back to France in 1787 following the agreement between France and Russia in 11 January 1787. For details of his life and activities, see Mustafa Kaçar, "Osmanlı Ordusunda Görevli Fransız Subayı Saint-Rémy'nin İstanbul'daki Top Döküm Çalışmaları (1785-87)," *Osmanlı Bilimi Araştırmaları* 5, no. 1 (İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayını, 2003), pp. 33-50.

[52] Mustafa Kaçar, "Osmanlı Ordusunda Görevli Fransız Subayı Saint-Rémy'nin İstanbul'daki Top Döküm Çalışmaları (1785-87)," p. 37.

with seventy-five franks each. Their salaries and transportation expenses (caique fees, ninety-two *kuruş*) started from Cemâziye'l-evvel 1199/March 1785.[53]

In the mid-1780s Jean Jacques Sébastien Le Roy and Du Rest travelled to Istanbul. Of Swiss origin, Le Roy was born in Paris on 15 September 1784. As a ship builder in the Pyrénées, he had established a structural design enabling the easy fitting of ship masts into their proper places with the aid of a lever. Later on, he had gone to Corsica and worked in the construction of many ships at Loirent. Upon the request of Halil Hamid Pasha, the French government sent Le Roy and his assistants to Turkey. As understood from a letter (23 May 1784) written by Comte de Vergennes in Paris to St. Priest, the French ambassador to Istanbul, among the aims of his employment were the establishment of a new defense system, the training of Ottomans in shipbuilding techniques and principles, the changing of the traditional system of shipbuilding, the re-establisment of the present Ottoman navy if possible, and its modernisation to European standards.[54]

Le Roy travelled to Istanbul in 1784 with the support of the French ambassador Comte de Choiseul-Gouffier, together with the workers of the naval arsenal in Toulon. His colleage, Du Rest, and the French team arrived in Istanbul in 1787. Among them were a caulker named Guillaume L'Abbé, a carpenter, an augerer named Michel Henri and a purser named René Peton, all from Brest; two caulkers, named Joseph-Marie Gassin and Antoine Bonveau from Toulon; and two carpenters, Antonie Olivier and carpenter Hyacinthe Gasquet[55] Their salaries were 125 *kuruş* for

[53] Ibid., p. 37-38.

[54] Mustafa Kaçar, "Osmanlı Devleti'nde Bilim ve Eğitim Anlayışındaki Değişmeler ve Mühendishânelerin Kuruluşu," p. 87.

[55] Roche, p. 17. See also Pierre Duparc, *Recueil des Instructions* (Paris: Centre National de la Recherche Scientifique, 1969), pp. 477-494.

Le Roy, one hundred *kuruş* for Du Rest, seventy *kuruş* for Guillaume L`Abbé, sixty *kuruş* for Michel Henri and René Peton, respectively, and fifty *kuruş* for the rest.

Kaçar writes that Guillaume L`Abbé was fifty-four at the time. He started as an apprentice and became master in 1765. He worked for four years and three months as workshop foreman (*atölye şefi*) in Istanbul. Michel Henri, forty-six, started as an apprentice in 1758 and became master in 1778. He also stayed in Istanbul for four years and three months and worked under Le Roy. Peton, sixty-one, started as an apprentice in 1741 and became assistant master in 1762.[56] Gassin, sixty-five, started in 1733, became master in 1750, and worked in Istanbul for two years. He was regarded as incompetent and cantankerous. A. Olivier, fifty-five, began his career as an apprentice in 1744, became foreman in 1779 and stayed two years in Istanbul. H. Gasquet, forty-four, started, as an apprentice in 1753, became assistant foreman in 1777, and foreman in 1779. He returned to France in June 1787, by the order of Choiseul-Gouffier. A. Bonveau, forty-two, started out as an apprentice in 1755 and became assisstant foreman in 1777 and master in 1778. He stayed on in Istanbul on the order of the ambassador, while other workers and masters returned to France in 1788.[57]

Le Roy and his colleague Du Rest were among the first French workers employed at the Imperial Arsenal. Before starting his work, he examined the Arsenal and determined some needs and deficiencies. Seeing that there was no proper place dedicated to drawing, he tried to arrange a well-lit room for that purpose. The first project he prepared was to the plans and a model of a warship of seventy-four guns.

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[56] Kaçar, p. 88.

[57] Ibid., p. 88.

On the arrival of the French masters and workers, the construction of the ship was started. Despite some difficulties[58] with the personnel of the Arsenal and supply of timber for ships, he managed to build several large ships.

Le Roy is also known to have made models for two sloops, one for Kaptan Pasha and other for Kapudana, when a small ship was launched into the sea on 25 April 1785. These models were presented to the Porte by Gouffier. The total number of ships regardless of their types, and sizes that were constructed by Le Roy and his team between 1784 and 1788 is stated to have been 112. Among the ships constructed in the period in question was the galleon *Mukaddeme-i Nusret* (Beginning of Victory) of seventy-four guns; two frigates of twelve guns; four corvettes of fourteen guns (each gun of eight *parmaks* in diameter); a galleot of ten guns (eight *parmaks* in diameter) and two *mortoloz* (twelve *parmaks* in diameter); a *preme* carrying a mortoloz of twelve *parmaks* in diameter and ten guns (twelve *parmaks* in diameter); twelve bomb vessels (bombarde) of sixty-eigth *kadems* in length and carrying a gun of thirty-six, and a mortoloz of ten *parmaks* in diameter; forty-one bomb vessels (bombardes) of fifty-eight *kadems* in length, each carrying a single twenty-four-gun; and finally sixteen gunships (*top çeker*), fifty *kadems* in length and each carrying a single twenty four-gun on board.[59]

This team and the ones employed in the following years brought their own measures, tools such as plans and scetches. They paved the way for the mutual

[58] Le Roy is reported to have said in despair that every piece of wood and each pound of nails was an object of negotiations during his assignment in the Naval Arsenal. See Avigdor Levy, "Military Reform and the Problem of Centralization in the Ottoman Empire in the Eighteeth Century," *Middle Eastern Studies* 18 (1982), p. 236.

[59] Kaçar, p. 90.

interaction and cooperation between Ottoman and French technicians with respect to some measures of length.[60]

Due to the French-Ottoman tension in 1788-1789 Le Roy was called back to France, after five years[61] in Istanbul. Considering the French quest for Black Sea naval materials and the Ottomans' strict policy preventing it, some writers tend to explain his mission in the capacity of shipbuilder as a part of French plan to encourage and assure a vigorous illicit traffic in masts from the Black Sea under the noses of the Ottomans.[62] He is reported to have considered the shape of Turkish ships' bottoms to be the most perfect and to have assured Eton that he took Turkish vessels as his models for the bottoms.[63]

Little is known about Du Rest. He received a salary of one hundred *kuruş* for his service at the Naval Arsenal. He contracted plague and after long treatment in a hospital in Beyoğlu, passed away on 25 September 1787. Following his death, the French monarchy provided financial support to his family.[64]

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[60] Feza Günergun, "Osmanlı Ölçü ve Tartılarının Eski Fransız ve Metre Sistemlerindeki Eşdeğerleri: İlk Karşılaştırmalar ve Çevirme Cetvelleri," *Osmanlı Bilimi Araştırmaları II (Studies in Ottoman Science II)* (İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayını, 1998), p. 24.

[61] Kaçar says that he stayed in Istanbul six years. In the year 1792, he worked as an asssisstant in naval constructions in France. He was arrested during the French Revolution and later on commissioned to naval constructions in Toulon. He changed his name and adopted the name of Abouzir. In 1795 he became Chief Naval Commisseour in Havre and participated in Napoleon's campaign in Egypt in 1798. He was appointed as consul to Hamburg. In 1811 he went to Copenhagen to deal in the shipbuiding and timber tarde. Following his retirement, he passed away on 17 February 1825 in Paris. See Kaçar, p. 87.

[62] Bamford, p. 204.

[63] Nicholas Tracy (ed.), *The Naval Chronicle; The Contemporary Record of the Royal Navy at War*, vol. 2 (1799-1804) (London: Chatham Publishing, 1998), p. 306.

[64] Kaçar, pp. 87-88.

Toussaint Petit, like his associates Le Brun and Jean-Baptiste Benoit, was a naval architect in the second French mission. The new foundry machines were installed and put into operation under his direction and that of an unnamed German renegade.[65] During the French Napoleonic expedition to Egypt, he was imprisoned and replaced in Istanbul by English or Swedes.[66]

Alexis Guez was a master caulker and Louis Desulier was a drilling master in the same mission in 1784. During the French Napoleonic expedition to Egypt they too were imprisoned and their places in Istanbul filled by English and Swedes.[67]

Jacques-Balthasard Le Brun was the most influential French engineer to serve the Ottoman Empire during the reign of Selim III. Actually as the Ottoman documents show, the Porte determined candidates both at home and abroad. During that process, Le Brun emerged with his reputation at Toulon.[68] The Sultan issued an imperial edict to employ him in the construction of a 57.5 *zira* galleon.[69] On his arrival in Istanbul, Le Brun presented his official document (*kaime*) to the *Tersane-i Amire emini Rashid Efendi* and was employed in the Imperial Naval Arsenal in the capacity of shipbuilder, both in Istanbul and other places, because of his skills, experience, and superiority to his collegues.[70] The Imperial edict in question warned

[65] Shaw, "The Established Ottoman Army Corpses Under Selim," *Der Islam* 40 (1965) p. 171.

[66] Shaw, "Selim III and the Ottoman Navy," p. 222.

[67] Ibid., p. 222. See also Roche, p. 19; and Muller-Wiener, p. 82.

[68] FO 78/15 (1794).

[69] BOA. Hatt-ı Hümâyûn, no. 14666 (1205/1790-91).

[70] BOA. Hatt-ı Hümâyûn, no. 10588 (1205/1790-91).

the other officials not to fail to show their respect to him. He entered Ottoman service as a shipbuilding engineer in June 1793[71] with a fixed salary, and clothes and belongings, and food granted him. Meanwhile, a picture of a ship was sent to Le Brun and he was ordered to draw the ship in a bigger size while floating at sea and send to the Sultan the same picture.[72]

On Küçük Hüseyin Pasha's demand, his bother Polid Brun, also an engineer, was employed at the Arsenal in 1796 to help the in the naval works, after being tested with the construction of a corvette.[73]

During his employment at the naval arsenal, Le Brun, worked in a wide range of positions, as a shipwright, as a teacher of the science of shipbuilding in the *Hendesehane*, as a dock engineer as well as the introducer of new naval tools and equipment to the workers in the Arsenal. He is also known to have provided new measures and techniques to Ottoman as well as foreign ship builders working at other docks or naval ship building yards. One of his most important contributions was a new method of launching ships after their completion on the land up to their gunports and finishing the rest in the sea.[74] Thanks to his work, the number of shipyards increased so that they were able to construct nine large ships at the same time. Two

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[71] Roche, p. 19. See also Shaw, "Selim III and the Ottoman Navy," p. 222.

[72] BOA. Hatt-ı Hümâyûn, no. 14666 (1205/1790-91).

[73] Idris Bostan, "Osmanlı Bahriyesi'nin Modernleşmesinde Yabancı Uzmanların Rolü," *İstanbul Üniversitesi Edebiyat Fakültesi Tarih Dergisi-Prof. Dr. Hakkı Dursun Yıldız Hatıra Sayısı* (İstanbul, 1994), pp. 179-182.

Kemal Beydilli referring a document from Maliyeden Müdevver Defteri, no. 10426, p. 110, mentions a man named Monier and suggests that he was Le Brune's brother. He further argues that Le Brun and Monier started work in the capacity of shipbuilding engineers at salaries of 500 *kuruş*. See Beydilli, p. 8 and 9.

[74] This launching method will be discussed in detail in the chapter relating to technological novelties.

ship building stocks were built at Hasköy and Ayvansaray. In the western end of the Tersâne site, new stone stocks replaced the old wooden ones. Additionally, small hangars were constructed at the upper end of the Golden Horn for the relatively smaller units of the navy. The construction of two new cranes with arms was completed in 1795.[75]

The various kinds of ships completed by him or with his help show his influence in a more concrete manner. The *Arslân-ı Bahrî* (Lion of the Sea, a galleon of fifty-nine *zira*, seventy-six guns and crew) launched in 1209/1794-95, the *Selâbetnumâ* (the Showing Power, a corvette of thirty-three *zira*, twenty-six guns and one hundred and fifty crew) launched in 1210/1795-96, the *Selimiye*[76] (a galleon of forty-seven meters, one hundred and twenty-two guns and 1,200 crew) launched in 1796, the *Mesken-i Gazî* (the Residence of the Victorious Fighters for Islam, a frigate of fifty-three *zira*, fifty guns and 450 crew) launched in 1211/1796-97, the *Bâdi-i Nusret* (the Sailing Ship of Victory, a galleon of forty-seven meters/sixty-three *zira*, eighty-two guns and 900 crew) launched in 1797, and the *Tâvus-i Bahrî* (the Peacock of the Sea, a galleon of forty-seven meters/sixty-three *zira*, eighty-two guns and 900 crew) launched in 1798, and the *Bedr-i Zafer* (the Full Moon of Victory, a frigate of fifty-three *zira*, fifty guns, 450 crew) launched in 1214/1799-1800 were all built by Le Brun.[77] Built by Le Brun and Antoin or built by Antoin following Le Brun's

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[75] These cranes are reported to have built in the old fashion way with big pulleys. See Müller-Wiener, pp. 83-84.

[76] Some researchers give different names for its builder and different numbers for the guns on it. We will discuss this subject in the section dedicated to the ships below.

[77] Karal, pp. 206-209.

instructions[78] were the *Cengâver* (Fighter, a corvette of thirty-seven *zira*, twenty-six guns and two hundred crew) launched in 1212/1797-98, the *Şucâ-i Bahrî* (Courageous Man of Sea, a corvette of thirty-seven *zira*, twenty-six guns and two hundred crew) launched in 1212/1797-98,[79] the *Sâika-bâd* (Drive of Wind, a corvette of thirty-seven *zira*, twenty-six guns and 175 crew) launched in 1212/1797-98, and the *Âteşfeşân* (Sparking Fıre, a corvette of thirty-seven *zira*, twenty-six guns and 175 crew) launched in 1212/1797-98[80].

His herculean performance was widely praised by foreign statesmen as well as the Porte. In a letter to the Secretary of State by British ambassador to Istanbul, he was described, despite his short time of residence (not yet two years) as "the artist appearing not to have been employed in vain." From the same letter it is understood that he was expected to have laid the keel of a three-decker to be formed on the model of the *Royal Louis.*[81] Another document mentions the ceremony of launching a frigate to carry thirty eighteen-pounders on one deck, built after a French model by Le Brun and says that laying the keel of a eighty-four gun ship had been undertaken by a Venetian master-builder in this Arsenal, where another ship to carry seventy-four guns was already in construction.[82] Other documents show that Le Brun and his

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[78] Karal, p. 208.

[79] The *Şucâ-ı bahrî* was among the naval ships at the *Tersane-i Âmire* in 1810. It appears among the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810. See Bahri S. Noyan, "Eski Gemilerimizin İsimleri," *Hayat Tarih Mecmuası* 1, no. 1, year 14 (İstanbul: Kent Basımevi, 1978), p. 93.

[80] The date *22* December 1798 is given for the launching *of* the *Sâika-i bâd* and the *Âteşfeşân.* See Işın, p. 154.

[81] FO 78/15, no. 31, pp. 338-346 (25 December 1794).

[82] FO 78/15, no. 4, p. 29 (25 February 1794).

entourage complained about the poor performance and low levels of self-sacrifice of the other French missions working in other dockyards who had higher salaries. They claimed that they deserved higher salaries than the others and demanded additional payment from the Porte in return for their efforts.[83]

Le Brun is known to have worked in casting copper nails on new models together with Dimitri[84] and in sheathing ships with copper[85] in the year 1210/1795-96. On demand, he taught the science of shipbuilding at the *Hendesehane* in 1211/1796-97.[86]

As for his activities at the *Tersâne Mühendishânesi* or *Hendesehâne*, Le Brun made some proposals to the Porte in order to improve the state of the Ottoman navy and naval education. His recommendations were added to the Küçük Hüseyin Pasha *Layihası* (report). To mention some of his proposals, he first drew attention to the need for a drilling house (*talimhâne*) that would serve as a training facility. Classes would be held every day, excluding Fridays and Sundays. Training would be held in three courses: mathematics and geometry (*ilm-i rakam ve ilm-i hendese*), drawings and the descriptions of ships (*resim ve gemilerin tasvîrâtı*) and the application of the theoretical courses at the shipbuilding sites. The course materials of the students would be provided by the state and delivered by Le Brun, who would submit regular reports to the naval authorities on the conditions, skills, merits and

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[83] Bostan, "Osmanlı Bahriyesi'nin Modernleşmesinde Yabancı Uzmanların Rolü", p. 180.

[84] BOA. Cevdet-Bahriye, no. 4436.

[85] BOA. Cevdet-Bahriye, no. 4437.

[86] BOA. Cevdet-Bahriye, no. 5849.

capacities of the students. The aim of the education would be to train local ship builders and architects in order to overcome the need for foreign experts. Students would be educated to the extent that would be able to draw plans, design and construct ships in compliance with geometrical calculations both at the Naval Arsenal and at other sites. Students would be given a certain amount of salary according to their success.

Le Brun's recommendations and remarks were accepted by the state and he was given full authority to implement them.[87] He, together with Honoré Benoit, remained in the service of the Ottoman navy even during the Napoleonic expedition to Egypt, when all the other French technicians in the Ottoman service were imprisoned and replaced by Englishmen and Swedes, thanks to their successful performance in creating a modern naval establishment and training a number of highly skilled naval architects to take over their work.[88] Küçük Hüseyin Pasha is said to have met with the Grand Vizier and they decided to keep him and his team in the Ottoman service.[89]

Le Brun is also known to have been commissioned by imperial edict to build ships in the countryside regions and adjust the *endâze* (measuring device) to measure and draw the pictures of the aforementioned ships in 1214/1799-1800. When his translator was asked to inform him of this imperial edict, his translator said that Le Brun entrusted his daughters to the Russian embassy in Istanbul, packed his personal belongings and left Istanbul on board a Russian ship to serve Russia. He left

[87] For the details of Le Brun's proposals, see Kaçar, "Osmanlı Devleti'nde Bilim ve Eğitim Anlayışındaki Değişmeler ve Mühendishânelerin Kuruluşu," pp. 118-120.

[88] Shaw, "Selim III and the Ottoman Navy," pp. 222-223.

[89] Kaçar, p. 122.

a note advising the Porte to commission Benoit in his place for the service in question. The Ottoman government, angry with both Le Brun and the Russian government, criticized Le Brun, saying that he had been in the Ottoman service for six to seven years, paid, and treated very well. They accused the admirals of the Russian ships, and Amiral Uchakov in particular, of running between the Black Sea and the Mediterranean Sea trying to entice into Russian service the skilled foreign personnel in Istanbul irrespective of any permission from the Porte. The Ottoman government demanded the Russian embassy respect the mutual treaty of friendship in order to avoid insurmountable consequences.

The Porte, aware of the lack of skilled engineers capable of replacing Le Brun, and that Benoit had been Le Brun's right-hand man, decided to take the necessary measures to prevent Benoit from being hired away by Russia. His salary was increased and Le Brun's former salary was added to it.[90] The course that Le Brun had taught on the science of shipbuilding at the *Hendesehane* was taken over by Benoit.[91] This sequence of events can be followed in the reports of the British Foreign Office as well. A "most secret" document, dated 17 February 1800 and written to the Secretary of State by the British ambassador, the Earl of Elgin at Istanbul, states that the ship-builder Le Brun, whose works had been most beneficial in the Arsenal, had been enticed away the previous Autumn, and openly received in Russia and that this had caused continuous disappointments in all commissions for

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[90] BOA. Hatt-ı Hümâyûn, no. 4503 (1214/1799-1800). Regarding Le Brun's escape, *Abdülkadir Paşa Layihası* says that he escaped to his country, without mentioning Russia, during the military campaign following the Porte's declaration of war against France in the face of Napoleon's attack on Egypt and Benoit replaced him. See Uzunçarşılı, *Merkez-Bahriye*, pp. 537-539.

[91] BOA. Hatt-ı Hümâyûn, no. 2495.

naval materials from Russia, so much so as to have obliged the government to give up any further attempts to procure them from that country.[92]

It is puzzling that an Ottoman document dated 1218/1803-4 indicates that Le Brun was still in the Ottoman service, both as a ship builder in the Arsenal and a teacher of the science of ship building in the Hendesehane.[93]

Jean-Baptiste Benoit and his son, Honoré Benoit, entered Ottoman service as a part of the second French mission. Senior Benoit was, like his associates Le Brun and Toussaint Petit, a naval architect.[94] Following the uproar over Le Brun's departure from Istanbul, the Porte took care to prevent Benoit from leaving for Russia as well. His salary was increased and Le Brun's former salary was added to it.[95] A document dated 1214/1799-1800 shows Benoit received 2,910 *kuruş* for his service of three months and seven days.[96] On 5 Cemâziyelâhir 1215/24 October 1800, his salary, together with that of his translator, was 2,460 *kurush.* This amount was decided to be given from the *Irad-i Cedid Treasury* (New Treasury for New Order) and the *Seferiyye akcesi* (Temporary Treasury for Wartime Expenses).[97] Among his permenant team was his son Honoré Benoit, Kiryas (a caulker), Petri (a sail maker), Alexander (a translator) and Adriya (later on Andon/Antoine, an

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[92] FO 78/28 (Constantinople, 17 February 1800, pp. 151-152).

[93] BOA. Cevdet-Bahriye, no. 2260.

[94] Muller-Wiener, p. 82.

[95] BOA. Hatt-ı Hümâyûn, no. 4503 (1214/1799-1800).

[96] BOA. Cevdet-Bahriye, no. 1214.

[97] BOA. Cevdet-Bahriye, no. 12281.

architect). It seems that 150 *kuruş* for his son, 150 *kuruş* for Kiryas, 140 *kuruş* for Petri, 100 *kuruş* for the translator, and 150 *kuruş* for the architect were allotted.[98] Benoit took over the course Le Brun had taught on the science of ship building in the Hendesehanet.[99]

A foreigner named Casey[100]was employed as an ironsmith at a monthly salary of 125 *kuruş,* starting from the month of Şa`bân 1212/1797-98, casting cannons to be mounted on galleons as well as in manufacturing iron parts for the gunstocks to be used on the galleons of one and three deckers and some other ships. He had been employed earlier at 250 *kuruş* in Istanbul along with twenty-five other Frenchmen, receiving 4,000 *kuruş* per month. When he went on leave, another worker was appointed to his post. Then he began to work at the *Tersâne-i Âmire* without a monthly salary until he was re-appointed to the above-mentioned job at 125 *kuruş* in 1212/1797-98.[101] Due to the poor quality of the previous Ottoman cannons, he gained considerable reputation for casting cannons.[102]

The third French mission to the Ottoman Empire was composed of the engineer Pierre Ferregeau and four other persons. For the construction of a new dry-dock the Ottomans had wanted to employ the French engineer Antoine Groignard, who had constructed the drydock at Toulon between 1774 and 1778.[103] At the end of

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[98] Bostan, "Osmanlı Bahriyesi'nin Modernleşmesinde Yabancı Uzmanların Rolü," p. 182.

[99] BOA. Hatt-ı Hümâyûn, no. 2495.

[100] It appears as *Kisi* and *Keysi* in Ottoman documents referred in the footnotes, 101 and 102.

[101] BOA. Cevdet-Bahriye, no. 9418 (3 Safer 1212/28 July 1797).

[102] BOA. Cevdet-Bahriye, no. 2808, 8714. See also Bostan, p. 182.

[103] Daumas and Gille, pp. 281-282.

1795, the Ottoman government communicated this to the revolutionary French government via French consul J. B. Barthélemy. The French government sent instead of Groignard, who was quite old, the younger Ferregeau, who had been successful in the extension works of the harbour of Cherbourg and in underwater constructions. Ferregeau, unlike A. L. Barabé and A. I. Castellan in the same mission, stayed in Istanbul for nearly three years, preparing plans regarding the defense of the Bosphorous. In May 1798, he returned to Paris together with G. A. Oliver.[104]

A British document dated 15 June 1797 on the French mission says that arrivals from French by land and by sea gradually formed an aggregate of more than three hundred persons. Among those of particularly notice was a hydraulic engineer of some eminence, named Ferregeau. The same document notes that Ferregeau became popular in Istanbul with his assistance in the construction of a basin and docks for shipping upon a plan similar to those at Toulon.[105] From the same document we also understand that the Porte preferred the project of a Swedish engineer named Rodée to that of Ferregeau.[106]

In addition to the above-mentioned information, an Ottoman document dated Rebiulevvel 1211/October 1796 says that Kapudan Pasha wrote a letter to the French government asking them to send the dock engineer Groignard to build a dry dock at the Imperial Naval Arsenal. But the French government stated that they did not know where he was. Then the Porte asked through a French trader to employ his

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[104] Müller-Wiener, p. 82.

[105] FO 78/18, no. 14, pp. 153-154 (15 June 1797). See also Max Roche, p. 17.

[106] FO 78/ 18, no. 14, p. 155 (15 June 1797).

assistant and learned that he was in Italy. The French trader recommended Groignard's son, Dushan Dumat,[107]instead of his father saying that he was more skilled and knowledgeable than his father. Dushan Dumat came to Istanbul and waited in the trader's house for the final decision of the Porte. Meanwhile the Porte started an enquiry and asked for information about Dushan Dumat from the French engineer Le Brun who confirmed that he was more skilful in dock construction than his father and they decided to employ him. He was paid monthly 500 *kuruş,* like the Swedish engineer employed in the construction of the dock.[108] From another document it is learned that Dushan Dumat, after the Swedish mission's employment in the construction of the dry dock, was commissioned in March 1797 with the deepening works of the port of Rhodes. When his work turned out to be fruitless in Rhodes he was recalled to Istanbul.[109]

Other members of the third French mission were the engineers the geo-desy expert A. L. Barabé and the draftsman A. l. Castellan.[110] They returned to France in June after learning that the construction of the dry dock had been awarded to the Swedish engineers.[111]

A document dated 11 Cemaziye'l-âhir 211/12 December 1796 reveals that although a French bore specialist (oymacı) named Joseph Benoit had been working at the *Tersâne-i Âmire* for three months, he had not been paid his agreed salary of

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[107]No original French version of his name is available. Our best given is Toissaint Dument.

[108] BOA. Cevdet-Hariciye, no. 4411.

[109] Bostan, "Osmanlı Bahriyesi'nin Modernleşmesinde Yabancı Uzmanların Rolü", p. 185.

[110] Müller-Wiener, *Bizans'tan Osmanlı'ya İstanbul Limanı*, p. 82.

[111] Ibid., p. 82.

125 *kuruş* and was owed 375 *kuruş*. The amount in question was demanded from the authorities.[112]

A document dated 1211/1797 states that Marko Vasalu and his four sons, Sharlo, Antuvan, Petro, and Nikola, had been working in the field of *makaracılık* (block making) at the *Tersâne-i Âmire* for more tha a month and had not been paid yet. 125 *kuruş* for Marko Vasalu and thirty *kuruş* each for his sons per month, amounting to 245 in total, were demanded starting from the beginning of the month of *Cemâziye'l evvel* (May).[113]

French Brul[114] was employed as a surgeon (*cerrah*) in the galleons of the imperial navy at five *kuruş* a day. He demanded payment of his salary (150 *kuruş*) for services rendered between Zilkade 1208/May-June 1794 with a petition dated 3 Zilhicce 1208/2 July 1794. The authorities met this demand.[115] Three years later, a petition dated on 12 Zilka`de 1211/May 1797 recorded that Brul had continued at his post with the same amount of salary. He again requested that the authorities pay his money of the month of *Şevval* (October).[116]

One Paralé is mentioned in Shaw to have been a French officer employed to supplement the regular Ottoman staff of the naval school as a teacher of cartography

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[112] BOA. Cevdet-Bahriye, no. 1033.

[113] BOA. Cevdet-Bahriye, no. 1033. These names are read differently by Beydilli, using Maliyeden Müdevver Defteri, no. 10421 (13 Şa'bân 1211/11 February 1797). *Sharlo* appears as *Salolu*; *Antuvan* as *Anton*; *Petro* as *Peter*. This kind of difference in spelling is a typical problem of writing foreign words in Ottoman Turkish. Writers sometimes spell the same name differently even on the same page. See Beydilli, *Türk Bilim ve Matbaacılık Tarihinde Mühendishane, Mühendishane Matbaası ve Kütüphanesi 1776-1826*, p. 90.

[114] This is the Ottoman spelling of the name in the document.

[115] BOA. Cevdet-Sıhhiye, no. 1355.

[116] BOA. Cevdet-Bahriye, no. 1129.

(*fenn-i harita*), geography (*coğrafya*), and navigation (*seyr-i süfun*) before 1798.[117] He worked there as an assistant to Seyyid Osman Efendi until he returned to his county.[118] He was employed especially in teaching the practical side of cartography while Le Brun taught the theory.[119] He had worked in the service of the Ottoman navy as a pilot (*kılavuz*) before his employment in the naval school. He was not paid a new salary for his services in the naval school, since he already had a salary from the Ottoman navy.[120] As is understood from an undated report (*lâyiha*) by Abdülkadir Pasha, a naval captain of Selim III's period, about the Naval Engineering School (*Bahriye Mühendishânesi*), Paralé was fired from his post at the *Tersâne-i Âmire* during the naval campaign against France. [121]

A man named Penyola was a French engineer. A document of 1214/1799-1800 mentions his name among those to be commissioned for the construction of a galleon at Gemlik. He was paid 200 *kuruş* as travel allowance. Emenili Enegli is referred to as an architect who received 100 *kuruş* in return for his services in the construction of the same galleon. A translator and an auger expert (*burgucu*) paid

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[117] Stanford J. Shaw, "Selim III and the Ottoman Navy," pp. 228-29.

[118] Kemal Beydilli, "İlk Mühendislerimizden Seyyid Mustafa ve Nizâm-ı Cedîd'e Dair Risalesi," *Tarih Enstitüsü Dergisi* 13 (İstanbul, 1987), p. 402.

[119] See Küçük Hüseyin Paşa Layihası (5 Şa'bân 1211/ 3 February 1797) in Mustafa Kaçar, "Osmanlı İmparatorluğu'nda Askeri Teknik Eğitimde Modernleşme Çalışmaları ve Mühendishanelerin Kuruluşu (1808'e Kadar)", p. 131. See also Tezel, p. 351.

[120] " *Françalu mühendislerinden dahi geçen sene (1796) tedarik olunup donanmâ-yı hümâyunda kılavuzlukta ve bazı hademe-i donanmaya fenn-i haritanın amelîsini icra ve tefhim hizmetinde istihdam olunan Parale nam Françalunun...elhâletu hâzihi canib-i miriden mahiye-i muayyene ile müstahdem olduğundan bu husus içün mahiye iktiza etmeyip...* " Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 508; Hayati Tezel, p. 535.

[121] "*Elyevm mûmâileyh ameliyyatına mukaddemâ muallim tayin olunmuş olan mersûm Parale nâm mühendis, Françelu aleyhine sefer-i hümâyun esnasında Tersâne-i Âmireden defolunmuş olduğundan ...* " See Uzunçarşılı, *Merkez-Bahriye*,p. 538.

fifty *kuruş* each, together with a mountain architect (*dağ mimarı*), paid 100 *kuruş*, accompanied them.[122]

A Frenchman named Rikali was employed as a pilot (*kılavuz*) at a salary of 150-*kuruş* in the time of the late Kapudân-ı Deryâ Hüseyin Pasha. He was promoted to the post of chief pilot (*kılavuz başı*), for his skill and the need for him at the *Tersâne-i Âmire* in the time of Kapudân-ı Deryâ Abdülkâdir Pasha. Records show that the 150 *kuruş* salary of one Lakos, who worked as an assistant engineer to Rhode in the construction of the big drydock at the *Tersâne-i Âmire,* was cut off because of his incompetence. This money, with a twenty-five *kuruş* deduction, was given to Rikali on 23 Zilka`de 1218/5 March 1804.[123]

In a document dated Rebiulahir 1222/May-June 1807 one Petro is mentioned as a French whetstone master (*bileğici*) with his guide (*kılavuz*), Igar. They are said to have received monthly 180 and 125 *kuruş*, respectively. Their salaries were provided by the *Tersâne-i Mamure Sergisi* (accounting department of the Arsenal).[124] It is not known if this Petro was the same as *ayakmimarı* (base architect)-carpenter Petro, who worked with Manol Kalfa on 11 Cemâziye'l-âhir 1216/19 October 1801 in the construction of the drydock in the Imperial Naval Arsenal[125] and on a three-decker[126] as well as in the repair of galleons and the gate of the drydock in 1217/1802-03.[127]

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[122] BOA. Cevdet-Bahriye, no. 7472.

[123] BOA. Cevdet-Bahriye, no. 5264.

[124] BOA. Cevdet-Bahriye, no. 7753.

[125] BOA. Cevdet-Bahriye, no. 8389.

[126] BOA. Cevdet-Bahriye, no. 9269.

A man whose name is recorded as Romus was a French engineer sent to Rhodes, together with Trandafil Kalfa, to work on the deepening of the harbor in 1212/1797-98. However, he was not employed there for a long time, since he was considered to be incompetent, and was recalled to the Arsenal. He received 500 *kuruş* for his service from the beginning of the month of Şevval 1211/January 1797.[128]

Tortil was the name of a Frenchman who worked as an architect in repairing and adjusting some parts of a galleon that was completed in Bodrum and launched on 12 Safer 1211/17 August 1796. He received 200 *kuruş* while Nikola, his translator, was paid and 180 *kuruş* and a messenger (*tatar*) accompanying them, 100 *kuruş*.[129]

François Kauffer was an architect originally from Ponts et Chauffées de Lorraine in France who worked for M. de Choiseul. When de Choiseul left Istanbul, Kauffer entered into the pay of the Porte.[130] He worked as a draftsman (*teknik ressam*) and engineer until he was removed from his post and payment of his salary was stopped in June 1800. As a royalist, he did not want to return to his country France and therefore, took refuge in the Ottoman Empire. The Porte decided to keep him under service with a monthly salary of 300 *kuruş* to employ him, when needed,

[127] BOA. Cevdet-Bahriye, no. 1250.

[128] BOA. Cevdet-Bahriye, no. 12232.

[129] BOA. Cevdet-Bahriye, no. 12383.

[130] PRO, FO 78/15, p. 341.

in drawing maps, pictures, and so on.[131] He is also known to have drawn the picture of the *Mühendishâne* in 1776[132] and prepared a project for new granaries for the provision of Istanbul, winning the commission from Selim III.[133] He died of a pulmonary disease in 1802, working on plans of the Bosphorus.

These plans are the most important documents describing settlement in Istanbul and along the Bosphorus at the beginning of the nineteenth century. Kauffer applied a method known as triangulation in city planning. During his work, Kauffer used astronomer Tondu's calculations and the French engineer Le Chevalier helped him as well. One of his Istanbul maps covers the Bosphorus up to the line of Suriçi, Pera, the Golden Horn, Ortaköy-Çengelköy, and the Anatolian side up to Fenerbahçe and Çamlıca. His other map includes the Black Sea between Riva and Kilyos, and the Anatolian side up to Alemdağ and Pendik; and the line of Bakırköy, Davutpaşa and Cebeciköy on the Anatolian side. A copy of his plans was sent to Choiseul-Gouffier and the other copy kept in Istanbul. These plans were published in 1819, together with Barbié du Bocage's additions, in Melling's *Voyages Pittoresque de Constantinople et du Rives du Bosphore* (Travel Pictures of Constantinople and Bosphorus Strait).[134]

The engineer Antoine and general Le Baron de Juchereau de St. Denys

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[131] Beydilli, *Türk Bilim ve Matbaacılık Tarihinde Mühendishane,* p. 88.

[132] Kaçar, "Osmanlı İmparatorluğu'nda Askeri Teknik Eğitimde Modernleşme Çalışmaları ve Mühendishanelerin Kuruluşu (1808'e Kadar)", p. 107.

[133] Doğan Kuban, "Kauffer François," *Dünden Bugüne İstanbul Ansiklopedisi,* vol. 4 (İstanbul: Türkiye Ekonomik ve Sosyal Tarih Vakfı,1994), pp. 492-493. For more information about his life and work in Istanbul during the time of Selim III, see Frédéric Hitzèl, "François Kauffer (1751- 1801): Ingénieur-cartogaphe Français au service de Selim III," in *Science in Islamic Civilisation* (İstanbul: IRCICA, 2000), pp. 233-241.

[134] Kuban, pp. 492-493.

entered the service of the Porte in 1807. De Juchereau was commissioned by a decree of Selim III to prepare a report about the fortification of the Dardanelles at the beginning of 1807. In the report, he pointed out that the passage of an enemy fleet sailing under a fair wind through the Dardanelles could not be prevented due to the absence of strong forts and fortifications. As a precaution, he suggested that such places as Kilidbahir, Kal'a-i Sultaniye, and Naraburnu were the most strategically important spots along the straits and that the construction of strong forts, the digging of fortifications and placement of many guns were needed there. Furthermore, he recommended that a fleet composed of twelve ships should take up a position behind Naraburnu.[135]

The Swedish Mission

The employment of Swedish technicians and officers dates back to 1787, to the wars between the Russia, Austria and the Ottoman Empire. In the wake of these wars, the resulting treaty of alliance between Sweden and the Ottomans on 11 July 1789/15 Cemâziye'l-evvel 1203 paved the way for strengthening of the technical solidarity that had already existed to some extent. The Porte, as a part of its modernisation movement, was in want of technical staff to be employed in the shipbuilding works. Reisulkuttab Rashid Efendi, on orders by the Sultan, had already begun a search for ship building architects and engineers through the ambassadors of the European states in Istanbul. The translator of the Swedish ambassador in Istanbul, Ignatius Mouradgea D'Ohsson, not only played an active role in providing Swedish engineers, shipbuilding architects, gun casting experts, infantry officers and

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[135] Enver Ziya Karal, *Selim III'ün Hatt-ı Hümayunları* (Ankara: TTK, 1999), p. 98.

tacticians to serve in the Ottoman lands, but also he wrote some reports to the Porte about the *Nizam-i Cedid* (the New Order) and the modernisation of the Ottoman military power.[136]

Mr. Rosenblad and Mr. Ranchot, two Swedish engineers, were sent in the spring of 1790 by the Swedish government to serve under the Vizier, and returned to their countries on 25 October. A British document described this incidence: "they returned in consequence of the bad human testified by the Turks at the unexpected defection of Sweden. It is said these gentlemen, for their greater security on the road, travelled under disguised as Prussian officers.[137]" It is understood that beside these engineers, the Porte for some reason or other also refused some other engineers.[138] There were only three Swedish engineers, who had been working there since September 1790, in Istanbul on 10 November 1791.[139] They too returned to their country by sail in December 1791 after the new minister from Sweden, Mr. De Asp, had an audience with the Sultan.[140]

Following the unsuccessful relations described above, the most significant Swedish mission, consisting of ten people, came to Istanbul through the mediation of

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136 Kemal Beydilli, "Ignatius Mouradgea D'Ohsson (Muradcan Tosunyan)," *İstanbul Üniversitesi Edebiyat Fakültesi Tarih Dergisi* 34 (İstanbul 1983-84), pp. 263-265. For a different assessment of D'Ohson see also Carter V. Findley, "Mouradgea D'Ohson (1740-1807): Liminality and Cosmopolitanism in the Author of the Tableau Général de L'empire Ottoman," *The Turkish Studies Association Bulletin* 22, no. 1 (Spring 1998), pp. 21-35.

137 PRO. FO 78/11, (31 October 1790), p. 281.

138 PRO. FO 78/11, (20 November 1790), p. 299.

139 PRO. FO 78/11, (10 November 1791), p. 177.

140 PRO. FO 78/12A, (21 December 1791), p. 203.

Muradca, their translator, on 7 June 1795.[141] Among them were A. E. Rhodé, Fredrick Ludwig Af Klintberg, Kihlberg, Schantz, Mihrhen, Weidenhelm, Hörling, Malmen, Carlstrand, Hallen, Lijorgen, Löngren, and Elmström.[142] These figures, together with others who arrived later, played considerable roles, specifically in the construction of the drydock and some ships in the naval arsenal. After completing their work, most of them returned to Sweden.

The Swedish engineer-officer A. E. Rhodé received his education in Kariskorona under the supervision of Daniel af Thunberg, who was an expert in underwater construction,[143] and worked on several underwater projects at Carlscrona, a naval base in Sweden.[144] The Ottoman government found the drydock construction project of the Swedish mission to be more feasible and economical than that of the French. In other words, Rodé's project was preferred to that of Ferregeau.[145] The construction of the drydock, started in February 1797, was completed in May 1800. Within this period, new Swedish experts were employed in the project, among which the engineer Lakos was one. He became Rhodé's assistant.[146]

After the completion of the dry-dock, some of the Swedish mission returned home on their own demand and two thousand *kuruş* was given to each to cover travel

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141 It is understood that on 22 Zilhicce 1209/10 July 1795, Swede mission began to be paid a regular salary. See BOA. Cevdet-Bahriye no. 1209.

142 Bostan, "Osmanlı Bahriyesi'nin Modernleşmesinde Yabancı Uzmanların Rolü," p. 183.

143 Müller-Wiener, p. 82.

144 İsmail Hakkı Aksoy, "İstanbul'da Tarihi Yapılarda Uygulanan Temel Sistemleri," p. 72.

145 FO 78/18, no.14, (15 June 1797), p. 155.

146 Bostan, "Osmanlı Bahriyesi'nin Modernleşmesinde Yabancı Uzmanların Rolü," p. 183. But Weiner gives the date 1793 for the arrival of Rhodé to Turkey. Müller-Wiener, p. 82.

After the completion of the dry-dock, some of the Swedish mission returned home on their own demand and two thousand *kuruş* was given to each to cover travel expense. Rhodé, after completing his work stayed in Pera, where he shared his house with six people and paid 58 *kuruş* for his share. The total money for the rent was 350 *kuruş*, which was expensive for 10 Şevval 1208/11May 1794.[147] He was still at charge in 1806 and died in Istanbul in 1811.[148]

Rhode is said to have built nine shipbuilding platforms (*gemi inşa tezgahı*).[149] He is also known to have built 102 wooden workbenches (*destgâh*), a wooden wheel with clamp, and some small tools in 1210/1795-96[150] as well as some iron tools, equipment and models during his service.[151] Among them was an underwater glass (*sualtı dürbünü*) used for observing construction carried out below the surface of the water.[152] He was commissioned to construct a workshop to produce nails in Şa`bân 1220/October-November 1805-06. He and his translator were given a monthly salary of 750 *kuruş*.[153]

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[147] Beydilli, *Türk Bilim ve Matbaacılık Tarihinde Mühendishane,* p. 91.

[148] Bostan, p. 183.

[149] Gencer, *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezareti'nin Kuruluşu (1789-1867)*, p. 49.

[150] BOA. Cevdet-Bahriye, no. 9981.

[151] BOA. Cevdet-Bahriye, no. 10103.

[152] Aksoy, *İstanbul'da Tarihi Yapılarda Uygulanan Temel Sistemleri*, p. 15.

[153] BOA. Cevdet-Bahriye, no. 12603.

Rhodes; the *Meserret-i Bahir* (Joy of the Sea) a corvette, of thirty-three *zira*, covered with copper, carrying twenty-two guns and 150 crew, and built in1214/1799-1800 in Rhodes.[160] It is written that a Logarini worked as his assistant in the construction of the *Kaplan-i Bahri* in Rhodes. It was decided that he be paid 2,600 *kuruş* from the *Sihâm akçesi* of the *Irâd-ı Cedîd* Treasury for the months of Zilkade, Zilhicce, Muharrem and Safer of 1214/1799-1800. It was decided that his salary of the month of Şevval, 660 *kuruş* that had formerly been transferred to the Furtuna Kapudan, be given by the Furtuna Kapudan to Klintberg.[161] He is also known to have built a three-decker ship in the drydock with the assistance of the Genoise ironsmith Yakomi. In a petition, Klintberg demanded the Porte pay his assistant's three-months unpaid salary, adding up to 240 *kuruş*.[162]

Malmen, Carlstrand and Hallen are mentioned as having been among the members of the Swedish mission under the direction of Rhode on 7 June 1795.[163] They were employed in the construction of the drydock at the Imperial Naval Arsenal. Carlstrand's speciality is unknown, but it is known that Hallen was a draftsman. Tezel says that he was the designer of the big drydock.[164] Malmen appears to have been a *gemi topçusu* (naval gunner).[165] We know also that these three

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[160] Karal, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar," p. 209.

[161] BOA. Cevdet-Bahriye, no. 1408 (28 Safer 1215/21 July 1800).

[162] BOA. Cevdet-Bahriye, no. 1638.

[163] Bostan, "Osmanlı Bahriyesi'nin Modernleşmesinde Yabancı Uzmanların Rolü," p. 183.

[164] Tezel, p. 656.

[165] BOA. Cevdet-Bahriye, no. 1204.

figures, together with Rhode and their interpreter demanded from the Porte their total salary of 1,560 *kuruş* for the month of Ramazan in 1212/1797-98.[166]

Little is known of the lives of Shantz, Weidenheim, Minthen, Elmström, Löngren, Leon, and Bragran. They were part of the Swedish mission led by Rhode and were employed in various areas. Accordingly, Shantz, Weidenheim and Minthen were naval officers (*deryâ oficyali*) with monthly salaries of 350 *kuruş* each. Elmström, Löngren, Leon and Bragran were pulley/block master (*makaracı*), woodworker (*doğramacı*), ironsmith (*âhenger*) and stonecutter (*taşçı*), respectively. They received 160 *kuruş* per month.[167]

The British Mission

The Napoleonic expedition to Egypt not only marked the end of the French missions to a great extent, irrespective of some exceptional cases such as Le Brun, but it also paved the way for the employment of the British missions in Istanbul as a natural consequence of the war waged by both the Ottoman Empire and its ally, Great Britain, against their common enemy, France. Before taking up the British mission commissioned to Istanbul, a brief look at some preceeding examples concerning Turkish-British relations in terms of the exchange of technicians and officers having direct or indirect relations with naval affairs is given here.

The relationship between the two states went back to earlier centuries. To start with a relatively later period, we can talk about the adventure of an Englisman

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[166] BOA. Cevdet-Bahriye, no. 2463.

[167] BOA. Cevdet-Bahriye, no. 1204. (Cemâziye'l âhir 1209/December-January 1794-95).

reported by Robert Ainslie to the Marquis of Carmarthen on 25 June 1787. Ainslie stated that the dragoman of the Porte had applied to Mr. Pisani for information about an English engineer who was expected from Germany by way of Belgrade. He was told that they had heard nothing respecting this person; from which circumstance, Mr. Pisani concluded, it must have been by mistake that the announced officer was supposed to be an Englishman. Nothwitstanding this explanation, he, the following day, received a message from the Vizier requesting to see the newly arrived English officer, only to ask him some questions. It became necessary to clear up the matter. Accordingly, Ainslie commissioned Mr. Crutta to assure the Vizier that the person in question, his connections, and his business, were altogether unknown to him; that no Frank officer was lately arrived by the route of Belgrade; but that the Vizier might depend upon receiving the earliest intelligence, if any such man made his appearance.

This affair piqued Ainslie's curiosity. He soon discovered that with the German mail, two letters had been directed to Captain Hopson, more specifically, "*Monsieur Hopson Hamilton Capitaine d'Infantterie au Service de la Majeste Britannique a Istanbul* (infantry captain in the service of the King of Britain in Istanbul.)" When Ainslie met Hopson, he asked if he knew Captain Hamilton of infantry for whom he had a letter. Ainslie said that following the question, the man appeared to be embarrassed, said the letter must be for himself and explained that he sometimes used his mother's name. After some further conversation, Ainslie told the man to call on him the next morning for his letters.

Ainslie was then informed that the person in question had arrived from Belgrade, and that he had waited on General Mustapha. Finally Ainslie found the gentleman. This man spoke broken English, French well but with a foreign accent, Italian to perfection, Latin fluently, and called himself Captain Hopson of the artillery, grand-son to the administrator and son of the late Captain Hopson of the Royal Navy. Ainslie said Hopson has all the appearance of a Venetian adventurer. Hopson had been brought up and educated in France and Italy. Seeing that the Ottoman Empire was threatened with war, he had determined to offer his services to the Sultan, in consequence of which he had embarked at Ancona for Ragusa, and proceeded for Bosnia, with the intention to travel to Istanbul. He had proceeded to Istanbul at the expense of the pasha of Belgrade, in hopes of an important employment by the Porte. After giving this short account, Ainslie concluded that the person in question was to sail in a few days for Leghorn.[168] It is unknown in what capacity the Englishman served exactly; it is supposed he served as an artilleryman.

The first document referring to a naval technology transfer is dated 1203/1788, just before Selim III's ascendence to the throne. This document inquires about the case of an English galleon builder who was said to have been sent by the English government to Istanbul as a result of an earlier agreement. An archival document states that the English ambassador was asked about the case, upon which he wrote to England to learn the situation. But the Ottoman government was unable to receive an answer and believed that the Spanish-English war was the reason for this delay. Meanwhile, the Porte requested two *top ve humbara dokumcu ustasi* (cannon and shell founders) from England. The English ambassador at Istanbul, while waiting for the answer from his own country and carrying out the correspondance, recommended that the Ottoman government send some skilled workers to England to observe and learn the work and the art of the masters. He estimated that they would learn the arts in question in five to six months. He also

[168] PRO. FO 78/8, p. 105.

stated that he could write about this offer to England in case the Porte agrees. The Porte, not refusing the suggestion, went on asking about the promised galleon builders.[169] The results of the correspondance are unknown, but it seems that both parties were positive about military cooperation.

A letter on 22 February 1793 from Robert Ainslie, the British Ambassador to Istanbul notes that he was introduced to the Captain Pasha and requested to inspect the arsenal and point out defects and remedies. He also says that the Porte sought to establish a permanent plan and was ready to offer encouragement, being aware of their vulnerable position.[170]

It is also known that on the recommendation of the famous British admiral, Lord Nelson, a cannon engineer with drawing skills called Joshua was employed in the *Mühendishâne-i Hümâyûn* at a salary of 400 *kuruş* a month and his translator at 50 *kuruş*.[171]

An Ottoman document of 1209/1794-95 states that the construction of a new frigate of 45.5 *zira* had been decided. For this frigate, Muradca, Swedish translator to Istanbul, set out from Bec together with two British officers. One of them was an expert in naval affairs and the other on land military. Muradca, when asked by the Ottomans, mentioned that the naval officer was an expert in both shipbuilding (*inşâ-i sefâin*) and ship manufacturing (*imâl-i sefâin*). For a test to learn his capacity and skill, he was asked to draw a picture of a model ship. He did well and was complimented by the experts. For the service of the navy built on the coast

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[169] BOA. Hatt-ı Hümâyûn, no. 9080 (1203).

[170] PRO. FO 78/14, p. 24 (by Robert Ainslie, Constantinople 22 February 1793).

[171] Uzunçarşılı spells the name of the engineer as "Joshru." See, Uzunçarşılı, *Merkez-Bahriye*, pp. 583-584.

of Tuna during the campaign, two other Englishmen who were skilled at geometry (*fenn-i hendese*) and construction travelled to Istanbul on demand. After recovering from a disease, one of them also was asked to draw a picture of a ship and his ship model was also complimented. They were employed.[172]

Thanks to British documents there is ample information about the British military mission that worked in connection with and in the service of the Porte during the Napeolonic wars. Although this mission does not seem to have been directly related to the naval mission or technology, the correspondence show that the ordnance they used and the function this mission carried out was closely connected to naval gunnery, as it was considered to be a part of land artillery. Letters and papers written from 12 October 1798 to 27 December 1798 to the British Secretary of State by Brigadier General Koehler, who was employed on a confidential military mission to the the Porte, describe the British mission with a certain proportion of military materials together with a number of artillery and engineer officers to the assistance of the Ottoman Porte in order to enable the government to continue the war, in which it was engaged in common with England against France at Istanbul and the Dardanelles.[173]

An Englishman recorded simply as Daniel was employed in the service of the Ottoman Navy in the Black Sea during 1787-1792 wars. Later on, he applied for service with the Porte with a letter of recommendation (*tavsiyyenâme*) by Yusuf Âgâh Efendi, the Porte's ambassador to London, and was employed at a salary of 400 *kuruş* on 16 Şa'bân 1209/ 7 March 1795, despite a written note stating that he

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[172] BOA. Hatt-ı Hümâyûn, no. 15370 (1209//1794-95)

[173] PRO, FO 78/25.

while was cognizant of construction, he had no mastery of any science. His employment did not last long. He was removed from the post and his salary was stopped on 17 Muharrem 1210/ 3 August 1795 on the grounds that he was lacking in any skills and was unsuitable for employment.[174]

We learn from a British document dated 25 June 1795, by Robert Liston, the British ambassador to Istanbul, that a naval mechanic named Richard White, lately employed in the construction of gunboats in the River Thames, also appeared in Istanbul, and was taken into the service in consequence of a letter of recommendation with which he had been furnished by Yusuf Agâh Efendi, the Turkish ambassador to London. A division of gunboats, forty in number, constructed on an improved plan and built in some of the ports of the Black Sea, had a few days earlier been brought round to the Bosphorus, and more were expected from the same quarter.[175] Another document dated 10 July 1796 states that the naval mechanic White and some royalist French figures of high rank such as the Comte de Bizemont, the Chevalier de Montclar, and de Cressur had all been discharged, which was considered unjust and impolite by English authorities with respect to diplomatic courtesy. It seems that White returned home by way of Russia.[176]

A man named Olaf was an English dock architect (*havuz mimarı*) also arrived in Istanbul by means of the *tavsiyyenâme* (letter of recommendation) from Yusuf Âgâh Efendi. However, he was not employed there, since a proper position could not be found for him. He was sent back to his country and his pre-deteremined

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[174] Beydilli, *Türk Bilim ve Matbaacılık Tarihinde Mühendishane,* p. 89.

[175] PRO. FO 78/16, p. 168.

[176] PRO. FO 78/17, p. 102.

Zilhicce 1210/22 June 1796. The employment of the Swedish dock engineer Rhode and his team seems to have been effective in this development.[177]

Another Englishman named Spurring is mentioned[178] by Shaw without any detail in the context of the foreign technicians working in the naval arsenal. He also mentions Spurring in connection with an anonymous French document saying he was the builder of the *Selimiye.*[179] Show compares this document with the one saying that French Le Brun was the builder of the *Selimiye* in Enver Ziya Karal's article.[180] Ottoman archival documents, at least the ones studied for this paper, do not mention his name. However, the British Foreign Archives cast considerable light on this controversial person, who caused temporary turmoil in diplomatic relations between the Porte and Britain as well as among British diplomats in Istanbul and England.

Spurring came to Istanbul in the winter of 1799 on the *Tigre* in the capacity of ship-builder and was received as such by the Porte and established for a certain period at the rate of 500 piasters per month, with 140 in addition for his son. His business was to work in the Turkish dockyards and assist any British ships that might occasionally come there. His appointments and his occasion were subjected equally on all occasion to the direction of the Porte, and to an intimate connection with the British embassy. Accordingly, he had apartments in the British palace and never left Istanbul upon any business except that from the Captain Pasha. Spurring in 1799

[177] Beydilli, p. 89.

[178] Shaw, 'Selim III and the Ottoman Navy', p. 223.

[179] He refers to the anonynous French "Essai sur la puissance navale des Turcs" (A E Memoires et Documents, Turquie, no. 30, fol. 355). See Stanford Shaw, p. 225.

[180] Karal, "Osmanli Bahriyesi...," p. 206.

Istanbul upon any business except that from the Captain Pasha. Spurring in 1799 built some gunboats,[181] in which the Captain Pasha showed much interest. His actions and overbearing manners made him obnoxious to the Captain Pasha and he was no longer employed.

With the Earl of Elgin's mediation Spurring again came to notice. Some arrangements were made with the Captain Pasha and Spurring's presence was required. Elgin searched for him during two days, without being able to learn anything. It turned out that he had secretly left the city on a Saturday and set out for Cyprus without letting Elgin know, placing him in a difficult position with the Porte. In his correspondence with some British bureaucrats, Elgin learned that the four British shipwrights under him had known the fact of his having gone away, but had declared that they had not been told where he had gone or how long he was to be absent. Later it emerged that Spurring had set out in the company of a group of Janissaries belonging to the Austrian internuncies. Before this, he had probably met Sir Sidney Smith,[182] and received part of his travelling equipage from him as well as letters.

On learning these facts, Elgin wrote to Mr. Smith, whose answer created so much astonishment as to oblige Elgin to send a second letter.[183] From Sidney Smith's political reply, dated 17 March 1800, we learn that Spurring had taken advantage of

[181] Tom Pocock says that the vessel *Tigre*, a former French prize taken by Lord Bridport in 1796, had brought out a team of English shiprights in October 1799, who were not only instructing the Ottomans in the building of gunboats, but also ships of the line. See *A Thirst for Glory: The Life of Admiral Sir Sidney Smith* (London: Pimlico, 1998), p. 84.

[182] For military and diplomatic activities of Admiral Sir William Sidney Smith who arrived in Istanbul in 1799, see ibid.

[183] For the letter from the Earl of Elgin at Constantinople to the Secretary of State, Lord Grenwille (March 18, 1800), see FO 78/28, no. 33, pp. 313-316.

the long stagnation of work in Istanbul to make a short excursion to rejoin his patron and commanding officer upon particular business, leaving his foreman to execute any wishes of the Captain Pasha during his absence.[184] Unsatisfied with Smith's reply, Lord Elgin sent him another letter inquiring by whose permission Spurring had left Istanbul. Smith's answer was again diplomatic and evasive. After repeating the previous letter he recommended that Lord Elgin ask Spurring himself or his commander at the Imperial Palace. From this reply Lord Elgin understood that Spurring had received orders from Smith directly or indirectly.[185] In a letter dated 26 March 1800, Lord Elgin wrote to Lord Grenwille that it was no longer in his power to hold further communication with Mr. Smith and he stated that the Ottoman government, in the meantime, had withdrawn the appointments of Mr. Spurring.[186]

George Frederic Koehler was a brigadier-general and captain in the royal artillery. Of German extraction, he was appointed to a direct commission as second lieutenanat in the royal artillery at Gibraltar during the siege on 20 January 1780. His subsequent British commissions were: first lieutenant royal artillery, 1 December 1782; brevet-major, October 1793; captain-lieutenant royal artillery, 5 December 1793; brevet-lieutenant-colonel, April 1794; captain royal artillery, 9 December 1796; and brevet-colonel, 1 January 1800.

Koehler distinguished himself during the defence of Gibraltar in 1782 by inventing a gun-carriage allowing the axis of the gun to be depressed to an angle of

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[184] FO 78/28, p. 317 (17 March 1800).

[185] FO 78/28, pp. 317-318 (17 March 1800).

[186] PRO, FO 78/28, p. 338, no. 36 (26 March 1800). This diplomatic correspondance can also be followed by a French document dated 18 March 1800, written to Alexander de Sutzo, Interprete de la Sublime Porte Ottomane, by B. Pisani. See PRO, FO 78/28, p. 319 (18 March 1800).

seventy degrees.[187] The accuracy of the fire was so great that at the first trial, on 15 February 1782, twenty-eight shot out of thirty fired took effect in one traverse of the Spanish San Carlos battery, at a distance of fourteen hundred yards.

Koehler is stated to have been at one time in Turkey, probably during the war with Austria and Russia in 1788, and to have acquired the language. When the French gained a footing in Egypt in 1789, a military mission of artillery and engineer officers, with detachments of royal artillery and royal military artificers, was sent to organise the Ottoman army. Koehler was placed at its head, with the local rank of brigadier-general.[188] He demanded from the British government several articles for the execution of his service to the Ottoman state. Among the military articles were howitzers, brass sea service mortars, travelling carriages with elevating screws, ammunition boxes, limbers, carcasses, copper or tin pontoons, wheelbarrows, intrenching tools, sling carts for transporting heavy guns, windlasses, rollers, levers, artillery carbines with bayonets, carbine cartridges with proper portion of flints, tents of Flanders pattern, officer marquees, laboratory tents, hospital tents with bedding, cavalry pistols, scaling ladders, musket proof mantelets, sets of tools to be used by blacksmiths, wheelwrights, carpenters, collarmakers, and armourers, sets of surveying instruments and steel spikes for spiking cannon. The estimated total cost was £16, 259,111.[189]

General Koehler proposed a list of officers and others to be employed, with the amount of allowances granted to them for outfit, travelling and some other

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[187] The model of this gun-carriage is now in the royal military repository, Woolwich.

[188] Henry Manners Chichester, "George Frederick Koehler," *The Dictionary of National Biography*, eds. Sir Leslie Stephe and Sir Sidney Lee, vol. 11 (Oxford: Oxford University Press, 1917), pp. 341-342. See also PRO, FO 78/27.

[189] PRO, FO 78/25, pp. 32-33. For more information of the military articles, see Appendix J.

expenses by direction of Lord Grenwille. The following table is rearranged from Koehler's letter of 9 November 1798.[190]

Table 12. Officers and other staff to be employed under Koehler

NAMES	RANK	ALLOWANCES
G.L. Koehler	Lieutenant Colonel	£ 500 received
Capt. Charles Holloway	Capt. Royal Engineer	£ 150
Robert Hope	Capt. Royal Artillery	£ 150
Thomas Dodd	Capt. Royal Artillery	£ 150
Richard Fletcher	Capt. Royal Engineer	£ 150
Thomas Lacy	First Lieut. Royal Artillery	£ 150
Will M. Leake	First Lieut. Royal Artillery	£ 150
Captain Franklin	Secretary	£ 150
M. Pink	Draftsman	£ 150
M. Thompson	Surgeon	£ 150
M. Chandler	Commissary	£ 150
Sergeant Thompson	Quarter Master	£ 150
	Clerk to Engineer	£ 150
	TOTAL	*£ 2,450*
	Received	£ 500
	Remains	£ 1,950

Source: PRO, FO 78/25, p. 107.

Koehler gives the following information about the ordnance department accompanying the above-mentioned mission in another letter of 27 May 1799.[191]

[190] PRO, FO 78/25, p. 107.

[191] PRO, FO 78/26, p. 90.

Table 13. Ordnance department accompanying the officers and other staff under Koehler

MILITARY		CIVIL
Engineers	Artillery	Kenelm Chandler (Comissary and Paymaster)
Charles Holloway (Captain)	Robert Hope (Captain)	Hugh P. Wight... (Clerk to the Commissary)
Richard Fletcher (Captain Lieutenant)	Thomas Dodd (Captain Lieutenant)	George Pink (Draftsman)
Thomas Lacey (First Lieutenant)	Robert Fead (Captain Lieutenant)	John Read (Clerk to the Engineer)
	William Leake (First Lieutenant)	
	Dr. William Wittman (Surgeon)	

Source: PRO, FO 78/26, p. 90.

The mission arrived in Istanbul in June 1799/Şaban-Ramazan 1213, and in January 1800/Şaban-Ramazan 1214, Koehler with some of his staff, disguised as Turks, proceeded overland to Syria, returning in April. On 15 January 1800 the whole party proceeded to the theater of war in Syria, arriving at Jaffa. Attended by a large body of Turkish troops, the mission made a progress towards Jarusalem. A malignant fever, produced by the filthy surroundings, carried off Koehler's wife on 14 December 1800, and Koehler soon after died near Jaffa after an illness of four days on 29 December 1800. Charles Holloway was appointed as royal engineer and major in his place. He, along with the remainder of the party, subsequently marched with the Ottoman army to join the British troops in Egypt in 1801. The medical officer in charge, Dr. W. Wittman, subsequently published a narrative of the mission.[192]

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[192] Chichester, pp. 341-342. For his death and the appointment of Holloway, see PRO, FO 78/25, pp. 32-33.

It seems that during his commission, Koehler had suffered from the indifference of both the Ottoman and British sides in terms of the procurement of military materials and discipline. He consumed nearly the whole of his service in the experiment of a boring machine that worked horizontally, for which a design upon a small scale, for one gun, had been obtained from Koehler for the British Artillery and which after all has succeeded only in part.[193] Koehler, in a letter dated 12 April 1800, Galata, complained about the behaviour of the Ottoman side, saying that he had let the Ottoman government know the directions of the British Foreign Office dated 10 December 1799 that the British military mission should return to England, which had suprized them very much. They had appeared to be as anxious for their longer continuance, as they had before been indifferent about it. Koehler added that he and Lord Elgin had repeatedly required acknowledgement of the arrival of the ordnance, the military stores of which were brought out with the party, but had received nothing but evasive answers. He said that he had given many months past lists of the stores in English, in French and in Ottoman. The stores were dispersed, misapplied and improperly classed, and rendered useless. Neither the officers, commissary nor any of the party had been allowed to interfere in any manner with them, although no acquittal or receipt had been given. Koehler had, however taken it upon himself to discharge the responsibility of the commissary with regard to these stores, knowing them to be *bonâ fide* and actually delivered to them. The ceremony of transferring them to the Ottoman government seems by the Ottoman's conduct to be superfluous, he had however mentioned it to Lord Elgin, and would act in any way His Lordship thought most advisable. Their conduct seems to have been incomprehensible to him upon any other principle than a desire to return to their former habits and

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[193] PRO, FO 78/15, No. 31, pp. 338-346 (25 December 1794).

connections. Their neglect or indifference seemed not to be partial to the military mission, but had been much more marked to the English shipbuilders, insomuch as it appeared that the master builder, Mr. Spurring, had left them without taking leave. He and his men had been unemployed for a long time previous to his departure.[194]

Sir Charles Holloway was born on 17 April 1749. He entered the drafting room of the board of ordnance at the Tower of London on 7 February 1764, and went to Portstmouth to assist the commanding royal engineer with the plans of new fortifications in 1772. On 16 January 1776 he received a commission as second lieutenant in the royal engineers. In October 1798 he was selected to be the commanding royal engineer and second in command with the local rank of major of a military mission under Brigadier-general George Fredrick Koehler to assist the Ottomans in the reorganisation of their army. He left London with the mission on 3 December and on the 24th was shipwrecked among the ice at the mouth of the Elbe. The mission was rescued and travelled across the continent to Istanbul, where it arrived on 28 March 1799.

In June, in conjunction with Major Robert Hope of the royal artillery, Holloway reported upon the fortifications of the Dardanelles and the defence works necessary for better security for that passage, and of Tenedos and the Gulf of Saros. The report was approved and the work commenced. In January 1800, the British mission joined the Ottoman army in Syria under the Grand Vizier. It was encamped at Jaffa after retiring from Egypt, and, at the Grand Vizier's request, Holloway entrenched the camp and designed additional defences, which were at once accepted. As mentioned above, a virulent attack of plague towards the end of the year caused great mortality and carried off Koehler on 29 December. The command of the

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[194] PRO, FO 78/27, pp 24-25.

mission then devolved upon Holloway, who received the local rank of lieutenant colonel from 1 January 1801, when he also obtained his brevet[195] majority.

Early in the following month, the Ottoman army advanced and, after crossing the desert, clashed with a superior French force under General Belliard in May. Although nominally the Grand Vizier commanded the Ottoman army, in practical terms Holloway did, both in the advance from Jaffa and at the battle of El-Hanka on 16 May. The fight lasted seven hours, when the French were defeated and fell back. On 12 July Holloway entered Cairo with the mission, which remained there until 18 February 1802. The mission returned home under the command of Major Richard Fletcher from the royal engineers. Holloway went to Alexandria. Later he visited Istanbul and Vienna on his return to England, where he arrived on 12 July. For his services with the Ottoman army, of which Lord Elgin, wrote in the highest terms, Holloway, who had been invested by the Sultan with a pelisse on five different occasions and presented with a gold medal in November 1801, was knighted on 2 February 1803.[196]

In a document dated 26 October 1798, Koehler mentioned his name together with Captain Hope and Captain Sarell among those proposed for the heads of their respective departments. Koehler said that Captain Holloway had been known to him for twenty years, and his service as Brigader Major to General Sir W. Green Chief Engineer of the Siege of Gibraltar and had even since been employed in an active life in his own corps, and had at this time an important trust being engineer for the River Thames. Koehler also stated that Holloway was an officer of great

[195] An honorary certificate or rank, which was considered to be influential on the promotion of an officer.

[196] Robert Hamilton Vetch, "Sir Charles Holloway," *The Dictionary of National Biography*, eds. Sir Leslie Stephe and Sir Sidney Lee, vol. 22, Supplement (Oxford: Oxford University Press, 1917), pp. 862-863.

professional, man of steadiness, zeal and honour.[197] Holloway is also known to have been granted £150 as allowance on 9 November 1798.[198] It is understood from a document written to Lord Grenwille by Lord Elgin in Istanbul and dated 16 February 1800, that Major Holloway commanded the military party in Brigadier General Koehler's absence.

Elgin, in his letter complained that during the whole of their stay in Turkey a very great deal of intrigue had been successfully exerted to impede the operations of the detachment, and prevent the utility they were enabled to render this country. Elgin stated that every trick had been used to disgust the officers and men. Those who were anxious that British land officers should be employed with the Grand Vezir, and those who wished the power of the Ottoman Empire to be kept under, had been equally busy. The work begun by them at the Dradenelles had been undone since their departure from there and the *firman* or passport delivered. In every point, without exception whether military, naval or political the government was in very great need of the assistance of a European power. It was impossible to select for the engineer and artillery department a number of officers and men more able, or more exemplary in their conduct, than those under General Koehler's command.[199]

On the death of the Gen. Koehler, Charles Holloway, as the senior officer, was appointed as royal engineer and major commanding the expedition against France at the camp of the Grand Vizier at Jaffa in Syria, Istanbul and in Hermanstadt.[200] On 21 October 1802, the officers of the military mission under the

[197] PRO, FO 78/25, pp. 34 -37.

[198] PRO, FO 78/25, p. 107.

[199] PRO, FO 78/28, p. 171 (16 February 1800).

command of Colonel Holloway, who returned to England from the Ottoman Empire, were granted allowances to cover their travelling expenses. L. Colonel Holloway was paid £280 for his travels from Alexandria to Istanbul, and from thence to England overland.[201]

The following table shows their names and travelling expenses.[202]

Table 14. Military mission under the command of Colonel Holloway (St. Albans Street, 21 October 1802)

L. Colonel Holloway from Alexandria to Constantinople, and then to England overland	280
Major Hope and D. Wittman from Alexandria to Constantinople, and then to England overland at 150 each	300
Major Fletcher, Mr. Chandler, commissiary of paymaster, and Mr. Read, secretary, from Alexandria to Marsilles, and then to England overland at £ 75	225
Captain Lacey from Alexandria to Naples and then to England overland	75
TOTAL	£ 880
Captain Leake of the Royal Artillery, and Mr. Pink, Royal Military Draftsman, had not yet arrived.	

Source: PRO, FO 78/34, p. 98.

Holloway was knighted by the King for his able conduct of the military mission. He received a gold medal along with Captain Lacy from the Sultan for the battle of El-Hanka.[203]

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[200] PRO, FO 78/34, pp. 7 -10.

[201] PRO, FO 78/34, p. 98.

[202] PRO, FO 78/34, p. 98.

William Martin Leake, well-known as a classical topographer and numismatist, was born in Boilton Row, Mayfair, London on 14 January 1777. He received his professional education at the Royal Military Academy at Woolwich and was commissioned as a second lieutenant in the Royal Regiment of Artillery to the West Indies in 1794. In 1799, promoted to Captain Leake, he was sent on a misson to Istanbul to instruct the Ottoman troops in artillery techniques. On 19 January 1800, he left Istanbul to join the Ottoman army in Egypt. He and his party, disguised as Tartar couriers, crossed Anatolia to Celenderis in Cilicia,[204] and crossed over to Cyprus. When a treaty was concluded between the Grand Vizier and the French, Leake did not at once proceed to Egypt, but visited Telmessus in Lycia, Assus in Mysia, and other ancient sites. He kept an accurate journal, which he published in 1824 with the title *Journal of a Tour in Asia Minor*. He returned to Istanbul in June 1800, and was again instructed to join the Ottoman army in Egypt. He went by way of Athens, Smyrna and Cyprus to Jaffa, where he spent the winter making excursions into Syria and Palestine. In March 1801 He crossed the desert with the Ottoman army into Egypt, but on the capitulation of the French army he was employed in making a general survey of Egypt in conjunction with Lord Elgin's secretary, William Richard Hamilton, until March 1802.[205]

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[203] W. Porter, *The History of the Corps of Royal Engineers*, vol. I (Great Britain: Chatham, 1977), pp. 233.

[204] Cilicia was the ancient name for the eastern half of the south coast of Asia Minor. Between 1080 and the occupation of the region by the Ottomans in the fifteenth century, Cilicia was ruled first as an independent Armanian principality then as a kingdom known as Little Armenia. See David Murno, *Dictionary of the World* (Oxford and New York: Oxford University Press, 1995), p. 147.

[205] Warwick William Wroth, "William Marin Leake," *The Dictionary of National Bibliography*, eds. Sir Leslie Stephan and Sir Sidney Lee, vol. 11 (Oxford: Oxford University Press, 1917), pp. 764-765.

Leake wrote about his training mission and complained of the difficulties he had faced as an artillery practice officer in the service of the Porte. In a letter he wrote to England on 22 June 1804, he said that he had observed that Ottoman discipline, which stemmed too closely from their religion, habits and manners and form of government to be affected by anything short of a fundamental change on all these points. He explained the possible advantages to be derived from the presence of a British officer with the Ottoman army. According to him, a British officer could help with correcting their natural improvidence by persuading them to pay attention to their supplies and resources of every kind, in combining their different movements, and directing them to one particular end, by checking their impatience, as well as by teaching them to bear the delays and temporary disappointments to which military operations were subjected.

He also pointed out that a British officer could maintain a personal influence with the independent chiefs and persuade them to keep order among their forces while the great object of the campaign was pursued. He attributed utmost importance to the possible role of a British officer in warning the Ottoman soldiers against the regular French forces that could take advantage of the irregularity of the Ottoman forces and seize every favourable opportunity to harass and distract them during an advance through an unknown and difficult country.[206]

In September 1804, Leak left England on a mission to discuss with the governors of the provinces of European Turkey respecting the defence of their frontier against the French. He was instructed to conduct military surveys and to pay particular attention to the general geography of Greece. In February 1807, war having broken out between the Porte and England, Leake was detained for several

[206]PRO, FO 78/57 (22 June 1804), p. 30.

months as a prisoner at Salonika. On regaining his liberty, he sailed at once for the coast of Epirus, and on the night of 12 November had a secret meeting with Ali Pasha of Albania, on the beach near Nicopolis. He there induced Ali Pasha to bring about reconciliation between the Porte and England, which proved successful.

In October 1808, he was sent to Greece by the British government to present stores of artillery and ammunition to Ali Pasha for use against the French. On his return to England in 1810, Leake (now a major) was granted an allowance of £600 per annum in consideration of his services in Turkey since 1799. On 4 June 1813 he received the brevet rank of lieutenant colonel. He now focused on his large collection of geographical materials, and in 1814 published *Researches in Greece.* He became a member of the Royal Geographical Society, and vice-president of the Royal Academy of Literature, and honorary member of the Royal Academy of Sciences at Berlin. He died in Brighton on 6 January 1860 and was buried in the cemetery of Kensal Green.[207]

Sir Richard Fletcher was born in 1768. He attended the Royal Military Academy at Woolwich, and was made second lieutenant in the Royal Artillery on 9 July 1788. He transferred to the Royal Engineers on 9 July 1788. In December 1798, he was ordered to Istanbul and promoted to major while commissioned in Turkey. He seems to have been recommended by Captain Holloway.[208] He reached Istanbul in May 1799 and accompanied the Grand Vizier on his march to Syria in June. On his return from this expedition, he was employed on the defences of the Dardanelles. In January 1800, he left Istanbul on a special mission to Syria and Cyprus. On his

[207] Sir Leslie Stephan and Sir Sidney Lee, (eds.) "William Marin Leake," *The Dictionary of National Bibliography*, vol. 11, pp. 764-765.

[208] PRO, FO 78/25, pp. 34-37.

return in April, he was awarded by the Sultan. In June he went to Syria and was employed constructing defence works at Jaffa and El Arish. He later was commissioned to survey the coast of Egypt, with a view to the landing of troops under Sir Ralph Abercromby. He was taken prisoner by the French. After the capture of Cairo and Alexandria, and the capitulation of France, he was released and presented with a golden medal in recognition of his services by the Sultan. He returned to England in 1802 and was employed in various works until his death in 1813.[209]

The name of Captain Robert Hope of the Royal Regiment of Artillery, together with that of Captain Holloway and Captain Sarell, was mentioned in Koehler's list proposed to the heads of their respective departments. Koehler reported how Captain Hope had served in the artillery for twenty years and had been constantly employed and commissioned in the war in the West Indies and that he was an excellent, steady officer, universally esteemed who spoke Spanish and French.[210]

Captain Sarell of the 31st Regiment Infantry was also mentioned in Koehler's list as an officer spoken of in the highest terms. Based on his observations, Koehler reported that Capatain Sarell was a man of a clear mind and steady in the exercise, manoeuvring and reviews in Yorkshire and that "he was the person of all others who had the quickest and clearest conception of what was to be done."[211]

Lieutenant Lacey of the Royal Engineers was described by Koehler as having a good reputation. The youngest engineer, under the direction and control of

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[209] Robert Hamilton Vetch, " Sir Richard Fletcher," *The Dictionary of National Biography*, vol. 7, pp. 319-321.

[210] PRO, FO 78/25, pp. 34-37.

[211] Ibid., pp. 34-37.

his two superiors, was eager to learn and acquire experience.[212] Along with Holloway, Lacey was presented with gold medals from the Sultan for the battle of El-Hanka.[213]

Captain Lieutenant Fead of the Royal Artillery, despite his youth, saw a great deal of service. He was of a good disposition, zealous in his word, with an excellent grasp of all equipment, appointments and practices of the Royal Artillery. He had experience with marine mortars, having taken part in several bombardings, with command of one of them in the Dawus. He was reported to be an active, valuable officer.[214]

Captain Lieutenant Dodd of the Royal Regiment of Artillery had been known by Koehler for several yers. He was a good officer, well acquainted with the languages and the manners of different foreign countries. He was good at writing up any direction as communications and an experienced officer.

Lieutenant Wallace of the Royal Regiment of Artillery was described by Koehler as a young man of high reputation similar to Lacey. Colonel Twis had informed Koehler that although an offer had been made for him to go into the corps of Royal Engineers, Wallace's great predilection for artillery had induced him to decline.

Captain Farster, also known as the Late Corsican Captain, was, according to Koehler, an officer who had seen a great variety of service and had always done his

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[212] Ibid., pp. 34-37.

[213] Porter, pp. 233.

[214] PRO, FO 78/25, pp. 34-37.

duty with fidelity and credit. At the time of Koehler's report, he was employed as an adjutant in the grenadiers' corps in Yorkshire district.

Lieutenant Fearou of the 31st Regiment of Infantry was described as a young man of great promise, accuracy and attention, who was very much approved of and distinguished by Lord Mulgrave. He was said to have served in the West Indies with great credit and had been employed in Yorkshire by Lord Mulgrave as a quartermaster to the Light Infantry Corps.

Lieutenant Comissionary Heatson and M. Quick, an Ordnance Draftsman, were also mentioned by Koehler, who said that Heatson was an active and useful man and Quick an excellent military draftsman, particularly recommended by Colonel Twiss and Captain Holloway of the Royal Engineers.[215]

Missions of Other Nations

Among the foreigners employed in the shipworks at the Imperial Naval Arsenal were two Spaniards. The first, a mechanic known as Wloa or Volla, was reported in a letter of 1794 Istanbul, to have been an ingenious mechanic who worked in the newly founded arms manufactory at a handsome salary under the supervision of Çelebi Efendi.[216] This factory at the Levend Çiftliği manufactured rifles and bullets.[217] The second Spaniard, known in the data only as Miguel, was a Spanish official who came to Istanbul with the permission of the Spanish government. He served in the Ottoman state at a salary of 500 *kuruş* paid from the

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[215]Ibid., pp. 34-37.

beginning of Cemâziyelâhir 1208/4 January 1794. His salary did not change untill 1210/1795-1796.[218]

From Austria were Andon/Antoin of Nemçe, a bridge builder, and a draftsman who later converted to Islam, Mustafa, employed in Silistire on 8 Safer 1205/17 October 1790 by the Porte. They made drawings and desiged the plan of a bridge in Silistire and sent it to the Porte for evaluation by the head architects. Their skills in geometry (ilm-i hendese) and bridge construction were much appreciated.[219]

A petition dated 1215/1800-01 by the shipbuilding engineer Klintberg reported that Yakomi was an ironsmith (*âhenger*) of Genoise origin employed in the construction of the three-decker galleon in the Imperial Naval Arsenal producing the iron equipment, *edevat-i aheniyye*, of the aforementioned galleon.[220] He is also known to have worked in the repair of the rifles and some other iron equipment used on the galleons.[221] Tezel notes that Yakomi worked as a *tavşan*[222] in the construction of the big dry-dock in the Imperial Naval Arsenal.[223] His fellow countryman Yozop,

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[216] PRO. FO 78/15, p. 338.

[217] Stanford Shaw gives his name as "Volla." See *Between Old and New*, p. 140.

[218] Beydilli, *Türk Bilim ve Matbaacılık Tarihinde Mühendishane*, p. 89.

[219] BOA. Hatt-ı Hümâyûn, no. 9792.

[220] BOA. Cevdet-Bahriye, no. 1638.

[221] BOA. Cevdet-Bahriye, no.12738.

[222] *Tavşan*, meaning "rabbit" in modern Turkish, in seamanship means a carpenter dealing with delicate piece of workmanship. See Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 474.

[223] Tezel, p. 656.

of Venician origin, worked with him as a carpenter in the construction of galleons built both in the Imperial Naval Arsenal and on Rhodes. He and Yakomi each were alloted an eighty *kuruş*-salary on 26 Zilka`de 1210/2 June 1796. Their salaries were increased to 100 *kuruş* from Muharrem 1216/May 1805.[224]

Ottoman Shipbuilders

There were also Ottoman subjects of various religions, who rendered important services as ship builders, manufacturers of new tools and equipment, carpenters, ironsmiths, repairers of the light arms, architecs, augerers, drydock masons, naval surgeons, and porters.

Non-Muslim Ottoman Subjects

A document dated 23 February 1787 reports that on the nineteenth, the Vizier had unexpectedly attended an inspection of two new sloops of twenty-two guns each constructed by a Greek master builder in the service of the arsenal. On strong evidence of neglect in the execution of this trust, and of infidelity in the charge, the artist was immediately condemned, and accordingly hanged on board one of these very ships.[225]

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[224] For related documents, see BOA. Cevdet-Bahriye, no. 1124, 1534, 1638, 2478, 8098; and also Bostan, "Osmanlı Bahriyesi'nin Modernleşmesinde Yabancı Uzmanların Rolü," p. 185.

[225] PRO. FO 78/8, p. 38.

Çamlıcalı Kalfa-Mimar Kara Yorgi was an architect. In 1208/1793-94 in Kemer he built the frigate the *Gazâl-ı Bahrî* (Gazelle of the Sea) of 45 zira, covered with copper, with forty-two guns and a 375 crew. He also built a corvette named the *Mürg-i Bahrî* (Sea Bird) of twenty-seven *zira*, covered with copper, and with twenty-two guns and a crew of 120 in 1211/1796-97.[226]

Documents show that Petro and Manol Kalfa were employed within the entourage of a galleon engineer in the capacity of *ayak mimarı* (base architects) and carpenters in 1216/1801-02 in the construction of the drydock in the Imperial Naval Arsenal.[227] They worked there from the beginning of the construction of the drydock to its completion. They also worked in the construction of a three-decker ship.[228]Petro also worked in the repair of galleons and of the gate of the drydock in 1217/1802-03. He received a raise of fifty *kuruş* with fifteen *kuruş* in addition to his previous thirty-five *kuruş* salary.[229]

Manol appears among the workers employed in the construction of a frigate on the island of Limni on 5 Safer 1215/28 June 1800. Hristo the architect, Antuvan the mountain architect (*dağ mimarı*), Anesti the chief augerer (*burgucubaşı*) and Vasıl Kalfa were among his colleagues.[230]

Manol later built together with Osman Kalfa, the *Fethiye*, a galleon of 193 *zira* in length, fifty-five *zira* in width, twenty-six *zira* in height, 22.5 *kadem* in

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[226] Karal, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar," p. 209.

[227] BOA. Cevdet-Bahriye, no. 8389.

[228] BOA. Cevdet-Bahriye, no. 9269.

[229] BOA. Cevdet-Bahriye, no. 1250.

[230] BOA. Cevdet-Bahriye, no. 1611.

displacement, with ninety-six guns, and 960 crew in Gemlik in 1827. On this important project he worked as an engineer with Osman Kalfa as architect. In the year 1828, he built, together with Mühendis Sadık Efendi, the *Nâvek-i Bahrî* (Sea Arrow), a frigate of forty-two guns in Midilli. Six year later, in 1834, under his engineering and Dimitri Kalfa's architectural design the *Teşrifiye* was constructed in Gemlik. It was a galleon 190 *zira* in length, fifty-two *zira* in widths, twenty-six *zira* in heigth, twenty-two *kadem* in displacement, with ninety-six guns, and crew of 960.[231]

In the following years, Manol remained active. He worked in the construction of a drydock (today known as the Number Two drydock, *kuruhavuz*) together with the chief engineer, Abdulhalim Efendi, who was a teacher at the *Muhendishane*. They completed the drydock between the years 1821-1825. There is no doubt that his previous experiences in the reign of Selim III played an important role in his later services.[232]

Nikoli Kalfa was Chief Augerer and Chief Architect, as understood from a document dated 9 Receb 1217/5 November 1802. He had worked in the Imperial Naval Arsenal for forty to fifty years as a deputy of Chief Architect and also worked as a Chief Augerer (*burgucubaşı*) in the construction of naval ships, and second of a three-decker ship and an imperial frigate.[233] Following the death of İsmail Kalfa, the

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[231] Tezel, pp. 666-667.

[232] Aksoy, *İstanbul'da...*, pp. 71-82.

[233] BOA. Cevdet-Bahriye, no. 330. Another document mentions three *Nikoli*s and one *Nikola*, which cause confusion. The first Nikoli, who had previously been the chief augerer with a salary of 1,640 *akçe* in the Naval Arsenal, was not dead on 10 Safer 1181/8 July 1767. On the other hand, Nikola was then the second augerer with previously 900 *akçe* and later 1,200 *akçe* of Anton's, who was the third augerer, with 1,200 *akçe* and later replaced the first Nikoli and received his salary of 1,200 *akçe* after his death. The other Nikoli was the chief augerer of a galleon being constructed then and was appointed as the third augerer. See BOA. Cevdet-Bahriye, no. 642.

First Architect of the Imperial Arsenal (*Tersâne-i Âmire Başmîmârı*), he was appointed chief architect and given all the salary and other allowances of the previous Chief Architect. In turn, his post of *burgucubaşılık* and other allowances were given to Anastas Kalfa. As for the salary and other allowances, it is recorded that he, as the Chief Architect of a galleon (*sermîmâr-ı kalyon*), received 6,000 *kuruş* monthly salary, two *kıyyes* of butter (*revğân*) and four loaves of bread (*nân-ı azîz*) a day from the Superintendent of the Naval Arsenal (*Tersâne-i Âmire Emini*) and two *kıyyes* of mutton (*kuşt-ı ğanem*) a day from the chief butcher (*kassabbaşı*).[234]

Anastas Kalfa, or Anesti the Chief Augerer (*burgucubaşı*), appears among the workers employed in the construction of a frigate in Limni on 5 Safer 1215/28 June 1800 along with Manol, Hristo the architect, Antuvan the mountain architect (*dağ mimarı*), and Vasıl Kalfa.[235] In Receb 1217/October-November 1802 he worked as an augerer at the Imperial Naval Arsenal. Later on he was given the income of the post of *burgucubaşı* and the other allotments of Nikoli Kalfa. Anastas Kalfa's salary and allotments in turn were given to Todori, the second augerer (*burgucu-i sâni*) and, as a result of sequential promoting, he received Anastas Kalfa's salary.[236]

Petro, the Chief Porter, worked in this capacity at the Naval Arsenal for thirty to forty years. Citing his long-term service, he demanded from the authorities a document indicating his exemption from the poll tax, which was levied on non-

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[234] BOA. Cevdet-Bahriye, no. 330.

[235] BOA. Cevdet-Bahriye, no. 1611.

[236] BOA. Cevdet-Bahriye, no. 330.

Muslims (*cizye*), and his right to a daily allotment of two loaves of bread from the bakery at the *tersâne zindanı* (prison).[237]

A document of 1210/1795-96 describes one Dimitri Kalfa as *zimmi* (non-Muslim Ottoman subject) citizen working as an *ayak mimari* in the Imperial Naval Arsenal. He was employed as a *burgucubaşı* during the construction of an Imperial frigate of fifty-five *zira* at Ereğli in the Black Sea[238] together with Tanaş the engineer, Isterbo/Isteryo the architect second-in-chief, Yani the mountain engineer, and Dimitri the chief augerer in 1215/1800-01.[239]

In 1834, Dimitri was employed as an architect in the construction of the *Teşrifiye* in Gemlik. In this project he accompanied Manol Kalfa, who was the engineer of the galleon.[240]

Mimar Papaço (Joseppo) Kalfa was the builder of fifty-one *zira* galleon the *Hilâl-i Zafer* (Crescent of Victory), in Bordum in 1205/1790, which was clad with copper, carried sixty-six cannons and had a crew capacity of 650.[241]

Nevsim Kalfa is known to have built the *Ejder-i Bahrî* (Dragon of the Sea), a fifty-seven *zira* galleon in Gemlik in 1208/1793-94. This galleon had a capacity of seventy-four guns and a crew of 800. In 1212/1797-98, he built another galleon, the

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[237] BOA. Cevdet-Bahriye, no. 330.

[238] BOA. Cevdet-Bahriye, no. 6300.

[239] BOA. Cevdet-Bahriye, no. 1611 (5 Safer 1215/28 July 1800).

[240] Tezel, pp. 666-667.

[241] Karal, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar," p. 207.

Beşâretnümâ (Showing Glad Tidings), of fifty-nine *zira*, clad in copper, with a capacity of seventy-six guns and a crew of 850 men.[242]

Nikolay/Nikoli Kalfa was a shipbuilder who worked especially in Sinop and Bodrum. Among the ships he built were the *Feyz-i Hüdâ* (Bounty of God), a galleon of fifty-five *zira*, covered with copper and with seventy-two guns and 650 crew, built in 1204/1789-90 in Sinop; the *Fâtih-i Bahrî* (Conqurer of the Sea), a galleon of forty-seven *zira*, covered with copper, with sixty guns and a crew of 550, built in 1206/1791-92 in Sinop; the *Pertev-i Nusret* (Beam of Victory), a fifty-three *zira* galleon, covered with copper, with sixty-eight guns and a crew of 700, built in 1208/1793-94 in Sinop; the *Şehbâz-ı Bahrî* (Sea Falcon/Braveheart of the Sea), a fifty-seven *zira* galleon, covered with copper, and with seventy-four guns and a crew of 850, and built in 1208/1793-94 in Bodrum; and the *Heybet Endâz* (Awe/Majesty Inspiring), a fifty-nine *zira* galleon, covered with copper with seventy-four guns and a crew of 850, built in 1211/1796-97 in Bodrum.[243]

In a document dated 1206/1791-92, the superintendent of the *Tersane-i Amire* complained about the chief carpenter, Hristo, who was employed in the *paşa gemisi* (a paşa ship), and a *zimmi* carpenter named Mavri, employed in the *kapudâne* (a naval rank) ship. He described their laziness, bad manners and provocation of the workers at the Imperial Arsenal.[244]

The name Hristo (most probably the same one) was recorded as being employed as an architect in the construction of a frigate in Limni on 5 Safer 1215/28

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[242] Karal, p. 206.

[243] Ibid., p. 206.

[244] BOA. Hatt-ı Hümâyûn, no. 56625 (1206/1791-92).

June 1800 together with Manol, Antuvan the mountain architect, Anesti the chief augerer, and Vasil Kalfa.[245] Vasil Kalfa is also known to have constructed a drydock (today known as Dry Dock Number One) between 1857 and 1870 and worked in the enlargement of the dry dock constructed in the reign of Selim III, towards landside in 1874-1876.[246]

Filip (Philip) Kalfa was the builder of the fifty-one *zira*-galleon, the *Şevketnümâ* (Showing Majesty), which was copperclad, had a crew of 450 men and fifty guns and was built in 1211/1796 on Lemnos/Limni.[247]

Trandafil Kalfa was employed in the capacity of drydock mason in the construction of the drydock in the Arsenal, and later on, worked with the French engineer Romus in the deepening works of the harbour of Rhodes in 1212/1797-98. During his work in Rhodes he dealt with the removal of a rock in the sea and he received eighty *kuruş* per month. The five other masons with him received forty-*kuruş* each.[248]

The names Masoraki and Arbili are mentioned in connection with staff in a hospital, the building of which near the large drydock at the *Tersâne-i Âmire* was declared in the resolutions of the *Bahriye Kânunnâmesi* (Naval Regulations) of Zilka`de 1219/February 1805. The hospital was to treat patients around the clock. The law also declared that the *Bahriye Nazırı* (Naval Minister) was responsible for commissioning physicians and surgeons for the naval ships contingent upon need.

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[245] BOA. Cevdet-Bahriye, no. 1611.

[246] Aksoy, *İstanbul'da...*, pp. 71-82.

[247] Karal, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar," p. 208.

[248] BOA. Cevdet-Bahriye, no. 12232. (10 Rebî`u'l-evvel 1212/2 September 1797). Tezel mentions a certain Komyanus working in the construction of the drydock in the Arsenal. See, p. 656

One Masoraki, a physician who had been promoted to chief-physician (*hekimbaşı*), and Arbili, a surgeon, who had been appointed to the post of chief-surgeon (*cerrahbaşı*) in this hospital, each received 250 *kuruş* a month. Seven students earning forty *kuruş* each and servants earning thirty *kuruş* were among other staff.[249] Indeed, a *Tıbhâne* (Medical school) was annexed to the earlier hospital on 17 Şevval 1220/ 9 January 1806). From this date on, candidates seeking to become surgeons and physicians began to be educated there not only for the Naval Arsenal and navy, but also for institutions throughout the country.[250]

Muslim Shipbuilders and Men of the Naval Works

In addition to the foreign missions and non-Muslim Ottoman subjects, there were Muslim shipbuilders and other craftsmen involved in work for the navy. These shipbuilders had a long tradition in shipbuilding and naval construction. As in many European countries up to the eighteenth century, the work they carried out was an art rather than a scientific pursuit. But with the European advances in technology, these men sought information and learned from the foreign engineers, shipbuilders and technicians employed at the Naval Arsenal. They helped the foreign missions organize personnel, procured the required raw materials, carried out the construction projects, and taught navigation and shipbuilding courses at the Naval School. They combined old and new techniques to create a new tradition in naval shipbuilding to be transferred to the following generations. Unfortunately, full accounts of their

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[249] A. İhsan Gencer, "İstanbul Tersânesinde Açılan İlk Tıb Mektebi," *Türk Denizcilik Tarihi Araştırmaları* (Istanbul: Türkiye Denizciler Sendikası, 1986), p.54.

[250] BOA. Cevdet-Bahriye, no. 1575.

activities and the division of labour they undertook are unavailable. Nevertheless, an examination of the available sources allows the formation of a general idea of the kinds of work in which these men were engaged.

Cezayirli Seyyid Hasan Hoca was appointed as *hoca* (teacher) to the re-organized *Mühendishâne* in 1776. Therefore, he was one of the first instructors there. He was said to have had a good command of Italian, French, English and Spanish. By 1781 he had fifty students, composed of the children of captains and statemen.[251] He taught courses four hours a day, excluding Tuesdays and Fridays.[252] According to Toderini, Seyyid Hasan went on voyages to the Mediterannean, Atlantic Ocean, East India and even America and returned to Istanbul, by which it is understood that he was a good sailor and pilot. He preferred the instruments and tools made in England and maps made in Frence.[253]

He is known to have been commissioned by Kapudân-ı Deryâ Gâzi Hasan Pasha to the Ottoman Navy as the second captan *kapudâna/mîrî kapudân* on 27 March 1781, leaving his post at the school to his colleague Seyyid Osman Efendi.[254] He attended the second course offered by Lafitte Clavé in November 1784. As understood from Lafitte's explanations, Seyyid Hasan Efendi was a very clever person and a master seaman, with a good command of European languages such as

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[251] Beydilli, "İlk Mühendislerimizden Seyyid Mustafa ve Nizâm-ı Cedîd'e Dair Risalesi," p. 396.

[252] Çağatay Uluçay and Enver Karatekin, *Yüksek Mühendis Okulu* (İstanbul: Berksoy Matbaasi, 1958), p. 24.

[253] Uluçay and Karatekin, p. 23.

[254] Kaçar, "Osmanlı İmparatorluğu'nda Askeri Teknik Eğitimde Modernleşme Çalışmaları ve Mühendishanelerin Kuruluşu (1808'e Kadar)," p. 87.

French and Italian. Seyyid Hasan translated a treatise on geometry in February 1785 to be used as a textbook at the *Mühendishâne*. He attended all of Clavé's courses and never missed them. He helped in the translation of the French courses into Turkish in a clear language when needed.[255]

Seyyid Hasan is known to have translated Tondu's book entitled *Traité du Pilotage et de la Manaeuvre* (Treatise on Piloting and Maneuver) into Turkish, although it was not published.[256] He also translated a one–volume-book entitled *Sefînetü'l-Fikr Meşhûnet fi'd-Dürer* (A Ship of Idea, Loaded with Pearls), about the science of the construction of ships and galleons (*fenn-i inşâ-i sefâin ve kalyon*).[257]

In the aftermath of the defeat of an attempt to capture Kılburun during the Russian and Austrian wars started in 1787, he was found guilty of incompetence and executed. After his execution, the state confiscated his possessions and his books were transferred to the *Mühendishâne.*[258]Among the books were seven volumes on geometry (*hendese*) in French; an illustrated book of war instruments and tools (*şekilli âlât-ı harb ve edevât-ı cenk*), which has been brought from *Enderûn-ı Hümâyûn* (the palace school) and copied by Seyyid Hasan Efendi; a one-volume geometry book in Arabic, translated as *Hediyyetu'l Muhtedî* (Gift for the Convert) by Osman b. Abdulmennan (*Belgrad Tercümanı and Mimarı Osman Efendi*); three copies of Turkish translation of a treatise entitled *Sefînetü'l-Fikr Meşhûnet fi'd-*

[255] Kaçar, pp. 94-95.

[256] Ibid., p. 96.

[257] Ibid., p. 82 and 91. For the book, see İ. Ü. M.Ktp., TY. No. 2740.

[258] Beydilli, "İlk Mühendislerimizden Seyyid Mustafa ve Nizâm-ı Cedîd'e Dair Risalesi," pp. 395-396.

Dürer (A Ship of Idea, Loaded with Pearls); and a one-volume treatise in Turkish about rapid firing cannons.[259]

İsmail Kalfa/Halîfe was the chief Architect[260] of the Naval Arsenal and builder of the galleons the *Bahr-ı Zafer* (Sea of Victory) and the *Âsâr-ı Nusret* (Signs of Victory)[261] at the *Tersâne-i Âmire* in 1204/1789-90 and 1208/1793, respectively.[262]He must have died towards the end of the year 1217/1802, since we learn from a document dated 9 Receb 1217/5 Kasım 1802 that Nikoli Kalfa (the second architect in the Naval Arsenal) was appointed chief architect in the place of Ismail Kalfa, and that Ismail Kalfa's salary and other allowances had been transferred to Nikoli Kalfa. Additionally it can be judged from the same document that Ismail Kalfa must held the post of the chief architect in the Arsenal for a long time, since the Nicoli had been the second architect for forty to fifty years.[263] Another document of 10 Safer 1181/8 July 1767 sheds light on the beginning of Ismail Efendi's role as a chief architect. When Mustafa Halife was the chief

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[259] Kaçar, p. 91.

[260] As a sign of the post he carried a silver scepter. Among his retinue were architects and carpenters. In the second half of the eighteenth century there were ten architects and 400 carpenters under his command. See Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 431.

[261] BOA. Hatt-ı Hümâyûn, no.14666 (1205/1790-91). In this document Ismail Halîfe and Le Brun were compared with respect to their competence in building a 57.5 *zira* galleon at the Naval Arsenal. It seems that although Ismail Efendi's high capacity, experience and success in shipbuilding was recognized by the authorities, Le Brun was preferred to him.

[262] Karal, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar," p. 207.

[263] BOA. Cevdet-Bahriye, no. 330.

architect, Ismail Halife was the second *halife*. Therefore, Ismail Efendi must have been appointed to the post of chief architect after 1181/1767.[264]

Ismail Efendi had such duties as monitoring the procurement of shipbuilding materials and tools and the shipbuliding process, working in cooperation with the other authorities at the Arsenal to make decision about the employment of Otttoman and foreign architects and informing his superiors about the progress of construction projects.[265]

Hammâmîzâde Ahmed was the builder of the thirty-seven *zira* corvette the *Ferahnümâ* (Showing Happiness and Relief), which was clad in copper and carried a crew of 150 twenty-four guns. It was built at Silistire in 1207/1792-93. Gülşen Bey built the galleon the *Kilidü'l Bahir* (Barrier of Sea), a fifty-nine *zira* with twenty-four guns at Sohom.[266] He also oversaw the construction of a sixty-*zira* frigate at Sohum during 1797.[267]

A Numan Bey built a corvette at Kalas and the *Tersâne-i Âmire,* of thirty-seven *zira*, copper sheathed, with ten guns and 150 crew.[268]. He also built a 51.5 *zira* galleon in Gemlik in 1795. For this galleon, 2,100 *kantars* of raw iron were used.[269]

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[264] BOA. Cevdet-Bahriye, no. 642.

[265] For some of his duties, see BOA. Hatt-ı Hümâyûn, no. 9707/A-B. (1205/1790-91).

[266] Karal, p. 209.

[267] Emsen, p. 22.

[268] Karal, p. 209.

[269] Emsen, p. 16.

He is also reported to have built some other galleons, in 1798 and 1804, in Gemlik and to have sent them to the *Tersâne-i Âmire* for rigging and fitting out.[270]

Another ship builder whose name is recorded as Konyalı Ebubekir, built a galleon of fifty-one *zira* in Midilli in 1791.[271]

Captain Ahmed Hoca learned the science of shipbuilding (*fenn-i inşâ-i süfun*) from the French shipbuilder Le Roy, the engineer of the galleon the *Mukaddime-i Nusret* (Harbinger of Victory),[272] and became an assistant (*şakird*) to the Swedish engineer Rhode. He constructed the galleon the *Zîver-i Bahrî* (Ornament of the Sea) in Midilli in 1211/1796[273] on his own.[274] A picture of this ship was shown in Mahmud Raif Efendi's book.[275] Rhode recognized Ahmed Hoca's abilities and naval authorities appointed him chief master supervisor (*baş halife*) to the Naval Engineering School on 27 Receb 1211/26 January 1797. After his appointment to this post, his former rank of captain with a salary of 86.5 *kuruş* was removed and his pay was increased to 100 *kuruş* a month.[276] In an imperial edict of 1218/1803-04, his name was mentioned among the masters and engineers who had taught the science of shipbuilding at the *Hendesehâne* and then were commissioned and assigned to the

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[270] Tezel, pp. 666-667. See also Emsen, p. 25.

[271] Ali Haydar Alpagut and Fevzi Kurtoğlu, *Türkler'in Deniz Harp Sanatına Hizmetleri* (İstanbul: Deniz Matbaası, 1936), p. 31; and Emsen, 11.

[272] BOA. Cevdet-Bahriye, no. 5849; see also BOA. Hatt-ı Hümâyûn, no. 10405.

[273] Karal, p. 206.

[274] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 534.

[275] Mahmud Raif Efendi (translated and edited by Arslan Terzioğlu and Hüsrev Hatemi) *Osmanlı İmparatorluğu'nda Yeni Nizamların Cedveli.* See the appendix of the book.

[276] Uzunçarşılı, p. 535.

construction of imperial ships in the provinces and presently were employed at the Imperial Arsenal. In the document, Ahmed Hoca appears as a captain and the first master supervisor (*halife-i evvel*). At this post, he received a mothly salary of 100 *kuruş*, thirty *kiyyes* of *erz* (rice), fifteen *kıyyes* of *revğân-ı sâde* (butter), forty-five *kıyyes* of *lahm-ı ğanem* (mutton), and 210 loaves of *nân-ı aziz* (bread).[277] He passed away in 1838 as one of the senior instructors of *Mühendishâne*. His position was filled by the second *halîfe*, Mehmed Ali Efendi, who later was replaced by Ahmed Hoca's son, Mehmed Fâzil Efendi.[278]

Seyyid (*Büyük*)[279] Mustafa Hoca/Molla Mustafa became chief *kalfa* (assisstant foreman) under Le Brun. During his work under Le Brun, he learned shipbuilding using geometrical techniques (*nisbet-i hendesiyye üzre sefâin inşasını tahsîl*). Then naval authorities, in order to test his abilities, asked him to draw a picture of a frigate. He drew it and presented to the Sultan Selim. Four other people were also asked to draw similar pictures. All the pictures, including that drawn by Mustafa Hoca, were appreciated by the Sultan and they were awarded 720 *kuruş* (atiyye) in total.[280] In 1211/1796, he constructed the 41-*zira* frigate *Bûlheves* (Very enthusiastic) at Kalas.[281]

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[277] BOA. Hatt-ı Hümâyûn, no. 2529-a (1218/1803-04).

[278] Beydilli; "İlk Mühendislerimizden Seyyid Mustafa ve Nizâm-ı Cedîd'e Dair Risalesi," pp. 422-423.

[279] The adjective "*büyük*" is added by Beydilli to show that this person is not to be confused with Seyyid Mustafa, the writer of a monologue on *Nizâm-ı Cedîd.* For the discussion of the misunderstanding, see Ibid., pp. 387- 479.

[280] Ibid., p. 400.

[281] Karal, p. 206.

He was appointed as an instructor (second *kalfa*) with a salary of eighty *kuruş* at the *Mühendishâne-i Berrî-i Hümâyûn* in 1797.[282] He seems to have worked in his capacity as shipbuilding engineer/shipwright commissioned in the construction of the the cutwater (*talimar*) of the bow, caulking and building of the stern and the upper part of the stern of a galleon being constructed on 13 Rebî`u'l-âhir 1212/3 September 1797 in Kal'a-i Sultâniye in the Dardanelles Strait. He was given, probably by Le Brun, some measuring equipment (*endâzeler*) with which to work. After the completion of the required parts, launching was undertaken by other architects. The government notables gave considerable importance to him. The document related to his employment in the above-mentioned work also indicates that Küçük Hüseyin Pasha insistently requested the *Kal'a-i Sultâniye Nâzırı,* the superintendent of the naval activities in Kal'a-i Sultâniye, not to fail in showing the required respect to Seyyid Mustafa and in making him feel comfortable in terms of accomodation, travel allowance and foodstuffs. [283]

In an imperial edict of 1218/1803-04, his name is mentioned among the masters and engineers who had previously taught shipbuilding at the *Hendesehâne* and then had been commissioned and assigned to the construction of imperial ships in the provinces and were presently employed at the Arsenal. In the document Mustafa Hâce appears as the second master supervisor (*halîfe-i sâni*), with a monthly salary of eighty-three *kuruş*, twenty *kiyyes* of *erz* (rice), ten *kıyyes* of *revğân-ı sâde*

[282] Uzunçarşılı, pp. 534-535.

[283] BOA. Cevdet-Bahriye, no. 3032.

(butter), thirty *kıyyes* of *lahm-ı ğanem* (mutton), and 120 loaves of *nân-ı aziz* (bread).[284]

Seyyid Mustafa served under the Mahmut II as well. Leaving his post in *Mühendishâne* in 1813, he was appointed chief architect of shipbuilding with a 300 *kuruş* salary, two *vakiyyes* of meat, 2.5 vakiyyes of olive oil and six loaves of bread from the *Tersâne-i Âmire Zindanı Fırını*. He replaced the *Tersâne-i Âmire Başmimarı,* Nikoli Halîfe, who had been removed from his post due to incompetence.[285] With the official title "*Ser Mimâr-ı Hâssa* (Chief Royal Architect)," he participated in the foundation ceremony of the dry-dock at the Naval Arsenal on 23 Rebî'u'l-evvel 1239/ 27 November 1823, together with Grand Vizier Silahdar Ali Pasha, Şehremini Hayrullah Efendi, Tersâne Emini Ataullah Efendi, Teşrîfâtî Süleyman Necîb Efendi and other notables. He stayed in this position for eleven years before he was removed from it on 23 Rebî'u'l-evvel 1240/ 15 November 1824. Afterwards he seems to have fallen into bad straits and a 250 *kuruş* pension was alloted to him.[286]

Among the Muslim shipwrights were a number of men of foreign birth who had converted to Islam. One such ship builder was the engineer Selim, known also as Mühendis Selim Ağa, Selim Efendi, İngiliz Selim, Baily and Bailey. He is reported to have left his country because of his anger with a relative over a matter of dignity

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[284] BOA. Hatt-ı Hümâyûn, no. 2529-a (1218/1803-04).

[285] Beydilli, "İlk Mühendislerimizden Seyyid Mustafa ve Nizâm-ı Cedîd'e Dair Risalesi," pp. 406-407.

[286] Ibid., pp. 408-409.

(*şeref meselesi*)[287] and embraced Islam. This young English engineer took the name Selim and entered the service of the Porte in 1792, with a salary of thirty *kuruş*.[288]

He worked in the capacity of assistant to the director of the works, Küçük Râşid Efendi, who was a man of ability and a favourite of the late Reis Efendi. Selim Efendi had the charge of the restoration of the fort of Bender. During his stay in that district he was ordered to reconnoitre the greatest part both of the Dniestr and the Danube, and on his return reported the expediency of fortifying the positions of Akkerman, on the Dniestr, about ten leagues below Bender, Kilia, situated near the northermost mouth of the Danube, was said to have the deepest water for navigation. His plans for these places were then taken under the consideration of the military committee of the supreme council, of which Çelebi Efendi was a leading official.[289]

Together with Hüseyin Rıfkı Tamani (*second halîfe* then), Selim Efendi translated a treatise entitled *Usûl-i Hendese* (Method of Geometry) on 6 Cemâziye'l-evvel1212/ 27 October 1797.[290] He, supposedly, helped Hüseyin Rıfkı Efendi translate Euclid.[291]

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[287] Osman Nuri Ergin, *Türkiye Maarif Tarihi*, I-II (Istanbul: Eser Matbaası, 1977), p. 322. See also PRO. FO 78/15, (1794), p. 342.

[288] Beydilli, "İlk Mühendislerimizden Seyyid Mustafa ve Nizâm-ı Cedîd'e Dair Risalesi," pp. p. 53.

[289] PRO. FO 78/15 (1994), p. 342. Beydilli says that Selim Efendi was commissioned to repair the fort of İsmail on 3 Şa'bân 1208/ 6 March 1794. Also he was employed in the repairs of the forts Yergöğü and Niş as well as some other fortified places. He applied geometrical methods to these places. See Beydilli, p. 53.

[290] Beydilli, p. 53 and 254.

[291] Kazım Çeçen, p. 14.

Selim Efendi is recorded as having been discussed to accompany the Ottoman in its defence of Egypt under the command of Grand Vizier Yusuf Ziya Pasha in the aftermath of the French attack in 1799. Having declined to join the campaign, his monthly salary of 100 *kuruş* was stopped. He was soon reemployed by the state with the salary of 100 *kuruş* in preparing maps and translating English, French and Italian books at the *Mühendishâne* related to geometry, the construction and siege of forts, temporary trenches digging, the construction of bridges, *Atlas-ı Kebîr* (World Atlas) as well as explaining how to draw the instruments in the books and how to apply all of this theoretical knowledge in practice.[292]

He was appointed the fifth assisstant or *kalfa* (until then there had been four caliphs) to the *Muhendishâne-i Berrî-i Hümâyun* with the recommendation of the instructor at the *Mühendishâne*, Abdurrahman Efendi, and given *berat* (written permission) on 2 Rebî`u'l-âhir 1216/12 August 1801. His salary was first increased to an annual 600 *kuruş* and later on to 750 *kuruş*, paid from *cânib-i mîrî* (state treasury). Meanwhile, he continued his services at the Naval Arsenal and at Beykoz. He seems to have invented and constructed some wheels (*çarh*) and been involved in similar works.[293]

Selim Efendi is perhaps best known for his efforts to fly trial balloons, the first attempt to utilize such technology for military purposes in the Ottoman Empire. Such balloons were used when conditions made it impossible to send messages to or to correspond with allies outside of a fort besieged by the enemy. In the Fall of 1801, Selim Efendi filled a balloon with hot air and carried out several unmanned flights.

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[292] Beydilli, "İlk Mühendislerimizden Seyyid Mustafa ve Nizâm-ı Cedîd'e Dair Risalesi," p. 53.

[293] Ibid., p. 53.

He presented his invention to Sultan Selim III and it was welcomed. In his first trial, his balloon came to earth in a field beyond Çorlu. When the owner of the field took this strange object to the local judge (*kadi*), the news reached Istanbul. In Selim's second trial, he attached a human form made of wood. The wooden man made it as far as Bozhâne, when the balloon became hung up on the wall of a fort.

In the third trial, a balloon made of red fabric was flown. Letters bearing the message "if this balloon reaches any of you under your administration, let the Porte/Istanbul know about it" adressed to the *kadı*s and *nâib*s (aide)" "were put inside the ballon. This trial was successful. Sakız Naibi Efendi saw it off Marmara and took it to Istanbul. Selim Efendi was awarded by the Sultan and appointed to the *Mühendishâne*. Selim Efendi launched another trial in front of the Yalı Köşkü during the ceremonies marking the saving of Egypt on 18 Cemaziyelâhir 1216/26 October 1801. At the time, Selim Efendi was a *halîfe* at the *Hendesehâne* and in charge of manufacturing fireworks (*havâî fişek*) at the Arsenal.[294]

Ottoman documents give information about his later services. A document of 1218/1803-04 reports that engineer Selim presented a petition demanding his salary of seven months (from the beginning of Rebiulahir to the end of the month Şevval), which added up to 1,190 *kuruş* (monthly 170 *kuruş*) in return for his various services be paid. The government assessed his petition and agreed to pay him the

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[294] Ekmeleddin Ihsanoğlu, "Osmanlı Havacılığına Genel Bir Bakış," in *Çağını Yakalayan Osmanlı-Osmanlı Devleti'nde Modern Haberleşme ve Ulaşım Teknikleri* (eds. E. İhsanoğlu and Mustafa Kaçar), (İstanbul: IRCICA, 1995), pp. 502-504. İhsanoğlu also mentions the names of two English balloon operators who were artificers and members of the Mahematical Society of London: Baily and Devignes. He says that these persons were invited by Selim III to realize a balloon flying and they succeeded in flying a balloon of eight feet in diameter after filling it with hydrogen. Second trial with a bigger balloon took place on 7 October 1802 before a crowd of people, about 25-35,000 in number, and such important figures as the Sultan, Kapudan Pasha and all the foreign ambassadors including Lord Elgin, assembled in the valley of Dolmabahce. The second balloon, which was made of red silk fabric, was 15 feet in diameter and filled in 39 minutes. Its stay in the air lasted for 20 hours and it crossed Marmara Sea and landed in Asia. The authorities awarded these two Englishmen. See Ihsanoğlu, pp. 504-505. It is unclear whether the balloon operator Baily was the same as he known as Selim Efendi, or if there was any connection between them.

sum. The same document gives additional information as well. He is understood to have served the imperial army during the campaign in Egypt and have drawn maps for various purposes. It is also understood that he was given permission for the service of the Porte on 18 Muharrem 1215/1800-01 and his salary was increased an additional 70 *kuruş* beginning from Muharrem 1217/May-June 1802. Furthermore, in 1218/1803-04 he was commissioned to travel to England by Kapudan Huseyin Pasha and again during the administration of the governor of the Imperial Naval Arsenal, Aziz Efendi, to learn the construction and manufacture of a newly invented fire pump (*ateş tulumbası*) for the gates of the large drydock at the Imperial Naval Arsenal.[295]

His name (as Baily) is mentioned in the correspondence dated 2-11 December 1805, in connection with the Ottoman request for steam engine from England, between the British mission at Istanbul and the British government in England. He was described as a renegade Englishman with a sufficient knowledge of mathematics and mechanics to pass for a good mechanical engineer among the Turks, and that he was very much in confidence.[296]

After the deposition of Selim III in the aftermath of Kabakçı Rebellion, Selim's salary was stopped, in spite of his fifteen years of service and his title, *Hassa Silahşörlüğü* (a rank for palace officers in charge of weapons), which he had been awarded not long before. Since he depended on this salary, he soon fell into bad starits. His later applications for the allotment of a salary were ignored by the

[295] BOA. Cevdet-Bahriye, no. 4010.

[296] PRO. FO 78/46 (2 December 1805) and (11 December 1805).

authorities, who suggested he wait until the appearance of a suitable position.[297] Some writers suggest that he left the country as a result of bad treatment[298] while others think that he might have been killed by rebellious Janissaries following the Kabakçı Rebellion.[299]

From Austria (Nemçe) was a convert known by the name Mustafa. He was employed as a draftsman along with a bridge builder, Andon/Antoin in Silistire on 8 Safer 1205/17 January 1790 by the Porte. They worked in drafting pictures of and designing the plan of a bridge, which were then sent to the Porte for evaluation by the skilled architects. Their skills in geometry (*ilm-i hendese*) and bridge construction were much appreciated.[300]

In addition to the names mentioned above were those of other naval architects such as Ismail, Çakır Ali, Fidanoglu Mehmet, Kalaslı Ali, of whom little is known beyond their names.[301] A document dated Recep 1217/October-November 1802 states the names of some Muslim architects in the Naval Arsenal and their other allotments. Among these names were Gümüşhaneli Hacı Mustafa, who received

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[297] Beydilli, p. 53.

[298] Mustafa Kaçar, referring to *Menâkıb-ı Kethüdâzâde Mehmed Ârif Efendi,* writes that Selim Efendi came to Istanbul during the reign of Selim III. He was capable of melting iron through works and making some iron tools such as chains used on ships. He embraced Islam, since he loved Muslim clothes and customs (âdet). Following his conversion, some leading figures with whom he met and spoke without any difficulty earlier on, began to insult him later because of his wearing Muslim clothes. Therefore, he left the country, saying, "Now I find out that knowledge is in my hat not in my head." Kaçar goes on, quoting from Arif Efendi, who said "if we did not fail to show respect to him and employ him, we would have perfect iron works, but unfortunatelly we lost him". See Kaçar, "Osmanlı İmparatorluğu'nda Askeri Teknik Eğitimde Modernleşme Çalışmaları ve Mühendishanelerin Kuruluşu (1808'e Kadar)," p. 108.

[299] Çeçen, p. 14.

[300] BOA. Hatt-ı Hümâyûn, no. 9792.

[301] Gencer, *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezareti'nin Kuruluşu (1789-1867)*, p. 53.

1,800 *kuruş* monthly salary, 1 *kıyye* of butter (*revğân-ı zeyt*) and two loaves of bread (*nân-ı azîz*) a day from the superintendent of the Naval Arsenal and 0.5 *kıyye* of mutton (*kuşt-ı ğanem*) a day from the chief butcher (*kassabbaşı*); Ali Halîfe, who received 1,800 *kuruş* monthly salary, 1 *kıyye* of butter and two loaves of bread a day and 0.5 *kıyye* of mutton a day; Mustafa with 1,800 *kuruş* monthly salary, 1 *kıyye* of butter and two loaves of bread a day and two *kıyyes* of mutton a day; Samatyalı Oğlu Mustafa Halife with 1,800 *kuruş* monthly salary, 1 *kıyye* of butter and two loaves of bread a day and two *kıyyes* of mutton a day; Karayaki with 1,200 monthly salary, 0.5 *kıyye* of butter and two loaves of bread a day and 0.5 *kıyye* of mutton a day; Ali, a recently hired architect, was given 720 *kuruş* monthly salary, and 1 loaf of bread a day and 0.5 *kıyye* of mutton a day.[302]

An imperial edict (*Hatt-ı Hümâyûn*) gives information about the personnel at the *Hendesehâne* (Geometry School) of the Imperial Arsenal of 1218/1803-04 in three parts. In the first part, the names, salaries and victuals of the masters and engineers who had previously taught the science of shipbuilding at the *Hendesehâne* and then were commissioned and assigned to the construction of the imperial ships in the provinces and presently employed at the Arsenal were given. Beside Ahmed Hâce, captain and the first master supervisor/*halife-i evvel*, and Mustafa Hâce, second master supervisor/*halife-i sâni*, both of whom were discussed above, some other personnel were Hafız Hâce, Ali Hâce, Muhammed Hâce, Mimar Manol Kalfa (mentioned above), Costa, Küçük Mustafa Hâce, Giridî Ahmed Hâce, Tahir Hâce, İstanbullu Abdullah Hâce and Mimar Tanaş Kalfa.[303] Each received a salary of twenty-five *kuruş*.

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[302] BOA. Cevdet-Bahriye, no. 330. For the complete text, see Appendix K.

The second part includes the names, salaries and victuals of the masters (*üstâd*) and their students (şakirdân) dealing with cartography and geography at the *Hendesehâne*. Among the names were Osman Efendi, the first instructor/*hâce-i evvel*; And Ahmed Hâce, the first master/ *halife-i evvel*, receiving monthly salary of sixty *kuruş*, twenty *kiyyes* of rice and ten *kıyyes* of butter, thirty *kıyyes* of mutton and 120 loaves of bread. Others were Hafızzâde Eşref Hâce, Çavuşbaşızâde Halil Hâce, Gemiağasızâde Ahmed Hâce, Miftahağasızâde Cafer Hâce, Kasımpaşa'lı Süleyman Hâce, Yeniçeşmeli Hâfız Râşid Hâce, Kolancı zâde Muhammed Hâce, Atıyye Kapudanzâde İsmail Hâce, Tophaneli Seyyid Muhammed Hâce, Ali Kapudanzâde Muhammed Hâce, Kerânecizâde İsmail Hâce, Kabataşlı Hâfız Arif Hâce, Pasha Kapudanzâde Mustafa Hâce, Flemenk Kapudanzâde Salih Hâce, Hacı Osmanzâde Ali Hâce, Tophaneli Ahmed Hâce, and Hâce Efendizâde Şakir Hâce, receivıng fifteen *kuruş* each.

The third part of the document gives the names of the *mülazım şakirds* (teaching assisstants) at the *Hendesehâne*: İbrahim Kapudanzâde Selim Hâce, Asitaneli Salih Hâce, and Riyâle Beyzâde Salih Hâce. Also mentioned is a *Mimâr-ı Sütûn* with a salary of 2,100 *kuruş* who was in charge of selecting and classifying the various kinds of posts.[304]

The names of other men working in secondary jobs in the naval arsenal were Mutemed Said Ağa (paymaster), Kâtib Mehmed Emin Efendi, Mahzenci Dede Mustafa (store keeper), Divanhâne Çavuşu Mustafa (officer in charge of the Divanhâne, the official residence of the Kapudan Pashas), Tosyalı Mehmed, Gebzeli

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[303] He is known to have built, together with Mühendis Ali Efendi, the *Hıfzürrahman* (Protection of God) of 64 guns in 1825. See Tezel, p. 666.

[304] BOA. Hatt-ı Hümâyûn, no. 2529-a (1218/1803-04).

Mehmed Kaptan, Seyyid Ahmed, Ser-hammâl Cezal (chief porter), Hacı Süleyman (foundryman or *dökmeci*), Lağımcıbaşı Lütfullah, sapper, Hasan, Dolab Reisi Mehmed (officer in charge of the use of treadmill) Reis, Ibrahim Çavuş, and Taşçı kalfası Tahir (stonemason).[305]

Having discussed the roles of foreign and Ottoman technicians in naval modernization, it is important not to stress that a fertile setting for these activities had been prepared by the administrative and naval reorganizations of the early nineteenth century. In this context, the regulations issued between November 1804 and May 1805 are striking. This period witnessed, for the first time, the creation of a Ministery of the Naval Affairs (*Umûr-i Bahriye Nezareti*) to replace the post of chief of the Arsenal (*Tersâne Emâneti*). All the duties, responsibilities, division of labour, salaries, rations, ranks, signs, uniforms, and retirement issues of the personnel of the Arsenal, navy and Naval School were determined and organized in detail by these regulations.[306] One of the most important novelties of the regulations was the establishment of an independent treasury (*Tersâne Hazinesi*) peculiar to the navy and administered by the Minister of the Navy (*Bahriye Naziri*).[307]

Foreign missions played an important role in the modernization of the Ottoman naval technology with the services they rendered specifically from the late eighteenth century onward. Their contributions can be assessed in three parts. First, they helped the Ottoman State keep abreast of the general technological

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[305]Tezel, p. 656.

[306] Gencer, *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezareti'nin Kuruluşu (1789-1867)*, pp. 65-89.

[307] For a detailed account of the creation of the *Tersâne Hazinesi* see Yavuz Cezar, "Osmanlı Devleti'nin Mali Kurumlarından Tersâne-i Amire Hazinesi ve Defterdarlığı'nın 1805 Tarihli Kuruluş Yasası ve Eki," *Istanbul Universitesi İktisat Fakültesi Mecmuası*, (Ord. Prof. Ömer Lutfu Barkan'a Armağan), 41/1-4 (İstanbul, 1985), pp. 361-388.

developments in the world and specifically in Europe as a result of a cunning international policy followed by Selim III. In this context, Selim's diplomatic efforts, political maneouvers, especially via embassies in the foreign countries, to make Istanbul a point of attraction for foreign officers, engineers and technicians should be taken into consideration. Selim's policy was so successful that in addition to the missions sent through official channels there were individual men, groups or families, skilled or unskilled, who applied to the Porte for technical jobs. This enabled the Porte to choose from a wide spectrum of foreign missions.

It is important to note that high wages were very influential in the preference of individuals of the Ottoman state. Ottoman and foreign documents show that despite some instances where the foreigners complained about low, irregular and unpaid salaries, it was a fact that foreign officers and engineers were paid much more than Ottoman subjects and what they would have had at similar jobs in their own countries and more than cases of religious for financial gain are common. For instance, when asked the reasons for his conversion to Islam and whether he did not continue in the faith of Christianity, a physician admitted that he had hoped to make money among the Turks and thought he could do no less than compliment with his religion. However, it is unfair to consider all the conversion cases within this framework without knowing each story. The later performance of the physician is unknown, but it is certain that the Ottoman authorities did not fail to dismiss unskilled foreigners. Although the embracing of Islam made the converts more attractive to Ottoman administrators, to some extent, it was not a sufficient factor for their employment in jobs requiring skill and technical proficiency.

Second, these foreign missions rendered substantial contributions in the sphere of naval warfare as well, including tactics, maneuvers and the use of navigational instruments. The third contribution was in technical areas such as shipbuilding and launching methods, the construction of drydocks, the use of new raw materials, tools and equipment. These technical advances enabled the Ottoman state to wage naval campaigns with a modern fleet, for instance, against the French forces invading Egypt.

The final and probably most influential contribution was their training of Ottoman engineers and officers. Foreign instructors taught Ottoman students the above-mentioned branches in theoretical and practical courses organized within the body of the Naval and Land Engineering Schools. Additionally, other Ottoman subjects and artisans were given the opportunity to learn the intricacies of their arts in master-apprentice arrangements.

CHAPTER FOUR

THE NAMES AND FEATURES OF THE NAVAL SHIPS OPERATING DURING THE REIGN OF SELIM III

The linguistic and literary assessment of ship names has received little attention from historians and other academics.[1] However, their importance cannot be ignored, considering the close relationships between Ottoman ships and the names attributed to them.

Every ship, irrespective of its being naval or mercantile, must bear some kind of distinguishing label for identification, reference and communication. This rule was valid for Ottoman ships as well. However, Ottoman ships were not given individual names during the period of galleys, up to the eighteenth century, but were called by the names of their commanders, such as "Hasan Reis's galley," or "Ahmet Reis' galliot." Of course, there were some exceptions to the general trend. Two ships of the *baştarda* type (an old war-galley of intermediated size) were named the *Yeşil Melek* (Green Angle) and the *Sultan*. The first was used during Süleyman I's Rhodes campaign in 1522, and the second during his Malta campaign in 1565.

[1] For the evaluation of the Ottoman historiography of sea from a literary point of view, see Caludia Römer, "The Sea in Comparisons and Metaphors in Ottoman Historiography in the Sixteenth Century," *The Ottomans and the Sea*, ed. Kate Fleet (Cambridge: Skilliter Center for Ottoman Studies and Istituto Per L'Oriente C. A. Nallino, 2001), pp. 233-244; also see Victoria Holbrook, "Oceanic Feeling, Narcissism and the Post Classical Image," in Fleet (ed.), *The Ottomans and the Sea*, pp. 245-254.

Ottoman ships began to be given proper names in the second half of the seventeenth century. This period was also marked by the transition to the galleon type sailing ship. The previous ship namimg tradition continued for some time. Only the triple decked galleons of the ships belonging to naval commanders such as the Kapudân-ı Deryâ, Kapudâne, Patrona and Riyâle were named.[2]

Ottoman galleons were named in various ways. Occasionally, they were named after the person or people who financed their construction. The *Uzunçarşı*, for instance, the first big galleon supposedly built for the Ottoman navy and the keel of which was put on the stocks in the Imperial Naval Arsenal in 1648, was given its name since she had been financed by the tradesmen of Uzunçarşı during the Crete campaign.[3]

At the beginning of the eighteenth century, the most striking physical features of a ship, such as its colour, stern, bow, hull shape and figurehead came to be influential in its naming. Close examination of the ship names sheds considerable light on the shapes and technical features of the ships and allows for the establishment of a visual gallery of ships. In this context, such names as the *Ejderbaşlı* (Dragon-figureheaded), the *Fırkateyn-i Kaplan Başlı* (Frigate with Tiger-Figurehead), the *Yılanbaşlı* (Snake-figureheaded), the *Akrepbaşlı* (Scorpion-figureheaded), the *Gülbaşlı* (Rose-figureheaded), the *Küçük Gülbaşlı* (Small Rose-figureheaded), the *Bayaz Atbaşlı* (White Horse-figureheaded), the *Siyah Atbaşlı* (Black Horse-figureheaded), the *Al Atbaşlı* (Red Horse-figureheaded), the *Karnı Atbaşlı* (Having the Belly of a Horse Figurehead), the *Esterkıçlı* (Mule-Sterned), the

[2] Bahri S. Noyan, "Eski Gemilerimizin İsimleri," no. 1, pp. 91-94.

[3] Eser Tutel. *Gemiler...Süvariler...İskeleler...* (İstanbul: İletişim Yay., 1998), p. 140.

Şadırvankıçlı (Fountain-Sterned), the *Çifte Ceylankıçlı* (Double Gazelle-Sterned), the *Zülfükarkıçlı* (Having the Stern of the Prophet Ali's Double-Headed Sword called Zülfikâr), the *Yaldızlı Narkıçlı* (Having a Pomagranate Gilded-Stern), the *Yaldızlı Batkıçlı* (Having Gilded, Narrow Stern), the *Güneşkıçlı* (Sun-Sterned), the *Kadırgakıçlı* (Galley-Sterned), the *Servibahçeli* (Having a Garden of Cypress), the *Kuşbahçeli* (Having an Aviary), the *Kırmızıkuşaklı* (Red-Belted), the *Yeşilkuşaklı* (Green-Belted), the *Mavi Arslanbaşlı* (Blue Lion-Figureheaded), the *Siyah Arslanbaşlı* (Black Lion-Figureheaded), the *Maviboyalı* (Painted Blue), the *Yaldızlı Hurma* (Gilted Date), and the *Çifteçaprazlı* (Double Transversed) were just a few of the names to appear in 1716-1717.[4]

Between 1736 and 1739, most of these ships were still in use, along with some additional ones. New names were the *Çift Aslan* (Double Lion), the *Büyük Gülbaşlı* (Big Rose-Figureheaded), the *İki Bağçeli* (Double-Gardened), the *Yaldızlı Şâhin* (Gilded Falcon), the *Mavi Arslan* (Blue Lion), and the *Mavi Firkata* (Blue Frigate).[5] Between 1737 and 1738 among other ship names seen were the *Çift Kaplan* (Double Tiger), the *Sipâh-ı Bahr* (Army of the Sea), the *Mâlika-i Bahr* (Owner of the Sea), the *Deve Kuşu* (Ostrich), the *İspinoz* (Chaffinch), the *Beyaz At* (White Horse), the *Al-qaṣr* (the Palace), the *Zülfikar* (Double-Headed Sword of Ali), the *Yaldız Bağçeli* (Having a Gilded Garden), the *Yıldız Kıçlı* (Star-Sterned), the *Ay Bağçeli* (Moon-Gardened), the *Sarı Kuşaklı* (Yellow-Belted), the *Yaldızlı Nar*

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[4] Tezel, p. 617.

[5] The names are taken from Panzac, who says he obtained them from a French document entitled *Etat de la Marine du Grand Seigneur* drawn up in 1736-39 by the ambassador of France at Constantinople on the occasion of the tension between Venice and the Ottoman Empire. See Daniel Panzac "Armed Peace in the Mediterranean 1736-1739: A Comparative Survey of the Navies," *The Mariner's Mirror* 84, no. 1 (London: Greenwich National Maritime Museum, Society for Nautical Research, February 1997), pp. 44-45.

(Gilded Pomagrenade), the *Baba Ibrahim* (Ibrahim the Father), the *La Premiere*, the *La Seconde*, the *Küçük Şahin* (Young/Small Falcon), the *Serçe Kuşu* (Sparrow), the *Beyaz Şahin* (White Falcon),and the *La Bleue.*[6] This practice of naming boats after their appearance continued into later periods. The *Tek Direkli Uskuna* (Single-Masted Uskuna), operating in 1791 is a good example of shape-based naming.[7]

From the mid-eighteenth century onward, combined heroic (*hamasî*) and epic names began to prevail. The attempts of establishing a new Ottoman navy in the aftermath of the Çeşme Incident in 1770 and Selim III's ascendance to the throne after two decades of the Incident accelerated this change, as did the long Russo-Ottoman wars. The *Niheng-i Bahrî* (Crocodile of the Sea), the *Şehbâz-ı Bahri* (Sea Falcon/Braveheart of the Sea), the *Râd-ı Bahrî* (the Braveman/Generous Man of the Sea), the *Burc-ı Zafer* (Tower/Fortress of Victory), the *Peleng-i Bahrî* (Sea Tiger), the *Nasr-ı* Cenk (Victory of war), the *Serheng-i Nusret* (Warrior for Victory), the *Peyk-i Nusret* (Harbinger of Victory), the *Mukaddeme-i Nusret/Mukaddeme-i Zafer* (Beginning of Victory), the *Necm-i Zafer* (Star of Victory), the *Seyyâd-ı Bahrî* (Hunter of the Sea), the *Berîd-i Fütuh* (Courier of Conquests), the *Nesîm-i Zafer* (Breeze of Victory), the *Hilâl-ı Zafer* (Crescent of Victory), the *Fâtih-i Bahrî* (Conqueror of the Sea), the *Mesken-i Gâzi* (Residence of the Victorious Fighter for the Islamic Faith), the *Peyk-i Zafer* (Harbinger of Victory), the *Kâid-i Zafer* (Leader of Victory), the *Reber-i Nusret* (Guide to Victory), the *Küh-ı Revân* (Agile/Flowing Mountain), the *Hüsn-i Guzât* (Beauty of Holy Warriors), *Nüvîd-i Fütuh* (Glad Tidings of Victories), the *Bahr-i Zafer* (Sea of Victory), the *Hilâl-ı Zafer* (Crescent

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[6] Panzac, "Armed Peace in the Mediterranean 1736-1739," p. 55.

[7] BOA. Hatt-ı Hümâyûn, no. 9658.

of Victory), the *Âsâr-ı Nusret* (Signs of Victory), the *Pertev-i Nusret* (Beam of Victory), the *Ejder-i Bahrî* (Dragon of the Sea), the *Hümây-ı Zafer* (Phoenix of Victory), the *Arslan-ı Bahrî* (Lion of the Sea), the *Salâbetnümâ* (Showing Power/Firmness), the *Şiâr-ı Nusret* (Hallmark of Victory), the *Heybetendâz* (Awe/Majesty Inspiring), the *Şehper-i Zafer* (Great Wing of Victory), the *Şevketnümâ* (Showing Majesty), the *Bûlheves* (Very Enthusiastic), the *Zaferküşâ* (Bringing victory), the *Cenk-Âver* (Brave Fighter), the *Bâdi-i Nusret* (Sailing Ship of Victory), the *Tîz Hareket* (Swift Moving), the *Kaplan-ı Bahrî* (Tiger of the Sea), the *Seddü'l Bahir* (Barrier of the Sea), the *Bedr-i Zafer* (Full Moon of Victory), the *Civân-ı Bahrî* (Handsome Young Man of the Sea), the *Bed'-i Nusret* (Beginning of Victory), the *Beşîr-i Zafer* (Harbinger of Victory), the *Husn-i Gazât* (Beauty of Victories), the *Bidâyetü'l Fütûh* (Beginning of the Conquests), the *Mukaddime-i Nusret/Mukaddime-i Zafer* (Beginning of Victory), the *Tılsım-ı Zafer* (Talisman of Victory), the *Şihâb-ı Sâkib* (Shooting Star), th *Burc-ı Zafer* (Tower/Fortress of Victory), the *Has Gazât* (Unique Holy Wars), the *Bâis-i Nusret* (Reason for Victory), the *Nusret-Nümâ* (Showing Victory), the *Pulâd-ı Bahrî* (Steel/Sword/Mace of the Sea), the *Menba-ı Nusret* (Source of Victory), the *Kilidü'l Bahir/ Kilidü'l Bahrî* (Lock of the Sea), the *Şehîd-i Zafer* (Martyre of Victory), the *'Îd-i Nusret* (Feast of Victory), the *Zü'l Ukâb* (Owner of an Eagle), and the *Cabbâr-ı Bahrî* (Orion/the Grand Sovereign of the Sea) were some examples[8] of compound heroic names.

The most striking aspect of these heroic names is the use of such motifs as wild animals, hunters, fortresses and mountains as deterrents to other navies and encouragement to the Ottoman warriors. Common features they associate are power,

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[8] Some of these ship names are taken from Tezel, pp. 617-618, with some corrections. For the rest of the names see the ship names and other details in the following pages on this chapter.

self-confidence, agility, glory and glad tidings for victory. Another motif is the role of leading warriors to victory in holy war against the infidels.

An important point to note is the similarities between ships names in different countries. Similar ship names, for instance, in England go back to the reigns of Henry VII and Henry VIII, when fighting ships appeared as a type seperate and distinct from merchant ships armed with cannons. The *Regent,* the *Lion,* the *Dragon,* the *Greyhound* (1545 and another ship of the same name in 1712), the *Bonaventure,* the *Mary Rose* and the *Sovereign of the Seas* (1637, and later on *Royal Sovereign* in 1660*)* are ship names that survived into the twentieth century. However, most Elizabethan ships bore warlike names such as *the Victory* (1765), *the Triumph, the Repulse, the Revenge* (1577), *the Defiance,*[9] and later on, *the Valiant* (1759), *the Inflexible* (1776), *the Thunderer*[10] as well as some compound names such as the *Dreadnought, the Vanguard, the Swiftsure, the Warspite.*[11] Some French ships such as *La Gloire* (1707), *the Terrible* (1739), *the Panthère*, (1744), *the Invincible* (1744), *Le Protecteur* (1755), *Superbe* (1785),[12] and ships from the United States such as *the Rattlesnake* (1781), *the Wasp* (1794) and the *Revenge* (1805)[13] can be put in this category.

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[9] T. D. Manning and C. F. Walker, *British Warship Names* (London: Putnam, 1959), p. 28.

[10] Richard Woodman, *The Story of Sail* (London: Catham Publishing, 1999), p. 103.

[11]Manning and Walker, p. 28.

[12] Woodman, pp. 102-109.

[13] Ibid., p. 115.

In the Ottoman Empire in the same period names such as the *Zîver-i Bahrî* (Ornament of the Sea), the *Tâvus-ı Bahrî* (Peacock of the Sea), the *Ankâ-yı Bahrî* (Phoenix of the Sea), the *Mürg-i Bahrî* (Bird of the Sea), the *Serçe* (Sparrow), the *Devekuşu* (Ostrich), the *Gazâl-ı Bahrî* (Gazelle of the Sea), the *Ceyrân-ı Bahrî* (Gazelle of the Sea), and the *Hûri-yi Bahrî* (Houri of the Sea) were common. The use of the names of some birds and of gazelle can be explained through their aesthetic and cultural associations. Additionally, the legendary bird, the phoenix, refers to the tale *Simurg* (The Thirty Birds) by Feridüddin Attar. On the other hand, the houri, the angel-like female creature of Paradise, appears as one of the divine rewards for sailors who died in holy war against the infidels and therefore had the right to enter Paradise as well as to enjoy pleasure, good service and comfort.

The introduction of names from Greek and Latin mythology, reflecting the classical flavours of the age, began to be felt in every walk of English life from the mid-eighteenth century onwards. The names of gods, goddesses, nymphs, princes, kings, heroes and monsters of mythology became favourable for ships. Examples are the *Jupiter,* the *Agamemnon,* the *Bellerophon,* the *Minotaur,* the *Minerva,* the *Dido* and the *Arethusa.*[14]

In the Ottoman Empire, the *Ferahnümâ* (Showing Happiness and Relief), the *Küşâde Baht* (Having Good Fortune), the *Nîreng-i Bahrî* (Magic of the Sea), the *Birr-i Bahrî* (Goodness of the Sea), the *Meserret-i Bahrî* (Joy of the Sea), the *Beşâretnümâ* (Showing Glad Tidings), the *Meşreb-i Bahrî* (Spring of the Sea), the *Secâ-ı Bahrî* (Nature/Disposition of the Sea), the *Sâika-ı Bâd* (Drive of Wind), the *Seyyâh-ı Bahrî* (Traveller of the Sea), and the *Bahr-ı Amîk* (Deep Sea) were also

[14] Manning and Walker, pp. 32-33.

among names used for ships.[15] Here the common elements were happines for and glad tidings of a future victory as well as harmony with the sea.

Another striking point is the preference for the names of such wild animals as the lion, tiger, snake, scorpion, crocodile, eagle, falcon and the legendary dragon in order to emphasize the terrifying and dashing quality of the ships. The horse and mule, on the other hand, symbolize the durable and lasting character of the navy. The main aim in using such names was double-sided: to encourage the Ottoman crew and warriors, and to terrorize the enemy psychologically before and during battle. Similar names were used in for Western vessels. In the first three quarter of the eighteenth century, English ships had names such as *the Leopard, the Dragon, the Antelope, the Eagle, the Panther, the Kingfisher,* and *the Swallow*. In the late eighteenth century, some other names, e.g., *the Elephant* were added.[16]

Names bearing religious associations or representing the wishes for God's victory or help were also common. Various attributes and names of God, some in Arabic and some in Persian were used in these name combinations. Among the examples were the *Nâsır-ı Bahir* (Helper of the Sailors), the *Feyz-i Hüdâ* (Bounty of God), the *Mazhar-ı Tevfik* (Worthy of Heavenly Aid), the *Fethü'l Fettâh* (Victory of the Great Victor/God), the *Nusret-i Yezdân* (Victory of God), the *Avn-i İlahî* (Aid of God), the *İnâyet-i Hakk* (Aid of God), the *Dâd-ı Hakk* (Justice of God), the *Kerem-i Bârî* (Generosity of God), the *Hıfz-ı Hüdâ* (Protection of God), and the *Hüdâverdi* (Favour/Blessing of God).[17]

[15] See Tezel, p. 617.

[16] Rif Winfield, *The 50-Gun Ship* (Great Britain: Caxton Editions, 1997), p. 67.

[17] Tezel, pp. 617-618.

In England, the use of names of religious significance for ships dates back to the time of Henry V. Among them vessels with names such as *the Jesu, the Holigost, the Grace Dieu* and *the Trinity Royal* were much in the limelight. A century later, these names appeared coupled with a ruler's name, that of Henry VIII: *the Trinity Henry, the Henry Grace a Dieu*, or *the Great Harry.*[18]

Sometimes the cannons, weapons, firepower on board or associated attributes of a ship determined the name. During the reign of Ahmed III, a type of galleon called *üç kantarlı kalyon* (a galleon with cannons firing cannonballs of three *kantars*) appeared in 1721 and in 1726. This name stemmed from its guns, since it carried a cannon firing cannonballs of three *kantars* in weigth.[19] In 1166/1753 and 1171/1758 two new *üç kantarlı kalyon* were constructed. Names directly related to firing power were the *Berk-i Hâtıf* (Dazzling Lightning), the *Berk-i Bahrî* (Lightning of the Sea), the *Şihâb-ı Bahrî* (Flame/Shining Star of the Sea), the *Sâikâ-ı Tîr* (Thunderbolt/Driver of the Arrow), the *Âteşfeşân* (Sparking Fire), the *Şihâb-ı Sâkıb* (Shooting Star), the *Ra'd-ı Bahrî* (Lightning of the Sea) and the *Tılsım-ı Bahrî* (Talisman of the Sea).[20] Here again the purpose was to strike fear into the hearts of the enemy as well as to embolden the Ottoman sailors.

Similar names can be seen in almost all the navies of the world. Among the English bomb vessels of the eighteenth century were *the Terrible, the Basilisk, the Carcass, the Furnace, the Lighting, the Thunder, the Comet, the Firedrake, the Mortar, the Serpent, the Terror, the Granado, the Volcano, the Etna, the Infernal, the*

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[18] Manning and Walker, p. 27.

[19] Noyan, "Eski Gemilerimizin İsimleri," p. 92.

[20] Tezel, pp. 617-618.

Meteor, the Devastation, the Hound, the Falcon, the Bulldog, the Fury, the Kingfisher and *the Racehorse*[21].

From the time of Selim III onwards, ships began to be named after Ottoman Sultans such as the *Selimiye,* the *Mansuriye,* the *Mesudiye* and, the *Mahmudiye*. Although Tezel claims that in the time of sailing ships none of the naval ships were named after Kapudan Pashas, other commanders or the places/wars where glorious victories were won,[22] some foreign sources mention names that were probably those of ship commanders. Six frigates, *-Hüseyin, Abbas, Zeynel, Süleyman, Kerim* and *Ahmed-* and five corvettes, *-Mustafa, Hüseyin, Ali Bey, Mehmed,* and *Hâlit Bey-* were a few ships mentioned to be operating in 1801 by a foreign source.[23]

The names of the sunken or scrapped ships were given to newly constructed ones to carry on the old names.[24] Therefore, it is common for an archival researcher studying ship names to come across similar names in different time periods, which is often a tough issue to sort out.

Some ships, such as the *Fethiye*, the *İskenderiyye*, the *Fırkateyn-i Cedîd-i Gümrü,* the *Tûnus,* bore the names of the places in which they had been built, while others were related to the function and duty of the ships, such as the *Sefîne-i Mektup* (Mail Ship), and the *Firkateyn-i Aktarma* (Frigate of Transfer and Transport).[25]

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[21] For more names, see Chris Ware, *The Bomb Vessel: Shore Bombardment Ships of the Age of Sail* (Annapolis, Maryland: Naval Institute Press, 1994).

[22] Tezel, pp. 617-618.

[23] Otto von Pivka, *Navies of the Napoleonic Era* (Newton Abbot: David and Charles, 1980), p. 214.

[24] Tezel, pp. 617-618.

Geographical names were much more common in the European navies. In the first half of the eighteenth century, names such as *the Edinburgh, the Glasgow* and the *Union* were common in England.[26]

Although it is difficult to say that all Ottoman warships had proper names,[27] it is understood that naming ships was a kind of tradition, especially in the late eighteenth century. Vasıf Efendi says that it was a tradition for newly constructed galleons to be given new names.[28] An imperial edict of 1209/1794-95 decreed that naval ships constructed earlier or later with no names had to be given proper names. In the same document, the Sultan ordered the *Tersâne-i Amire Emiri* to write down on a paper the ship names[29] he considered to be proper for the above-mentioned ships and submit them to the Sultan along with the notebook of the ships prepared by the *Kapudan Pasha*.[30] The Sultan, as understood from the post scrip note, written by him, let the other authorities (the *Kapudan Pasha* or the *Tersâne-i Âmire Reisi*) choose proper names. As can be deduced from the process, the Sultan seems to have had the final say in naming ships.[31]

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[25] BOA. Hatt-ı Hümâyûn, no. 9658. (1206/1791-92).

[26] Manning and Walker, p. 32.

[27] Henry Grenville, *Observations sur l'état actuel de l'Empire ottoman*, ed. Andrews S. Ehrenkreutz (Ann Arbor: The University of Michigan Press, 1965), p. 3.

[28] "*Müceddeden inşa olunan kalyonlara tefe'ül bi'l-hayr ma'razında birer isim vaz'ı mu'tad olmağla kariha-i sâbiha-i cihandâriden zikr olunan kalyon Mukaddeme-i Zafer ismiyle tesmiye olundu.*" Ahmet Vasıf Efendi. *Mehasinu'l-Asar ve Hakaiku'l Ahbar,* published by Mucteba Ilgurel (Ankara: TTK, 1994), p. 393.

[29] Noyan says that among these names were new ones as well as ones formerly left for scrap. See Noyan, "Eski Gemilerimizin İsimleri," p. 93.

[30] BOA. Hatt-ı Hümâyûn, no. 14141.

The names determined by the Sultan or people authorized by him were given to the ships during launching ceremonies attended by all of the leading statesmen, such as the *Sadrazam* (Grand Vizier), the *Şeyhülislam* (Leader of the Religious Institution of the Ottoman Ruling Class), the *Kapudan Pasha* (Grans Admiral), as well as arsenal workers and lookers-on. The launching ceremony, as in the case of the one marking the setting up of the sternpost at the beginning of the construction,[32] was organized on a date deemed auspicious (*vakt-i muhtar*/chosen time) by the chief-astronomer (*Müneccimbaşı*).[33] The Sultan's attendance at ship launching ceremonies

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[31] Ibid.

[32] "*Tersane-i amirelerinde vaz olunacak kalyon bodoslaması yarınki Pazartesi günü yahut Şa`bân-ı şerifin yedinci Perşembe günü vaz olunmak şıklarından kangısı irade buyrulacağı istizanını muhtevi arz olunan takrir-i çakeri bâlâsına kangı gün şereflü ise ol gün vaz olunsun mazmumunda sadır olan hatt-ı hümayunları karib-izân-ı bendegânem olmuştur. Yarınki gün ahar şehr olmağla Şa`bân'ın yedinci Perşembe günü şereflu olduğundan Şa`bân'ın yedinci günü tanzim olunmak üzere kapudan paşa kullarına buyruldu, isdar olunduğu malum-ı alileri buyruldukta...* " See BOA. Hatt-ı Hümâyûn, no. 10679 (1205/1790-91), 14486 (Muharrem 1209/July-August 1794), 14523 (1220/1805). On the occasion of setting up the sternpost, some prayers were recited and almost all the workers and engineers of the ship under construction were given presents and clothes. In a similiar ceremany held on the occasion of setting up the sternpost (*bodoslama refi*) of a new galleon at the *Tersâne-i Âmire*, a person known as Mardînî Şeyh (Sheikh from the city of Mardin) recited some prayers, then the French engineer, the deputy of chief architect (Nikoli Kalfa), two carpenters, and one chief augerer were all given presents and clothes, the cost of which amounted to 522.5 *kuruş* on 26 Rebî`u'l-evvel 1209/21 October 1794. See BOA. Cevdet-Bahriye, no. 7210. For the launching ceremonies in Europe and specifically in Britain see Margaretta Lincoln, "Naval Ship Launches as Public Spectacle 1773-1854," *The Mariner's Mirror: The Journal of the Society for Nautical Research* 83, no. 4 (London: Greenwich National Maritime Museum, Society for Nautical Research, November 1997), pp. 466-472.

[33] This practice appears among the traditional duties of the chief-astronomers. Although it was given a great deal of emphasis by some Ottoman sultans, others such as Abdulhamid I and Selim III, considered it to be ceremonial rather than a necessity. For example, when Selim III was requested in a *telhis* (petition) presented to him to choose between two different times for a naval campaign, he said: "Every single day is God's day. I don't believe in astrology (*ilm-i nücum*). I resign myself to Allah; you can launch the naval campaign whenever you think it is appropiriate and do the same thing for the war." On a second *telhis* repeating the same content, Selim III said: "Seeing that it is a custom, let it be the way it was before." For a detailed account of the institution, see Salim Aydüz, "Osmanlı Devleti'nde Müneccimbaşılık," *Osmanlı Bilimi Araştırmaları*, (İstanbul: İstanbul Üniversitesi Edebiyat Fakültesi Yayını, 1995), pp. 159-207.
An Ottoman document dated Şa`bân 1208/March-April 1793-94 says as follows: "*Bundan mukaddemce takdim olunan bir kıta takrir-i çakeride beyan olunduğu üzre tersane-i amire sahasında inşa olunan iki kıta kalyon-ı hümayunun ruy-ı deryaya tenzili işbu mah-ı şaban-ı şerifin on sekizinci gününe taaluk buyrulmuştu, ancak yine saha-i mezkurede kurulmak üzere atmış üç zira bir kıta kalyon-ı hümayunun karinesi vaz ve bodoslamaları ihzar olunmağla zikr olunan iki kıta kalyon-ı hümayunun ruy-ı deryaya tenzilinden mukaddem yevm-i mezkurda ihtiyar olunan vakitte salifu'z-zikr*

was obligatory by a law dating back to the reign of Süleyman the Lawgiver and maintained by Selim II and Murad III.[34] Before Sultan's arrival at the ceremony, his throne was decorated with precious cloths[35] and written invitations (*tezkire*) were sent to the above-mentioned statesmen. Separate marquees were set up for each statesman. Gift clothes, which were called "*âvize/askı,*" were draped on the hulls of the ships for exhibit. These cloths were divided properly in shares among the ship's engineer, architect, foreman and workers. Animals were sacrificed and prayers[36] were recited by the Şeyhülislam just before launching. The same day, the Sultan presented *samur kürkler* (sable furs), caftans and *hilats* (robes of honour) as gifts to all of the participants, from the Grand Vizier to all the personnel working at the *Divanhâne* and the Arsenal. The ship, after being launched into the sea, was towed into position beneath a crane (*macuna*), called a *Darağacı* (gallows), for rigging out.[37]

atmış üç zira kalyon-ı hümayunun bodoslaması kaldırılıp badehu maru'z-zikr kalyonlar ruy-ı deryaya tenzil olunacağı malum-ı alileri buyruldukta emr ü ferman..." See BOA. Hatt-ı Hümâyûn, no. 11264.

[34]Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 490.

[35] Before the launching ceremony of a three-decked galleon, red broadcloth (*al çuka*), cotton for cushions (*minderlik kutn*) and pink fabric (*pembe*) for furnishing the throne of the Sultan were planned for purchase. The total cost for all these preparation amounted to 380.5 *kuruş* in 1217/1802-03. See BOA. Cevdet Bahriye, no. 1281.

[36] It is known that during a ceremony attended by Abdulhamid I, the Grand Vizier, the Sheikhulislam and the Kapudan Pasha (Gazi Hasan Pasha), on the occasion of the launching of the galleon the *Bed'-i Nusret* on Thursday, 24 Receb 1199, the Qur'anic verse *bismillahi mecrâhâ ve mursâhâ* referring to the Prophet Noah and meaning "... embark therein; in the name of Allah will be its (moving) course and its (resting) anchorage" was recited. See Ahmet Vasıf Efendi, p. 260.

[37] Tezel, p. 619.

Types of Ottoman Naval Ships Constructed in the Last Quarter of the Eighteenth Century

For a naval historian it is a kind of tradition to classify and enumerate all of the types of ships operating in Ottoman waters when the naval panoroma of a certain period of the Empire is depicted. Therefore, the picture can be complicated and blurred with details, divisions and subdivisions, causing the reader to miss and underestimate the peculiarities of the time in question. Moving from this premise, despite some occasional references to earlier periods when needed, the focus here will be on the naval sailing ships constructed and adopted as an extension of the new technology in the third quarter of the eighteenth century.

In the time of Selim III, all naval ships were counted and classified according to their sizes, which was an important step towards the standardization and development of the Ottoman navy.[38] In this context, some types of sailing ships began to draw attention of the naval circles in the late eighteenth century. The construction of such galleon type of ships as *Kapak/kaypak/kapak açar kalyon* (two decked galleons), *üç ambarlı* (thriple decked galleon), *şehtiye*, frigate, corvette, gunboat, brig and fire ship were accelerated. The *Tersane-i Amire*, Gemlik, Sultaniye, Midilli, Bodrum, Rhodes, Sinop, Sohum were generally the building sites of these sailing vessels.[39]

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[38] *Mahmud Râif Efendi ve Nızâm-ı Cedîd'e Dâir Eseri,* trans. and ed. Kemal Beydilli-İlhan Şahin (Ankara: TTK, 2001), p. 55.

[39] E. Ziya Karal, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar," *Tarih Vesikaları* I, no. 3 (1941), pp. 210-211.

Pivka says that in the year 1790 the Turkish fleet consisted of thirty ships of the line with fifty to seventy-four guns, fifty frigates with ten to fifty guns and one hundred galliots. The total cannon numbered 3,000 and there were 50,000 seamen, mainly Greeks from the Aegean Sea. In a report written in 1706 by the French ambassador in Istanbul to Napoleon Bonaparte, the Ottoman naval force is said to have been composed of twenty-seven triple-deckers and twenty frigates. It also was described as the most beautiful fleet in Europe.[40]

The positive decription of the Ottoman navy is echoed in a report from St. Vincent to Berkeley as well. The report, written on the *Royal George*, 28 July 1800 said, "I could not have conceived it possible that this squadron (channel fleet of Great Britain) should have been in so many instances worse arranged and economized than the ships of Spain or Russia; I do assure you the armed vessels of the Porte, Tunis, Tripoli and Algiers are so clean in every part that the officers of many of the ships of this fleet ought to blush at the comparison."[41]

Coming to the year 1807, when the naval activities of Selim III began to offer positive outcomes, it is seen that except for a few classical galleys scattered here and there, they had almost completely disappeared. In the reports and observations they do not appear on the tables and lists regarding the Ottoman Navy. In this context, the following table is noteworthy.[42]

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[40] von Pivka, p. 212.

[41] Roger Morris (ed.) *The Channel Fleet and the Blockade of Brest, 1793-1801* (Aldeshot: Ashgate for the Navy Records Society, 2001), p. 541.

[42] PRO. FO 78/55 (27 January 1807), p. 122.

Table 15. Turkish Force at Istanbul (1807)

Place	Line-of-the battle (three-deckers)	Frigates	Corvettes
At the arsenal fitting	3	5	4
At the anchorage near the Saraglio point	3	5	7
At Büyükdere	2	0	2
At the arsenal	One three decker ship apparently nearly ready		
Dardanelles	1	2	3

Source: PRO. FO 78/55 (27 January 1807), p. 122.

The data in the table was the part of a report dated 27 January 1807, prepared by Captain Capel. The most striking point here is the appearance of new ship types and the disappearance of the old oared vessels. Line-of-the battle ships, frigates and corvettes appear to be the leading types of naval ships promoted by the Porte. The general trend in both foreign and local interpretations and observations about the time in question seems to have been positive. The modernization efforts and their immediate consequences seem to have played an important role in this respect.

Having mentioned the rise of some types of naval ships and their numerical analysis, the discussion will now turn to the main properties and specifications of the rising fighting ships.

Üç Ambarlı Kalyon (Three-deckers)

Three-decked galleon, one of the largest types of galleons, began to be constructed for use in the Ottoman navy from 1093/1682 onwards. This class of ship had guns on each deck. Its length ranged from fifty-nine to sixty-five *zira*. The number of the guns, excluding the upper deck, was 110-120, and the number of men on board was 800-1,000. Construction of a three-decker galleon was seen in the reign of Mustafa II (1695-1703), but the program was scrapped because of lack of use. Later, in the time of Ahmed III, new three-decker galleons were built.[43] There were guns on each of the three decks of the ship as well as on the upper deck. The second deck after the upper deck was called the *palavra*, followed by the middle deck, and last the gun deck (*top ambari*).[44] Construction of three decker galleons increased during the reign of Selim III. The three-decker *Selimiye* is one of the best examples of this type in the late eighteenth century.[45]

The number of the line of the battle ships (including three decker galleons) as twenty-four on 22 April 1784[46] and as twenty-six on 25 April 1787, excluding the six still on the stocks.[47]

Foreign sources say that in 1790 the Ottoman fleet had thirty ships of the line, with fifty to seventy-four guns. The number of three-decker galleons is given as twenty-seven in the French ambassador's report written to Napoleon Bonaparte in

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[43] Panzac, referring to Çelebizade, says that the first three-deckers of the Ottoman fleet were built in the 1725 during the reign of Ahmed III. See Panzac, "Armed Peace in the Mediterranean 1736-1739: A Comparative Survey of the Navies," 1 (London: Greenwich National Maritime Museum, Society for Nautical Research, February 1997), pp. 42-43.

[44] Uzunçarşılı, pp. 473-474.

[45] Detailed information about the *Selimiye* will be given in the following pages in the section on ships constructed and repaired during the reign of Selim III.

[46] Karal obtained this list from M. Bonneval's report of 22 April 1784. This Bonneval was not Kont De Bonneval, but one who came to Istanbul to conduct technical research on behalf of the French government and stayed there in 1770-1784. Bonneval's report describes the condition of the Ottoman Navy. See Enver Ziya Karal, "Osmanlı Tarihine Dair Vesikalar," *Belleten*, 4, nos.14-15 (1940), p. 181.

[47] PRO. FO 95/8/14, pp. 862-863.

1796.[48] It seems that the construction of these types of ships continued in the following years. As a result of administrative regulations issued in 1804, the crew of the thriple-decked galleons and their number were governed by a set of rules.

The total number of the crew was amount to 370, including two *reis-i evvel* (executive officers), two *sertopî* (artillery chiefs), one *başhoca* (chief scribe and instructor), two *reis-i sânî* (executive assistants), two *bâdbânî-i evvel* (chief sailmakers), two *bâdbânî-i anbar* (sailmakers in charge of stores), two *sertopî-i güverte* (artillery chiefs on the upperdeck), one *hoca-i çorba* (official in charge of provisions), one *hoca-i jurnal* (scribe in charge of keeping the logbook), two *reis-i sâlis* (executive assistants), two *ser-oda* (chief officers in charge of rooms), four *ser-aylak* (heads of the temporary seamen hired for six moths), six *çavuşân* (officers responsible for security), two *vekilharç* (ship stewards), 150 *gabyâr* (officers in charge of monitoring a ship's rigging), forty *rubu'lu reisler* (officers responsible for masts), two *ser-dümen* (chief helmsman), two *cebeci-başı* (chief officers responsible for ammunitions), 150 *sodagabo* (artillerymen), two *ağa-yı kalyon* (officers responsible for the sailors on a galleon), two *anbarî* (persons in charge of stores), seven *ser-marangozân* (chief carpenters), one *ser-kalafatcıyân* (chief caulker), twelve *marangozân* (carpenters), and seven *kalafatcıyân* (caulkers). During naval campaigns, seven other posts were added to this number: one *kethüdâ-yı dümen* (helmsman), one *kethüdâ-yı cebehâne* (officer in charge of ammunition), one *çavuş-ı kandil* (officer in charge of lighting candles), one *varilci* (person in charge of barrels), one *imam* (religious leader), one *aşcı* (cook), and one *sömbeki* (diver).[49]

[48] von Pivka, p. 212.

[49] Ali İhsan Gencer, *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezareti'nin Kuruluşu (1789-1867)*, p. 81.

This list of personnel shows that the triple-decked galleon was a huge platform with an extensive division of labour.

The following years witnessed the construction of more of this type of ship. The construction of a thriple-decked ship was almost completed in Istanbul on 27 January 1807, which shows the extension of the process and the importance attributed to this type of ship by the Ottoman authorities.[50]

Kapak/Kaypak/ Kapak Açar/ Kapak Kaldırır Kalyon

The double decker man-of-war with 80 to 110 guns and with two gun-decks below the spardeck was known as a *kapak/kaypak/kapak açar/kapak kaldırır kalyon.* On the third rate *kapaks,* the number of guns was sixty to eighty with a crew of 600-800. There were around 800-1,000 warriors on board together with the crew.[51]

Records show that a certain amount of specific kinds of timber were ordered from Numan Bey in Iznikmid for a *kapak kaldırır* galleon of sixty-three *zira*, with eighty guns, as well as a corvette of 36.5 *zira*, with twenty-six guns, both under construction at the *Tersâne-i Âmire* on 22 Ramazan 1211/21 March 1797.[52]

According to the administrative regulations in 1804, the number of crew on a galleon was 242 including two *reis-i evvel* (executive officers), two *sertopî* (artillery chiefs), one *başhoca* (chief scribe and instructor), two *reis-i sânî* (executive assistants), one *bâdbânî-i evvel* (chief sailmaker), two *bâdbânî-i anbar* (sailmakers in

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[50] PRO. FO 78/55, p. 122.

[51] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 472. And see also *The Lingua Franca in the Levant*, p. 305.

[52] BOA. Cevdet-Bahriye, no. 10896.

charge of stores), one *sertopî-i güverte* (artillery chief on the upperdeck), one *hoca-i çorba* (official in charge of provisions), one *hoca-i jurnal* (scribe in charge of keeping logbook), two *reis-i sâlis* (executive assistants), two *ser-oda* (chief officers in charge of rooms), two *ser-aylak* (heads of the temporary seamen hired for six moths), four *çavuşân* (officers responsible for security), one *vekilharç* (ship steward), one hundred *gabyâr* (officers in charge of monitoring a ship's rigging), thirty *rubu'lu reisler* (officers responsible for masts), two *ser-dümen* (chief helmsmen), two *cebeci-başı* (chief officer responsible for ammunitions), sixty-four *sodagabo* (artillerymen), one *ağa-yı kalyon* (officer responsible for sailors on a galleon), two *anbarî* (persons in charge of stores), one *ser-marangoz* (chief carpenter), one *ser-kalafatcıyân* (chief caulker), ten *marangozân* (carpenters), and five *kalafatcıyân* (caulkers).[53]

Captain Capel's report on the Ottoman force at Constantinople and its environs on 27 January 1807 states that three ships of line were at the arsenal for fitting, another three at the anchorage near the Seraglio point, two at Büyükdere and one at the Dardanelles.[54] Here the document uses the word "line," which most probably refers to ships other than thriple-decker galleons, frigates and corvettes, since the same documents mention these last three types separately. Therefore, it is likely that it refers to double decker galleons though line-of-battle generally refers to wooden war ships with two or three decks.[55]

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[53] Gencer, *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezareti'nin Kuruluşu (1789-1867)*, p. 82.

[54] PRO. FO 78/55, p. 122.

[55] *The Lingua Franca in the Levant*, p. 238.

Firkateyn (Frigates)

The word frigate appears to have emerged in the Mediterranean and came to be used rather loosely for any swift ship of some force until the eighteenth century, at which time they came under the strict rating system of the British Royal Navy as fifth-rates. The main function of frigates was to keep well out of fighting range, but have the enemy under constant observation. They were the eyes and ears of the fleet, repeating signals and carrying despatches. During a fleet action, they assissted disabled ships and took possession of captured enemies. Sometimes they were sent to attack enemy commerce or to protect their own, to hunt down privateers or pirates, or to take part in the conquest of a colony.[56] Almost all frigates were built entirely of oak, with masts and spars of pine. These ships were fit to stay at sea in any weather and could carry six months' provisions.[57]

As for Ottoman frigates, they emerged in the late eighteenth century in parallel to the developments in the maritime world. On 26 March 1783 there were ten frigates at the Arsenal, carrying cannons of three, six and nine-pound balls.[58] According to the table taken from M. Bonneval's report dated 22 April 1784, the total number of the frigates at the time was fifteen. Their gun capacity was thirty to fifty. As for their construction sites and gun capacity, out of seven frigates constructed in Istanbul, one had fifty guns, two had forty guns, two had thirty-six guns, one had thirty-two guns, and one had thirty guns. A frigate constructed at

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[56] James Henderson, *The Frigates* (London: Wordsworth Military Library, 1998), pp. 16-17.

[57] Ibid., p. 19.

[58] PRO. FO 78/4, pp. 48-49.

Midilli had thirty guns, one built at Brest had thirty-six and one built in England had forty.[59]

To the fifteen frigates of 22 April 1784 were added nine more on 25 April 1787. Out of these twenty-four frigates, fourteen had thirty-two to forty guns, while the other ten had twenty-four to thirty guns. Two frigates of forty guns each were on the stocks at the time. Regarding the locations of these twenty-four frigates, five of them were in the Mediterranea Sea, eight in the Black Sea and eleven at Istanbul.[60]

In the squadron prepared in the Arsenal on 22 March 1789 for a naval campaign in the Black Sea against Russia, there were five frigates: one with fifty, three with forty, and seven with between thirty-six and twenty-eight guns. Besides these five frigates in the squadron there were an estimated twenty-three frigates at the Arsenal as well.[61]

From a list of the war ships prepared by Karal, a general idea of the specifications of the fourteen Ottoman frigates constructed in the reign of Selim III (1789-1807) can be obtained. These frigates had a length of thirty-seven to fifty-three *zira* in general. Their number of gun ranged from thirty-two to fifty. The number of men on board ranged from 200-400, depending on the size of the frigate. The *Tersâne-i Âmire*, Rhodes, Kemer, Limni, Kalas, Sinop and Ereğli[62] were the main construction sites for this type of vessel. Four were built in Rhodes, two in Limni,

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[59] Karal, "Osmanlı Tarihine Dair Vesikalar," *Belleten*, IV/14-15, 1940, p. 181.

[60] PRO. FO 95/8/14, pp. 862-863.

[61] PRO. FO 78/10.

[62] For the seven frigates constructed in Ereğli between 1799 and 1806, see Sinan Yakay, *Kdz. Ereğli'de Tersâneciliğin Tarihi ve Tersâneci Ağalar* (İzmit: Kdz. Ereğli Ticaret Odası Yayınları, 2004), pp. 31-34.

two at the *Tersâne-i Âmire*, two in Ereğli, one in Sinop, and one in Kalas between 1789 and 1807.[63] These frigates were not the only ones operating at the time in the Ottoman navy. Frigates of thirty, thirty one and fifty-three *zira* which do not appear in Karal's table were encountered during the research for this study.They may be thought to have been given as presents or bought from abroad or captured in naval campaigns. Ahmed Cevdet gives the name of twenty-two frigates among the other warships at the *Tersâne-i Âmire* in 1216/1801-02.[64] The number of frigates seems to have fluctuated since it is given as fifty with ten to fifty guns in the year 1790,[65] and twenty in a French report dated 1796.[66]

Administrative regulations in 1804 set the number and duties of the crew of frigates. The total number of the crew was to amount to 163, and consist of one *reis-i evvel* (executive officer), one *sertopî* (artillery chief), one *başhoca* (chief scribe and instructor), one *reis-i sânî* (executive assistant), one *bâdbânî-i evvel* (chief sailmaker), one *reis-i sâlis* (executive assistant), one *ser-oda* (chief officer in charge of rooms), one *ser-aylak* (head of the temporary sailors hired for six moths), two *çavuşân* (officers responsible for security), one *vekilharç* (ship steward), seventy-five *gabyâr* (officers in charge of monitoring a ship's rigging), twenty *rubu'lu reisler*

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[63] Karal, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar," pp. 210-211.Yakay says that seven frigates were constructed in Ereğli between 1799 and 1806, and he gives the names of the conctructors as Hacı Mehmet Emin Ağa, Midilli Nazırı Hacı İsmail Ağa, Orta Bostancıbaşısı Mehmet Emin Ağa, Hacı İsmail Ağa, Viranşehir Voyvodası Çalıkzade Hüseyin Ağa and Kassabbaşısı Osman Aağa. See Sinan Yakay, *Kdz. Ereğli'de Tersâneciliğin Tarihi ve Tersâneci Ağalar*, pp. 31-32.

[64] Ahmed Cevdet Paşa, *Târih-i Cevdet*, vol. 7-8, pp. 349-351.

[65] von Pivka, p. 212.

[66] This report written to Napoleon by General Sebastiani, says that the Ottoman navy consisted of twenty-seven big warships and twenty frigates and that this naval force was the best among European powers since they had been built by French engineers. See Karal, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar," pp. 206-209.

(officers responsible for masts), one *ser-dümen* (chief helmsman), one *cebeci-başı* (chief officer responsible for ammunitions), forty *sodagabo* (artilleryman), one *ağa-yı kalyon* (officer responsible for seamen on a galleon), one *anbarî* (person in charge of stores), eight *marangozân* (carpenters), and five *kalafatcıyân* (caulkers).[67]

Captain Capel's report of the Ottoman force at Constantinople and nearby areas referring to the date 27 January 1807 states that five frigates were at the arsenal for fitting, another five at the anchorage near the Seraglio point, and two at the Dardanelles.[68]

Korvet (Corvettes)

The corvette was a three-masted man-of-war thirty-three to thirty-nine *zira* in length with twenty to thirty guns on the upper deck.[69] Karal's table shows that eleven Ottoman corvettes constructed in the reign of Selim III each had a length of twenty-seven to thirty-seven *zira*. Their gun capacity ranged from ten to twenty-six. Crew numbered 120-200, depending on the size of the vessel. The *Tersâne-i Âmire*, Rhodes, Silistire and Kalas were the main construction sites for corvettes. Seven were built at the *Tersâne-i Âmire*, two in Rhodes, one in Kalas and one at an unknown site between 1789 and 1807. When we add the two corvettes (both thirty-one *zira*, one with twenty-two and the other with twenty-four guns) sent by the

[67] Gencer, *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezareti'nin Kuruluşu (1789-1867)*, p. 83.

[68] PRO. FO 78/55, p. 122.

[69] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 468.

Sultan of Morocco and one purchased from France during the Corfu campaign (forty-three *zira*, 250 men, forty guns) this number increases to fourteen.[69]

As far as the 1804 regulations are concerned, the total number of the crew on corvettes or small frigates was to be 112. The crew consisted of one *reis-i evvel* (executive officer), one *sertopî* (artillery chief), one *başhoca* (chief scribe and instructor), one *reis-i sânî* (executive assistant), one *bâdbânî-i evvel* (chief sailmaker), one *reis-i sâlis* (executive assistant), one *ser-oda* (chief officer in charge of rooms), one *ser-aylak* (head of the temporary seamen hired for six moths), two *çavuşân* (officers responsible for security), one *vekilharç* (ship steward), one *gabyâr* (officers in charge of monitoring a ship's rigging), fifteen *rubu'lu reisler* (officers responsible for masts), one *ser-dümen* (chief helmsman), one *cebeci-başı* (chief officer responsible for ammunitions), twenty-two *sodagabo* (artillerymen), one *ağa-yı kalyon* (officer responsible for sailors on a galleon), one *anbarî* (person in charge of stores), six *marangozân* (carpenters), and four *kalafatcıyân* (caulkers).[70]

Captain Capel's report of the Ottoman force at Constantinople and nearby areas referring to the date 27 January 1807 states that four corvettes were at the Arsenal fitting, another seven at the anchorage near Seraglio point, two at Büyükdere and three at the Dardanelles.[71]

Şehtiye (or *Şitye/Çamlıca*)

[69] E. Ziya Karal, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar," pp. 210-211.

[70] Gencer, *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezareti'nin Kuruluşu (1789-1867)*, p. 83.

[71] PRO. FO 78/55, p. 122.

Şehtiye came in two types: small ones of twenty-three to twenty-seven *zira* and larger ones of twenty-nine to thirty-five *zira*. They had generally two masts, but some large ones could have three. The total personnel, including officers (*zâbitân ve gedikli*) and other crew on a *şehtiye*, were about 200 in the late eighteenth century.[72]

In an imperial decree, or *hüküm*, to Osman, the *Âyân* (local notable) of Varna, dated 1 Rebiu'l-âhir 1218/17 October 1803, we can see the construction of *şehtiyes* together with *kalyon kıçlı üç direkli* (three-masted and galleon sterned vessel), *pergandi* or *pergende* (small man-of-war, with eighteen to nineteen banks of oar, of the sixteenth and seventeenth centuries), *çekleve* (a kind of light transport vessel with two short masts that lean forward) and *çenber* that were left for a period of time for the construction of smaller ships, such as *çekdirme* (a small oared vessel) and *beş çifte*. The reason behind this attitude is reported to have been the lack of larger ships with the capacity to carry larger loads.[73]

Sloops (*Şalope/ Şalopa/ Şalupe*)

Sloops, small sailing ships of war without a hold, they were generally two-masted and twenty-seven *zira* in length. The two masts were rigged with plain sails called *sübye*. In 1230/1815 a sloop carried twelve guns and its personnel consisted of a *reis* (executive officer), a *bâdbânî* (sailmaker), *hoca-i emanet* (assisstant scribe), a *çavuş* (security officer), a *klavuz* (pilot), a *humbaracı halifesi* (an officer responsible

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[72] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, pp. 467-468.

[73] BOA. Cevdet-Bahriye, no. 2779.

for cannonballs), four *humbaracı* (bombardiers), one *topçubaşı* (chief artilleryman), and six *sudagabu* (artillarymen), which amount to sixty-two.[74]

Regarding construction sites for sloops, the Naval Arsenal in Istanbul,[75] Biga Gümrüğü,[76] Galatz,[77] Sinop,[78] and Idra[79] were important centers. Beside the sloops built in these places in the Ottoman territories, some American[80] and British built[81] sloops were purchased by the Porte. The iron required for the *planketes* (chain shots) for the equipment of new sloops was generally provided from the *Tersâne-i Âmire.*[82]

The number of sloops appears in one of M. Bonneval's report of 22 April 1784,[83] while in a document of 25 April 1787, this number is forty, ten of which have sixteen to twenty guns, and thirty with eight to twelve guns. In terms of the

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[74] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 466.

[75] For the two new sloops of 22 guns built by a Greek master builder at Arsenal, see PRO. FO 78/8 (23 February 1787), p. 38.

[76] For two sloops constructed in Biga Gümrüğü in 1206/1791-92, see BOA. Cevdet-Bahriye, no. 1206 (1206/1791-92)

[77] PRO. FO 78/7 (26 June 1786), p. 193.

[78] 5 sloops were completed in Sinop in 1204/1789-90. To rig and equip them some materials were demanded. See BOA. Cevdet-Bahriye, no. 1751 (13 Rebî'u'l-âhir 1204/29 March 1790). BOA. Cevdet-Bahriye, no.

[79] For 12 sloops of war with 14-16 guns built at Idra, see PRO. FO 78/9 (1 May 1788), p. 118.

[80] For an American- built sloop sold by British merchants to the Ottomans, see PRO. FO 78/10, (15 March 1789), p. 71.

[81] For a Camilla sloop reformed from British navy and purchased from British merchants, see PRO. FO 78/10, (1 March 1789), p. 58.

[82] BOA. Cevdet-Bahriye, no. 5832. (1204/1789-90).

[83] Karal, "Osmanlı Tarihine Dair Vesikalar," p. 181.

geographical distribution of these forty ships, twenty of them were in the Mediterranean, four in the Black Sea and sixteen at Istanbul.[84] According to a report by Mahmud Raif Efendi, several hangars and sheds (*göz*) had been built at the entrance of Kağıthâne and over fifty sloops were put into them.[85] Considering their superiority in number over the other kinds of ships of the time, it is reasonable to assume that they made up an important part of the Ottoman navy in the late eighteenth century.

In many places sloops are mentioned in connection with naval campaigns. Sloops of war are recorded as having been employed at Büyükdere,[86] Egypt,[87] Black Sea,[88] Galatz,[89] the Dardanelles,[90] Varna and the Danube and so on. Five sloops appear among a list of ships prepared for a naval campaign to Varna on 22 March 1789 in order to harry the ice bound Russian fleet in the Boristhenes.[91] On 8 Safer 1205/17 October 1790, there were sixty sloops employed in the Danube navy. A

[84] PRO. FO 95/8/14, pp. 862-863.

[85] *Mahmud Râif Efendi ve Nızâm-ı Cedîd'e Dâir Eseri,* trans. and ed. Kemal Beydilli and İlhan Şahin (Ankara: TTK, 2001), p: 57.

[86] PRO. FO 78/8 (25 May 1787), p. 84.

[87] PRO. FO 78/7 (25 October 1786), p. 293.

[88] PRO. FO 78/11 (8 April 1790), p. 63.

[89] PRO. FO 78/9 (1 May 1788), p. 118.

[90] PRO. FO 78/9 (15 December 1789), p. 356.

[91] PRO. FO 78/10.

certain number of guns firing cannonballs of three, five and seven *kıyye* were ordered from Istanbul.[92]

Sloops seem to have been used in such works as drawing off enemy ships,[93] cruising for the defence of the Ottoman coasts and the islands in the Archipelago[94] and accompanying training ships. In 1205, two sloops were ordered to be rigged out and equipped for that last purpose. Two ships were prepared for training. For this purpose, red flags were hung from the stern of one of the ships as was the tradition. In order to differentiate between the ships, a white flag was flown from the middle mast and a small white flag from the first mast on the other training ship carrying Swedish officers. The training process was to start the following Wednesday at 13:30.[95]

Records show sloops to be rigged out and repaired depending on the employment period. Among the seventeen ships at the Naval Arsenal to be rigged out were two sloops of nineteen *zira*. Furthermore, among twenty-four ships to be fully repaired, caulked and greased were fourteen sloops of twenty-two to twenty-three *zira.*[96] Sloops, like other ships, faced harsh weather conditions. For instance, a sloop of war was run aground on the Black Sea coast between Amasra and Sinop on 10 November 1787, although all hands and the artillery were saved.[97] In another

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[92] BOA. Hatt-ı Hümâyûn, no. 9792 (8 S 1205/17 October 1790).

[93] PRO. FO 261/7 (22 May 1791), p. 23.

[94] PRO. FO 78/9 (15 December 1788)

[95] BOA. Hatt-ı Hümâyûn, no. 12418 (1205/1790-91).

[96] BOA. Hatt-ı Hümâyûn, no. 9658 (1206/1791-92).

storm that raged for seventy-two hours, from Thursday, 18 Zilkade 1215/2 April 1801, two sloops heading for Dimyat sunk and many other ships such as the *Selimiye*, the *Tâvus-i Bahrî*, the *Ceyran-i Bahri*, the *Şehîd-i Zafer* and a galleon carrying British Admiral Keys were damaged.[98]

Ateş Gemisi /Kayığı (Fire Ships)

A fireship, or *ateş gemisi/kayığı,* was a vessel of the same size and general lines as a sloop, but fitted with an extra "fire deck" to take combustibles and fireworks, and extra features to encourage the rapid spread of flames such as downward-opening ports and special chimneys. Merchant and war ships could be converted into fire ships.[99]

Generally classified as sailing ships as they used sails in addition to oars, they were used for setting enemy ships on fire during sea battles. Loaded with barrels full of explosives and inflammable materials, the ships were sent towards enemy ships, especially at night or in foggy weather. When they approached the enemy ships, the crew of the fire ships, who were experienced sailors, would set the explosives and other materials on fire by lighting their fuses, jump down from the portholes in the stern of the ship into the sea and swim to their other ships or escape in life boats before the fireship rammed into the target. Ramming the enemy with a ship full of explosives could set the enemy ship on fire and sometimes destroy a whole fleet. Fire

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[97] PRO. FO 78/8 (10 November 1787), pp. 238-242.

[98] BOA. Hatt-ı Hümâyûn, no. 3446-e (29 Zilka`de 1215/13 April 1801).

[99] David Lyon, "British Warships: Types and Building Policy," Acerra, Martine and José Merino and Jean Meyer (eds.), *Les Marine De Guerre européenne XVII-XVIII siècles* (Paris: Presses de l'Université de Paris-Sorbonne, 1985), p. 152.

ships, since they were very difficult to stop once they were launched at a target, could only be blocked by fast vessels sent in time to meet and tow them off track by hooks.[100] Fire ships were used at the battle of Çeşme by the Russian fleet against the densely crowded Ottoman fleet and played an important role in its destruction.[101]

As for the use of this type of ship in the Ottoman navy, foreign documents report that French architects introduced fire ships to the Ottoman navy. Four were ready in February 1788 in the Arsenal.[102] An Ottoman document refers to the French role as well. In the document, the vızier is encouraged to do his utmost to send certain materials, and to have French engineers arrange fire ships and feluccas, ship boats.[103] Vessels previously built for other purposes were sometimes converted into fire ships.[104]

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[100] See Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 466; Selim Sırrı Altıer, *Osmanlı Bahriyesinin Yelken Devri ve Türk Korsanları* (Istanbul : Boğaziçi Yayınları, n.d.), pp. 38-39; İdris Bostan, *Osmanlı Bahriye Teşkilatı : XVII. Yüzyılda Tersâne-i Âmire* (Ankara : TTK, 1992), pp. 96-97.

[101] For a detailed account of the event and functions of fireships, see William C. Chapman. "Prelude to Chesme," *The Mariner's Mirror: The Journal of the Society for Nautical Research*, vol. 52 (London: Greenwich National Maritime Museum, Society for Nautical Research, 1966), pp. 61-77; Mehmet Zeki Pakalin, *Osmanlı Tarih Deyimleri ve Terimleri Sözlüğü*, vol. 1 (Ankara: MEB, 1993), p. 164.

[102] PRO. FO 78/9 (22 February 1788), p. 45.

[103] *"Benim vezirim göreyim şu tertib olunan mühimmat ve levazımatı gece ve gündüz işletip bir gün evvel tekmilen irsal eylesin, aşağıda mühendislerin tasvib eylediği mahallere icaleten istihkamlar versinler gidecek salları ve ateş gemileri Fransız mühendisleri vaz ve tertib eylesinler ve tarik-i istimali gerek gibi öğrensinler kapudan paşaya etraflı yazılup tekid olunsun tabyalara top döşemesi içün aşağıda kalın tahta ağaç yoktur, burada kerestecilerden ve bulunduğu mahallerden alunub icaleten döşeme tahtası gönderilsin."* See Hatt-ı Hümâyûn, no. 14011 (1208/1793-94).

[104] It is reported that a vessel of the late Mavroyeni's was thought to be very proper for conversion into a fire ship, and therefore, was prepared for that purpose. The number of the fireships altogether would be six, five of which were to be prepared at Vidin, eight at Nicopoli, ten at Rushtchuk, ten at Silistria, all carrying four thırty-two pounders: thirty to forty gunboats of the remains of last year. PRO. FO 78/12-A, p. 46.

Uskuna

An *uskuna* was a two-masted sailing ship, twenty-seven *zira* in length. The first mast (*pruva direği*) was square rigged (*kabasorta donanımlı*) and the second one (*grandi direği*) was single rigged (*sübye donanımlı*). In 1831, a typical *uskuna* had sixteen guns and ninety men on board.[105]

Kırlangıç

A *kırlangıç* was an oared-ship used for duties such as war or coast guarding or trade. A number of this type of ship was constructed in Sinop in 1204/1789-90.[106] In 1205/1790-91 a newly developed kind of *kırlangıç* (*kırlangıç-ı kebîr-i new îcad*) was produced that would carry a 100-man crew.[107]

Trabago (trabacco)

A *trabago* (trabacco) was a type of vessel used in the Adriatic Sea. The name appeared in the second half of the eighteenth century. Fifteen ships of this kind are mentioned in connection with a plan for naval construction in 1768.[108] An Ottoman

[105] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 467. See also Mustafa Zaloğlu, "Uskuna," *Gemici Dili* (İstanbul: Türk Deniz Kuvvetlerini Güçlendirme Vakfı Yayınları, 1988), p. 383.

[106] BOA. Cevdet-Bahriye, no. 1751 (13 Rebî'u'l-âhir 1204/29 March 1790).

[107] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 459.

document dated 1205 mentions two *trabago*s whose bottoms were ready and whose construction would be launched starting first with the sternpost part at the *Tersâne-i Âmire.*[109] An edict dated 18 R 1205/23 March 1791 ordered that *trabago* ships could be constructed at the *Tersâne-i Âmire* and guns mounted. The document tells of the demand for casting of fifty *obüs* and *sürat* guns for the *trabago* and some other ships at the *Tophâne-i Âmire*. It also says that seventy-two *kantars* of *kali-yi İngilizî* (British tin) were required for casting these guns.[110]

Bomb ketches/bomb vessels

It is generally accepted that bomb ketches were invented by the French in the late seventeenth century, particularly for shore bombardment with heavy mortars, and that they were first used by Du Quesne against Algiers in 1682. A bomb ketch was designated to enable a pair of heavy mortars to be located on an uncluttered deck forward of the main mast. Mortars were firmly secured to absorb the recoil. Bomb ketches carried a single anchor, upon the cable of which another rope was clapped in order to enable the mortar shells to be accurately aimed. The entire vessel could be pointed at the target by means of heaving and veering these and setting steadying sails. Range was achieved by the size of the charge while the timing of the explosion

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[108] *The Lingua Franca in the Levant*, p. 440.

[109] *"Bu defa tersâne-i âmire sahasında müceddeden inşaları irade buyrulan iki kıta trabago sefînelerinin karinaları ihzar olunup bimennehi teâlâ yarınki perşembe günü bodoslamaları refiyle inşalarına mübaşeret olunacağın kapudan paşa kulları takririyle beyan ve isti'zân etmekle takriri pâye-i serîr-i a'lalarına arz olunmuştur..."* BOA. Hatt-ı Hümâyûn, no. 11282.

[110] BOA. Cevdet-Bahriye, no. 1454.

was calculated by the length of the fuse. Her forward standing rigging was made of chain to avoid damage.[111]

As for the bomb-ketches used in the Ottoman navy, the table showing the state of the Ottoman navy on 25 April 1787 indicates that there were eight bomb-ketches; two in Mediterranean and four at the Naval Arsenal.[112] This number seems to have increased with new additions in the following years.[113]

We see bomb ketches employed in some missions in the Archipelago, Egypt and Morea,[114] Büyükdere,[115] Ockachov,[116] Black Sea,[117] the Dardanelles[118] as well as in the Naval Arsenal on various dates.[119]

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[111] Woodman, p. 89.

[112] PRO. FO 95/8/14 (25 April 1787), pp. 862-863.

[113] PRO. FO 78/8 (23 February 1787), pp. 30-31; PRO. FO 78/8 (10 March 1787), p. 47. These documents show, for instance, that there were some bomb-ketches ordered to be in the readiness by the end of April 1787 for the grand fleet. In March 1787, the Naval Arsenal was busy. Seven ships of the line, eight frigates large and small, two bomb-ketchers, besides sloops, and gun-boats, were completely ready for sea. Of these, three of the line, two chebecks, four sloops, and a bomb-ketch, were actually in the harbour taking on board a considerable quantity of cannon, and ordnance stores for different ports on the coast of the Black Sea.

[114] PRO. FO 78/8 (10 May 1787), p. 79.

[115] PRO. FO 78/8 (25 May 1787), p. 84.

[116] PRO. FO 78/8 (10 November 1787), pp. 238-242. See also PRO. FO 261/6 (25 March 1788), p. 65 for their use in the protection of other ships of war at Chingiany Schlesy.

[117] PRO. FO 78/8 (25 April 1787), p. 70; PRO. FO 261/6 (11 February 1788), p. 10; PRO. FO 78/9 (1 April 1788), p. 45.

[118] PRO. FO 78/7 (10 May 1786), p. 124; See also PRO. FO 78/7 (10 April 1786), p. 98.

[119] PRO. FO 78/8 (9 August 1787), 147; PRO. FO 78/9 (22 February 1788), p. 81; PRO. FO 261/1, no. 22, (9 October 1784); PRO. FO 78/5 (25 November 1784), pp. 217-218; PRO. FO 78/10 (22 March 1789), p. 78; PRO. FO 78/9 (May 1789), p. 136.

It is understood that two French shipbuilders, Le Roi and Dureste, were commissioned to build some ships, including two large bomb-ketches.[121]

Bomb-ketches seem to have been used in such works as searching and drawing off enemy ships attacking Ottoman merchant ships.[122] They often accompanied and escorted these ships in order to protect the merchandize on the ships from the enemy attacks. For instance, a detachment of the Ottoman fleet returned from Egypt, after remaining at anchor in the Propontis with a great deal of merchandises and property, entered the Arsenal on 13 December 1786. In this detachment was a bomb-ketch.[123]

In some cases, different names appeared for bomb vessels in the late eighteenth century under the reign of Selim III, such as *korvet-i bomba* (bomb corvette) [124] and *firkateyn-i bomba* (bomb frigate).[125]

Gunboats

Ottoman gunboats appear to have been employed in many naval campaigns, drawing off enemy ships, escorting and protecting merchant ships, cruising the coasts

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[121] PRO. FO 78/8 (9 June 1787), p. 95.

[122] The squadron, including bomb-ketches destined for the archipelago departed on the seventh for the Dardenelles in consequence of the intelligence, that Sig Qulielmo, with two large frigates and three sloops were off Rhodes, into which place they had chased a large Ottoman Caravella richly loaded from Alexandria for Constantinople. See PRO. FO 261/7 (22 May 1791), p. 23.

[123] PRO. FO 78/7 (23 December 1786), p. 367.

[124] *The Lingua Franca*, p. 111.

[125] The *Tılsım-ı bahri* (Talisman of the sea) of thirty *zira* and the *Şihâb-ı sâkıb* of thirty *zira* are both described as *firkateyn-i bomba* (bomb frigate). These two ships will be discussed in section on frigates. See BOA. Hatt-ı Hümâyûn, no. 9658 (1206/1791-92).

in locations such as the Dardanelles,[125] Büyükdere,[126] Ockachov,[127] Crimea,[128] the Black Sea,[129] Varna,[130] and Kilburun.[131]

This type of boat was usually constructed according to French plans, as in the case of four gunboats constructed at the Naval Arsenal in July 1784.[132] A document dated 10 October 1785 about the newly constructed harbour for gunboats and galleys with a very complete battery in the bay of Buyukliman, indicates that it was completed under the direction of French engineers.[133] In the following years, some engineers from other countries built gunboats, as did the Englishman Spurring, who built some in 1799.[134]

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[125] Two gunboats upon a new construction, each carrying a small mortar, were among the ships in the fleet under Captan Pasha proceeding for the Dardanelles. See PRO. FO 78/7 (10 May 1786), p. 124.

[126] PRO. FO 78/8 (9 June 1787), p. 95.

[127] PRO. FO78/9 (15 March 1788), pp. 66-67; Gunboats are mentioned as having been among a fleet for the protection of four Ottoman ships of war, now at Chingiany Schlesy, exposed to an attack, said to be meditated by the Russian fleet and filled out at Sebastople. See PRO. FO 261/6 (25 March 1788), p. 65.

[128] PRO. FO 78/9 (22 February 1788), p. 45.

[129] PRO. FO 78/8 (9 August 1787), p. 147; PRO. FO 261/6 (11 February 1788), p. 10.

[130] PRO. FO 78/10 (22 March 1789), p. 78.

[131] PRO. FO 78/8 (10 November 1787), pp. 238-42.

[132] PRO. FO 261/1, no. 16, (23 July 1784)

[133] PRO. FO 78/6 (10 October 1785), p. 207; PRO. FO 261/2, no. 21, (10 October 1785).

[134] PRO. FO 78/28 (18 March 1800), p. 316.

The number of the gunboats shown in a chart on the state of the Ottoman navy on 25 April 1787 was twenty-one: eleven in the Black Sea, eight in Istanbul, and two in the Mediterranean.These gunboats carried a twenty-four pounder and a mortar of ten inches each, and most of them had been constructed by French engineers at the Arsenal.[135] In the following years, the number of gunboats and their gun capacity increased with new additions in the face of new threats.[136] There were, for instance, twelve new gunboats constructed at Sinop, each carrying a thiert-six pounder and a mortar of 10.5 inches, in May 1788.[137] The number of the gunboats was estimated to be forty[138] in 1789, thirty to forty in March 1791,[139] and forty at the Arsenal in June 1795.[140]

Şebek (xebec/chebec/zebec)

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[135] PRO. FO 95/8/14 (25 April 1787), pp. 862-863; PRO. FO 78/ 8 (23 February 1787), pp. 30-31; PRO. FO 78/8 (10 March 1787), p. 47.

[136] PRO. FO 78/8 (10 May 1787), p. 87; PRO. FO 78/8 (9 August 1787), p. 147; PRO. FO 78/9 (25 March 1788), p. 75.

[137] PRO. FO 78/9 (1 May 1788), p. 118.

[138] PRO. FO 78/10 (1789), p. 136.

[139] PRO. FO 78/12A (24 March 1791), p. 46.

[140] On that date, a person by the name of White, recently employed in the construction of gunboats on the River Thames, also appeared in Istanbul, and was taken into the service in consequence of a letter of recommendation with which he had been furnished by the Ottoman Ambassador in London. A division of gunboats forty in number, constructed on an improved plan, and built in some of the ports of the Black Sea, were brought round to the strait of Istanbul and more were expected from the same quarter. PRO. FO 78/16 (25 June 1795), p. 168.

The *şebek*, or *xebec*, *chebec*, or *zebec*, was a three-masted ship much used by the corsairs of North Africa to patrol their coasts and raid enemy merchant vessels with considerable success. Later on, the navies of France, Spain and Britain adopted this type of ships by copying, capturing and purchasing. Actually, *şebeks* were of several types. Some were large enough to mount up to forty guns, like frigates, while others served as cargo vessels with lengths up to forty meters. Although the *şebek* was characterized by oars and oar-benches, its great reputation was for its qualities as a sailing vessel, usually lateen-rigged in full, but often, after about 1750, incorporating square rig. The *şebek* was also famous for its maneuverability.[141] It was also regarded as a type of caravella with a narrow and long stern, and was generally used in the Mediterranean.[142]

The *şebek* often appeared in connection with the Ottoman navy. A British document menions two Algerian *şebek*s, one with thirty-six guns, the other with twenty, that chased a Russian ship into Modon in September 1782.[143] *State Papers* reported that between 1785 and 1789 there were about nine new *şebek*s a year.[144]

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[141] Woodman, p. 244.

[142] *Kâmus-ı Türkî*, p. 769.

[143] PRO. FO 261/4 (25 Nov. 1782), pp. 412-413.

[144] Reports give information about the character of their ships, and say "they are sharp built and swift, but so light as not to stand the broadside of a good frigate. Their guns are of different calibers, unskillfully pointed and worked. The vessels illy maneuvered, but crowded with men, one third Turks, the rest Moors, of determined bravery, and resting their sole hopes on boarding. But two of these vessels belong to the government, the rest being private property. If they come out of harbour together, they separate immediately in quest of prey; and it is said that, they were never known to act together in ant instance. Nor do they come out at all, when they know there are vessels cruising for them. They perform three cruises a year, between the middle of April and November, when they unrig and lay up for the winter. When not confined within the straits, they rove northwardly to the channel, and westwardly to the westward islands. They are at peace at present with France, Spain, England, Venice, the United Netherlands, Sweden, and Denmark; and at war with Russia, Austria, Portugal, Naples, Sardinia, Genoa and Malta..." See "Report of the Secretary of State Relative to the

These ships accompanied the other Ottoman ships of war, as in the case of two Ottoman ships of war at Büyükdere in June 1783.[145] In 1789, they joined a fleet and sailed out of Istanbul.[146] On September 1789, three *şebeks*, carrying twenty-four guns each, sent as a present to the Sultan by the emperor of Morocco, arrived at Istanbul. They were fine vessels, well out fitted carrying a treasure amounting to three million piasters, sent as a subsidy to the Porte. Additionally, about the same date, four Algerian *şebeks* arrived at the Dardanelles accompanying a Russian prize (a captured Russian ship), also destined to reinforce the Ottoman navy.[147]

Documents also mention that a squadron of fourteen frigates and *şebeks*, with two ships of the line intended for the Archipelago, was delayed waiting for crew to arrive from the Mediterranean in April 1790.[148]

To sum up, all the documents and sources show that *şebeks* were mostly of Algerian origin, and were an important part of the Ottoman navy before and after the late eighteenth century.

Pergandi (*Pergende*)

An imperial decree reinstituted a kind of boat called a *pergandi*, which had been abandoned for a period of time in favor of smaller ships, such as *çekdirme* ve

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Mediterranean Trade" (Dec. 28, 1790) in *State Papers and Publick Documents of the United States, from the Accession of George Washington to the Precidency, Exhibiting a Complete View of Our Foreign Relations Since That Time*, vol. 10 (Boston: Thomas B. Wait, 1819), pp. 41-47.

[145] PRO. FO/ 78/4, p. 112.

[146] PRO. FO 78/10, p. 136.

[147] PRO. FO 78/10, pp. 271-272.

[148] PRO. FO 78/11, p. 63.

beş çifte. Ships with bigger freight capacity were in greater need; the *perganti* was brought back to fill this need. The construction of ships with capacities of less than fifty thousand *kiles*[149] of load came to an end.[150]

Caravella/Caravel/Karavela/Karavila/Karavana[151]

The caravel or *caravella*, *karavel*, *karavila* or *karavana* was closely linked to the Portuguese and Spanish explorations that spearheaded the opening of a sea route to the East Indies and the conquest of the New World. Both Colombus and Vasco da Gama took caravels on their voyages.[152] From the mid-fifteenth century on, they gained popularity across Atlantic Europe and the Mediterranean as small to medium size cargo carriers, warships, patrol or dispatch boats, and corsair vessels. From the 1430s to the 1530s was the European century for the caravel.[153] This type of ship had a blunt, transom-built stern with a large rudder and was caravel-built, that is constructed with planks joined edge-to-edge, rather than overlapping as in the norhern style. Both square and lateen-rigged sails were used on the caravels.

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149 "*Kile*" was a unit of measurement used for grains in the Ottoman Empire. There were various types of *kile* such as *Istanbul kilesi*, eighteen to twenty *okka* or about twenty-five kilos and *Ibrail kilesi*, seventy to eighty *okkas*, or around 100 kilos. In the period of sailing ships *kile* was also assumed a new meaning and was used in the same way that we use ship "tonnage" today. Thirty-six *kiles* was equal to one tonnage (*tonilato*). See Pakalın, p. 281.

150 BOA. Cevdet-Bahriye, no. 2779 and 2216.

151 For the etymological analysis and comparisons of the various derivatives of the name, see *Lingua Franca*, pp. 149-151.

152 Philip De Souza, *Seafaring and Civilization: Maritime Perspectives on the World History* (London: Profile Books, 2001), p. 17.

153 Robert Gardiner and Richard Ugner, eds. *Cogs, Caravels and Galleons: The Sailing Ship 1000-1650* (London: Conway Maritime Press, 1994), pp. 91-98.

In the late fifteenth century they became vessels much feared on the seas, thanks to an invention by Portugal King John II (1481-1495), who discovered the effectiveness of mounting great guns in small caravels, which had greater manoeuverability than other ship types. A few small caravels with big guns could force many larger ships to surrender.[154]

As for Ottoman caravels, they were not a common type of ship and generally are described as a type of galleon. In the reign of Süleyman the Lawgiver, galleons like Venetian caravels were built, but later were abandoned because of their inpractibility in the absence of wind.[155] They were originally employed to protect convoys and later came to be used as transporters or corsairs, cruising against adversary ships.[156] The Ottoman caravels in the later periods were said to have been generally forty *zira* or more in length and had 500 *levend*s (sailors employed during sea campaigns) and 500 sailors on board.[157] Caravels served both as warships and freighters.[158] In June 1785 there were two Ottoman caravels at Büyükdere to proceed into the Black Sea as a part of a naval campaign.[159] In January 1786, a large Ottoman caravel is known to have sailed out of the Istanbul Arsenal for Cazdakli on the Black

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[154] Carlo Cipolla, *Guns, Sails and Empires (Technological Innovation and the Early Phases of European Expansion 1400-1700)* (New York: Funk and Wagnalls, 1965), p. 81.

[155] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 469.

[156] A. H. J. Prins, "Mediterranean Ships and Shipping, 1650-1850," *The Heyday of Sail: The Merchant Sailing Ship 1650-1850,* ed. Robert Gardiner (London: Conway, 1995), p. 78.

[157] Uzunçarşılı, p. 469.

[158] Tezel, p. 727.

[159] PRO. FO 78/6 (10 June 1785), pp. 118-119.

Sea coast to load a cargo of planks, ready there for the use of the Arsenal.[160] Again, regarding its cargo function, it is known as an Ottoman squadron composed of sixteen two-deckers and twelve frigates, exclusive of about twenty sloops, bomb ketches and other small craft destined for the archipelago, departed for the Dardenelles in consequence of the intelligence that Sig Qulielmo, with two large frigates and three sloops, was off Rhodes, into which place they had chased a large Ottoman caravel richly loaded from Alexandria and destined for Istanbul.[161]

Brig

A brig was a single-decked, two-masted sailing warship. It was semi-rigged and among the speediest warships of the time. Its two masts were rigged with square sails called *kabasorta*. There were guns at the portholes on the upperdeck.[162] Guns numbered twenty to thirty depending on the type of the brig, which were ten to twenty-two meters in length and seven to nine meters in width.[163]

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[160] PRO. FO 78/7 (25 January 1786), p. 19.

[161] PRO. FO 261/7 (22 May 1791), p. 23.

[162] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, pp. 466-467.

[163] Nejat Gülen, *Şanlı Bahriye (Türk Bahriyesinin İkiyüz Yıllık Tarihçesi 1777-1973)* (İstanbul: Kastaş Yayınları, 2001), pp. 21-22.

Ships Constructed and Repaired in the Reign of Selim III

Having discussed at length the types of ships dominant during the reign of Selim III, now a closer look will be taken at them as much as the data at hand allow. The ships mentioned here are not necessarily the ones constructed or repaired in Selim's reign. To pose a background to this specific period, we consider it to be beneficial to include some ships constructed and repaired as an extension of the modernisation current in the aftermath of Çeşme. The lists of ships prepared by Ahmed Cevdet and Karal are accepted as a starting point and many other names found in local and foreign archival documents as well as the chronicles of the period enrich the material available. Another point to make is the difficulty in presenting a standard description of the ships, since the same data for all the ships mentioned here are unavailable. Therefore, some ships are examined in more detail while others are given only a few sentences. Finally, the lack or insufficiency of the pictures or drawings of the ships in archival documents and even in some secondary sources is another drawback before the sudent of naval technology. Therefore, we must be content with presenting what visual data are available.

The *Bahr-i Zafer* (the Sea of Victory) was a galleon of fifty-five *zira*, covered with copper, with seventy-two guns and 750 men aboard, constructed in the Imperial Naval Arsenal by Ismail Kalfa, who had also been a chief architect in the reign of Abdulhamid I. All but its gun deck was finished when Selim III ascendend the throne, after which it was completed and launched in 1204/1789-90.[164] A document from 1204/1789-90 reveals that four large cannons of sixty-six diameters (throwing a projectile of sixty-six pound) each were produced at the Imperial Cannon

[164] Karal, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar," pp. 207. Noyan gives 1793 for its construction date. See Noyan, "Eski Gemilerimizin İsimleri," p. 92.

Foundry (*Tophane-i âmire*) and ready to mount on this new galleon, which the *Kapudan Pasha* would command.[165]

Uzunçarşılı, referring to a certain naval document reports that there were fifty-nine *aylakçı* (temporary sailors recruited for six months) serving on the *Bahr-i Zafer* in 1790.[166] Some of its equipment underwent repair and maintenance in 1208/1793-94 when its hoses became worn out. The *Tersâne-i Âmire Tulumbacıbaşısı* (the chief official in charge of pumps at the Imperial Naval Arsenal) installed two new ones.[167]

Shaw writes that when the *Bahr-i Zafer* was launched in 1794, it boasted a new provisions system which provided the cooks with wood, salt, and oil sufficient for the entire voyage at the expense of the Treasury, the first of it kind to be installed on a ship of the line.[168] Tezel notes that this provision system was applied not only to the *Bahr-i Zafer* but also to the *Humây-i Zafer* at the same time, in 1208/1793-94.[169] Gencer supports Tezel with a quote by Halil Efendi, and says that there was a kitchen system on most of the naval ships in 1794, which provided not only regular

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[165] BOA. Hatt-ı Hümâyûn, no. 55529.

[166] They were temporary salaried mariners recruited during the campaigns for 6 months. In the second half of the eighteenthcentury they were paid forty-six *kuruş*. This amount was paid in two installments. Their leader was called *seraylakçı* (chief of the temporary mariners). He was among the real personnel of the navy and given salary from treasury. There were four *seraylakçı* on a three-decker, 3, 2 or 1 on galleons and other sailing ships. See Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 484.

[167] BOA. Cevdet-Bahriye, no. 1913.

[168] Shaw refers to FO 78/15, no. 31 (25 December 1794). See Shaw, "Selim III and the Ottoman Navy," *Turcica: Revu d'Etudes Turques*, I (1969), p. 220.

[169] Tezel, p. 622.

nourishment for the crew, but also eliminated the mess and disorder preventing cannons from efficient firing due to the haphazardness of private stoves.[170]

In early 1215/1800-01, this galleon cast anchor in the Bosphorous Strait (*Bahr-i Sefid Bogazi*) under the command of Mustafa Kapudan from Eyup. It is understood from the correspondance between the *Tersane Emiri* and Mustafa Kaptan that the galleon in question had been taking in one *karış* of water per hour for five days and had had a difficult time. He was asked to come to the *Tersane* by as soon as possible, by caique on 25 Şa`bân 1215/11 January 1801.[171] The *Bahr-i Zafer* was still in use in the Imperial Naval Arsenal in 1216/1801-02.[172]

The *Feyz-i Hüdâ* (Bounty of God) was a galleon of fifty-five *zira,*[173]covered with copper, with seventy-two guns and 650 men aboard. Like the *Bahr-i Zafer,* its construction started in the time of Abdulhamid I and was completed in Selim III's time, in 1204/1789-90 by Nikoli Kalfa in Sinop.[174] A British Foreign Office document reports that some ships of the line built in Sinop were launched on 22 July 1789.[175] It is probable that the *Feyz-i Hudâ* was one of them. In 1205, the

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[170] Ali Ihsan Gencer, *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezareti'nin Kuruluşu (1789-1867)* (İstanbul: TTK, 2001, p. 44.

[171] BOA. Cevdet-Bahriye, no. 12602.

[172] *Târih-i Cevdet*, vol. 7-8, pp. 349-351.

[173] An Ottoman document says that a galleon of fifty-one *zira* was completed in Sinop and sent to Istanbul. In addition, another galleon of 47.5 zira was under construction on 13 Rebî'u'l-âhir 1204/29 Marh 1790 in Sinop. For the requirement of the galleon, sliding ways (*kızak*), cross pieces of timber (*felenk*), raw iron, tallow, wire and anchor were demanded. See BOA. Cevdet-Bahriye, no. 1751.

[174] Karal, "Selim III Devrinde Osmanlı Bahriyesi Hakkında Vesikalar," p. 207.

[175] PRO. FO 78/10, pp. 294-295.

foretopmast (*trinkete sutunu*) of the *Patrona-i humayun kalyon-ı Feyz-i Hüdâ* (the *Feyz-i Hüdâ*, the vice-admiral's flagship) accidentally fell into the water and was in difficult straits thereafter.[176]

The *Feyz-i Hüdâ* is qualified as a *Patrona-i Humayun*, the vice-admiral's flagship, in a document dated 1208/1793-94. Its hoses had become worn out and two new ones were mounted in 1208/1793-94 by the chief officilal in charge of supply and delivery of the pumps and related equipment at the Imperial Naval Arsenal.[177] A document dated 13 Rebî'u'l-âhir 1215/3 September 1800 mentions that the *Feyz-i Hüdâ*, prepared and equipped in Beşiktaş, needed a crew of 150 men. The required crew were hired from among volunteers and the total payment for the crew increased to 12,000 *kuruş*.[178] It is known that the *Feyz-i Hüdâ* was still in use in the Imperial Naval Arsenal in 1216/1801-02.[179] During battles against the British fleet, it appeared with seventy-two guns among the ships ready at Marmara in 1806[180] and also among the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[181]

The *Hilâl-i Zafer* (Crescent of Victory) was a galleon of fifty-one *zira*, covered with copper, with sixty-six guns and a crew of 650. Its construction started

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176 BOA. Hatt-ı Hümâyûn, no. 9644-A.

177 BOA. Cevdet-Bahriye, no. 1913.

178 BOA. Cevdet-Bahriye, no. 1479.

179 *Târih-i Cevdet*, vol. 7-8, pp. 349-351.

180 Emsen, p. 41.

181 Noyan, "Eski Gemilerimizin İsimleri," p. 93.

in Halicarnassus/Bodrum in the time of Abdulhamid I. After spending seven years on the stocks, it was completed in 1205/1790-1 by Papacho Kalfa. Although in 1205/1790-1, it was reported to be in bad condition and left for scrap,[182] in 1206/1791-92, its name appeared on a list of the ships to be repaired and rigged.[183]

Another document of 1205 describes a galleon, without giving its name, under construction at Halicarnassus/Bodrum under the supervision of Süleyman Bey. The document notes the cost and some of the materials required. Süleyman Bey was ordered to finish the construction by early spring. 5,000 *kuruş* from the Imperial Treasury, 20,000 *kuruş* from the *Menteşe Mütesellimi* (governor of the district of Menteşe), 800 *kantars* of raw iron, 35,000 *kuruş* from the *Aydın Muhassılı* (district administrator) and Çavuşzâde, the *Menteşe Müteselllimi*, and 50,000 *kuruş* from Egypt were among the material and monetary sources dedicated to the construction of this galleon.[184] Considering the names and places, it seems plausible that this galleon was the *Hilâl-i Zafer*.

In another document, an unnamed galleon of fifty-one *zira* was noted as under renovation through the agency of Kapucubaşı Mir Süleyman at Halicarnassus/Bodrum on 11 Şevval 1206/2 June 1792. 90,154 *kuruş* from the Imperial Treasure and 2,150 *kantars* of raw iron and other equipment had been used up to that time. Süleyman was asked about the construction process and was urged to complete the ship at the earlies possible date.[185] It is most probable that this galleon

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[182] Karal, "Selim III...," p. 207.

[183] BOA. Hatt-ı Hümâyûn, no. 9658.

[184] BOA. Hatt-ı Hümâyûn. no. 8845.

was the *Hilâl-i Zafer* and that Mir Süleyman was not the builder, but the person responsible for supervising the work.

The *Kepçe Kıçlı Kalyon* (Scoop-sterned Galleon), a fifty-three *zira* vessel, was under construction in Cemâziyelâhir 1206/January-Febrary 1792 at the *Tersâne-i Âmire* in Istanbul. The quality timber required for the construction of the galleon was provided from İznikmid by İznikmid Emini Ali Ağa at a price of 30,000 *kuruş*, out of which 17,500 *kuruş* had been paid up to the above-mentioned date. More timber (*kemerelik lata-i kebîr-i çam, pıraçol-ı kebîr-i meşe*) was demanded as soon as possible for the completion and launching of the galleon. 15,000 *kuruş* was needed for the felling and transportation of this timber[186]

The *Fâtih-i Bahrî* (the Conquror of the Sea), a galleon of forty-seven *zira*, covered with copper, with sixty guns and a crew of 550 men, was constructed in 1206//1791-92[187] by Nikoli Usta in Sinop.[188] However, it must have been in use earlier, since it appeared in 1205 in the Straits under the command of Riyâle-i Cezayir Yakup Kapudân. Its main topmast (*gabya çubukları*) fell and the foretopmast (*trinkete*) and mizzen topmast (*mizana sutunları*) were crippled.[189]

When its hose became worn out, a new one was mounted in 1208/1793-94 by the chief official in charge of pumps at the Imperial Naval Arsenal (*Tersane-i Âmire*

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[185] BOA. Cevdet-Bahriye, no. 2194.

[186] BOA. Cevdet-Bahriye, no. 8705.

[187] Noyan gives 1746 for the construction date. See Noyan, 'Eski Gemilerimizin İsimleri," p. 92.

[188] Karal, pp. 207.

[189] BOA. Hatt-ı Hümâyûn, no. 9644-A.

tulumbacıbaşısı).[190] In 1214/1799-1800, while returning from a mission along with some other ships on the Egyptian coast, the ship was caught in a storm near Gelibolu and ran aground.[191]

The *İnâyet-i Hak* (Aid of God) is mentioned in a document dated 1208/1793-94 as a *Riyâle-i Hümayun* (rear admiral's flagship) whose hoses had become worn out. Two new ones were installed in 1208/1793-94 by the chief officilal in charge of supply and delivery of the pumps and related equipment at the Imperial Naval Arsenal.[192]

The *Ferahnümâ* (Showing Happiness) was a corvette of thirty-seven *zira*, covered with copper, with twenty-four guns and a crew of 150 men, constructed in 1207/1792-93 by Hammâmizâde Ahmed in Silistre during the office of former Grand Vizier Yusuf Pasha. Later on, it was sent to the Imperial Naval Arsenal to be scrapped because of its unsuitability for employment.[193] This ship, however, was most likely rebuilt, since it appears as a brig on the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[194]

The *Âsâr-ı Nusret* (Signs of Victory) was a fifty-five *zira* galleon, covered with copper, with seventy-four guns and a crew of 800, constructed in 1208/1792-1793[195] by Ismail Kalfa[196] (the chief architect) at the Imperial Naval Arsenal.[197]

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190 BOA. Cevdet-Bahriye, no. 1913.

191 Karal, "Selim III...," pp. 207.

192 BOA. Cevdet-Bahriye, no. 1913.

193 Karal, "Selim III...," p. 209.

194 Noyan, "Eski Gemilerimizin İsimleri," p. 93.

Sultan Selim III attended its launch ceremony.[198] The application of its copper sheathing took place in 1795.[199]

The *Âsâr-ı Nusret* is referred to as a *Kapudâne-i Hümayun* (imperial admiral's flagship) in a document dated 1208/1793-94. Its hoses had become worn out and two new ones were mounted in 1208/1793-94 by the *Tersâne-I Âmire tulumbacıbaşısı* at the Imperial Naval Arsenal.[200] The *Âsâr-ı Nusret* was still in use at the Imperial Naval Arsenal in 1216/1801-02.[201] It played an active role during battles against the British fleet in the Marmara Sea, with seventy-four guns in 1806. It defended itself for half an hour against an eighty-four gunned British galleon and then ran aground. Refusing to abandon their vessel, the sailors went on firing their guns. A British ship directed itself towards the *Âsâr-ı Nusret* and destroyed it completely.[202]It is possible that this ship was repaired or rebuilt later on, since its

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195 Noyan gives 1792 for its construction date. See Noyan, ibid., p. 92.

196BOA. Hatt-ı Hümâyûn, no.14666.

197 Karal, "Selim III...," p. 207. See also BOA. Hatt-ı Hümâyûn, no.14666.

198 Şemim Emsen, *Selim III devrinde Osmanlı donanması*, BA thesis in history, İstanbul Üniversitesi, no. 1118 (Istanbul, n.d.), p. 12.

199 Emsen, p. 8.

200 BOA. Cevdet-Bahriye, no. 1913.

201 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

202 Emsen, pp. 41-44.

name appears among on a list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[203]

The *Pertev-i Nusret* (Beam of Victory) was a galleon of fifty-three *zira*, covered with copper, with sixty-eight guns and a crew of 700, constructed in 1208/1793-1794 by Nikoli Kalfa[204] in Sinop.[205] The application of the copper sheathing to the *Pertev-i Nusret* was completed in 1795.[206] Altıkulaçzâde Hüseyin, the Kastamonu *Mütesellimi* (Governor of the district of Kastamonu) was ordered to construct the galleon along with another one of fifty-one *zira* in Sinop. For the construction of the two galleons 40,000 *kuruş* and 1,200 *vakiyye*s of raw iron were spent up to 11 Şevval 1206/2 June 1792.[207] Before that date, on 9 Rebî`u'l-evvel 1206/6 November 1791, Altıkulaçzâde had demanded iron materials such as shrouds, rudders, rings, and a *çene* (a slightly round place at the connection of stem and keel). In addition, he demanded pipe and copper tools.[208]

Altukulaçzâde demanded more materials, workers and money in the following months. The authorities, after advising him on the procurement of the required materials, ordered him to finish the fifty-three-*zira* galleon, of which only

[203] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

[204]BOA. Hatt-ı Hümâyûn, no.14666.

[205] Karal, "Selim III...," p. 206. See also BOA. Hatt-ı Hümâyûn, no.14666.

[206] Emsen, p. 17.

[207] BOA. Cevdet-Bahriye, no. 2194.

[208] BOA. Cevdet-Bahriye, no. 10514.

1/3 had been completed, as well as the galleon of fifty-one *zira*, the careen of which was far from completed, as soon as possible.[209]

No further information is available about the *Pertev-i Nusret,* except that it was in use at the Imperial Naval Arsenal in 1216/1801-02[210] and on the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[211]

The *Ejder-i Bahrî* (Dragon of the Sea) was a fifty-seven-*zira* galleon, with seventy-four guns and a crew of 850, constructed in 1208/1793-94[212] by Nevsim Kalfa using Le Brun's measurements in Gemlik.[213] It was not sheathed with copper until 1211/1796-97, on order of the Kapudan Pasha. The ship needed lead plates of thirty-two and thirty-three *vukiyye* but there were none left in the *mahzen-i surb* (store where ship and shipyard supplies such as iron pieces, nails, copper pots, lead plates, hemp, cords, barrels, sails, awnings, anchor, cannon, lamp and paper were kept and stored for future use). It was decided to supply 100 large lead plates (*tahta kurşun*) of thirty-two and thirty-three *vukiyye* each through the chief lead supplier, Hassa Kurşuncubaşı.[214] The vessel was in use at the Imperial Naval Arsenal in 1216/1801-02.[215] During battles against the British fleet in 1806, it waqs active, with its seventy-four guns among the ships ready in the Marmara Sea[216] and its name appears on the list of naval ships at the *Tersâne-i Âmire* in 1810.[217]

The *Şehbâz-ı Bahrî* (Sea Falcon or Braveheart of the Sea) was a galleon of fifty-seven *zira*, with seventy-four guns and a crew of 850, constructed in 1208/1793-94 by Nikoli Kalfa, using Le Brun's measurements in Bodrum.[218] It was

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[209] BOA. Cevdet-Bahriye, no. 9360.

[210] *Târih-i Cevdet,* vols. 7-8, pp. 349-351.

[211] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

later covered with copper in 1795.[219] Tezel claims that this ship was constructed in Rhodes along with the galleons, the *Hıfz-i Hüdâ* (Protection of God) and the *Tevfikullah* (Aid of God) in 1798.[220]

It appears on the list of the ships to be caulked, pressed and greased in 1206/1791-92.[221] It is known to have been still in use at the Imperial Naval Arsenal in 1216/1801-02.[222] It participated in battles against the British fleet, appearing on the lists with seventy-four guns among the ships ready in the Marmara Sea in 1806[223] and among the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[224]

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212 Noyan gives 1776 for its construction date. See Ibid., p. 92.

213 Karal, "Selim III...," p. 206.

214 BOA. Cevdet-Bahriye, no. 5136.

215 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

216 Emsen, p. 41.

217 Noyan, "Eski Gemilerimizin İsimleri," p. 93.

218 Karal, "Selim III...," p. 206.

219 Emsen, "Selim III devrinde Osmanlı donanması," p. 8.

220 Tezel, p. 651.

221 BOA. Hatt-ı Hümâyûn. no. 9658.

222 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

223 Emsen, p. 41.

224 Noyan, "Eski Gemilerimizin İsimleri," p. 93.

The *Hümây-ı Zafer* (Phoenix of Victory) was a frigate of fifty-three *zira*, with fifty guns and a crew of 450 men, constructed in 1208/1793-94 by Dimitri (second architect) at the Imperial Naval Arsenal.[225] It was coverd with copper in 1794.[226] It and the galleon *Bahr-i Zafer* received new provision and kitchen systems in 1793. This system supplied the cooks of the ships with wood, salt, and oil in quantities enough for the entire voyage at the expense of the Treasury.[227]

The hose of the *Hümây-ı Zafer* had become worn out and the *Tersâne-i Âmire tulumbacıbaşısı* mounted a new one in 1208/1793-94.[228] The *Hümây-ı Zafer* was still in use at the Imperial Naval Arsenal in 1216/1801-02.[229] It appears among the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810[230].

The *Şiâr-ı Nusret* (Hallmark of Victory) was a frigate of fifty-one *zira*, covered with wood, with fifty guns and a crew of 450 men, constructed in 1208/1793-94 by Antuvan Kalfa (Antoin) in the Rhodes dockyard.[231] The *Şiâr-ı Nusret* was still in use at the Imperial Naval Arsenal in 1216/1801-02,[232] and it was on the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[233]

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[225] Karal, p. 208.

[226] Emsen, p. 8.

[227] Tezel, p. 622. Shaw also draws attention to the application of this new system to the *Bahr-i Zafer*, without mentioning the *Hümây-ı Zafer*. Shaw, "Selim III and the Ottoman Navy," p. 220.

[228] BOA. Cevdet-Bahriye, no. 1913.

[229] *Târih-i Cevdet*, vol. 7-8, pp. 349-351.

[230] Noyan, "Eski Gemilerimizin İsimleri", p. 93.

[231] Karal, "Selim III...," p. 208.

The *Nesîm-i Zafer* (Breeze of Victory), a frigate of forty-seven *zira*, covered with wood, with forty guns and a crew of 375 men, was constructed in 1208/1793-94 by Antuvan Kalfa (Antoin) in the Rhodes dockyard.[234] Accordıng to a document, the hose of this ship became worn out and the *Tersâne-i Âmire tulumbacıbaşısı* installed a new one in 1208/1793-94.[235] The *Nesîm-i Zafer* was still in use at the Imperial Naval Arsenal in 1216/1801-02.[236]

The *Gazâl-ı Bahrî* (Gazelle of the Sea), a frigate of forty-five *zira*, was covered with copper, carried forty-two guns and had a crew of 375. It was constructed in 1208/1793-94 by Kara Yorgi Kalfa in Kemer.[237] It was still in use at the Imperial Naval Arsenal in 1216/1801-02.[238]

All that is known of the *Zafer-i Hümâyûn* (Royal Victory) is that it was a ship of galleon type constructed at the *Tersâne-i Âmire* in 1793-94, and launched the same year.[239]

More is known about the *Arslân-ı Bahrî* (Lion of the Sea), a fifty-nine *zira* galleon, covered with copper, with seventy-six guns and a crew of 850 men. It was

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232 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

233 Noyan, p. 93.

234 Karal, p. 208.

235 BOA. Cevdet-Bahriye, no. 1913.

236 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

237 Karal, "Selim III...," p. 208.

238 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

239 Emsen, p. 13.

constructed in 1209/1794-95 by the French shipbuilder Le Brun at the Imperial Naval Arsenal.[240] It was among the ships to receive copper sheathing in 1795.[241]

An Ottoman document dated 28 Rebî`u'l-evvel 1210/12 October 1795 lists the *Arslan-ı Bahrî* of the Kapudan Pasha and other galleons and flagships whose signs, sword and regiment flags and colours were to be renewed, repaired and dyed. The document gives all of the expenses in total without special refence to each ship. The expenses of dye, tailors and silk thread added up to 1,339 *kuruş*.[242] Another Ottoman document detailing the repair of the kitchen ovens of the *Rehber-i Nusret* and the *Necm-i Zafer* refers to the *Arslân-ı Bahrî*. It says, in a small note, that the price of the iron sheets produced formerly for the galleon *Arslân-ı Bahrî*, which had been boarded by the Kapudân Pasha, would be applied to the above-mentioned ships.[243] The *Arslân-ı Bahri* was still in use at the Imperial Naval Arsenal in 1216/1801-02.[244] During battles against the British fleet, it was active with seventy-six guns among the ships ready in the Marmara Sea in 1806.[245] It also appears on the list of the navy in 1810.[246]

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[240] Karal, "Selim III...," p. 206.

[241]Emsen, p. 8 and 11.

[242] BOA. Cevdet-Bahriye, no. 6229. For the document see Appendix L.

[243] BOA. Cevdet-Bahriye, no. 8085 (23 Muharrem 1212/18 July 1797).

[244] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[245] Emsen, p. 41.

[246] Noyan, "Eski Gemilerimizin İsimleri", p. 93.

Little is known about the *Salâbetnümâ* (Showing Power/Firmness), a corvette of thirty-three-*zira*, covered with copper, with twenty-six guns and a crew of 150 men except that it was built in 1210/1795-96 by the French shipbuilder Le Brun at the Imperial Naval Arsenal[247] and that it was still in use at the Imperial Naval Arsenal in 1216/1801-02.[248] The same is the case for the *Küşâde Baht* (Having Good Fortune), a frigate of thirty-seven *zira*, covered with copper, with thirty-eight guns and a crew of 300 men. It was constructed at the Imperial Naval Arsenal at an unknown date. It is known that she was captured by enemy forces and after some time returned to Istanbul under the name of the "Golermo" on route to the Black Sea. It was not allowed to sail to the Black Sea and was bought by the Porte. In 1210/1795-96 it was commissioned to Corfu.[249]

The *Zîver-i Bahrî* (Ornament of the Sea) was built by Ahmet Hoca Kaptan on Midilli[250] in 1211/1796-97.[251] Ahmet Hoca Kaptan had been a student of Le Roy's[252] and was an engineer at the Arsenal. Of fifty-three *zira*, the ship was covered with copper, carried sixty-eight guns and had a crew of 700. The *Zîver-i Bahrî* was still in use at the Imperial Naval Arsenal in 1216/1801-02.[253] During battles against the

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[247] Karal, "Selim III...," p. 209.

[248] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[249] Karal, "Selim III...," p. 209.

[250] Ibid., p. 206.

[251] Noyan gives 1752 for its construction date. See Noyan, "Eski Gemilerimizin İsimleri," p. 92.

[252] Kazım Çeçen, "Mühendishâne-i Bahri-i Hümâyûn," *Dünden Bugüne İstanbul Ansiklopedisi*, vol. 6 (Istanbul: Türkiye Ekonomik ve Sosyal Tarih Vakfı, 1994), p. 14.

British fleet in the Marmara Sea in 1806, it was active with sixty-eight guns among the ships,[254] and on the list of the auxiliary fleet of the navy at the Tersâne-i Âmire in 1810.[255] A picture of this ship was shown in Mahmud Raif Efendi's book, where it is shown carrying seventy guns. Its length is given as fifty-nine and half a French pic.[256]

The *Selimiye* was a three-decked galleon of sixty-two *zira*, covered with copper, with (62-110-122-132) guns and 1,200 men aboard. It was built in 1211/1796 by the French shipbuilder Le Brun at the Imperial Naval Arsenal, according to French models.[257] Its construction had been ordered by the Sultan on 23 Rebî`u'l-evvel 1209/18 October 1794, two years before its completion. At that time it was then planned to be of sixty-seven *zira*, six-storeyed, and thriple-decked.[258] Although its construction did not begin immediately, its keel was to have been laid on the model of the *Royal Louis*[259] shortly after that date.[260]

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[253] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[254] Emsen, p. 41.

[255] Noyan, p. 93.

[256] Mahmud Raif Efendi, trans. and ed. by Arslan Terzioğlu- Hüsrev Hatemi, *Osmanlı İmparatorluğu'nda Yeni Nizamların Cedveli* (İstanbul: Turkiye Turing ve Otomobil Kururmu, 1789), see the appendix of the book.

[257] Shaw, "Selim III and the Ottoman Navy," p. 225. The number of the guns is mentioned both as 62 (probably by mistake) and 122 in Karal, p. 206.

[258] Emsen, p. 15.

[259] The French *Royal Louis,* with 100 guns, was built in 1759. It was one of three-deckers constructed for the French navy and was very similar to the British first rates. It also shows the important changes that had occurred in replacing the aging ships of Louis XIV's fleet. The hull sheer is much flatter and less emphasis placed upon decoration. The quarterdeck is extended, while increased draught and beam have made a more stable gun-platform and a more weather resistant hull with higher freeboard. There seems to have been significant alteration in basic ship-rig, too. The

The timber for masts and yards required for the *Selimiye*, necessary timber were ordered from Hasan Çelebizade Seyyid Halil Ağa, a notable from Kidros, and a certain İbrahim Ağa in his retinue. An architect furnished with the necessary measuring equipment was to be sent from the *Tersane-i Amire* to accompany them. They were warned to be meticulous in searching for the proper trees in Kidros, Cide and surrounding places, in felling them according to the pre-determined measures and diameters, and in transferring them to the *Tersâne-i Amire* in safety. A document dated 15 Rebîulâhir 1211/18 October 1796 reports that a galleon of three-decks (referring to *Selimiye* without giving its name) was under construction at the *Tersâne-i Amire*. When it neared completion, large masts and yards in specific diameters and sizes would be needed. Since those on hand in the *Tersâne-i Amire* were not of high enough quality to equip a ship like the *Selimiye* forty new great masts (each forty *zira* in length, a down edge of ten to eleven *karış* and an upper edge of six to seven *karış*), ten large masts (each thirty-four *zira* in length and with a down edge of eight to nine *karış* and an upper edge five to six *karış*) and another ten masts (each thirty-two *zira* in length and with a down edge of 7.5-8 *karış* and an upper edge of five to six *karış*) amounting to sixty in total, were required.[261]

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spirit-topsail has gone, doubling it with a jib boom extends the bowsprit. It retained its square sails, often useful for pulling a dimasted battle-ship out of the line, but now supported a series of jibs that were complemented by staysails set between the masts. Above the deep-gored topsails with three rows of reefing points, were set topgallants and royals. Most interesting was the spanker with its vertical leech, which, although it retained its long, vestigial lateen yard (carried as a spare lower yard), had shed the area of sail forward of the mast. See Woodman, p. 99. Unlike the information given above, James Prichard refers to the *Le Royal Louis* as having 116 guns on board and states that by the spring of 1758 her keel, stem-and sternpost had been laid down at Brest and frames were being mounted, but she was only completed late in 1761. See James Pritchard, *Louis XV's Navy 1748-1762* (Kingston and Montreal: McGill-Queen's Univiversity Press 1987). For a general account of the French navy, see E. H. Jenkins, *A History of the French Navy from Its Very Beginnings to the Present Day* (London: Macdonald and Jane's, 1973).

[260] FO 78/15, p. 346.

There is disagreement over the identity of the builder of the *Selimiye* and the number of guns it carried. Shaw refers to an anonymous French document saying that the English Spurring was the builder,[262] and he compares this information with some suggesting that the French Le Brun built it.[263] However, no sound evidence was found in the course of the research for this paper showing that anyone (including Spurring) other than Le Brun constructed this ship.

Regarding the guns of the *Selimiye*, various figures are given. Unlike the figure mentioned in Karal's article (sixty-two guns), one hundred and twenty-two at its launch in 1796 is given by Goodwin,[264] 132 in letters from the Earl of Elgin to the Secretary of State on 6 November 1799[265] and 21 April 1800.[266] It is also said to have had 110 guns aboard during the war waged against France in Egypt on 26 March 1801,[267] and sixty-two guns in 1806.[268] On 29 Zilkade 1215/13 April 1801, a

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[261] BOA. Cevdet-Bahriye, no. 6188.

[262] He refers to the anonymous French "Essai sur la puissance navale des Turcs" (A E Memoires et Documents, Turquie, no. 30, fol. 355). See Shaw, "Selim III and the Ottoman Navy," p. 225.

[263] Karal, "Selim III...," p. 206.

[264] Godfrey Goodwin, *The Janissaries* (London: Saqi, 1997), p. 107.

[265] The document says that the *Selimiye* had all the improvements, thanks to Captain Pasha's extreme attention to naval matters and his ability. See FO 78/34, (6 November 1799), p. 22

[266] In another letter from the Earl of Elgin at Constantinople to the Secretary of State on 21 April 1800, the Captain Pasha is said to have sailed from Constantinople on Saturday the 26th on his own ship the *Selimiye* of 132 guns together with six other ships of the line, and four fifty's, and six smaller ships of war. See FO 78/29, (21 April 1800), pp. 78-79.

[267] James William, *The Naval History of Great Britain*, vol. 3 (London: R. Bentley and son, 1886), p. 87.

[268] Emsen, p. 41.

senty-two hour storm damaged the *Selimiye* and a number of other ships, breaking two rudder tillers.[269]

The three-decker *Selimiye* was still in use at the Imperial Naval Arsenal in 1216/1801-02.[270] It was also active during the wars with the British fleet, where it sailed with sixty-two guns in the Marmara Sea in 1806.[271]

Tezel describes a *Selimiye* galleon of 128 guns and with crew of 1,280, constructed in 1808 by Monsier Löbral (an engineer) and Monsier Benoit (an architect). He says that its length was 147 *kadem*, its beam fifty *kadem*, its height twenty-five *kadem*, and its deplacement 23.5 *kadem.*[272] It also appears as thriple-decker galleon in 1810 on the list of the Navy.[273]

The *Heybetendâz* (Awe Inspiring) was a galleon (*patrone-i humayun*) of fifty-nine *zira*, covered with copper, with seventy-six guns and 850 men aboard. It was constructed in 1211/1796 by Nikoli Kalfa, using Le Brun's measures, in Bodrum.[274] The *Heybetendâz* was still in use at the Imperial Naval Arsenal in 1216/1801-02[275] and active during wars with British fleet in 1806, with its seventy-

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[269] BOA. Hatt-ı Hümâyûn, no. 3446-e (29 Zilkade 1215/13 April 1801)

[270] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[271] Emsen, p. 41.

[272] Tezel, p. 655.

[273] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

[274] Karal, "Selim III...," p. 206.

[275] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

four guns.[276] It also appears on the list of the auxiliary fleet of the navy at the *Terâne-i Âmire* in 1810.[277]

In *Çeşmî-zâde Tarihi* (A History by *Çeşmî-zâde*), under the title of "*zikr-i nuzûl-i kalyon der-Tersâne-i âmire* (About the Launch of the Galleon at the Arsenal)," the *Mesken-i Gâzî* (the Residence of the Victorious Fighter for the Islamic Faith) appears as a galleon launched to sea on 7 Zilka'de 1180/6 April 1766 with the attendance of the Sultan and Kapudân-ı Derya Mehmed Pasha.[278] This name was later on given to a frigate in the time of Selim III, which was fifty-three *zira*, covered with copper, carrying fifty guns and 450 men. It was built in 1211/1796 by the French shipbuilder Le Brun at the Imperial Naval Arsenal.[279] The *Mesken-i Gâzî* was still in use at the Imperial Naval Arsenal in 1216/1801-02.[280] On 18 Şevval 1216/21 February 1802, some large mirror glasses were required for the equipment of the *Mesken-i Gâzî*, at a cost of 379 *kuruş* and sixteen *para.*[281] During the battle against the British fleet in 1806, it was blown up together with the frigate the *Nesm-i Futûh.* At the time, it had thirty-eight guns aboard.[282] It also appears among the list of the ships in 1810.[283] It must have been repaired or rebuilt.

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[276] Emsen, p. 41.

[277] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

[278] Çeşmî-zâde Mustafa Reşîd, *Çeşmî-zâde Tarihi* (İstanbul: İstanbul Fetih Cemiyeti, 1993), p. 23.

[279] Karal, "Selim III...," p. 207.

[280] *Târih-i Cevdet,* vols. 7-8, pp. 349-351.

[281] BOA. Cevdet-Bahriye, no. 9274.

[282] Emsen, p. 41.

The *Şehper-i Zafer* (Great Wing of Victory) was a frigate of fifty-three *zira*, covered with copper, armed with fifty guns, and with 450 men aboard. It was constructed in 1211/1796[284] by the architect Antuvan (Antoin?) in Rhodes, using Le Brun's measures. It was among the Corfu navy and then was commissioned to join the Ancona (an Adriatic port and capital of Marche region of central Italy) siege. It sailed to Trieste in the winter and was still there in 1211/1796.[285] This vessel was still in use at the Imperial Naval Arsenal in 1216/1801-02.[286]

Filip (Philip) Kalfa built the frigate *Şevketnümâ* (Showing Majesty) in 1211/1796 on the island of Lemnos/Limni.[287] It was fifty-one *zira* in length, covered with copper, with fifty guns and 450 men aboard. When the frigate underwent a crash and sunk in the following years, its equipment was rescued and transferred to the Naval Arsenal via another galleon, the *Beşâretnümâ*. As far as is known, the *Şevketnümâ* was composed of three parts: an upper deck (*birinci ambar*), a main deck (*palavra*) and the bilge (*sintine*). Among the mast equipment were the royal mast (*kontra babafingo*), the topmast (*gabya çubuğu*), the yard (*seren*), the main mast (*ana direk*), the boom (bumba), and the bowsprit (*cıvadıra*).[288] The *Şevketnümâ*

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[283] Noyan, "Eski Gemilerimizin İsimleri,"p. 93.

[284] Noyan gives 1779 for its construction date. See Ibid., p. 92.

[285] Karal, "Selim III...," p. 208.

[286] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[287] Karal, p. 208.

[288] Emsen, p. 9.

was still in use in the Imperial Naval Arsenal in 1216/1801-02.[289] It was probably repaired or rebuilt later on.

The *Bûlheves* (Very Enthusiastic), a frigate of forty-one *zira*, covered with copper, filled out with forty guns and a crew of 275, was constructed in 1211/1796 by Mustafa Molla (Büyük Seyyid Mustafa of the Mühendishâne instructors and chief assistant to Le Brun) in Kalas. It was among the ships of the Corfu navy and then was commissioned to the Ancona siege and sailed to Trieste in the winter and was still there in 1211/1796.[290] This vessel was still in use at the Imperial Naval Arsenal in 1216/1801-02.[291] It also appears among the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[292] A picture of this frigate is shown in Mahmud Raif Efendi's book, where it appears to have forty-eight guns and to be forty-nine and half French pic in length.[293]

The *Zaferküşâ* (Bringing Victory), a corvette of thirty-seven *zira*, covered with copper, with twenty-six guns and 200 men aboard, was constructed in 1211/1796 by the French shipbuilder Le Brun at the Imperial Naval Arsenal.[294] It was still in use at the Imperial Naval Arsenal in 1216/1801-02.[295] During wars with

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[289] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[290] Karal, "Selim III...," p. 208.

[291] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[292] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

[293] Mahmud Raif Efendi, *Osmanlı İmparatorluğu'nda Yeni Nizamların Cedveli.* See the appendix of the book.

[294] Karal, p. 208.

the British fleet in 1806 in the Marmara Sea, it participated with thirty-four guns.[296] It appears on the list of the auxiliary fleet of the Navy at the *Tersâne-i Âmire* in 1810.[297]

A Swedish shipbuilder by the name of Klintberg built the thirty-five *zira* corvette *Rehber-i Nusret* (Guide to Victory) on Rhodes in 1211/1796. It was clad in copper, had twenty-six guns and 200 men aboard.[298] As understood from an Ottoman document, this corvette had been planned as a corsair ship. Murâbitzâde Hasan Kapudân, the governor of Rhodes (*Rodos mutasarrıfı*), was in charge of the administration of the construction of this vessel. All the cost of the necessary materials and equipment were met by the state. The corvette cost 23,308 *kuruş* in total.[299]

The *Rehber-i Nusret* appears both as a galleon and a corvette along with a ship called the *Necm-i Zafer*. The kitchen ovens of which needed repair on 27 Muharrem 1212/22 July 1797. The ovens were renewed by the *Liman Reisi* (the commander of the Port of Istanbul). The required iron sheet (*âhen sac*) and some iron equipment were purchased. All the expenses, including, workmanship, amounted to

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[295] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[296] Emsen, p. 41.

[297] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

[298] Karal, "Selim III...," p. 209.

[299] BOA. Cevdet-Bahriye, no. 2144 (Gurre-i Safer 1212/26 July 1797).

903.5 *kuruş* and ten *para*.[300] It was still in use at the Imperial Naval Arsenal in 1216/1801-1803.[301]

Little is known of the *Necm-i Zafer* (the Star of Victory). It appears both as a galleon and corevette. Because its name is mentioned together with the *Rehber-i Nusret*, with which it underwent the same repair process, it might be judged to have had similar features.[302]

The *Mürg-i Bahrî* (Bird of the Sea) was a corvette of twenty-seven *zira*, covered with copper, with twenty-two guns and a crew of 120. It was constructed in 1211/1796 by Çamlıcalı Kalfa Kara Yorgi, at an undisclosed site. It sailed to Alexandria in the company of merchant ships in 1211/1796[303] and was still in use at the Imperial Naval Arsenal in 1216/1801-02.[304]

There was another ship with the same name, of the *şehtiye* type, thirty-three *zira* in length. It appears among the ships at the Imperial Naval Arsenal for rigging out in 1206/1791-92.[305] The total personnel consisted of a *kaptan* (captain), *reis-i evvel* (first commander), *reis-i sânî* (second commander), *reis-i sâlis* (third commander), four other *reis*, a *bâdbânî* (man in charge of rising or lowering the sails), an *ağa*, a *hoca* (kâtip/scribe), two *çavuş*, a *vekiliharç* (a kind of majordomo or

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[300] BOA. Cevdet-Bahriye, no. 8085.

[301] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[302] BOA. Cevdet-Bahriye, no. 8085.

[303] Karal, "Selim III...," p. 209.

[304] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[305] BOA. Hatt-ı Hümâyûn, no. 9658.

butler), a *topçubaşı* (chief gunner), ten *topçukethüdası* (gun officers), twelve *topçu* (gunners), a *serhazine* (chief treasurer), a *serdümen* (chief helmsman), a *dümen kethüdası* (a helmsman), an *aylak başı* (chief temporaray mariner with a certain salary), five *aylakçı*, eighteen *aylakçı* of Greek origin, eight *aylakçı* of Armenian origin, a *kandil çavuşu* (officer in charge of oil lamps), a *klavuz* (guide), a *sermarangoz* (chief carpenter), a *serkalafat* (chief caulker), three *kalafatçı* (caulkers), and a *varilci* (man in charge of barrels).[306]

The *Tevfik-i Hüdâ* (Aid of God) was a galleon commissioned to İznikmid to transport timber in 1211/1796. The transport of timber was generally carried out by a type of sailing ship called a *çekeleve*,[307] but because of the urgent need for a large quantity of timber for the construction of a three-decked frigate before the approaching winter, the *Tevfik-i Hüdâ* was assigned this task.[308]

The *Rûzgâr-ı Bahrî* (Wind of the Sea) was a corvette of twenty-two guns, with a crew of 120, built in 1796, the construction site is unknown. Its name does not appear in Cevdet Pasha or Karal's lists, only in Tezel's list of ships constructed between 1789-1799.[309] Unlike Tezel, Güleryüz writes that it was thirty-seven *zira* and with ten guns and a crew of 150.[310]

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[306] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, pp. 467-468.

[307] A sailing craft used in the Levant, with two short masts that lean forward. See *The Lingua Franca*, p. 563.

[308] BOA. Cevdet-Bahriye, no. 8709.

[309] Tezel, pp. 392-393.

[310] Ahmet Güleryüz, *Kadırgadan Kalyona Osmanlıda Yelken, Mikyas-ı Sefain* (Ottoman Sailing Ships From Galleys to Galleons, Particulars of Ships and Their Equipment) (İstanbul: Türkiye Sualtı Arkeolojisi Vakfı TINA, Denizler Kitabevi, 2004), p. 98.

A corvette of thirty-seven *zira*, covered with copper, with guns and 200 men aboard, the *Cenk-Âver* (Brave Fighter) was constructed in 1212/1797-98 by the French shipbuilder Le Brun, together with Antuvan at the Imperial Naval Arsenal.[311] It was still in use at the Imperial Naval Arsenal in 1216/1801-02.[312]

Another corvette of thirty-seven *zira* built by Le Brun and Antoin in the same year was the *Secâ-ı Bahrî* (Nature/Disposition of the Sea). It also carried twenty-six guns and a crew of 200. It was sheathed with copper as well.[313] It was still in use at the Imperial Naval Arsenal in 1216/1801-02.[314]

In 1213/1798-1799, Le Brun and Antuvan built the *Sâika-bâr/Sâika-ı Bâd* (the Drive of Wind) at the Imperial Naval Arsenal. It too was thirty-seven *zira* in length, covered with copper, with twenty-six guns and 175 men aboard.[315] The *Sâika bâr/Sâika-ı dâd* was still in use at the Imperial Naval Arsenal in 1216/1801-02.[316] During the battles against the British fleet in the Sea of Marmara in 1806, it was active with twenty-four guns,[317] and on the list of the naval ships in 1810.[318]

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311 Karal, "Selim III...," p. 208.

312 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

313 Karal, "Selim III...," p. 208.

314 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

315 Karal, p. 208.

316 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

317 Emsen, p. 41.

318 Noyan, "Eski Gemilerimizin İsimleri," p. 93.

The *Âteşfeşân* (Sparking Fire) was another corvette of thirty-seven *zira*, covered with copper, with twenty-six and a crew of 175, constructed in 1213/1798-99 by Le Brun and Antuvan at the Imperial Naval Arsenal.[319] It was still in use in 1216/1801-02[320] and on the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[321]

The *Beşâretnümâ* (Showing Glad Tidings) was a galleon (*Riyâle-i Hümayun*, the rear admiral's flagship) of fifty-nine *zira*, covered with copper, with seventy-six guns and 850 men aboard, built in 1212/1797-98 by Nevsim Kalfa, using Le Brun's measures, at Gemlik.[322] It was still in use at the Imperial Naval Arsenal in 1216/1801-02.[323]

The *Bâdi-i Nusret* (the Sailing Ship of Victory), a galleon of sixty-three *zira*, covered with copper, with eighty-two guns and 900 men aboard, was built in 1212/1797-98 by Le Brun and Antoin at the Imperial Naval Arsenal.[324] In the same year, for the equipment of this three-decker, various blocks (*makara*) with Santo sheaves were purchased from the Galata traders through Idris Pasha. The price paid

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[319] Karal, "Selim III...," p. 208.

[320] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[321] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

[322] Karal, "Selim III...," p. 206.

[323] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[324] Karal, "Selim III...," p. 206.

for the blocks was 283 *kuruş*.[325] This vessel was still in use at the Imperial Naval Arsenal in 1216/1801-02.[326]

The *Seyyâd-ı Bahrî* (Hunter of the Sea) was a galleon of fifty-nine *zira*, covered with copper, with seventy-four guns and 850 men aboard, constructed in 1212/1797-98 by the Venitian Joseph Kalfa, using Le Brun's measures, at Kal'a-i Sultâniye in the Dardanelles.[327] During the battles with the British fleet, it was active with seventy-four guns.[328] It is listed as a galleon of *Riyâle-i Hümâyûn* (the rear admiral's flagship) in 1810.[329]

Dimitri (second architect) built the *Şâhin-i Deryâ* (Falcon of the Sea), a frigate of fifty-three *zira*, covered with copper, with fifty guns and 450 men aboard, in 1212/1797-98, using Le Brun's measures in the Black Sea Ereğlisi dockyard.[330] In 1797 it was recorded that this vessel was a galleon of 53.5 *zira* and that its hull had cost 48,529 *kuruş*.[331] It was still in use at the Imperial Naval Arsenal in 1216/1801-02.[332]

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[325] BOA. Cevdet-Bahriye, no. 2287.

[326] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[327] Karal, "Selim III...," p. 206. See also Alpagut and Kurtoğlu, p. 30.

[328] Emsen, p. 41.

[329] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

[330] Karal, "Selim III...," p. 207.

[331] Alpagut and Kurtoğlu, p. 31.

[332] *Târih-i Cevdet*, vol. 7-8, pp. 349-351.

The *Hediyyetü'l Mülûk* (Gift of the Sultans) was a frigate of thirty-nine *zira,* covered with copper, carrying forty-six guns and a crew of 200, constructed by Mustafa (the second assistant to Le Brun at the Imperial Naval Arsenal) in Sinop in 1212/1797-98 and then was commissioned to Corfu.[333] A picture of the corvette appears in Mahmud Raif Efendi's book, and Mustafa appears as Çavuşoğlu Mustafa, as builder of the vessel. The numbers given for the length (thirty-six and half French pic) and that of guns (twenty-four) differ from those given above.[334]

The *Tîz Hareket* (Swift Moving) was a frigate that at one time was under the command of the Grand Vizier. Of thirty-eigth *zira,* it was covered with copper, with thirty-two guns and 200 men aboard. It was constructed in 1212/1797-98 by Antuvan (Antoin) Kalfa using Le Brun's measurements in Rhodes.[335] A document of 1218/1803-04 states that this frigate would be ready to set off in two to three days, loaded with raw copper from Samsun wharf, bound for the Imperial Naval Arsenal. In the same document, a firman orders that the crew of the ship be paid as soon as the ship arrived at Istanbul. The salary in question, when calculated together with that of the *Bahr-i Amîk* crew coming from Canik with a load of 850 pieces of *karaağaç* (elm) timber, added up to 19,488 *kuruş.*[336] The *Tîz Hareket* appears on the list of the navy at the *Tersâne-i Âmire* in 1810, charged with timber transportation.[337]

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[333] Karal, "Selim III...," p. 208.

[334] See the pictures in the end of *Mahmud Râif Efendi ve Nızâm-ı Cedîd'e Dâir Eseri,* trans. and ed. by Kemal Beydilli and İlhan Şahin (Ankara: T.T.K., 2001).

[335] Karal, "Selim III...," p. 208.

[336] BOA. Cevdet-Bahriye, no. 1897.

[337] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

A copper-hulled galleon (*Kapudâne-i Hümayun*) of sixty-three *zira*, the *Tâvus-ı Bahrî* (Peacock of the Sea) with eighty-two guns and 900 men aboard, was constructed in 1213/1798-99 by Le Brun at the Imperial Naval Arsenal.[338]It was launched on 22 December 1798.[339] A document of 29 Zilkade 1215/13 April 1801 mentions that as a result of a severe storm that lasted for two hours, the *Tâvus-ı Bahrî,* on which the Kapudâne was present, was damaged significantly. The rudder was ripped off when the bearing pintles were lost.[340] The vessel was still in use at the Imperial Naval Arsenal in 1216/1801-02.[341] In the 1806 Marmara battles against the British fleet, it was active with eighty-two guns.[342] It also appeared on the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[343]

The *Kaplân-ı Bahrî* (Tiger of the Sea), a galleon of fifty-nine *zira*, covered with copper, with seventy-six guns and 850 men aboard, was built in 1214/1799-1800 by the Swedish shipbuilder Klintberg on the island of Rhodes.[344] A document by the Chief of the Imperial Naval Arsenal (*Tersâne-i Amire Reisi*) of 1215/1800-01 says that the *Kaplân-ı Bahrî* and another vessel named the *Seddülbahir* were to be covered with copper. As there was not enough of the material in the *mahzen-i sürb*, it

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338 Karal, "Selim III...," p. 206.

339 Işın, *Osmanlı Bahriyesi Kronolojisi 1299-1220*, p. 154.

340 BOA. Hatt-ı Hümâyûn, no. 3446-e (29 Zilkade 1215/13 April 1801)

341 *Târih-i Cevdet,* vols. 7-8, pp. 349-351.

342 Emsen, p. 41.

343 Noyan, "Eski Gemilerimizin İsimleri," p. 93.

344 Karal, "Selim III...," p. 207.

was decided that ten thousand *vakiyye*s of raw copper, valued at 6,666.5 *kuruş*, would be transferred from the Imperial Mint (*Darphâne-i-Âmire*).[345] The *Kaplân-ı Bahrî* was still in use at the Imperial Naval Arsenal in 1216/1801-02.[346]

Launched to sea in 1799/1213-1214, the *Seddülbahir* (Barrier of the Sea) was a new galleon of 59.5 *zira*, covered with copper, with seventy-six guns and a crew of 850, completed[347] by Benuva (Benois) at the Imperial Naval Arsenal.[348] As discussed above, like the *Kapân-ı Bahrî,* the *Seddülbahir* was covered with copper provided from both the *mahzen-i sürb* and the Imperial Mint (*Darphâne-i Âmire*) between 1214/1799-1800 and 1215/1800-01.[349] Thirty bronze guns, thirteen *karış* in diameter and fourteen *kıyye*s in weigth, were cast for the *Seddülbahir*, since there were no guns of the required measures available at the *Tersâne-i Âmire*. At the same time, 250 bronze guns were cast for other ships. Among these ships were, a frigate of fifty-four *zira*, and two galleons under construction in Rhodes and Sohum.[350] The *Seddülbahir* was still in use at the Imperial Naval Arsenal in 1216/1801-02.[351] In 1806 it was active against the Britishnavy with seventy-six guns.[352]

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345 BOA. Cevdet-Bahriye, no. 1860 and no. 2359.

346 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

347 İ. Bülent Işın, p. 155.

348 Karal, "Selim III...," p. 207.

349 BOA. Cevdet-Bahriye, no. 1860 and 2359.

350 Emsen, p. 36.

351 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

A frigate of fifty-three *zira,*[353] covered with copper, with fifty guns and a crew of 450, was built in the Eregli dockyard in 1214/1799-1800 by Dimitri Kalfa (second architect), using Le Brun's measurements.[354] Named the *Bedr-i Zafer* (the Full Moon of Victory) it was still in use at the Imperial Naval Arsenal in 1216/1801-02.[355]

Of the *Civân-ı Bahrî* (Handsome Young Man of the Sea), a frigate of fifty-three *zira*, covered with copper, with fifty guns and 450 men aboard, all that is known is that it was built in 1214/1799-1800 by Benuva (Benois) on the island of in Lemnos/Limni.[356] Likewise, of the *Meserret-i Bahrî* (Joy of the Sea), all that is known is that it was corvette of thirty-three *zira*, covered with copper, with twenty-two guns and 150 men aboard, constructed in 1214/1799-1800 by the Swedish shipbuilder Klintberg on Rhodes. She was commissioned to transport the Ottoman soldiers on Rhodes.[357]

Gülşen Bey built the *Kilidü'l Bahir/Kilidü'l Bahrî* (Lock of the Sea) in Sohum, at an undisclosed date. The galleon had a length of fifty-nine *zira* and carried twenty-four guns. Covered with copper, it was equipped with war equipment.[358] The

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[352] Emsen, p. 41.

[353] Tezel suggests that this was a galleon of 53.5 *zira* rather than a frigate of fifty-three *zira* and that its hull cost 48,529 *kuruşh*. See Tezel, p. 611.

[354] Karal, "Selim III...," p. 207.

[355] *Târih-i Cevdet,* vols. 7-8, pp. 349-351.

[356] Karal, p. 207.

[357] Ibid., p. 209.

[358] Ibid., p. 209.

Kilidü'l Bahr was still in use at the Imperial Naval Arsenal in 1216/1801-02[359]and served during the battles against the British with seventy-four guns.[360] It is also listed among the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[361]

The construction date, site and builder of the *Ceyân-ı Bahrî* (Gazelle of the Sea) are unknown. A document of 29 Zilkade 1215/13 April 1801, mentions that as a result of a severe storm that lasted for two hours, the *Ceyrân-ı Bahri*, on which Giridî Hüseyin Kapudan was travelling, had been damaged considerably and its rudders lost.[362] This vessel was still in use at the Imperial Naval Arsenal in 1216/1801-02.[363]

The *Bed'-i Nusret* (Beginning of Victory) was a galleon of forty-five *zira*, the construction of which was ordered by imperial edict at the Imperial Arsenal before 1199/1784-85. It was launched to sea, along with a recitation of the Qur'anic verse *bismillahi mecrâhâ ve mursâhâ*[364] on Thursday (24 Receb 1199/1784-85) in a ceremony attended by the Sultan Abdulhamid I, the Grand Vizier, the *Şeyhülislam* and Gazi Hasan Pasha, the Kapudan Pasha. During the ceremony, sable furs, caftans and robes of honour were presented to the people of the Imperial Naval Arsenal.[365]

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359 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

360 Emsen, p. 41.

361 Noyan, "Eski Gemilerimizin İsimleri," p. 93.

362 BOA. Hatt-ı Hümâyûn, no. 3446-e (29 Zilkade 1215/13 April 1801

363 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

364 This phrase is a part of a verse referring to the prophet Noah. To understand the full meaning here is the translation. "*And he {Noah} said: Embark therein: in the name of Allah will be its (moving) course and its (resting) anchorage. Surely, my Lord is Oft-Forgiving, Most Merciful.*" See *The Noble Qur'an*, 11/41.

The *Bed'-i Nusret* is known to have operated during the reign of Selim III. In a document dated 1205/1790-91, it appears as a galleon under the command of el-Hac Süleyman Kapudan, *Cezayir kapudanesi* (full admiral of Algeria), requiring equipage, crew and provisions at Büyükdere.[366]

This vessel is also mentioned in a document dated 1208/1793-94. Its hose had become worn out and the *Tersâne-i Âmire tulumbacıbaşısı* at the Imperial Naval Arsenal installed a new one in 1208/1793-94.[367] No further information about it is available other this galleon was still in use at the Imperial Naval Arsenal in 1216/1801-02.[368]

The specifications of the galleon *Hüdâverdi* (Favour/Blessing of God) are unknown. A document indicates that it was at anchor off Daragaci at the Naval Arsenal in 1205/1790-91. The same document reports fire smoke billowing from the stern the galleon, caused by the carelessness of the crew. It is understood that the fire was put out and the necessary measures were taken.[369]

The *Seyyâh-ı Bahrî* (Traveller of the Sea) was a frigate commanded by Omer Kapudan in 1205. All that is known beyond that is that, in the same year, there was a mutiny on board. Many crew were killed, and the safe of the ship was forced open and the money inside stolen.[370]Even less is known of the *Kerem-i Barî* (Generosity

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365 Ahmet Vasıf Efendi, *Mehasinu'l-Asar ve Hakaiku'l Ahbar*, p. 260.

366 BOA. Hatt-ı Hümâyûn, no. 10011.

367 BOA. Cevdet-Bahriye, no. 1913.

368 *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

369 BOA. Hatt-ı Hümâyûn, no. 10631.

370 BOA. Hatt-ı Hümâyûn, no. 1205.

of God). A document dated 1205 states that it was a galleon under the command of Hasan Kapudan, *CezayirKapudanesi*, and was to be equipped, manned and victualled at Büyükdere.[371]

From a document dated 1205 we learn that the *Hıfz-ı Hüdâ* (Protection of God) was a galleon-type ship in the straits under the command of el-hâc Ibrahim Kapudân, *Kapudâne-i Tunus* (full admiral of Tunus) and that its bowsprit, cutwater, and lion figurehead had fallen, requiring it to be equipped, manned and victualled at Büyükdere. [372] Tezel says it was constructed at Rhodes, along with the galleons the *Şahbâz-ı Bahrî* and the *Tevfikullah*, in 1798.[373]

The *Nuvîd-i Fütûh* (Courier of Victories) was a galleon under the command of Hasan Bey Kapudân. A document from 1205/1789-90 states that it was to be equipped, manned and victualled at Büyükdere. From the same document it is learned that a galleon named the *Pulâd-ı Bahrî* (Steel/Sword/Mace of the Sea) was under the command of Ülgünlü Idris Kapudân, and was also to be equipped, manned and victualled at Büyükdere.[374]This vessel appears in 1206/1791-92 as a frigate of fifty-three *zira* within the list of the ships that were to be caulked, pressed, and greased.[375] Tezel says it was constructed on the island of Lemnos/Limni in 1798,[376]

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[371] BOA. Hatt-ı Hümâyûn, no. 10011.

[372] BOA. Hatt-ı Hümâyûn, no. 9644-A.

[373] Tezel, p. 651.

[374] BOA. Hatt-ı Hümâyûn, no. 10011.

[375] BOA. Hatt-ı Hümâyûn. No. 9658.

together with three other galleons, the *Şehbâz-i Bahri,* the *Tevfikullah,* and the *Hıfz-ı Hüdâ.*[377] The *Pulâd-ı Bahrî* was still in use at the Imperial Naval Arsenal in 1216/1801-02.[378]

The *Serheng-i Nusret* (Warrior for Victory), according to the document dated 1205/1790-91, was a frigate under the command of Süleyman Kapudân of Algeria/Karabağ, and was to be equipped, manned and victualled at Büyükdere, as was the *Beşîr-i Zafer* (Harbinger of Victory), a frigate under the command of Tunuslu Ali Kapudân.[379] The *Beşîr-i Zafer* is mentioned in a document dated 1208/1793-94 because its hose became worn out and was replaced by the *Tersâne-i Âmire tulumbacıbaşısı* of the Imperial Arsenal 1208/1793-94.[380]

The *Hüsn-i Gazât* (Beauty of Holy Warriors/Victories) was a type of ship known as a *şehtiye,* according to a document dated 1205/1790-91. Under the command of Ülgünlü el-hâc Ibrâhim Kapudan, it was to be equipped, manned and victualled at Büyükdere.The same document reports on a frigate by the name of the *Bidâyetü'l Fütûh* (Beginning of the Conquests) under the command of Abdulvehhâb Kapudân. It was also to take on supplies and men at Büyükdere.[381]

The *Tılsım-ı Bahrî* (Talisman of the Sea) and the *Şihâb-ı Sâkıb* (Shooting Star) were bomb frigates of thirty *zira* each on the list of the ships that were going to

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[376] Noyan gives 1780 for its construction date. See Noyan, "Eski Gemilerimizin İsimleri," p. 92.

[377] Tezel, p. 651.

[378] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[379] BOA. Hatt-ı Hümâyûn, no. 10011.

[380] BOA. Cevdet-Bahriye, no. 1913.

[381] BOA. Hatt-ı Hümâyûn, no. 10011.

be repaired and rigged out in 1206//1791-92 at the Imperial Naval Arsenal. One of them, the *Burc-ı Zafer* (Tower/Fortress of Victory) was a galleon of forty-three *zira,* to be caulked, pressed and greased.[382] This vessel was still in use at the Imperial Naval Arsenal in 1216/1801-02[383] and participated with twenty-four guns in the Marmara Sea against the British 1806.[384] It was on the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[385]

One document mentions three ships that were to be repaired in 1206/1791-92, the *Has Gazât* (Unique Holy Wars), a *şehtiye* of thirty-three *zira*; the *Bâis-i Nusret* (Reason of Victory), a frigate of forty-five *zira*; and the *Peyk-i Nusret* (Harbinger of Victory), a frigate of thirty *zira.*[386] This last vessel is also mentioned in a document dated 22 Rebî`u'l-âhir 1211/25 September 1796, written to Süleyman Ağa, the chief officer in charge of providing bread for imperial galleons (*kalyonlar ser-habbâzı*). It states that the daily allotment of bread for the *gedikliyân* (sailors) and *zabitân* (officers) of this frigate, commanded by (Trablisî) Hasan Kapudân, was sixty-four in total.[387]

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[382] BOA. Hatt-ı Hümâyûn. no. 9658.

[383] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[384] Emsen, p. 41.

[385] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

[386] BOA. Hatt-ı Hümâyûn. no. 9658.

[387] BOA. Cevdet-Bahriye, no. 1164. For the distribution of the bread over the personnel of the frigate see the document in Appendix M.

The *Nusret-nümâ* (Showing Victory), a frigate of thirty-five *zira*, was also on the list of the ships to be caulked, pressed and greased in 1206/1791-92.[388] Noyan gives 1746 as its construction date.[389]

The *Berk* (Thunderbolt) was a galleon constructed on the island of Rhodes in 1216/1801-02. 10, 000 *vukiyyes* of raw copper were ordered for both *Berk* and a corvette launched to sea. 6,566.5 *kuruş* were paid for the copper, which was provided from the Imperial Mint as *seferiyye akçesi* (temporary wartime treasury for urgent needs).[390]

The *Bahr-i Amîk* (Deep Sea) was commissiod in 1218/1803-04 to take 850 pieces of *karaağaç* (elm) timber from Canik to the Imperial Naval Arsenal. The salaries to be paid for its crew, together with the those of the men on the frigate *Tiz Hareket,* added up to 19,488 *kuruş*.[391] It was still in use at the Arsenal in 1216/1801-02[392] and it was on the list of the navy at the *Tersâne-i Âmire* in 1810 engaged in timber transportation.[393]

Ahmed Cevdet lists the *Fethiye*, the *Ankâ-yı Bahrî* (Phoenix of the Sea), the *Menbâ-ı Nusret* (Source of Victory), the *Tûnus* (Tunusia), the *Hûri-yi Bahrî* (Houri of the Sea), the *İskenderiyye* (Alexandria), the *Meşreb-i Bahrî* (Spring of Sea), the *'Îd-i Nusret* (Feast of Victory), the *Zü'l Ukâb* (Owner of Eagle), and the *Hâlit Bey*

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388 BOA. Hatt-ı Hümâyûn. no. 9658.

389 Noyan, p. 92.

390 BOA. Cevdet-Bahriye, no. 3040 (5 Safer 1216/ 17 June 1801).

391 BOA. Cevdet-Bahriye, no. 1897.

392 *Târih-i Cevdet,* vols. 7-8, pp. 349-351.

393 Noyan, p. 93.

Korveti as in use at the Imperial Naval Arsenal in 1216/1801-02.[394] Out of these ships, thr'ple-decked *Fethiye* was built on a large dry-dock and launched in1801.[395] During the battles with the British fleet in 1806, it took part with eighty-four guns.[396] It also appears along with the *İskenderiyye* on the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[397]

A document dated 29 Zilkade 1215/13 April 1801, mentions that as a result of a severe storm lasted for two hours, the frigate *Şehîd-i Zafer* (Martyr of Victory), on which Girîdî Salih Kapudan was travelling, had been disabled, with its rudders lost.[398]

The date and place of construction of the *Cabbâr-ı Bahrî* (Orion/Grand Sovereign of the Sea) are unknown. However, it is understood to have been in use before 1205/1790-91. According to a register book dated 5 Zilkade 1205/6 July 1791, it was a frigate under Fettah Kapudan. In the register book, detailed information is presented about its inventory, including riggings, gunnery, spare equipment and materials and also about the conditions of these materials in question, their number, if they were usable or broken, or had been fallen into the sea or not. Among the items were various types of guns, cannon wagons, cords for securing guns, shells, lanterns, compasses, pulleys and blocks, sheaves, pumps, hourglasses, water barrels with iron rings, sledgehammers, various types of bolts and nails,

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[394] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[395] Emsen, p. 23.

[396] Ibid., p. 41.

[397] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

[398] BOA. Hatt-ı Hümâyûn, no. 3446-e (29 Zilkade 1215/13 April 1801)

various chains, straw carpets, chisels, cauldrons for cooking, boats, and various kinds of ropes and sails, mostly in the color green.[399]

The *Ukâb-ı Bahrî* (Eagle of the Sea) appears in the records as a galleon under the command of Cezayli Karabıçak Ali Kapudân, to be equipped, manned and victualled at Büyükdere in1205.[400] Another document, dated 12 Safer 1207/ 29 September 1792, gives more information about its specifications. It was a galleon of forty-five *zira* built by Ismail Ağa at Midilli. The same document mentions another galleon of fifty-one *zira* built by Bekir Ağa of Kalona at Midilli. When this latter galleon's timber and structure fell into bad condition in two to three years, it was converted into a galleon of forty-five *zira,* like the *Ukkâb-ı Bahrî.* So the conversion of the fifty-one-*zira* galleon into a forty-five-*zira* galleon was given to Ismail Aga, considering his experience.[401] We learn that its hose became worn out and a new one was installed in 1208/1793-94 by the *Tersâne-i Âmire tulumbacıbaşısı* at the Imperial Naval Arsenal.[402]

The *Mukaddime-i Nusret/Mukaddime-i Zafer* (Beginning of Victory), as reported in the document of 3 Zilka`de 1215/18 March 1801, was a galleon of 59.5 *zira*, built in 1201/1786-87[403] by the French shipbuilder Le Roi[404] at the Imperial

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[399] BOA. Kamil Kepeci, no. 5726. For the details, see Appendix N.

[400] BOA. Hatt-ı Hümâyûn, no. 10011.

[401] BOA. Cevdet-Bahriye, no. 2335.

[402] BOA. Cevdet-Bahriye, no. 1913.

[403] Noyan gives 1785 for its construction date. See Noyan, "Eski Gemilerimizin İsimleri," p. 92.

Naval Arsenal.[405] Another document, dated 1205/1790-91, says that it was a galleon, a *Kapudâne-i Hümayun*, and that outside the straits on the Anatolian side its captain Seyyid Ali was wounded.[406] Uzunçarşılı, referring to a certain naval document, says that there were forty-three *aylakci* (temporary marinars recruited during the campaigns for six months at a time) serving on the *Mukaddeme-i Nusret* in 1790.[407]

It is understood from another document, dated 1211/1796-97, that the French builder of the *Mukaddeme-i Nusret* taught shipbuilding to Ahmed Hâce, who later was the builder of a galleon in Midilli.[408] The *Mukaddeme-i Nusret* later became disabled from use, and, following inspections by Huseyin Pasha, was ordered to be removed from use on 13 Zilka`de 1215/28 March 1801 by Canib Mehmet Efendi.[409]

Little is known about the galleon the *Fethü'l- Fettâh* (Victory of the Great Victor/God), except that it was stubby and high and its interior was too narrow. It had a crew of 700 men on board in 1205/1790. Likewise, the *Tevfîk-i İlâhî* (Heavenly

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[404] Ahmet Refik (Altınay), "Onsekizinci Asırda Fransa ve Türk Askerliği," *Türk Tarih Encümeni Mecmuası*, yeni seri, I/4 (İstanbul 1930), p. 32. See also Çeçen, p. 14. Vasif Efendi confirms that a French architect built it in two to three years. He says that it was launched into the sea as a fifty-nine-*zira* galleon on Wednesday (13 Şa`bân 1201/31 May 1787). Some statesmen attended the launching ceremony and its architect was gived a sable fur because he was a foreigner. Then the vessel was named the *Mukaddeme-i Zafer* as it was a tradition to give a name for newly constructed ships. Ahmet Vasıf Efendi. *Mehasinu'l-Asar*, p. 393.

[405] BOA. Cevdet-Bahriye, no. 2373.

[406] BOA. Hatt-ı Hümâyûn, no. 9644-A.

[407] Uzunçarşılı, *Osmanlı Devletinin Merkez ve Bahriye Teşkilatı*, p. 484.

[408] BOA. Cevdet-Bahriye, no. 5849. See also BOA. Hatt-ı Hümâyûn, no. 10405.

[409] BOA. Cevdet-Bahriye, no. 2373.

Aid) was a galleon with 450 men on board in the year 1205/1790. Like the *Fethü'l-Fettâh*, it was also stubby and with a narrow interior.[410]

The beginning date of the construction of the galleon *Mes'ûdiye* is not known for sure, but it appears in the sources to have operated in the straits under the command of Kaşoğlu Ahmed Kapudan. Its main yard (*mayıstra sütunu*) fell in 1205/1790.[411] However, it is estimated that it was completed in 1214/1799-1800 at the Imperial Naval Arsenal.[412] It was a three-decker with 118 guns and 1180 men, 191 *kadem* in length, 50 *kadem* in beam, 25 *kadem* in heigth, and 13 *kadem* in displacement. Its engineer was Mr. Benoit, and its architect Andreya.[413] The *Mes'ûdiye* appears in Cevdet Pasha's list of 1216/1801-02 as well.[414] It was careened along with some other unnamed ships at the large dry-dock in 1218/1803. 200 *kantars* of lead were requested for the equipment and fitting out of the ships, including the *Mesudiye.* After the 140 *kantars* of lead (costing 3,542 *kuruş*) given in the previous year, this time, 150 *kantars* of lead (*kurşun*) at twenty-three *para* per *kantar* (total 3,795 *kuruş*) was given to these ships.[415] During the battles with the

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[410] Gencer, *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezareti'nin Kuruluşu (1789-1867)*, p. 27.

[411] BOA. Hatt-ı Hümâyûn, no. 9644-A.

[412] Gülen suggests that it was built in 1798 and launched into the sea. See Nejat Gülen, *Şanlı Bahriye, Türk Bahriyesinin İkiyüz Yıllık Tarihçesi 1773-1973* (Istanbul: Kastaş Yayınları, 2001), p. 63.

[413] Tezel, p. 665.

[414] *Târih-i Cevdet*, vol. 7-8, pp. 349-351.

[415] BOA. Cevdet-Bahriye, no. 1295.

British fleet in 1806, this vessel appears with eighty-four guns.[416] It was also on the list of the naval ships in 1810.[417]

The *Mansûriye* is another ship about which very little is known. In Cevdet Pasha's account it is stated that the *Mansûriye* was in use at the Imperial Naval Arsenal in 1216/1801-02.[418] Somewhat more is known about the *Tevfîk-nümâ* (Showing Heavanly Help), a galleon constructed on Rhodes in 1803 and sent to the *Tersâne-i Âmire*. It is understood that its picture was drawn and presented to the Sultan. Although the Sultan stated that the picture seemed to have been drawn without geometrical measures and riggings, he ordered a gift be given to the artist who drew the picture. It was decided that the picture in question would be kept at the *Tersâne-i Âmire*. The engineer of the galleon was then given several presents in order to encourage others.[419] During the battle against the British fleet in 1806, this vessel participated with eighty-four guns.[420]

The *Âyet-i Hayır* (Clear Evidence of God's Benevolence), the *Süreyyâ* (a Legenday constellation), and the *İkbâl-bâr* (Bringing Good Fortune) were among the Ottoman fleet ready at Marmara for the battle against the British fleet, with their forty, thirty-six and thirty-four guns, respectively, in 1806. The frigate *Âyet-i Hayır* played an active role in the war and engaged in a fierce struggle with British galleons of eighty-four guns. In the face of British superior gunfire, it had to head for the

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[416] Emsen, p. 41.

[417] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

[418] *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

[419] Emsen, p. 24.

[420] Ibid., p. 41.

European side of the Marmara Sea. When a British frigate was sent to catch it, rather than surrender their vessel, the crew on the *Âyet-i Hayır* blew up it.[421] The frigate *Süreyya* appears on the list of the auxiliary fleet of the navy at the *Tersâne-i Âmire* in 1810.[422] It is not known what happened to the *İkbâl-bâr*.

The *Fırkateyn-i Kaplan Başlı* (Frigate with Tiger Figure-Head) was among the ships ready to be rigged in 1206/1791-92 at the Imperial Naval Arsenal. It was thirty-one *zira* and in want of timber.[423] It was employed in 1793 transferring timber for a galleon almost completed in Sinop.[424]

The *Fırkatey-i Cedîd-i Gümrü* (New Gümrü Frigate) is mentioned as a forty-five-*zira* frigate in a list of ships to be caulked, pressed and greased at the Imperial Naval Arsenal in 1206/1791-92. Additionally there were ten sloops of twenty-two and twenty-five *zira*, as well as one *şehtiye*, and one mail ship.[425] Among the small and big ships ready to be rigged in 1206/1791-92 at the Arsenal were three *sefine-i mektup* (mail ships) each twenty-five *zira*; two *firkateyn-i aktarma* (a river ship),[426] each thirty *zira*; two *şalope* (sloop), each nineteen *zira*; and one single masted *uskuna* (a type of sailing ship, typically with sixteen guns and ninety men).

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[421] Emsen, pp. 41-45.

[422] Noyan, "Eski Gemilerimizin İsimleri," p. 93.

[423] BOA. Hatt-ı Hümâyûn, no. 9658.

[424] Emsen, p. 13.

[425] BOA. Hatt-ı Hümâyûn, no. 9658.

[426] *Aktarma* had two meanings: a river ship (mostly the ones on the Danube) escorting a fleet; and a captured and towed enemy ship. Kâtip Çelebi, *Tuhfetü'l kibâr fî esfâri'l bihâr*, ed. Orhan Şaik Gökyay (Istanbul: Milli Eğitim Basımevi, 1973), p. 295. Also see Bostan, *Tersâne*, p. 90.

In addition to these ships, there were others, the names of which are unknown. Among them were two galleons constructed in Bodrum, one of sixty-three *zira* constructed in 1803 and the other of 55.5 zira in 1806. In Gemlik a frigate of fifty-one *zira* in 1790, a galleon of fifty-five *zira* in 1792, a galleon of fifty-nine *zira* in 1800, and finally a galleon of fifty-nine *zira* in 1803 were constructed. In Limni, two frigates were constructed in 1798 and 1803. As for Midilli, three galleons, one of 45.5 *zira*; the second of fifty-one *zira* (by Konyalı Ebubekir); and the last, of 53.5 *zira,* were built in 1790, 1791 and 1794, respectively.[427] A frigate was built in Silistire in 1791 and another was under construction in 1794 in the same place. Also a frigate of 45.5 *zira* was under construction at the Biga Kemeri (around the Dardanelles) by Hacı Emir Mehmed Ağa in the same year.

A galleon of 56.5 *zira* was under construction in Çanakkale/Dardanelles by İznikli Osman Bey in 1793. The architect of this galleon was Yozep and its augerer was Yorgaki.[428] A galleon of 47.5 *zira* was built in Rhodes in 1790. Some frigates and galleons were also built in 1791 and 1803 in Sinop, a galleon in 1795 and two new ones in 1800 in Sohum. Beside the big ships constructed in the above-mentioned arsenals, small size of river ships such as sloops, houseboats (*duba*),[429] and caiques were built for the Tuna fleet in 1790.[430]

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[427] Alpagut and Kurtoğlu, p. 31; and Emsen, p. 11.

[428] Ibid., pp. 11-15.

[429] "Duba" means vessels used in transporting goods and in the construction of the feet of bridges. See Zaloğlu, p. 110.

[430] Alpagut and Kurtoğlu, p. 31.

Although its name and construction date are unknown for certain, a corvette of 31.5 *zira* was built in Kalas by İnegöllü Numan Bey. Upon his death before its completion, some shipbuilders were sent to the construction site from the *Tersâne-i Âmire*. The length of the corvette was extended by siz *zira*. When completed, it was transferred to the *Tersâne* and used in timber transportation.[432]

Information about the construction of a corvette in Midilli is available from summary notes written by el-Hâc İsmail Ağa, the governor of Midilli and a *dergâh-i âlî kapucubaşı*[433] (leader of the palace servants), to the *Defterdar Efendi* (treasurer of the imperial treasury) on 28 Safer 1213/11 August 1798. No information is given about its size, artillery or crew capacity, although the document does say that a corvette, the construction, launching and rigging out of which had been ordered by an imperial edict, had been completed at Midilli within about eleven months. After that it was delivered by el-Hac Mustafa Kapudan's men at the *Tersane-i Amire*. The *koguşluk* pine timber was provided from Midilli and Kazdağı regions for the vessel. The document complained that the Central Treasurey had sent no money and all the expenses had been met by getting into debt in the surrounding villages.[434]

Ships Purchased from Foreign Countries and Traders

In addition to the ships constructed in the Ottoman shipyards, vessels were sometimes sent by the rulers of the other states as gifts on occasions such as the

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[432] Karal, "Selim III...," p. 209.

[433] Some ship constructors were awarded *kapucubaşı, mirimiran, paşa* etc. See Yakay, p. 82.

[434] BOA. Kamil-Kepeci, no. 5734.

ascendancy of a new Sultan to the throne, and other times they were purchased from foreign states or traders. It is important to remember that all of these kinds of ships may very well have constituted opportunities by the Ottomans for technology transfer over time.

A British foreign office document (12 January 1778), written to Anthony Hayes by Robert Ainslie mentions the sale of an English ship in Istanbul. Throsten Christians, Nils Johnson, Peter Sunbar, Bewn Ulsen, and Jens Williamson, the one a Danish, and the other four Swedish seamen, navigated out of the Port of London to Istanbul, on board an English ship, which was then sold there.[435] This ship was most likely purchased by the Porte.

A document dated 10 February 1784 tells of a light frigate that was purchased by the Vizier from a Mr. Humphry, an English merchant lately appointed agent of the court of Denmark. This vessel was formerly called the *Lord Thurlow*, was an armed ship, previously a Compos French frigate fitted out at London, but lately from Smyrna (Izmir), loaded with about 400 iron cannon, two hundred barrels of gunpowder, with some large cable, and cordage. That ship was purchased by the Porte together with all of is equipment and armaments. It is thought to have been intended as a present for the Algerians or Tunisians.[436]

From a letter written to the Marquis of Carmarthen by Robert Ainslie, dated 9 October 1784, it is understood that England had three ships for sale in Istanbul: two capable of mounting fifty guns each, and the third mounting twenty-six.[437] On 10

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[435] PRO. FO/261, no. 3w.

[436] PRO. FO 78/5, pp. 18-19.

[437] PRO. FO 261/1, no. 22.

November 1784, there were five stout English armed ships, mounting from thirty to fifty guns, all for sale, although only two of them, a Spanish prize, and the other, an old Indiaman, were purchased by the Arsenal.[438] Tezel reports that two frigates were bought from England in 1785. One was named the *Mazhar-ı Saadet* (Worthy of Bliss) and the other the *Dâd-ı Hakk* (Justice of God).[439] The *Mazhar-ı Saadet* is mentioned in a document dated 1208/1793-94. It is understood that her hose became worn-out and the *Tersâne-i Âmire tulumbacıbaşısı* at the Imperial Naval Arsenal mounted a new one in 1208/1793-94.[440] The *Dâd-ı Hakk* is described in a document dated 1206/1791-92 as an "English frigate" of forty-three *zira* on the list of the ships to be caulked, pressed and greased.[441]

It is evident from a British document dated 25 September 1787 that a sloop with twenty-six guns had just been purchased from the Imperialists (probably the French) at the Arsenal.[442]

Another British document written to the Marquis of Carmarten by Robert Aislie and dated 1 May 1788 refers to a frigate of thirty-six guns, which formerly had been a French corvette, and lately had been renamed the *Phoenix,* sold by the commander Captain St. Barbe to the Porte.[443]

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[438] PRO. FO 261/1, no. 22, p. 209.

[439] Tezel, p. 649.

[440] BOA. Cevdet-Bahriye, no. 1913.

[441] BOA. Hatt-ı Hümâyûn. No. 9658.

[442] PRO. FO 78/8 (25 September 1787), p. 197.

[443] PRO. FO 78/9, p. 118

On 1 March 1789, the Porte purchased three armed ships brought out on speculation by British merchants, for the sum of twenty-two thousand pounds. Two of them were French frigates captured during the last war, the third was formerly the *Camilla Sloop,* reformed from the British navy.[442]

In a Foreign Office document of 15 March 1789, Istanbul, it is reported that the Porte purchased two more foreign vessels, one a large Swedish ship to serve as a transport, the other a very handsome American built sloop of war brought out by English merchants, being the fourth now sold by them to the Porte.[443]

An imperial edict dated 1204/1789-90 reports that the Ottomans had previously bought an English frigate to use in their navy. There were forty-six guns on the ship, but the Ottomans authorities, after testing the guns, decided that they were not useful to the navy and declined to buy them.[444]

Karal mentiones a corvette called the *Nimet-i Hüdâ* (Blessing of God) (copper sheathed, forty-three *zira*, with forty guns and 250 crew capacity) among the ships bought from France during the conquest of Corfu. He says that it was in bad condition.[445] However, Güleryüz suggests that this ship was a frigate built in 1792 and captured from Russian navy.[446]

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[442] PRO. FO 78/10, p. 53.

[443] PRO. FO 78/10, pp. 71.

[444] BOA. Hatt-ı Hümâyûn, no. 8083 (1204/1789-90)

[445] Karal, p. 209.

[446] Ahmet Güleryüz, *Kadırgadan Kalyona Osmanlıda Yelken, Mikyas-ı Sefain*, p. 98. The same ship is referred as a galleon as well. See Ahmed Cevdet Paşa, *Târih-i Cevdet*, vols. 7-8, pp. 349-351.

Gencer, judging from an archival document,[447] states that the Ottoman state started negotiations with Holland (Flemenk) to buy six warships from that country via its ambassador in 1205/1790-91, which was for the first time that Ottoman State moved to buy warships from a foreign country. Negotiations began to be made with traders from Holland, who stated that they could supply new and firm ships of sixty to seventy guns, five of which had never sailed out of their harbour, and one of sixty guns, which had sailed once out of the harbour. In addition to these ships, there were five other that were difficult to sail out of their harbour, since they needed proper repairs and a long period before they would be ready to head for the Porte.[448] Unfortunately, nothing else is known about how these negotiations developed.

Another document, dated 10 Cemâziye'l-evvel 1205/15 January 1791, reports that a frigate had been bought from England or English merchants. It is understood that this frigate was under the command of Osman Kapudân at the time. The document gives detailed lists about the riggings, gunnery and spare equipment and materials on board.[449]

On some occasions the Ottomans ordered ships from foreign countries. In the spring of 1205/1790, the Ottomans planned to purchase three galleons from England and three from Holland, together with their equipment and rigging. For this aim, official petitions were written to the ambassadors of these countries.[450]

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[447] BOA. Cevdet-Bahriye, no. 6055. Document mentions that the ships were of sixty to seventy guns and five of them never left the harbour and they needed some equipment and tools to sail off. The one with sixty guns sailed off for an expedition around the surrounding areas. It also mentions that these ships could only be purchased after they arrived the Ottoman harbours and had been examined carefully there.

[448] Gencer, *Bahriyede Yapilan Islahat Hareketleri*, p. 57.

[449] BOA. D.BŞM-TRE, no. 15211. See Appendix O for the document.

[450] BOA. Hatt-ı Hümâyûn, no. 9210.

Another British Foreign Office document of 1793 reports that two French ships, formerly used as merchant ships especially in trade with Izmir (Smyrna), had been sold to the Ottomans, and now sailed under their flag.[451]

In a *takrir* (official petition) dated 29 Receb 1207/March 1793, the Porte requested some galleons and frigates from the British authorities through the British ambassador. First of all, the Porte wanted to buy a test frigate of 47.5-50 *zira* in length, younger than three years, constructed according to the drawings and measures (*arşın hesabı*) used at the the Imperial Naval Arsenal, copper-sheathed, fully-equipped, with fourteen to fifteen cannons on board. If there were no ship on hand that of these specifications, the Porte said it would purchase one of the ships at hand that did. This ship needed to be at least forty-five *arşın* (according to the measures used at the Arsenal), copper-sheathed, at most three years old, resembling the drawings given to the ambassador by the Porte. When the frigate reached Istanbul, its cost would be negotiated and fixed in a meeting between the Ottoman authorities and the British ambassador. In case of the lack of such a ship, the Porte would ask the British government via British ambassador to give a certain time period for the construction and rigging out of such a ship.

After receiving an answer, the process would start. A galleon might also be constructed instead of the frigate, depending on the negotiations. 25,000 *kuruş* were paid to the British ambassador for the test frigate. The British ambassador stated that he had received the money and would try his best to provide the aforementioned ships as soon as possible. He also pointed out, in a letter dated 2 Şa`bân 1207/15 March 1793, written in French, that he would refund the money in the case he was

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[451] PRO. FO 78/14, p. 223.

unable to provide the ships.[452] The result of the correspondence is unknown. However, later developments showed that the relationship regarding the purchase of ships between two countries continued.

It seems that in the following years, the Porte occasionally ordered other ships from foreign powers. A document dated 25 February 1803 indicates that Reis Efendi, through the British ambassador, requested that England sell the Sultan two ships of war of from eighteen to thirty guns, or to allow two ships of that force to be purchased from British subjects, for the purpose of employing them in the Red Sea.[453]

Apart from naval ships, merchant ships were also purchased from foreign traders in Selim III's period, to be used in transporting goods and personnel in the Mediterranean and Black Seas. Therefore, the number of the merchant ships increased as well.[454]

Ships Received as Presents or Captured at War

Karal writes that the emperor of Morocco, Mevlânâ Muhammed, sent two corvettes to Sultan Selim III as a present in 1204/1789-90. One was thirty-one *zira* with twenty-four guns, the other thirty-one *zira*, with twenty-two guns.[455] The

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[452] Uzunçarşılı, "Ondokuzuncu asır başlarına kadar Türk-İngiliz münasebatına dair vesikalar," *Belleten* 13 (1949), pp. 582-583.

[453] PRO. FO 78/39, p. 25.

[454] *Mahmud Raif Efendi ve Nizâm-ı Cedîd'e Dair Eseri*, p. 58.

[455] Karal, p. 209.

number of the ships must have been more, considering an imperial edict reporting that four ships and 1,000 *kantars* of gunpowder had been sent to the Imperial Naval Arsenal by the emperor of Morocco during 1204/1789-90. The same emperor was understood to have freed some slaves to work at the Imperial Naval Arsenal and sent a ceratin amount of money for the poor in Mecca and Medina (*Harameyn*). In carrying out these actions, the emperor used his commander, Tahir bin Abdulhak, and some *Atabegs* (local commanders).[456]

A British document written by Robert Ainslie to the Secretary of State mentions the presents and says that three xebecks, each carrying twenty-four guns sent as a present to the Sultan by the Emperor of Morocco, had arrived there on 9 September 1789. It says that they were really fine vessels, well fitted up, and on one of them was the greatest part of the treasure, amounting to three million piasters, furnished as a subsidy to this court. Four Algerian xebecks likewise arrived at the Dardanelles accompanying a Russian prize also destined to reinforce the Ottoman Navy.[457] Another document reports on new bar-shot/chain-shot (*planketa*) and metal cannons (*maden topları*) ordered to be prepared at the casting foundaries at the Imperial Naval Arsenal for equipping the frigates received from Morocco.[458]

A letter dated 26 June 1806, Istanbul, to the Secretary of State, from Mr. Arbuthnot reported that the *Justice*, a French frigate, had been handed over as prize to the Ottomans by the English at the evacuation of Egypt and that the Captain Pasha

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[456] BOA. Hatt-ı Hümâyûn, no. 8686.

[457] PRO. FO 78/10 (22 September 1789).

[458] BOA. Cevdet-Bahriye, no. 5832.

had embarked on this frigate then.[459] This information is validated by some other sources along with additions. Clowes mentions a ship named the *Justice*, of forty-eight guns (he gives the figure forty at one point, which should be the correct one), as having been given to the Ottomans along with the *Causse,* with sixty-four guns, and a former Venetian twenty-six-gun frigate.[460] Anderson states that the *Montaue*, with thirty guns, was the third frigate handed over to the Porte.[461] William James adds the *Heliopolis,* stating that it was probably a former Ottoman corvette restored to the Captain Pasha.[462] Additional ship names and explanations are given in the *Keith Papers*. The Commander of the British Mediterranean fleet, George Keith Elphinstone, in a letter dated 30 November 1801, Foundroyant, Valette to the Navy Board, gives the names and the valuation of the French ships found in the harbour of Alexandria at the surrender of that place. He distinguishes the ones taken by the British from those delivered to the Porte.[463]

Table 16. Captured French Ships in the Harbour of Alexandria in 1801.

Commissioned in His Majesty's service	
Egyptienne	£23,663-0-0
Regenerée, now *Alexandria*	£16,771-13-6

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459 PRO. FO 78/50 (26 June 1806)

460 William Laird Clowes, *The Royal Navy*, vol. 4 (New York: Chatham, 1996), pp. 458.

461 R.C.Anderson, *Naval Wars In the Levant (1559-1853)* (Liverpool: Liverpool University Press, 1952), pp. 391-392.

462 William James, *The Naval History of Great Britain*, vol. 3 (London: R. Bentley and son, 1886), p. 93. For an assessment of British naval sources and specifically archives, see Rupert C. Jarvis, "Sources for the History of Ships and Shipping," *The Journal of Transport History* 3, no. 3 (May 1958), pp. 212-234.

463 Lloyd (ed.) *The Keith Papers*, vol. 2, (1950), pp. 358-359.

Ships Delivered to the Turks	
Justice	£17,095-2-2
Mantou	£9,607-1-0
Hatul Bey	£2,365-10-6
Morngo Balerie	*£2,593-12-8*
Salâbetnümâ	£4,465-19-3

Source: Christopher Lloyd (ed.) *The Keith Papers*, vol. 2, 1950, pp. 358-359

In the second part of the table, the *Hatul Bey* and the *Salâbetnümâ* seem to be out of context, since they have Turkish names. In fact, no other sources mention them. Actually, the *Salâbetnumâ* was constructed in 1210/1795-96 at the Imperial Naval Arsenal as we discussed.[464] It was still in use at the Imperial Naval Arsenal in 1216/1801-02. So it was not a French ship in origin. The *Hatul Bey* should most probably be the *Halil Bey*, which is mentioned on Ahmet Cevdet's list.[465] The valuations of the *Hatul Bey* and the *Salabetnuma* by Keith are still confusing if the origins of the ships are taken into consideration. It is also possible that their names were changed after their capture.

There are other ships mentioned, too. It is said that the Ottoman commander Abdulkadir Bey, after capturing Corfu, 2 May 1799, took the French frigate the *Brune* of twenty-eight guns.as part of the spoils. In 1801, twenty-eight Ottoman ships are said to have been placed under the command of the Russian Vice-Admiral, F. F. Uschakov. They are said to have included four ships of the line, six frigates: the *Huseyin*, the *Abbas,*[466] the *Zeynel*, the *Süleyman*, the *Herim (*most probably *Kerim)*

[464] Karal, "Selim III...," p. 209.

[465] *Târih-i Cevdet,* vol. 7-8, pp. 349-351.

and the *Ahmed*, four corvettes; and the *Mustafa*, the *Hüseyin*, the *Ali-Bey,* the *Mehmed* and fourteen other gunboats.[467]

Having discussed the specifications of the Ottoman navy in terms of vessel potentials, ship names and types, and their later functions, it is now possible to reach certain conclusions. It seems that the Ottoman Sultan was the final authority in the naming of a ship. There were many factors influencing the naming of a ship. To begin with, the owner or the source of the monetary support for the construction of a ship might be influential, as in the case of the *Uzunçarşılı*, though it was rare, since it was generally state that financed naval construction due to the high costs and various technological instruments required. The most striking physical features of the ships such as colour, stern, bow or hull shapes were also common inspirations. In addition to the physical features, the function and duty of the ship were also determining factors. In the context, heroic/epic names, the names of wild animals, or religious names suggestive of asking Heavenly aid in the holy war against the infidels, the names of cannons encouraging the Muslims or scaring the enemy were favored. In some cases, aesthetic and mythic names were chosen. In addition, the names of the construction sites and places as well as those of the sunken or scrapped ships were occasionally given to new ships. It is noteworthy that in the time of sailing ships, none of the naval ships were named after Ottoman sultans, kapudan pashas, other commanders or the places/wars where glorious victories had been won until the time of Selim III, when a three-decker called the *Selimiye* was built.

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466 This might be *Abbas Kaptan Gemisi*, on which Mehmed, a galleon sailor was injured in his eye while trying to disjoint a cannon and was granted 10-25 akce in 1207/1792-93. See BOA. Hatt-ı Hümâyûn, no. 8905.

467 von Pivka, p. 214.

In the late eighteenth century Ottoman Empire galley-type oared vessels became obsolete and were systematically replaced by the new type sailing ships, which had been in use in northern European countries since the sixteenth century. Although the transition began in 1682, it was not until the late eighteenth century that sailing ships came to be dominant. Galleons (*kapak/kaypak/kapak açar, iki ambarlı, üç ambarlı*), frigates, corvettes, *şehtiyes*, fireships, gunboats, *uskuna, kırlangıç*, trabacco, bomb vessels, *şebek*/xebec, caravella, and brigs were among the vessels constructed in Ottoman dockyards such as the *Tersâne-i Âmire*, and those at Midilli, Sinop, Kalas, Rhodes, Kemer, Limni, Ereğli, Bodrum, Gemlik, Kal'a-i Sultânî, and Sohom.

The late eighteenth century witnessed not only the construction of new sailing ships, but also the purchase of new ships from foreign countries or private traders. Ships sent by Muslim countries to the Ottoman Sultan as gifts as well as ships captured during naval campaigns all contributed to the development of the Ottoman navy, both in quality and quantity, to compete with the ships of the contemporary navies of the world.

The newly constructed ships regenerated the Ottoman navy. The Ottoman fleets and squadrons constituted the backbone of the wars waged in the Mediterranean and the Black Sea. Especially between 1787 and 1791, they managed to challenge and to thwart the Russian navy. In 1798-1801, when the alliances changed, Ottoman fleets consisted of sailing warships that cooperated with Russian and English naval forces against French forces and played an active role in the transportation and landing of the Ottoman land forces in Egypt. Therefore, the systematic introduction of these new ships along with some technological and administrative regulations changed the structure of the Ottoman navy to a great extent. It was a huge step for naval modernization that would be taken over by another Ottoman Sultan, Mahmut II.

CHAPTER FIVE

CONCLUSION

Ottoman history, by its very nature, offers a wide range of materials to the scholarly understanding and assessment of historians who are willing to discover the intriques of the state of science and technology in the Ottoman Empire. The state of naval technology during the late eighteenth century Ottoman Empire constituted the general trajectory of this work. The reason behind the preference of this period, apart from irresistable charm of working on something "undiscovered," "alien," and "unpreferred," was the temptation of the tension and fluctuations between old and new, which the late eighteenth century harbors abundantly.

The discussion on the background to the eighteenth century showed that following a protracted and hesitant process that was accelerated and slowed down by various factors, a systematic adoption of sailing ships was adopted by the Ottomans from 1682 onwards. The defeat in Çeşme (1770) came both as a shock and a motivating force behind reform movements that would continue at a gradually declining pace until the rise of Selim III. The systematic construction of new types of sailing warships took place in this period. Various imperial edicts were issued by the Sultan in this regard. Two and three decked galleons, frigates, corvettes, sloops, gunboats, fire ships and other small crafts began to dominate the Ottoman fleets rendering the galley-type oared ships obsolete as war ships. These new war ships were mounted with modern cannons, which rendered the Ottoman navy a deterrent force in the Mediterranean. Galleons (*kapak/kaypak/kapak açar, iki ambarlı, üç ambarlı*), frigates, corvettes, *şehtiyes*, fireships, gunboats, *uskuna*s, *kırlangıç*s, trabaccos, bomb vessels, *şebeks*/xebecs, caravellas, and brigs were among the types of ships constructed in Ottoman dockyards such as the *Tersâne-i Âmire*, and at the sites such as Midilli, Sinop, Kalas, Rhodes, Kemer, Limni, Ereğli, Bodrum, Gemlik, Kal'a-i Sultânî, and Sohom.

In addition to the ships constructed in the Ottoman shipyards, there were other sources from which the Ottomans obtained ships. Purchasing new ships from foreign countries and private traders was a common way to which the Porte had frequently recourse to strenghten its naval power. Ships sent by Muslim countries, as in the case of the Sultan of Morocco, to the Ottoman Sultan as presents to celebrate his ascendance to the Ottoman throne constituted another source. Moreover, prize ships captured as spoils during naval campaigns contributed to the development of the Ottoman navy, since it facilitated comparisons, examination and imitation of the foreign naval technologies.

There is no doubt that the systematic introduction of these new ships along with the regulations in the naval administration changed the structure of the Ottoman navy to a great extent. Ottoman naval power not only appeared as a strong entity *per se*, but also came to be a driving force behind the development of Ottoman land forces with its contributions in security, finance, discipline, and supplying provision. New ships gave a new impetus to the Ottoman fleets so that they waged successful wars in the Mediterranean and in the Black Seas. The regenerated Ottoman navy managed to challenge and thwart the Russian navy between 1787 and 1791. Ottoman fleets composed of new sailing warships cooperated with Russian and English naval forces against French forces, played an active role in the transportation and landing of Ottoman troops in Egypt during 1798-1801. They were also active, though partially worn out and far from their previous efficiency, against the British fleet in 1806.

In the late eighteenth century, shipbuilding began to undergo a shift from being a craft to a semi-scientific pursuit. This is termed "semi-scientific," since it does not mark a watershed in terms of the full adoption of modern naval technology. However, it was a milestone in the sense that it paved the way for the beginning of a resolute transformation in the Ottoman mentality of naval technology. Change in the real sense occurred in the second half of the nineteenth century.

Regarding the raw materials required for shipbuilding and naval works, Ottoman sources do not record a shortage in many of them. On the contrary, in some raw materials such as timber, copper, rope, iron and lead, Ottoman sources seem to have been ample and adequate to meet the needs and allowed for some export. However, there appeared some problems and delays in the procurement of, for instance, timber, in the cases that the Porte ordered the construction of several ships at the same time. On balance, the thesis suggesting that the Ottomans failed to or lagged behind in adopting the modern naval technology due to the difficulties in finding and the constraints of raw materials falls short in describing the late eighteenth century.

One of the striking breakthroughs of the period was the adoption of the systematic sheathing of the hulls and bottoms of ships by the Ottomans with copper from 1207/1792-93 onwards. The first noteworthy trials of this technology had taken place in Europe about thirty years earlier. This technology provided protection from wood eating worms, an increase in sailing speed that not only reduced voyage times, but also made navigation easier, held caulking materials in position and reduced maintenance costs between voyages.

The development of naval cannons was another important subject taken into consideration, since the outcome of any naval battle was closely connected with the gun capacity of ships on both sides. Among the naval cannons used by the Ottoman navy were *şâhî, cehrin, saçma/çarha, misket, eynek/enik, darbzen, prangı* (mortar), *bacaluşka* (basilisco), *kolomborno* (culverin), *şayka* (battering gun), *obus,* and *balyemez.* These guns were generally provided by the *Tersâne-i Âmire/Mamûre Kârhânesi* and the *Tophâne-i Amire.* Projectiles made of various materials were used in the cannons on Ottoman galleons and they were mostly manufactured in the shell and shot works at the Arsenal and the Galata Tophanesi. Marble, granite, heavy stones, and metal shells, chain shots/shots joined together by an iron chain and bar shot/iron bars, cartridge bag/ grape shot or canister, shells with five holes/carcass (*beş delikli paçavra*) and scissors of metal shells were used as projectiles in the cannons of Ottoman ships. Marble shells were generally provided from the Marmara islands, while iron for shells was supplied from the Samakov (in Bulgaria) and Pravişte mines (Salonika) As a consequence of the interaction with foreign countries, mainly France and England, the Ottomans managed to follow and adopt new naval guns and complementary equipment regarding them.

An interesting theme, which seems to be a part of a work of literature rather than technology, is the naming of ships. As far as the Ottoman ship names are concerned, the Ottoman sultan was the final authority. As a tradition, the sultan either chose a name from a list, which had been prepared and presented to him by the Grand Admiral or he commissioned the Grand Admiral or another high-ranking official to name a ship during its launch. Various factors such as the source of the money provided for the construction of a ship, as in the case of the *Uzunçarşılı*, prominent physical features (colour, stern, bow or hull shapes of the ships), as well as the function and duty of the ship were taken into consideration. Heroic or epic names, the names of wild animals, religious names suggestive of asking heavenly aid and holy war against infidels, the names of naval guns encouraging the Muslims and scaring the enemy were popular. In some cases, some aesthetic and mythic names were also involved. The names of construction sites and places as well as the names of sunken and scrapped ships were occasionally given to new ships as well. It is interesting that in the time of sailing ships none of the naval ships were named after sultans, kapudan pashas, other commanders or the places/wars where glorious victories had been won, until the time of Selim III, when a thriple-decked ship called the *Selimiye* was built.

Another important development in the time was the construction of the first dry dock in the Golden Horn. This modern structure, designed by Swedish engineers led by Rhode, was the construction site for many Ottoman warships and is still in use today. In connection with the construction of the drydock, the Ottoman government entered into negotiations at the very beginning of the nineteenth century to purchase a steam engine from England to be used at the Arsenal in emptying the large basins in which ships of war were careened and repaired. Although, the result of the negotiations is unknown, it indicates that the Porte was aware of the technology in question and willing to adopt it.

The introduction of a new galleon launching method was another novelty. Introduced by French Le Brun and first applied to a 59-*zira* galleon, the *Arslan-ı Bahrî*, on 9 Şa`bân 1209/1794-95, this method enabled the launching of the galleons after the completion of their hulls on stocks up to their gunports and the completion of the rest in the sea. This method supplanted the traditional method of launching, which had required the launching of completed ships into the sea and putting the ships needing repair on stocks. In addition to requiring hard work and great number of workers, the old method had many disadvantages among which was the collapse of the timbers of ships during launch. The new method not only reduced the pressure on the bottom timbers of the ships during launch, but also brought economic advantages in that it reduced the number of workers. This new system was used for the next forty years.

Alongside these the most important developments, were others that contributed to the overall improvement of the Ottoman navy. Among them were the construction of an anchor house (*lengerhâne*) for the production of anchors, the building of a measuring house (*endâzehâne*) for the modelling and drawing of the plans of ships, the adoption of new mast machines for fitting the masts into their places, the adoption of pumps and fire conduits for emtying bilge and rain water from ships and putting out fires aboard, and the introduction of a new kitchen and provisioning system, which brought order to the feeding habits of the crew and provided extra space on ships enabling them to mount more guns.

In navigation, the tradition of keeping logbooks (*seyir defteri* or *seyir jurnali*) was introduced in this period as well. Logbooks covering naval and navigational regulations (*kavâid-i bahriye*) were given to the ships. All of the captains carried Pirî Reis' *Kitâb-ı Bahriye* as a guide and they were charged with annotating and adding new information to this precious book according to their own observations. Among the navigational equipment used on the ships were sounding lead (*iskandil*) for measuring the depth of the sea and hourglasses (*saat-i rîk/kum* *saati*), newly drawn maps, hand glass/sandglass (*fula*), quadrants (*rub' tahtası*), ship compass (*gemi pusulası*), set square with wood (*gönye maa tahta*), square compass (*çâr kûşe pusula*), a pair of compasses (*pergâr-ı tâm*), illustrated celestial globe of a large size (*musavver kebîr kürre-i semâ*), elevation wood with hand and needle (*akrebli ve ibreli basîte-i âfâkî*), a moving compass of the Austrian type (*müteharrik nemçekârî pusula*) and many other tools, maps deliniating fortified and strategic sites, and books relating to navigation, shipbuilding and maritime commerce.

Foreign missions played an important part in the modernization of Ottoman naval technology with the services they rendered specifically from the late eighteenth century onward in shipbuilding and launching methods, the construction of dry-docks, the use of new raw materials, tools and equipment in naval construction. They also contributed much to Ottoman warfare and navigation through their knowledge of naval tactics, maneuvers and the use of navigational instruments. These technical contributions enabled the Ottomans to wage naval campaigns with a modern fleet, for instance, against the French forces invading Egypt.

This discussion of technological developments in the late eighteenth century would be insufficient without the mention of Selim III's international policy. As a result of his diplomatic and political maneuvers, the reports and activities he received from the permanant ambassadors in the leading capitals of European countries, Istanbul became a center of attraction for foreign officers, engineers and technicians. Selim's policy proved so successful that beside the missions sent through foreign official channels, individual men, groups or families, skilled or unskilled, who applied to the Porte for technical jobs independent of their countries. This enabled the Porte to choose from among a wide spectrum of foreign missions. It is important to note that high wages drew foreigners to Istanbul. Ottoman and foreign documents show that despite some instances where foreigners complained about unpaid, low or irregular salaries, foreign officers and engineers were paid much more than Ottoman subjects or than they would have received for the same work in their own countries.

Cases of conversion to Islam on the pretext of making money in Ottoman lands were not uncommon. For instance, when asked the reasons for his conversion to Islam and if he did not wish to remain a Christian, a physician admitted that he hoped to make money among the Ottomans and thought he could do no less than compliment with his religion. However, it is unfair to consider all the conversion cases within this framework. It seems that meritocracy stood out as the determining factor for foreigners' employment in the naval shipbuilding sector. The Ottoman authorities dismissed workers hired for jobs requiring skill and technical know-how who failed to carry out their jobs as required, irrespective of their religion.

Selim III's reforms in the scope of naval technology brought about two long-term consequences of a controversial nature. First of all, they initiated a pattern of technological dependence on Europe, considering the employment of an increasing number of foreign technicians in all sectors of naval and military technology. Although negative results were not immediately apparent, the period under discussion served as an incubation period, leaving the door ajar to uncontrollable foreign influence.

On the other hand, from a different perspective the period in question might be considered to have been a positive. The increasing employment of foreign technicians and the adoption of new naval technologies paved the way for the development of a fertile platform for the training and rise of prospective native shipwrights, architects and arsenal workers as a consequence of their interaction with the foreign engineers and technologies. These foreigners taught Ottoman students in the above-mentioned branches in theoretical and practical courses organized within the body of the naval and land engineering schools. Additionally, some Ottoman subjects and artisans were given the opportunity to learn the intricacies of their art in master-apprentice relationships. For example, it was Abdülhalim Efendi, the chief engineer and a teacher at the *Mühendishâne*, who completed the construction of the second dry dock together with an Ottoman subject, Manol Kalfa, between 1821-1825. Also Vasil Kalfa, an Ottoman subject, constructed a dry dock during 1857-1870 and enlarged the first one in 1874-1876. It is important to note that these construction projects were carried out under the supervision of individuals who had already worked on projects under foreigners.

In addition to men trained in dock engineering were native shipbuilders who combined their previous experiences with what they learned from the foreigners. İsmail Kalfa/Halîfe (the chief architect at the Naval Arsenal), Hammâmîzâde Ahmed, Gülşen Bey, İnegöllü Numan Bey, Ahmed Hâce, Seyyid Mustafa Hoca, and Konyalı Ebubekir are just a few names to mention. In the following years, native shipbuilders achieved greater works. The engineer Mehmet Efendi and the architect Mehmet Usta built the well-known galleon the *Mahmûdiye* of 64.48m, with 128 guns, and a crew of 1280, in 1245/1830, which was considered the greatest ship of the time, and became a legend during the bombardment of Sevastopol and honoured with the title "gâzi (war veteran)." In the same year, the same Mehmet Efendi and the architect Hasan Kalfa completed the frigate *Şerefresân*, of sixty-four guns.

The means and methods by which the Ottomans attempted to keep abreast of European naval technology and know-how seem to have been, more or less, in parallel with those of all the naval powers of the world in the time in question. The principal channels of information were diplomatic and consular representatives and paid agents controlled by them. In addition, there were foreign officers and engineers, who were sent by their own countries or applied for service independently, to work for rival countries. Other important sources were captured ships, gifts and wreckages, since they enabled the state to examine the enemy's technology closely. Sending a ship to look into enemy harbours to count the ships at dock and observe the state of their rigging, construction and repair facilities was an important part of espionage and information gathering methods as well. The accounts and observations of travellers and merchant officers were also taken into consideration, though no reliance could be placed on their accuracy without taking into strict account the education, biases and prejudices of the authors. It seems that these channels served foreign countries much more than they did the Ottomans, who had occasional difficulties in obtaining the required know-how to operate these channels properly.

All in all, these developments show the Porte's willingness to keep abreast of the developments in naval technology in Europe. The Ottomans achieved this goal to some extent by the end of the century, during the reign of Selim III. On the other hand, regarding the end of the Selim III's reign, the role of the Kabakçı Revolt on 29 May 1807 as well as some internal turmoil characterised by a series of other rebellions, the Serbs in Balkans, the Wahhabis in Arabia and those led by provincial administrators and notables such as Pasvandoğlu, Tepedelenli, Tayyar Pasha and Cezzar Ahmed Pasha, who refused to pay taxes, are claimed to have a negative impact on the modernization movements of Selim III in combination with the unwillingness of bureaucracy, these factors have not been studied or interconnected yet in terms of the history of naval technology to constitute a satisfactory evidence for the present work.