Ottoman-Flagged Ships, 1830s–1860s: Hull, Rig, and Geography

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■ ABSTRACT[1]

This paper presents major hull and rig types among Ottoman-flagged merchant ships from the 1830s to the 1860s and discusses the effects of nautical and climatic conditions on the physical features of merchant ships. The statistics demonstrate that brigs, especially frigate-built brigs, were the most common merchant ships. The article argues that despite the prevalence of Atlantic-origin ships in Ottoman waters, local geographical factors were the primary cause in determining the physical properties of Ottoman-built merchant ships, especially in the Marmara and Black Seas. Due to these nautical and climatic conditions, *trehantiri* was still the most common traditional ship in the Aegean Sea, and the production of *perama* was concentrated around Istanbul. However, these ships were mixed with *martigo* that sailed offshore the Black Sea. *Dhow*-like ships, which could sail both offshore and in the narrow waterways common in the Straits and Danube River, were also common.

Keywords: South Black Sea, Marmara, Ottoman-flagged ships, hull, rig.

That is no country for old men, [...]
The salmon-falls, the mackerel-crowded seas,
Fish, flesh, or fowl, commend all summer long
Whatever is begotten, born, and dies,
Caught in that sensual music all neglect
Monuments of unageing intellect,
[...] And therefore I have sailed the seas and come
To the holy city of Byzantium,

"Sailing to Byzantium"

William Butler Yeats

■ RESUMEN

Este trabajo presenta los principales tipos de casco y aparejo entre los buques mercantes que, con bandera otomana, navegaron desde la década de 1830 hasta la de 1860. También analiza los efectos de las condiciones náuticas y climáticas en las características físicas de dichos buques. Las estadísticas demuestran que los bergantines eran los buques más comunes. El artículo argumenta que, a pesar de la prevalencia de los barcos de origen atlántico en aguas otomanas, los factores geográficos locales fueron la causa principal que determinaba las propiedades físicas de los barcos mercantes construidos por los otomanos, especialmente en el Mármara y el mar Negro.

Debido a las condiciones náuticas y climáticas particulares, el *trehantiri* seguía siendo el barco tradicional más común en el mar Egeo, mientras que la producción de *perama* se concentró alrededor de Estambul. Estos barcos convivían con el *martigo*, que navegaba por el mar Negro. Del mismo modo, los barcos del tipo *dhow* también eran habitules, ya que podían navegar tanto en alta mar como en las estrechas vías fluviales comunes en el estrecho y el río Danubio.

Palabras clave: mar Negro Sur, Mármara, marina otomana, cascos, aparejos.

■ INTRODUCTION

Long-distance merchant ships were built to sail among various ports, but Ottoman-flagged merchant ships had one specific destination: Istanbul. This might seem contradictory to the nature of long-distance shipping; however, in the Ottoman case, all roads led to new Rome, not to the open seas. No matter where the journey started, it always ended at "the mother of all cities". The reason behind this curious situation was due to the nature of nineteenth-century commerce in the Black Sea: the port of Istanbul was the main gateway to the rest of the world. Both the Marmara and Black Seas are inland seas only connected by the Straits. Accordingly, every ship in the Marmara and Black Seas should pass the Bosporus to reach transmarine ports, and the fact that most merchant ships in the Marmara and Black Seas were built to sail to Istanbul made a great impact on their maritime history. Accordingly, the nautical and climatic conditions of a journey to Istanbul were the most important factors behind the physical properties of wooden ships in the Marmara and Black Seas.

This article presents the preliminary results of a study on Ottoman commercial shipping and maritime trade from 1804 to 1914. The primary objective of this article is to introduce the physical features of early nineteenth-century Ottoman-flagged merchant ships and then to discuss the effect of geography on Ottoman wooden ship-building technology in the case of ship-building in the Marmara and South Black Sea from 1831 to 1853. The geographical and historical uniqueness of this region provides opportunities to examine the role of geography in technological transfer to the Ottoman Empire in the early nineteenth century.

Unlike the East Mediterranean Ottoman ports, the Marmara and Black Sea ports were connected to the world only by the Straits. These Straits were officially closed to foreign ships until 1774, and transmarine shipping between the Mediterranean and Black Sea remained limited until the 1810s. Due to their isolation from the rest of the world, the merchant ships in the Marmara and Black Seas evolved independently from early-modern ship technologies. Consequently, the most common types of merchant ships in the Marmara and Black Seas in the eighteenth century, *perama* (the traditional ship of the Marmara Sea), *şayka* (the traditional ship of the Black Sea rivers), and *volik* (the best ship for sailing in muddy, shallow waters), bore few similarities to Mediterranean merchant ships[2]. However, with the opening of the Marmara and Black Seas to global markets, new ship technologies arrived following the end of the Napoleonic Wars in the 1810s. This technological change was so radical and fast that all eighteenth century-type ships were crowded out by the new generation of merchant ships within a few decades. Statistics demonstrate that the ships built in the Ottoman Empire from 1831 until 1853 were similar to newly arrived ocean-origin ships, while the eighteenth-century merchant ships *volik*, *şayka*, and *perama* became coastal ships.

This article argues that even though new types of ships originating from the Atlantic and Indian Oceans became

the dominant types of ships in the Ottoman Empire by the 1830s, geography remained the most important factor in determining the physical features of Ottoman-flagged merchant ships built from 1831 to 1853. The nautical and climatic conditions in the Levant had two effects on the physical properties of the ships. Firstly, the hull and rig formation of each ship was modified according to the physical requirements for a voyage to Istanbul. As a result, there was a geographic concentration of specific types of traditional merchant ships in limited regions. *Trehantiri* was the most common Aegean ship, and *perama* was the most common ship in the region around Istanbul, while their martigo-hybrids were the best option to sail offshore on the Black Sea. Two dhow-like ships were built to sail in the narrow waterways and offshore seas: *alamna* to navigate the Straits and *kırlaç* for the Danube River. The only exception was the frigate-built brigs, which were built all around the Levant. Secondly, the cargo size and, indirectly, the type of the Ottoman-flagged ships built in a port were strictly related to the distance of this port to Istanbul. The farther away the port was, the greater cargo capacity the ship had.

■ A NOTE ON THE METHODOLOGY

The Ottoman archives possess an unexplored treasure trove of information on commercial shipping. The ongoing research on nineteenth-century Ottoman maritime commerce explores ship traffic records in Istanbul carefully registered with details from 1780 to 1844[3] and the entire collection of Ottoman ship licenses from the 1820s to the 1910s, which are dispersed among various archives and catalogues. This article is based on the preliminary results of an analysis of a small proportion of *sened-i bahri*s (ship licenses) that have been used to create a database on the physical properties of Ottoman-flagged ships from 1831 to 1853. The database on Ottoman-flagged ships used in this article was composed using two different methods: first, all the ship licenses issued for new and old ships for two specific years—1831 and 1849—were analyzed to measure two decades of change. Second, a random selection between 1831 and 1853 was made to fill the gap between these two years[4]. As a result, this study scrutinizes 1,007 Ottoman-flagged ships (from the 1830s to 1860s) out of 1,123 licenses—eliminating reissued licenses for the same ship. A total of 467 of these 977 ships were newly-built ships, and the remaining 510 licenses represent the old ships whose licenses were renewed for various reasons.

These ship licenses contained information on the captain (his name and birthplace), on the ship (hull structure, usually rig formation, number of masts, cargo capacity, and length), and on the ownership (name(s) and, usually, profession, hometown, and share(s) of the ship owner(s))[5]. Since a new license was issued for any change in the basic information given in the license, from the replacement of captain to change in partnership, these documents shed light on Ottoman-flagged merchant shipping in the nineteenth century.

The main purpose of an Ottoman ship license was to describe the physical properties of a ship in enough detail so that the judges, port officers, and coastguards could easily identify it. For that reason, Ottoman officers identified merchant ships by pointing out their physical properties: length, cargo capacity, hull structure, number of masts, and rig formation. Since shipping licenses described the hull, number of the mast and rig separately with few exceptions[6], in this study each ship has been analyzed according to its hull structure and its rig formation/number of masts.

In general, the officers paid more attention to the shape of the hull and the number of masts than the rig[7]. Any remarkable modification in the bow or stern was always carefully noted[8]. In this paper, these variations in the bow or sterns were ignored to simplify the analysis. For example, all *martigo*s with a curved/*trehantiri* bow (*çekdirme baÐlı martigo*) are identified as *martigo*s not *trehantiri*s. However, in cases in which there was only a description of the bow, such as the perama-bow brig, then the hull type was accepted as a *perama* not a frigate, even though the Ottoman officers usually shortened the term frigate-built brig simply as brig in military documents.

As standard procedure, the Ottoman officers always recorded the number of masts but not the rig formation if it was complicated. If the rig had an easily recognizable formation such as a brig, fully-rigged, scoleva, bratsera, schooner, and goleta, the officer recorded it as such. Oth-

Imperial Dockyard. (turkishpostcards.com, PG-014),

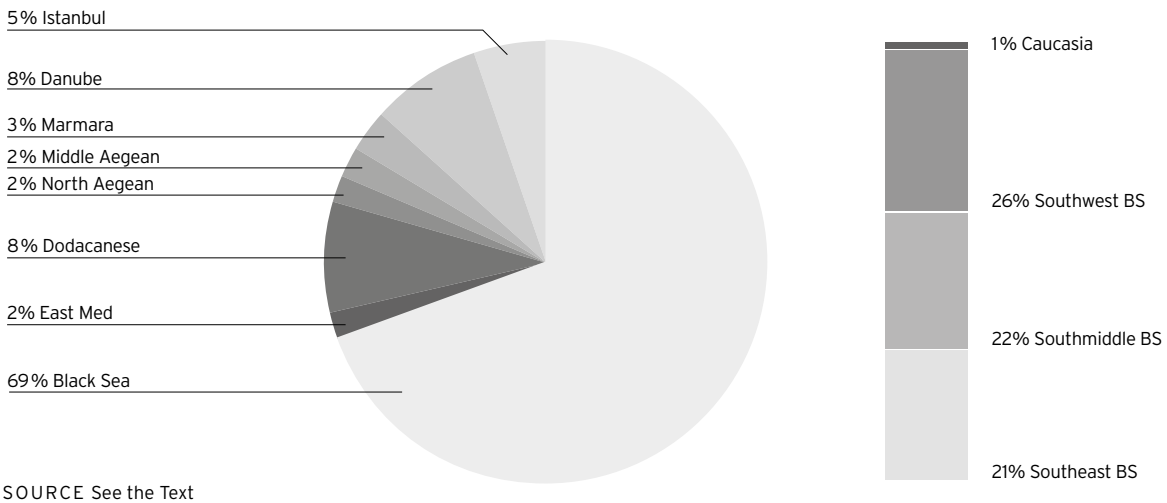
erwise, this information was left blank. To fill in this blank, this paper adds three-masted, two-masted, single-masted, one-and-a-half masted, one mast and lateen sail, and lateen sails as statistical categories. These categories represent only the ships without a recognizable rig formation. For example, the brigs always had two masts by definition, and the fully-rigged ones had three. Accordingly, all the two-masted ships with no specifications were definitely not brigs, and the three-masted ships might have any rig formation, except fully-rigged. If a ship had a lateen sail, officers simply identified it as a lateen sail without inscribing the number of masts. If only one of the sails were lateen and the other not, it was identified as one mast and lateen sail. Hence, the remaining single-masted and two-masted ships were the ships with no lateen sails in their foremast and mainmast.

Ottoman port officers carefully measured each ship's cargo capacity and length. These licenses were taken into account when a port officer determined how much tax to pay on the cargo. Accordingly, Ottoman officers were precise in measuring the cargo capacity of a merchant ship, which was also controlled by the Imperial Dockyard in Istanbul with the utmost care[9]. These cargo capacities were usually measured by volume, not weight, with the exception of ten ships carrying wood and coal. For this reason, all cargo capacities measured in Ottoman *kile* were converted into liters, including these ten ships carrying wood and coal measured in *okka*, not kilograms.

The database on ship licenses has historiographical limits. First, these licenses were only issued for merchant ships that always sailed from one Ottoman province to another or to a foreign port. Merchant ships engaging in trade over short distances were not required to have such licenses. For that reason, the merchant ships operating between close ports were missing from this database.

Secondly, and more importantly for the database, these licenses seem to contain a great majority of merchant ships built in the Marmara and South Black Sea coasts but not the entire fleet of Ottoman merchant ships; for example, the great majority of the ships built on the Aegean Islands seems to be missing. Specifically, the database covered ships built on the South Black Sea from Batumi to Varna and some Danubian ports, the entire Sea of Marmara, Aegean Islands around the Dardanelles, and small Dodecanese Islands. However, many ships built on the Aegean Islands and in Western Anatolia were missing from the dataset. Accordingly, 85% of Ottoman flagged-ships were from coves of the Marmara and South Black Seas, and the remaining 15% were from the ships bought from the Aegean Islands (12%), Syria and Egypt (2%), and otherwise of foreign origin (1%, mainly from the Kingdom of Greece). Considering that Istanbul and Sinop were the main shipyards for the Ottoman Navy, most ship-building sites along the South Black Sea functioned as the main auxiliary ship-building ports[10]. Therefore, it is natural that so many Ottoman-flagged merchant ships were built in the South Black Sea. The Anatolian Black Sea coast was one of three main ship-building regions along with the Aegean Islands and Lebanon. The Ottoman archives point out that there had been many Aegean ships with captains from the Aegean Islands of Santorini, Kasos, Psara, and Limnos sailing regularly between Russia and Istanbul before the Greek Revolution (1821–1831), but all of these captains and their ships were missing from the database of ship licenses for Ottoman-flagged ships used in this study. Moreover, in addition to the existence of the ship-building industry in Syros[11], historical data on other periods shows that Lesbos and the Gulf of Antalya could have had important ship-building industries. However, the number of ship licenses issued from these ports were considerably lower than it should have been. The most likely explication is that a great majority of Aegean merchant ships dealing with long-distance trade preferred to sail under foreign flags during the period from 1831 to 1853. For that reason, a considerable number of Ottoman ships mainly from the Aegean Islands and East Mediterranean are missing from this study. Accordingly, the number of ships from the Aegean Sea was not enough to comment on the nature of Aegean Ottoman merchant ships. However, if all ship licenses and traffic, including foreign ships, are processed, the nature of Aegean ships could hopefully be estimated with the help of secondary sources. For that reason, this article settles for examining merchant ships in the Marmara and Black Sea and uses the statistics on Aegean ships as a control group for the former[12].

Graph 1. Shipbuilding Regions according to Cargo Capacity



SOURCE See the Text

■ PHYSICAL PROPERTIES OF THE SHIPS: RIGGING, MAST FORMATION, AND HULL

This article addresses two interrelated subjects: a statistical analysis on the physical properties of Ottoman-flagged merchant ships and the effects of geography on merchant ship production. Therefore, this article examines Ottoman-flagged ships from 1831 to 1853 in two sections. Firstly, it presents the major hull and rig types among Ottoman-flagged merchant ships. The statistics demonstrate that the ship technologies originating from the Atlantic Ocean dominated the Levant. While the brigs were the main rigging of Levantine merchant ships, *Đehtiye* (frigate-built) was the most common type of hull in the Marmara and South Black Seas. Secondly, this article discusses the effects of geography over the physical properties of merchant ships. It argues that *perama* and *trehantiri* were the most important traditional ships in the Aegean and Marmara Seas, but they were mixed with features of *martigo* in order to sail offshore on the Black Sea. In addition to Atlantic-origin rig and hull types, *alamna* and *kırlaç* were two hull structures originating from the Indian Ocean. Both ships were capable of sailing offshore on the Black Sea and in the narrow waterways of the Black Sea rivers and the Straits. Over the course of this period, lateen sails were victims of change; they were increasingly replaced with square sails, even in traditional Levantine ships.

■ NORDIC STYLE RIGS: BRIG AND FULL-RIGGED SHIPS

The brig was the main rig formation among Ottoman-flagged merchant ships from 1831 to 1853. Ottoman-flagged brigs were homogenous vessels whose cargo capacity usually ranged from 200 to 350 kiloliters. An average brig was a

17-meter ship with 250 kiloliters cargo capacity. Statistics show that the brigs of the Aegean, Marmara, and Black Seas bore great similarities in size, cargo capacity, and their weight in maritime shipping. Firstly, according to the statistics half of the merchant ships built in the Black Sea, Aegean Sea, and Syros were brigs, with three quarters used as cargo capacity. Obviously, the brig was the dominant rigging in the Levant. Secondly, assuming that an average brig had carried cereals, the average cargo capacity of a brig carrying 250 kiloliters of cereals would have consisted of 200–235 tons of wheat, 150–180 tons of barley, and 130–155 tons of oats[13], which is closer to an average Syran brig carrying 208 tons[14] rather than a West Mediterranean ship[15]. It can be argued that there was no difference in the percentage of how many brigs were produced in the Black and Aegean Seas[16].

Other major Nordic rigs were three-masted ships: *navi*, barques, and brigantine. A *navi* (*nava* in Greek) was defined by its hull, but all the Ottoman-flagged *navi*s were three-masted barquentine-rigged ships[17]. These ships were the biggest vessels in the Ottoman merchant fleet: an average *navi* was 23 meters long with 450 kiloliter cargo capacity. The fully rigged *navi* was the only three-masted ship in the Black Sea, while barque (*meze navi*) and brigantine (*perkantin*), popular in Syros and Malta, were absent in the South Black Sea[18]. Accordingly, it can be argued that the most common three-masted fully rigged ships of the Black Sea were the *navi*, while the Aegean maritime agents preferred barques and brigantines instead.

■ TRADITIONAL LATEEN SAILS

Apostolos Delis' argument, which maintained that the age of lateen-sailed ships was over in the Aegean Sea, was also true for Black and Marmara Sea merchant ships by the 1830s: only 10% of the merchant ships from 1831 to 1853 were navigated using lateen sails, which consisted of 1% as cargo capacity[19]. The technological transformation from lateen to square sails began during the Napoleonic Wars but continued until the early nineteenth century. As discussed below, most traditional hull types, *perama*, *trehantiri*, and *martigo*, owed their survival to their ability to adapt to the new market conditions, which usually meant rigging these traditional ships with square sails instead of traditional lateen. Accordingly, although in 1831 almost all traditional Ottoman-flagged ships were lateen-sailed ships, traditional brig-rigged ships emerged during the 1830s. Within two decades, in 1849, a great number of *perama*, *trehantiri*, and *martigo* had square sails. In the 1840s, the great majority of *perama*, *trehantiri*, and *alamna* with lateen sails were built in close proximity to Constantinople; most probably these were ships following the coast to reach Istanbul.

■ OTHER MAJOR RIG TYPES: SCOLEVA, BRATSERA, AND GOLETA

Brigs and lateen sails were the main types of rigging in the Levant. Other Ottoman-flagged ships defined by their rig types were scoleva rigs, schooner, goleta, and bratsera. There were few scoleva in the South Black and Marmara Seas, but schooner, goleta, and bratsera were almost insignificant. Scoleva (*çekelve* or *sokolve*)[20] was common among robust Ottoman ships carrying heavy loads such as coal and wood to Istanbul in the eighteenth and early nineteenth century[21]. However, with the arrival of steamers providing better options to carry heavy cargo, such scoleva-rigged ships became obsolete[22]. A goleta was an Aegean type of ship defined by its rig. Although goletas were even rarer in the Black Sea, a significant number of Ottoman-flagged Aegean and Syran ships had this type of rigging[23]. Other types of rigging were bratsera (*braçerde* or *piraçire*) and schooner. Although there were 75 ships with bratsera and schooner rigs built in Syros, and most *trehantiri* built on Lesbos had bratsera rig formations in the 1910s[24], there were only four Ottoman-flagged schooners from the Aegean Sea and one bratsera bought from the Kingdom of Greece[25]. Accordingly, the goleta, bratsera, and schooner riggings should have been considered as Aegean rig types. However, at this point of the study, the number of examples from the Aegean Sea does not allow for comments on the nature of these ships.

Sehtiye Brik (turkishpostcards.com, RJ-15010g)

■ HULL TYPE FROM THE ATLANTIC OCEAN: FRIGATE-BUILT *(ŞEHTIYE)*

The most common hull type was the *Đehtiye* (frigate-built). One in every three merchant ships built between 1831 and 1853 was frigate-built, which consisted of more than half as cargo capacity[26]. As the brig was the main rigging in the Levant, the frigate-built was the main hull type. Like brigs, the frigates were produced regardless of the geography at every port, and the frigate-built ships built in the Black Sea were similar to Aegean frigate-built ships. An average merchant frigate-built ship was 17 meters with 270 kiloliter cargo capacity, considerably smaller than military *şehtiye* but almost identical to a merchant brig-rigged ship[27]. All merchant frigate-built ships were brig-rigged; however, only 81% of brig-rigged ships were frigate-built, and the remaining 19% had traditional hull types, all of which emerged later in the 1830s[28]. With the spread of brig-rigging among traditional ships, there was a relative decrease in the production of frigate-built ships from 1831 to 1849.

■ HULL TYPES FROM THE INDIAN OCEAN: *KIRLAÇ* AND *ALAMNA*

Among the Ottoman-flagged merchant ships, two types of ships bore great resemblance to ships sailing in the Indian Ocean: *alamna* and *kırlaç*. The main reason for these specific hull types is due to the fact that both ships were built to navigate both open seas and narrow waterways. The nineteenth-century *kırlaç*—19-meter ships with 160 kiloliter cargo capacity—was a transport vessel in the Danube River that could also sail offshore on the Black Sea. Most *kırlaç* were two-masted ships with square sails. Its hull looked like a nineteenth-century Persian Gulf *baghlah* (بَغْلَة): its bow was long and pointed[29], and some versions had a completely flat bottom. *Kırlaç* was originally a fifteenth-century merchant ship sailing between the Persian Gulf and the Indian Ocean that was also able to navigate the Tigris River[30]. This ship replaced the original Black Sea river ship known as the *şayka,* which could sail the rivers and coasts of the Black Sea[31]. Compared with *şayka*, *kırlaç* performed better offshore. In fact, Ottoman naval authorities complained about how vulnerable *şayka* and Aegean ships (tree-masted and pontoons (*tombaz*) were against the dangers of the Black Sea[32]. Eventually, with the increasing need to sail offshore on the Black Sea in the early nineteenth century, *şaykas* became a river ship.

Alamna, also called *kancabaş* (hook headed), was basically a dhow-like ship adapted to the calmer sea conditions of the Marmara Sea and the dangers of the Straits[33]. Compared to *kırlaç*, the *alamna* was a small ship (ten-meter ship with 22.5 kiloliters cargo capacity) with great maneuverability and used primarily to carry bulk cargo over short distances, mainly cereals[34], between Lesbos and the Northern Constantinopolitan shores. *Alamna* was mainly built on the Gallipoli peninsula and northern fishing ports of Constantinople.

■ TRADITIONAL HULL TYPES OF THE LEVANT: *TREHANTIRI, PERAMA,* AND *MARTIGO*

Trehantiri (Çekdirme)

The most famous Levantine ship was the *trehantiri* (*çekdirme*)[35]. A typical *trehantiri* is defined by its crescent-shaped hull and curved prow, which was perfectly suited to the nautical conditions of the Aegean Sea. All the *trehantiri*s listed in 1831 were lateen-rigged as their predecessors were in the eighteenth century. An average *trehantiri* with lateen sails was a small ship, eight to ten meters long with 15 kilolitres cargo capacity. However, brig-rigged *trehantiri* emerged in the 1830s, and eventually in 1849, one-third of all *trehantiri* were brig-rigged, which consisted of 84% cargo capacity. An average brig-rigged *trehantiri* was considerably larger than lateen-sailed ones and could carry up to 240 kilolitres. For example, a sixteen-meter long brig-rigged *trehantiri* steered by Havva (the only woman captain in the dataset) from Trabzon port carried up to 300 kiloliters[36].

Perama (Beşçifte)

Perama was another traditional type of ship defined by its hull—basically a *trehantiri* with a straighter hull and smoother prow. As its Greek and Turkish names sug-

gest, it was a Constantinopolitan ship[37]: its production was concentrated around Istanbul, with production taking place within a 300-kilometre radius of the city, from Lesbos to Bartın. *Perama*, with lateen sails, had been one of the main merchant ships in the Black Sea before its commercial opening. However, in 1788, the government forbade the construction of the *perama*, *şayka* and brig-rigged *çakmakbaşlı,* and bowsprit ships along the Black Sea coasts and promoted the production of brig-rigged frigates[38], galleons, and brigantine instead. Some years later, the ports along the Black Sea began once again to ignore this law and produce traditional *perama*[39]. During May 1802, for example, the great majority of tax in kind from the province of Bogdan (mainly grains) was transported from Galati to Constantinople by the *perama*s[40]. As a response to the Greek Revolution (1821–1831), the Great Admiral Koca Hüsrev Pasha again forbade the construction of *perama* and bowsprit and exclusively promoted frigates during the second, even more radical modernization of the Ottoman Navy[41]. For this reason, in the certificates from 1831, the *perama* was extremely rare. However, during this period, *perama* and bow-sprit owners acquired their certificates under various pretexts, such as they were built before the prohibition or bought abroad[42]. Eventually, building *perama* became legal again. This time, just like in the case of *trehantiri*, *perama* also underwent a series of changes in the 1830s by mixing with *martigo*s and using brig rigging instead of typical lateen sails. This new *perama* with brig formation (75–225 kilolitres) was also larger and more common than *perama* with lateen sails (smaller than 150 kilolitres) such as *trehantiri*[43].

Martigo

Although the number of pure *martigo*s was limited, martigo-hybrids were the most popular type of traditional merchant ships in the Black Sea during the early nineteenth century. The reason behind its prevalence was due to the change of courses of ships in the Black Sea. Typical eighteenth-century Black Sea ships followed the coastline in order to avoid infamous Black Sea storms. In fact, during this era, when most coast-guard and merchant ships followed a coastal trajectory, the pirates used the *martigo*s to surprise their victims and avoided authorities by sailing in the offshore Black Sea[44]. However, with their integration into world markets, the merchant ships needed to sail directly between ports in the open sea in order to save time. Accordingly, *perama* and *trehantiri*, best suited to the conditions of the Marmara and Aegean Seas, were adjusted to the nautical conditions of the Black Sea by mixing characteristics of *martigo*s. Subsequently, the martigo-hybrids (almost 90% of the nineteenth-century *martigo*s were hybrid) became the most widespread type of traditional ship in the Black Sea region.

These martigo-hybrids were basically Mediterranean *martigana* with a more crescent-shaped hull and a typical Levantine curved prow. Another difference between the Black Sea ships and the Aegean ships was that the Black Sea ships had generally more pronounced sheers, more curved bows, and heavier builds than the Aegean and Marmara Sea versions[45]. Such physical adjustment was common in South Black Sea ships, which could also be observed in *taka* (fishing boats) and *çapar* (main cargo ships in short distances) in the South Black Sea[46]. Since the prows of the Black Sea martigo-hybrids were even sharper than Aegean *trehantiri*, this ship was called a [ship] with rostrum (*gagalı*) in the late nineteenth century[47]. As the result of being a hybrid of different type of ships, the length and cargo capacity of *martigo*s varied greatly. The smallest *martigo* built in Kilyos was only 12 meters long with 18,5 kiloliters cargo capacity, and the biggest one was built in Inebolu, 18 meters long with 330 kiloliters cargo capacity[48]. Because of this great variation in hull structure, it is virtually impossible to define a typical nineteenth-century *martigo*[49].

■ GEOGRAPHY AND THE PHYSICAL PROPERTIES OF THE SHIPS

Reviewing the ship licenses reveals two links between geography and the physical properties of the ships (rig, hull, and size). Firstly, the production of major types of

Limanekin karadeniz
Marmaraliman (author's composition)

hulls and rigs concentrated on certain geographical areas, except in the case of oceangoing frigates and brigs. Overall, there were three main production zones and three major traditional types of ships in the Levant. While the Aegean Sea was the seat of *trehantiri* production, *perama* production was concentrated around Istanbul, particularly from the islands facing Gallipoli to the northern mouth of the Bosporus. Both ships were replaced by their martigo-hybrid versions in the Black Sea[50]. The main reason behind this geographical distribution seems to be nautical and climatic: although *trehantiri*, *perama*, and martigo-hybrid ships shared similar hull types, they were altered due to the changing climatic and nautical conditions of these three seas. Moreover, these ships needed to sail in both open seas and narrow waterways and thus were fitted with dhow-like hulls; while small *alamna* with greater maneuverability were more fit to sail along the Straits and Marmara, *kırlaç* were more common in the Danube River.

Table 1. Geographical Distribution of Ships according to Hull and Rig

Region		Ship-building Areas
Hull	Frigate-built	Everywhere
	Bombard	Aegean and Marmara Seas + Bartın
	Perama	From Çakraz to Ayandon
	Trehantiri	From Tekfurdağ to Ereğli + Aegean Sea
	Martigo	South Black Sea
	Tserniki	Aegean Sea
	Kırlaç	Danube River
	Alamna	The Straits
Rig	Fully-rigged	from Bartın to Giresun
	Brig	Everywhere
	Goleta	Aegean Sea + from Tirebolu to Giresun
	Scoleva	South Marmara + Aegean Sea
	Lateen Sail	Marmara Sea + from Kilyos to Alaplı

SOURCE See the Text

Second, the distance of the port where the ship was built to Istanbul was related to the size of the ship. The length and cargo capacity of a ship were larger the farther away from the port where the ship was built to Istanbul. In other words, the farther the building site was from Istanbul, the larger the ship became. The reason behind this might have been due to the structure of nineteenth-century trade, the nature of trade, the economic scale of maritime shipping, or simply a bias in the statistics generated by the importance of Istanbul[51]. These topics are out of the scope of this article. For that reason, this paper will remind the reader why sailing to Istanbul was so important and focus on the effects of this relation on features of merchant ships rather than the causes.

■ CONDITIONS OF SAILING AND PHYSICAL PROPERTIES OF THE SHIPS

The Ship of the Black Sea: Martigo

The database on ship licenses points out that martigo-hybrids were the main traditional type of hull in the Black Sea and were massively produced on its coasts, especially from Plovdiv to Sinop. The register on ship traffic in Istanbul suggests the reason why martigo-hybrids might have been so popular in the Black Sea. According to these registers, the great majority of the ships that sailed offshore on the Black Sea over long distances were either *Đehtiye*s (frigate-built) or martigo-hybrids. For example, Table 13 and 14 show the traffic of Ottoman-flagged ships sailing between Istanbul and Russian ports from October 1826 to October 1827. According to Table 13, while 44% of these ships were martigo-hybrids, 15% were frigate-built. In addition, all the 80 ships in the Table 14, were frigate-built brigs, except 2 *navi*s[52].

There are basically two main climatic and nautical reasons why *trehantiri* and *perama* should have adjusted to sail offshore on the Black Sea. Firstly, the Siberian high-pressure belt created sudden cold storms in the Black Sea, usually much more severe than in the Aegean. Due to these unpredictable hard storms, even the most experienced Black Sea captains avoided sailing offshore unless it was really necessary. Secondly, docking and sheltering ships from harsh weather were always issues for wooden ships in the Black Sea. The main commercial ports along the coast, like Istanbul, Sinop, Samsun, and Trabzon, became important ports mainly because they provided easy passage to central Anatolia, but, even today, docking at these ports during bad weather is still risky[53]. In the nineteenth century, most ships anchored in the commercial ports of Samsun and Trabzon sought refuge in Ünye and the Constantinopolitan port in the Golden Horn during storms.

Due to these climatic and nautical conditions, until the nineteenth century, most merchant ships sailing long distances followed a longer coastal trajectory instead of directly sailing between two ports. However, in the early nineteenth century with the integration of the Black Sea into global markets, an increasing number of ships sailed directly between Romanian and Russian ports to Istanbul to save time[54]. Accordingly, the eighteenth-century ships *perama*, *volik*, and *şayka*, which followed a coastal trajectory, were replaced by martigo-hybrids and frigate-built brigs, which could sail offshore on the Black Sea. Frigate-built brigs had the advantage of being able to sail between Russian and West Mediterranean ports, which was a great novelty in the early nineteenth century. Therefore, with the increasing demand for sailing offshore on the Black Sea, the shipyards at Black Sea ports produced martigo-hybrids or frigate-built brigs to fill this demand.

Aegean Ships

Contrary to martigo-hybrid versions, pure *trehantiri* were mainly produced in the Marmara and Aegean Seas. There was one exception to this rule: *trehantiri* were also built in the coves around the town of Alaplı (180 kilometers east of the Bosporus) in the South Black Sea[55]. As seen in Table 15, the *trehantiri* entering Istanbul during the week of 3-9 March 1823 all came from Mediterranean ports, with the exception of two ships[56]. The ship types arriving from the Mediterranean and Black Sea ports were generally different, as in these examples; while *trehantiri*s sailed between the Aegean Sea and Istanbul, the martigo-hybrids sailed in the Black Sea. The only ships common in these traffic records

Left çektirme, right brig (turkishpostcards.com, RJ-15011,85)

Left brigs, docked mavna, behind a hybrid
(turkishpostcards.com, Le Bosphore a Hissar, 02-EHT000y)

were *perama* and frigate-built brigs. Besides *trehantiri*, a number of ships also sailed from the Aegean to Istanbul. Unfortunately, the statistics on the ship licenses and traffic studies so far were insufficient to construct more solid arguments on the Aegean Ships, except for *trehantiri*. The findings of this study simply conclude that tserniki, polaca, trata, bratsera, schooner, and goleta were all Aegean ships[57].

Ships of the Rivers and Straits

The ships built to sail in narrow waterways were significantly different from other ships: the *alamna* of the Straits and *kırlaç* of the Danube River bore similarities with dhow-like ships sailing in the Persian Gulf. The dhow-like hull could easily navigate various types of bodies of water, including the Tigris River and offshore in the Indian Ocean. Likewise, the Ottoman *alamna* of the Straits and *kırlaç* of the Danube River were built to sail offshore on the Black and Marmara Seas and in narrow waterways like the Straits and the Black Sea rivers. However, despite their resemblance to the dhow-like ships, the physical properties of *alamna* and *kırlaç* diverged greatly because of the great differences in the sailing conditions of the Straits and the Danube River.

Sailing through the meandering Danube was easier than the Straits in general, but the river's muddy and constantly changing delta caused many challenges for sailors[58]. Moreover, *kırlaç* had to cope with the dangers presented by the Black Sea, while the Sea of Marmara offered reliable winds for *alamna*. Accordingly, *kırlaç* was bigger in size, and its gunwale was higher than *alamna*, especially in military versions of the ship[59].

The real danger for *alamna* was due to the narrow, shallow, curvy, and sinuous Straits. The Bosporus was famous in antiquity as "the dread passage into the Sea of Pontus" with "crashing rocks (Συμπληγάδες)"[60], as its unpredictable currents frequently sent ships slamming into its rocky coasts. Therefore, if not carefully maneuvered, these currents, known for sudden changes in direction and pace, would drive any ship into danger. For that reason, the *alamna* that were built mainly in the northern fishing villages of Constantinople and the coves of the Gallipoli peninsula were smaller than *kırlaç* but possessed greater maneuverability.

■ THE DISTANCE

In determining the physical features of a merchant ship, the distance to Istanbul mattered: the farther from Istanbul the ship was built, the bigger the ship became. In order to prove this hypothesis, the merchant shipyards were divided into nine zones: four zones from Caucasia to the Bosporus and another four zones from Dodecanese Islands to Gallipoli. As Tables 2 and 3 demonstrate, the ship's length and cargo capacities increased with the distance the ship would travel to Istanbul. This tendency was more

Table 2. The Length of Ships according to Regions (in meters)

	Region	New-built Ships	Entire List
From West to East South Black Sea	Izmit	9.9	11.5
	Southwest Black Sea	13.6	13.9
	South Middle Black Sea	16.2	16.5
	Southeast Black Sea	18.5	18.2
From North to South Marmara and Aegean Seas	Marmara Sea	9.9	10.6
	North Aegean Sea	10.7	11.6
	Middle Aegean Sea	10.3	11.7
	Dodecanese Islands	13.7	14.2

SOURCE See the Text

Table 3. The Cargo Capacity of Ships according to Regions (in kiloliters)

	Region	New-built Ships	Entire List
From West to East South Black Sea	Izmit	29.1	42.4
	Southwest Black Sea	124.3	127
	South Middle Black Sea	211.5	220
	Southeast Black Sea	271	267
From North to South Marmara and Aegean Seas	Marmara Sea	34.7	48
	North Aegean Sea	87.6	104.6
	Middle Aegean Sea	106.4	120
	Dodecanese Islands	208.4	214.5

SOURCE See the Text

Alamna (turkishpostcards.com, 02-EHT014a)

obvious in the Black Sea ports than the Aegean Sea: comparing the ships from the Southeast Black Sea with those from Izmit, the length of a ship in the Southeast Black Sea was double that of the length of a ship in the Aegean, and its cargo capacity quintupled.

There are two plausible reasons why the ships grew larger with longer distances: returns to scale and statistical errors caused by the overrepresentation of Constantinopolitan merchant ships. Firstly, the nature of commerce might have been an important factor. The reason behind this relation was due to the structure of nineteenth-century trade, the nature of the trade, and the economic scale of maritime shipping[61]. To discuss this hypothesis, this article would need to explain the ownership, commercial institutions, maritime networks, and the agents playing part of this maritime trade. Unfortunately, all these topics are outside the scope of this article.

Secondly, this effect might have been simply generated by statistical coverage errors caused by the overrepresentation of Constantinopolitan merchant ships[62]. Put in simple terms, the ships built around Istanbul might have been overrepresented in the sample. As pointed out several times in this article, the Bosporus was the natural gateway between the Black and Mediterranean Seas. Accordingly, there was no distinction between short-distance and long-distance trade in Istanbul: every cargo—even between close ports—that reached the city was automatically considered part of international trade. Therefore, every small vessel engaged on local trade would be ignored in the Ottoman ship license system and would fall automatically under the category of international trade when it entered Istanbul. In other words, since every ship that sailed to Istanbul was already part of the international trade system, even the small coasters sailing to the city became part of this network; hence, the minimum required sizes to be part of international trade decreased as the shipyard where new boats were built became closer to Istanbul. For example, the *alamna* was a small ship that sailed mainly between Lesbos and the northern shore of the Bosporus at its maximum

range, which was a relatively short voyage compared to those of frigate-built brigs. However, these *alamna*s carried cargo from the Bosporus to the Marmara and Lesbos to be picked up by other ships, and on their return, they also carried cargo from the Aegean to be transferred to ships involved in long-distance trade. Therefore, even though these *alamna* carried commodities to Istanbul within a short range, they automatically became part of the long-distance trade network. On the other hand, *çapar*, short-distance cargo vessels in the South Black Sea, were invisible in the Ottoman system. This is because even though these ships transported the cargo from coves and coasts in east Black Sea to major international ports like Trabzon and Samsun, they were considered as coastal ships and not registered under the Ottoman ship license system. Accordingly, even though the *çapar* and *alamna* fulfilled a similar task in maritime trade, only *alamna* became part of the database on Ottoman merchant ships.

The coverage error does not produce a fundamental issue in defining the physical properties of merchant ships, since this error is generated in the nature of commerce. The importance of small coastal Constantinopolitan vessels was exaggerated in the database because of the central role of Istanbul in trade. The city's total cargo exports to the Mediterranean Sea were equal to the entire exports of the Black Sea ports to the Mediterranean Sea. That is why Istanbul was the biggest port in the world from the late nineteenth century until the Great War, thanks to transit trade from the Black Sea to the rest of the world[63]. For that reason the coastal ships of Istanbul were all part of international trade.

If the relationship between cargo capacities and the distance to Istanbul is an error that does not result from economic factors, then ships like *perama*, *alamna*, and lateen-sailed ships should have less importance in nineteenth century long-distance trade, as the database suggests. In this case, considering the fact that lateen-sailed ships mainly built around Istanbul accounted for only 10% of the ships in the database (1% of cargo capacity), lateen-sail shipping should have been considered obsolete in long-distance trade by the 1830s. Likewise, the brigs, frigate-built, *martigo*s, and *trehantiri* could have been much more important in the new long-distance maritime trade, as this paper argues. However, such questions can be answered only after analyzing all Black Sea traffic and ship licenses.

■ CONCLUSION

This article presented some of the preliminary results of ongoing research on maritime trade and commercial shipping in the Levant from 1804 to 1914. It discusses the physical features of early nineteenth-century Ottoman-flagged merchant ships using statistics created from shipping licenses and the effects of geography on the physical features of the merchant ships. The statistics demonstrate that the frigate-built brigs were the backbone of the Ottoman-flagged merchant fleet from 1831 to 1853. While one in three ships was a frigate-built brig, their total cargo capacity consisted of roughly half of that of the Ottoman merchant fleet. Brig-rigged traditional ships (~15% of the ships) emerged in the 1830s. Traditional ships owed their survival to their ability to adapt themselves to new market conditions. The most common traditional ships were the *trehantiri*, mainly produced in the Aegean and Marmara Seas, and *perama*, produced within a limited zone from Bartın to Lesbos. With the emergence of international commerce, the merchant ships increasingly sailed offshore on the Black Sea. Alongside the frigate-built brigs, martigo-hybrids sailed long distances offshore on the Black Sea. These martigo-hybrids were basically *perama* or *trehantiri* whose hull was adapted to the harsher nautical conditions of the Black Sea by mixing with the features of a *martigana*.

This paper argues that even though foreign-origin ship technology prevailed in the early nineteenth century, geography was still the primary factor determining the physical factors of merchant ships. In addition to the geographical concentration of *trehantiri* in the Aegean Sea and martigo-hybrids in the Black Sea, *kırlaç* was the main ship in the Danube River and *alamna* in the Straits. Both ships' hull structure resembled dhows, which enabled these ships to sail easily in narrow waterways and open seas.

■ APPENDIX

Table 4. Rigging from 1830s to 1850s					
	Number	Cargo Capacity	Length	As number	As cargo capacity
Left Blank	130	50,858.3	10.6	13.7%	4.2%
Fully-rigged	16	454,940.0	23.2	1.7%	4.6%
Brig	427	250,148.8	17.2	45.0%	67.8%
Schooner	4	193,200.0	15.2	0.4%	0.5%
Bratsera	1	22,080.0	9.1	0.1%	0.0%
Scoleva	3	140,213.3	16.2	0.3%	0.3%
Goleta	34	113,755.3	13.3	3.6%	2.5%
Single Mast	105	75,159.6	12.5	11.1%	5.0%
Two Masts	122	168,988.9	16.7	12.9%	13.1%
Three Masts	1	736,000.0	25.0	0.1%	0.5%
Lateen Sail	99	22,113.9	10.3	10.4%	1.4%
One and Half Mast	7	56,514.3	11.8	0.7%	0.3%
One mast and Lateen Sail	2	47,840.0	10.6	0.2%	0.1%
Total	949	166,087.1	14.9		

Table 5. Rigging in 1831					
	Number	Cargo Capacity	Length	As number	As cargo capacity
Left Blank	1	54,560.0	12.9	0.8%	0.2%
Fully-rigged	-	-	-	-	-
Brig	78	260,808.2	19.8	63.9%	79.7%
Schooner	-	-	-	-	-
Bratsera	-	-	-	-	-
Scoleva	1	96,800.0	20.5	0.8%	0.4%
Goleta	7	172,434.3	19.7	5.7%	4.7%
Single Mast	16	115,920.0	15.2	13.1%	7.3%
Two Masts	7	134,765.7	15.9	5.7%	3.7%
Three Masts	1	736,000.0	25.0	0.8%	2.9%
Lateen Sail	11	27,236.4	14.2	9.0%	1.2%
One and Half Mast	-	-	-	-	-
One mast and Lateen Sail	-	-	-	-	-
Total	122	209,304.3	18.4		

Table 6. Rigging in 1849					
	Number	Cargo Capacity	Length	As number	As cargo capacity
Left Blank	66	55,227.9	10.4	17.0%	6.0%
Fully-rigged	7	412,685.7	22.0	1.8%	4.7%
Brig	182	237,491.4	16.6	46.8%	70.8%
Schooner	3	196,266.7	15.4	0.8%	1.0%
Bratsera	-	-	-	-	-
Scoleva	2	161,920.0	14.0	0.5%	0.5%
Goleta	10	105,984.0	12.1	2.6%	1.7%
Single Mast	37	79,965.4	13.0	9.5%	4.8%
Two Masts	35	145,097.1	14.7	9.0%	8.3%
Three Masts	-	-	-	-	-
Lateen Sail	46	26,840.0	10.1	11.8%	2.0%
One and Half Mast	1	73,600.0	11.4	0.3%	0.1%
One mast and Lateen Sail	1	40,480.0	9.1	0.3%	0.1%
Total	389	157,005.4	14.2		

Table 7. Rigging in Random Selection					
	Number	Cargo Capacity	Length	As number	As cargo capacity
Left Blank	63	46,222.0	10.7	14.4%	4.1%
Fully-rigged	9	487,804.4	24.2	2.1%	6.2%
Brig	167	258,964.5	16.6	38.1%	60.9%
Schooner	1	184,000.0	14.4	0.2%	0.3%
Bratsera	1	22,080.0	9.1	0.2%	0.0%
Scoleva	-	-	-	-	-
Goleta	17	94,164.7	11.3	3.9%	2.3%
Single Mast	52	59,198.5	11.4	11.9%	4.3%
Two Masts	80	182,436.0	17.6	18.3%	20.6%
Three Masts	-	-	-	-	-
Lateen Sail	42	15,596.2	9.5	9.6%	0.9%
One and Half Mast	6	53,666.7	11.9	1.4%	0.5%
One mast and Lateen Sail	1	55,200.0	12.1	0.2%	0.1%
Total	438	162,115.1	14.5		

Table 8. Hull Structure from 1830s to 1850s					
	Number	Cargo Capacity	Length	As number	As cargo capacity
Minor or no Hull Spec.	79	146,878.0	19.7	7.8%	7.1%
Bombard	47	74,015.0	11.2	4.7%	2.1%
Perama	62	117,992.5	13.7	6.2%	4.5%
Trehantiri	156	63,826.1	-	15.4%	6.1%
Cutter	1	147,200.0	17.4	0.1%	0.1%
Felucca	3	14,560.0	11.1	0.3%	0.0%
Rowboat	2	36,800.0	10.2	0.2%	0.0%
Alamna	31	23,207.7	10.1	3.1%	0.4%
Tserniki	20	25,576.0	8.6	2.0%	0.3%
Galleon-built	1	44,160.0	9.1	0.1%	0.0%
Kırlaç	30	157,626.7	18.9	3.0%	2.9%
Mahona	9	29,848.9	10.9	0.9%	0.2%
Tonbaz	1	147,200.0	17.4	0.1%	0.1%
Frigate-built	346	268,532.8	17.6	34.4%	56.8%
Lefke	7	72,548.6	11.1	0.7%	0.3%
Martigo	122	117,874.6	13.9	12.1%	8.8%
Kütük	6	36,186.7	9.9	0.6%	0.1%
Brig with Perama bow	19	186,130.5	16.0	1.9%	2.2%
Brig with Trehantiri bow	15	133,952.0	15.3	1.5%	1.2%
Navi	16	454,940.0	-	1.6%	4.4%
Goleta with no hull Spec.	34	113,755.3	13.3	3.4%	2.4%
Total	1.007	162,660.0	13.0		

Table 9. Hull Structure in 1831					
	Number	Cargo Capacity	Lenght	As number	As cargo capacity
Minor or no Hull Spec.	12	186,480.0	17.3	9.8%	8.7%
Bombard	-	-	-	0.0%	0.0%
Perama	6	49,658.2	13.8	4.5%	1.1%
Trehantiri	3	57,302.9	20.0	2.9%	0.8%
Cutter	1	147,200.0	17.4	0.8%	0.6%
Felucca	2	16,320.0	12.9	1.6%	0.1%
Rowboat	-	-	-	0.0%	0.0%
Alamna	-	-	-	0.0%	0.0%
Tserniki	-	-	-	0.0%	0.0%
Galleon-built	-	-	-	0.0%	0.0%
Kırlaç	-	-	-	0.0%	0.0%
Mahona	-	-	-	0.0%	0.0%
Tonbaz	1	147,200.0	17.4	0.8%	0.6%
Frigate-built	69	265,493.3	20.0	56.6%	71.4%
Lefke	-	-	-	0.0%	0.0%
Martigo	16	122,130.0	15.2	13.1%	7.6%
Kütük	-	-	-	0.0%	0.0%
Brig with Perama bow	5	228,160.0	17.4	4.1%	4.4%
Brig with Trehantiri bow	-	-	-	0.0%	0.0%
Navi	-	-	-	0.0%	0.0%
Goleta with no hull Spec.	7	172,434.3	19.7	5.7%	4.7%
Total	122	210,323.3	18.0		

Table 10. Hull Structure in 1849					
	Number	Cargo Capacity	Length	As number	As cargo capacity
Minor or no Hull Spec.	33	123,670.3	17.9	8.0%	6.4%
Bombard	22	64,400.0	10.4	5.4%	2.2%
Perama	28	113,028.6	13.7	6.8%	5.0%
Trehantiri	82	76,001.0	11.4	20.0%	9.8%
Cutter	-	-	-	-	-
Felucca	-	-	-	-	-
Rowboat	-	-	-	-	-
Alamna	15	23,184.0	9.3	3.6%	0.5%
Tserniki	9	36,800.0	10.0	2.2%	0.5%
Galleon-built	-	-	-	-	-
Kırlaç	-	-	-	-	-
Mahona	5	34,592.0	11.1	1.2%	0.3%
Tonbaz	-	-	-	-	-
Frigate-built	127	272,218.6	17.1	30.9%	54.6%
Lefke	3	71,146.7	11.5	0.7%	0.3%
Martigo	45	113,752.9	13.8	10.9%	8.1%
Kütük	1	36,800.0	9.1	0.2%	0.1%
Brig with Perama bow	11	177,309.1	15.9	2.7%	3.1%
Brig with Trehantiri bow	13	130,498.5	15.4	3.2%	2.7%
Navi	-	-	-	-	-
Goleta with no hull Spec.	10	105,984.0	12.1	2.4%	1.7%
Total	411	153,973.5	11.7		

Table 11. Hull Structure in Random Selection					
	Number	Cargo Capacity	Length	As number	As cargo capacity
Minor or no Hull Spec.	34	155,425.9	22.2	7.2%	7.1%
Bombard	25	82,476.2	11.8	5.3%	2.8%
Perama	29	136,056.7	13.7	6.0%	5.2%
Trehantiri	70	49,890.3	15.5	14.8%	4.7%
Cutter	-	-	-	-	-
Felucca	1	11,040.0	7.6	0.2%	0.0%
Rowboat	2	36,800.0	10.2	0.4%	0.1%
Alamna	16	23,230.0	10.8	3.4%	0.5%
Tserniki	11	16,392.7	7.5	2.3%	0.2%
Galleon-built	1	44,160.0	9.1	0.2%	0.1%
Kırlaç	30	157,626.7	18.9	6.3%	6.3%
Mahona	4	23,920.0	10.6	0.8%	0.1%
Tonbaz	-	-	-	-	-
Frigate-built	150	266,810.3	16.8	31.7%	53.5%
Lefke	4	73,600.0	10.9	0.8%	0.4%
Martigo	61	119,799.1	13.7	12.9%	9.8%
Kütük	5	36,064.0	10.0	1.1%	0.2%
Brig with Perama bow	3	148,426.7	14.1	0.6%	0.6%
Brig with Trehantiri bow	2	156,400.0	14.0	0.4%	0.4%
Navi	9	487,804.4	31.7	1.9%	5.9%
Goleta with no hull Spec.	17	94,164.7	11.3	3.6%	2.1%
Total	474	157,919.2	12.8		

Table 12. List of non-Muslim merchant ships sailed between Istanbul and Russia from 21 October 1826 to 2 October 1827[64]

Town of captain	Nickname	Name	Cargo	Bow or Stern	Hull	Rig	Mast	Crew
Varna		Tiro	8000	Bowsprit		Brig	2	17
Ünye	Heci (Χατζη)	Nikola	6000	Bowsprit		Brig	2	13
Vasilikos (Tsarevo)		Yanni	3000		Trehantiri			16
Misivri (Nesebar)		Yorgo	7000		Martigo		1	14
Vasilikos (Tsarevo)	Spanos	Konstanti	5000	Perama-bow	Martigo		1	13
Vasilikos (Tsarevo)		Panayod	5000	Perama-bow		Brig	2	17
Misivri (Nesebar)	Dirak (son of)	Boris	8000		Lefke		2	17
Misivri (Nesebar)		Manual	4000		Frigate-built	Brig	2	10
Ahtabolu (Ahtopol)		Yanaki	6000	Perama-bow		Brig	2	15
Ünye	Skinny (son of)	Panayod	4000	Raked-stern	Şayka			13
Misivri (Nesebar)		Sotori	4000	Bowsprit	Martigo			12
Vasilikos (Tsarevo)		Apostol	6000	Perama-bow	Martigo		1	14
Ahtabolu (Ahtopol)		Nikolaki	4000	Bowsprit	Martigo		1	15
Ahtabolu (Ahtopol)		Yanaki	6000	Perama-bow	Martigo			15
Vasilikos (Tsarevo)		Yanni	3000		Trehantiri			16
Misivri (Nesebar)		Sotori	n.i	Bowsprit	Martigo			12
Vasilikos (Tsarevo)	The Little	Panayod	n.i	Felucca-stern	Martigo		2	16
Vasilikos (Tsarevo)		Yorgi	2700		Frigate-built	Brig	2	10
Vasilikos (Tsarevo)	Yanni (son of)	Stephan	4000		Trehantiri			14
Ünye	Corcor (son of)	Hristo Doro	6000		Frigate-built	Brig	2	18

Table 12. List of non-Muslim merchant ships sailed between Istanbul and Russia from 21 October 1826 to 2 October 1827[64]

Town of captain	Nickname	Name	Cargo	Bow or Stern	Hull	Rig	Mast	Crew
Vasilikos (Tsarevo)	Dimitraki (son of)	Todori	5000	Perama-bow		Brig	2	15
Vasilikos (Tsarevo)	Spanos (son of)	Konstanti	5000	Perama-bow	Martigo		1	13
Vasilikos (Tsarevo)		Panayod	5000	Perama-bow		Brig	2	13
Vasilikos (Tsarevo)	The Long	Panayod	5000	Bowsprit	Martigo		1	11
Vasilikos (Tsarevo)	Portar (son of)	Stodori	5000	Perama-bow	Martigo		1	14
Vasilikos (Tsarevo)		Apostol	6000	Perama-bow	Martigo		1	14
Trabzon	Jeweler (son of)	Konstanti	6000	Perama-bow		Brig	2	16
Misivri (Nesebar)		Manual	4000		Frigate-built	Brig	2	10
Tirebolu	Paraskevi (son of)	Kara Panayod	7000		Frigate-built	Brig	2	16
Varna		Tiro	8000	Bowsprit		Brig	2	17
Vasilikos (Tsarevo)	The Skinny	Yanaki	3500	Trehantiri-bow	Martigo		1	11
Evrenye	Kalapakçı (son of)	Dimitri	3700	Perama-bow	Martigo		1	10
Misivri (Nesebar)		Yorgo	7000	Perama-bow	Martigo		1	14
Misivri (Nesebar)		Andrea	5000		Frigate-built	Brig	2	10
Ahyolu (Pomorie)		Alexandri	8000		Lefke		2	15
Ahtabolu (Ahtopol)		Nikolaki	4000	Bowsprit	Martigo		1	10
Ünye		Nikola	6000	Bowsprit		Brig	2	13
Παλαιό Τρίκερι		Storis	3000		Frigate-built	Brig	2	15
Giresun	Heci (Χατζη)	Kiryako	5000	Bowsprit	Martigo		1	n.i
Vasilikos (Tsarevo)	The Little	Panayod	n.i.	Felucca-stern	Martigo		2	16

Table 12. List of non-Muslim merchant ships sailed between Istanbul and Russia from 21 October 1826 to 2 October 1827[64]

Town of captain	Nickname	Name	Cargo	Bow or Stern	Hull	Rig	Mast	Crew
Vasilikos (Tsarevo)	The Long	Panayod	5000	Bowsprit	Martigo			11
Vasilikos (Tsarevo)		Yanni	n.i.		Trehantiri			11
Ahtabolu (Ahtopol)		Yanaki	6000	Perama-bow		Brig	2	15
Ünye	Corcor (son of)	Hristo Doro	6000		Frigate-built	Brig	2	18
Evrenye	Jeweler (son of)	Yanni	n.i.	Raked-stern	Martigo			16
Ünye	Kapadin (son of)	Yorgi	n.i.		Frigate-built	Brig	2	23
Vasilikos (Tsarevo)		Panayod	5000	Perama-bow		Brig	2	13
Misivri (Nesebar)	Soapmaker (son of)	Andrea	n.i.		Frigate-built	Brig	2	10
Misivri (Nesebar)	Dirak (son of)	Boris	n.i.		Frigate-built	Brig	2	18
Vasilikos (Tsarevo)	Zerit (son of)	Lefter	n.i.	Bowsprit	Martigo			15
Misivri (Nesebar)	Todoraki (son of)	Kara Lefter	n.i.	Bowsprit		Brig	2	17
Varna		Tiro	8000	Bowsprit		Brig	2	17
Vasilikos (Tsarevo)	Stephan (son of)	Yanni	6000		Trehantiri			16
Vasilikos (Tsarevo)		Dimitri	n.i.	Perama-bow		Brig	2	15
Vasilikos (Tsarevo)	Zerit (son of)	Lefter	n.i.	Bowsprit	Martigo			15
Vasilikos (Tsarevo)		Apostol	6000	Perama-bow	Martigo		1	14
Vasilikos (Tsarevo)		Yanni	n.i.		Frigate-built	Brig	2	10
Ünye		Nikola	6000	Bowsprit		Brig	2	13
Misivri (Nesebar)		Yorgo	7000	Perama-bow	Martigo		1	16

Table 12. List of non-Muslim merchant ships sailed between Istanbul and Russia from 21 October 1826 to 2 October 1827[64]

Town of captain	Nickname	Name	Cargo	Bow or Stern	Hull	Rig	Mast	Crew
Misivri (Nesebar)		Foti	5000	Bowsprit	Martigo		1	13
Vasilikos (Tsarevo)		Panayod	5000	Perama-bow		Brig	2	13
Varna	Boatman (son of)	Dimitri	n.i.	Perama-bow	Martigo		1	10
Vasilikos (Tsarevo)	The Long	Panayod	5000	Bowsprit	Martigo		1	11
Vasilikos (Tsarevo)	The Little	Panayod	n.i.	Felucca-stern	Martigo		2	16
Süzebolu		Tekfur	n.i.	Perama-bow	Martigo			13
Yeniköy		Sotori	5000	Perama-bow		Brig	2	18
Ünye	Priest (son of)	Panayod	n.i.		Frigate-built	Brig	2	16
Ahtabolu (Ahtopol)	Dimitri (son of)	Manual	n.i.		Trehantiri	Lateen		15
Mürefte		Todori	2500 q.	Bowsprit	Felluca			16
Vasilikos (Tsarevo)	Alsino (son of)	Konstanti	n.i.	Perama-bow	Martigo		1	13
Vasilikos (Tsarevo)	Yutar (son of)	Snodoro	n.i.	Perama-bow	Martigo		1	14
Ahtabolu (Ahtopol)		Yanaki	n.i.	Perama-bow		Brig	2	15
Varna		Varsami (?)	n.i.	Perama-bow	Martigo			10
Varna		Mihail	n.i.	Perama-bow		Brig	2	12
Ahtabolu (Ahtopol)		Yorgi	n.i.		Frigate-built	Brig	2	12
Varna		Panayod	n.i.	Bowsprit		Brig	2	10
Misivri (Nesebar)		Kiryako	n.i.	Perama-bow	Martigo		2	13

Table 13. List of Muslim merchant ships sailed between Istanbul and Russia from 2 October 1838 to 3 January 1839[65]

Town of captain	Nickname	Name	Cargo	Hull	Rig	Mast	Crew
Ereğli	Babalı oğlu	Hacı Mustafa		Frigate-built	Brig	2	15
Ereğli	Tuman oğlu	Mehmed		Frigate-built	Brig	2	13
Rize	Sarı Ahmed	İbrahim	7000	Frigate-built	Brig	2	15
Bartın	Hacı Ali oğlu	Mustafa		Frigate-built	Brig	2	15
Bartın	Mala Hüseyin	Ali		Frigate-built	Brig	2	15
Trabzon	Şişman oğlu	Mehmed Hafız	7000	Frigate-built	Brig	2	13
Arhavi	Hancı oğlu	Hüseyin		Frigate-built	Brig	2	15
Trabzon	Uzun derviş oğlu	Hüseyin		Frigate-built	Brig	2	15
Amasra	Buğdaycı oğlu	Mehmed	6000	Frigate-built	Brig	2	15
Sinop		İsmail		Frigate-built	Brig	2	15
Varna		Kel Süleyman		Frigate-built	Brig	2	15
Rize		Ali		Frigate-built	Brig	2	14
Gerze		Hasan		Frigate-built	Brig	2	15
Rize	Kara Osman oğlu	Hasan	11500	Navi	Barquentine	3	18
Ünye	Hacı Hafız oğlu	Osman		Şehtiye	Brik	2	15
Trabzon	Uzun Hafız	Hasan		Frigate-built	Brig	2	13
Rize	Muşmula oğlu			Frigate-built	Brig	2	14
Rize	Nevruz oğlu	Mehmed		Frigate-built	Brig	2	15
Kırım		Hüseyin		Frigate-built	Brig	2	14
Tirebolu		Deli Salih		Frigate-built	Brig	2	15

Table 13. List of Muslim merchant ships sailed between Istanbul and Russia from 2 October 1838 to 3 January 1839[65]

Town of captain	Nickname	Name	Cargo	Hull	Rig	Mast	Crew
Rize	Pezerim oğlu	Ali		Frigate-built	Brig	2	15
Rize	Kilimci oğlu	Memiş		Frigate-built	Brig	2	15
Asitane		Hacı Edhem		Frigate-built	Brig	2	13
Rize	Mani oğlu	Ömer		Frigate-built	Brig	2	15
Ünye	Kanmaz oğlu	Mehmed		Frigate-built	Brig	2	15
Arhava	Hancı oğlu	Đbrahim		Frigate-built	Brig	2	17
Rize	Hantal oğlu	Mehmed		Frigate-built	Brig	2	15
Rize		Abdülrahim		Frigate-built	Brig	2	15
Astana		Talib	12000	Frigate-built	Brig	2	15
Rize	Oğuz oğlu	Ali		Frigate-built	Brig	2	15
Galata		Mustafa		Frigate-built	Brig	2	15
Đbrail		Ahmed		Frigate-built	Brig	2	17
Makraya		Ahmed		Frigate-built	Brig	2	15
Trabzon	Kalkan oğlu	Kamil		Frigate-built	Brig	2	16
Trabzon		Kara Yazıcı		Frigate-built	Brig	2	15
Trabzon	Paşalı oğlu	Ahmed		Frigate-built	Brig	2	16
Tirebolu		Zaim Mustafa		Frigate-built	Brig	2	14
Gideros	Karagöz oğlu	Mehmed		Frigate-built	Brig	2	15
Gideros	Çavuş oğlu	Mehmed		Frigate-built	Brig	2	15
Rize		Emir Osman		Frigate-built	Brig	2	16

Table 13. List of Muslim merchant ships sailed between Istanbul and Russia from 2 October 1838 to 3 January 1839[65]

Town of captain	Nickname	Name	Cargo	Hull	Rig	Mast	Crew
Ünye	Dumur oğlu	Hafız Mehmed		Frigate-built	Brig	2	15
Trabzon	Gediz oğlu	İbrahim		Frigate-built	Brig	2	16
Trabzon	Moncol oğlu	Hafız Mehmed		Navi	Barquentine	3	20
Trabzon	Küçük Mehmed oğlu	Bayram		Frigate-built	Brig	2	15
Rize	Sarı Ahmed oğlu	İshak	4000	Frigate-built	Brig	2	15
Trabzon	Hacı Hasan oğlu	İsmail		Frigate-built	Brig	2	15
Ünye		İbrahim		Frigate-built	Brig	2	17
Sinop	Hacı Yusuf oğlu	Aziz		Frigate-built	Brig	2	15
Sinop	Teh oğlu	Seyid Mehmed		Frigate-built	Brig	2	17
Rize	Kaba Osman oğlu	Ömer	6000	Frigate-built	Brig	2	15
Trabzon		Ataş Ahmed		Frigate-built	Brig	2	13
Tirebolu		Kara Ahmed		Frigate-built	Brig	2	15
Tekeönü		Mehmed		Frigate-built	Brig	2	16
Sinop		Arif	7000	Frigate-built	Brig	2	15
Varna		Seyid İbrahim		Frigate-built	Brig	2	17
Ünye	Hacı Abbas oğlu	Mehmed		Frigate-built	Brig	2	15
Trabzon	Deli Mehmed oğlu	Hüseyin		Frigate-built	Brig	2	16
Trabzon		İbrahim		Frigate-built	Brig	2	16
Arhava	Bazim oğlu	Ömer		Frigate-built	Brig	2	15
EreÐli		Makaracı İbrahim		Frigate-built	Brig	2	15

Table 13. List of Muslim merchant ships sailed between Istanbul and Russia from 2 October 1838 to 3 January 1839[65]

Town of captain	Nickname	Name	Cargo	Hull	Rig	Mast	Crew
Rize	Hamza Çavuş oğlu	Mustafa		Frigate-built	Brig	2	13
Rize	Sarı Ahmed oğlu	Ahmed		Frigate-built	Brig	2	16
Trabzon		Kara Mustafa		Frigate-built	Brig	2	15
Trabzon	Döki oğlu	Halil		Frigate-built	Brig	2	16
Trabzon	İmraz oğlu	Ahmed		Frigate-built	Brig	2	15
Rodos		Kara Köle Mehmed		Frigate-built	Brig	2	17
Trabzon		Uzun Hacı Salih		Frigate-built	Brig	2	13
Trabzon	Babalı oğlu	Ali		Frigate-built	Brig	2	15
Bartın	Kör Bekir oğlu	Hüseyin		Frigate-built	Brig	2	15
Sinop		Ali Yazıcı		Frigate-built	Brig	2	15
Tirebolu		RuÐen		Frigate-built	Brig	2	15
Ünye	Terzi Ali oğlu	Hasan		Frigate-built	Brig	2	15
Mesura		İsmail		Frigate-built	Brig	2	15
Trabzon	Döki oğlu	Halil		Frigate-built	Brig	2	15
Trabzon		Tayyar	10000	Frigate-built	Brig	2	14
Trabzon	Zor oğlu	Mehmed		Frigate-built	Brig	2	15
Varna		Osman		Frigate-built	Brig	2	15
Trabzon		Yusuf		Frigate-built	Brig	2	13
Trabzon	Hasan oğlu	Hüseyin		Frigate-built	Brig	2	15

Table 14. List of Ship Entry to port of Istanbul[66]						
Captain's Religion	Type of Ship	Original Port	Orthodox Crew	Muslim Crew	Gregorian Crew	Cargo
Orthodox	Trehantiri	Tekfurdağ	7			Wheat and misc.
Orthodox	Trehantiri	Ganos	15			Wine
Muslim	Trehantiri	Ðzmit	2	8		Wood
Orthodox	Trehantiri	Hasköy	4			Wine
Orthodox	Trehantiri	Karabiga	11	4		Wheat
Muslim	Trehantiri	İzmit	4	12		Wood
Orthodox	Trehantiri	Maydos	6			Ballast
Muslim	Trehantiri	Kostifili**		7		Wood
Orthodox	Trehantiri	Çınarcık	3	12		Wood
Muslim	Trehantiri	Halıdere		19		Coal
Muslim	Trehantiri	Foçadere	6	1		Wood
Orthodox	Trehantiri	Kostra (Mora)	8			Wood
Orthodox	Trehantiri	Kostra (Mora)	9			Wood
Orthodox	Trehantiri	Engiri	6			Wood

Table 14. List of Ship Entry to port of Istanbul[66]						
Captain's Religion	Type of Ship	Original Port	Orthodox Crew	Muslim Crew	Gregorian Crew	Cargo
Muslim	Trehantiri	Mihaliç	4			Giblets
Orthodox	Trehantiri	Yalova		9		Wood
Orthodox	Trehantiri	Yalova		7		Wood
Orthodox	Trehantiri	Kostra (Mora)		10		Wood
Orthodox	Trehantiri	Kostra (Mora)		9		Wood
Orthodox	Trehantiri	Kostra (Mora)		7		Wood
Orthodox	Trehantiri	Çekmece		9		Hay
Orthodox	Trehantiri	Çınarcık	2	3		Wood
Muslim	Trehantiri	Çınarcık	7	2		Wood
Orthodox	Trehantiri	Çınarcık	1	?		Wood
Orthodox	Trehantiri	Yalova	6	2		Wood
Muslim	Trehantiri	Mudanya	7	3		Wheat and cloth
Muslim	Trehantiri	Yalova		5		Molasses
Muslim	Trehantiri	Kabakoz**		4		Wood

Table 14. List of Ship Entry to port of Istanbul[66]						
Captain's Religion	Type of Ship	Original Port	Orthodox Crew	Muslim Crew	Gregorian Crew	Cargo
Orthodox	Piyade	Mudanya	4			Ballast
Muslim	Trehantiri	Ağva		6		Wood
Muslim	Trehantiri	Mudanya		6		Wheat
Muslim	Trehantiri	İzmit	4	12		Wood
Orthodox	Trehantiri	Midye	4			Ballast
Muslim	Trehantiri	Çanakkale	5	1		Chickpea and Molasses
Muslim	Trehantiri	Karamürsel		9		Wood and coal
Muslim	Sandal	Ağva**		35		Ballast
Muslim	Trehantiri	İzmit		6		Wood
Muslim	Trehantiri	Karamürsel	3	4		Wood
Muslim	Trehantiri	İğneada		9		Coal
Muslim	Trehantiri	Gelibolu		5		Cloth, molasses and yarn
Orthodox	Tombaz	Mihaliç	11	1		Raw Cotton
Orthodox	Trehantiri	Kartal	2			Ballast

Table 14. List of Ship Entry to port of Istanbul[66]						
Captain's Religion	Type of Ship	Original Port	Orthodox Crew	Muslim Crew	Gregorian Crew	Cargo
Orthodox	Martigo	Darıca	8			Wine
Muslim	Trehantiri	Karamürsel		3		Coal
Muslim	Trehantiri	Pavlo		6		Coal
Muslim	Trehantiri	Midye**	3	1		Ballast
Muslim	Trehantiri	İzmit		15		Wood and coal
Muslim	Trehantiri	Ganice**	5			Coal
Orthodox	Trehantiri	Ahyolu**	7			Candle
Orthodox	Piyade	Mudanya	4			Ballast
Orthodox	Trehantiri	Mudanya	4			Ballast
Muslim	Trehantiri	Karamürsel		10		Wood
Muslim	Trehantiri	Ðzmit	3	12		Wood
Muslim	Sandal	Gelenbe		11		Fruits
Muslim	Trehantiri	Ağva**		7		Wood
Muslim	Trehantiri	Ağva**		7		Wood

Table 14. List of Ship Entry to port of Istanbul[66]						
Captain's Religion	Type of Ship	Original Port	Orthodox Crew	Muslim Crew	Gregorian Crew	Cargo
Orthodox	Trehantiri	Mudanya	4			Ballast
Muslim	Trehantiri	Çınarcık	3	1		Wood
Muslim	Trehantiri	Kartal		3		Onion
Muslim	Trehantiri	Silivri		4		Coal
Orthodox	Piyade	Mudanya	4			Ballast
Orthodox	Trehantiri	Kurşunlu	7			Grape
Muslim	Trehantiri	KurÐunlu	2	4		Valonia
Orthodox	Trehantiri	KurÐunlu	6			Giblets
Muslim	Trehantiri	Gebze		6		Wheat
Muslim	Trehantiri	Ðile	4			Wood
Muslim	Trehantiri	Gelenbe		8		Fruits
Muslim	Sandal	Gelenbe		12		Fruits
Muslim	Trehantiri	Darıca		1		Fruits
Muslim	Sandal	Gelenbe		10		Fruits

Table 14. List of Ship Entry to port of Istanbul[66]						
Captain's Religion	Type of Ship	Original Port	Orthodox Crew	Muslim Crew	Gregorian Crew	Cargo
Orthodox	Trehantiri	Ahyolu**	6	2		Molasse
Muslim	Trehantiri	Karamürsel		7		Wood and coal
Muslim	Sandal	Gelenbe		11		Fruits
Muslim	Trehantiri	Ağva**		6		Wood
Orthodox	Piyade	Mudanya	4			Ballast
Muslim	Trehantiri	Armutlu	1	7		Wood
Orthodox	Trehantiri	Kastra (Mora)	10			Wood
Orthodox	Trehantiri	Yalova	6			Wood
Muslim	Trehantiri	Kabaklı		7		Wood
Orthodox	Trehantiri	KapıdaĐ	6			Wine
Orthodox	Trehantiri	Erinorkoyu	7	1		Wood
Muslim	Trehantiri	Halıdere	2	12		Coal
Orthodox	Trehantiri	Yalova	6			Wood
Orthodox	Trehantiri	Kastra (Mora)	8			Wood

Table 14. List of Ship Entry to port of Istanbul[66]						
Captain's Religion	Type of Ship	Original Port	Orthodox Crew	Muslim Crew	Gregorian Crew	Cargo
Orthodox	Trehantiri	Çınarcık	3	1		Wood
Orthodox	Trehantiri	Çınarcık	4	1		Wood
Orthodox	Trehantiri	Yalova	3	3		Ballast
Muslim	Trehantiri	Karacabey		4		Wood
Orthodox	Trehantiri	Ereğli**	3			Coal
Orthodox	Trehantiri	Kapıdağ	10			Wood
Muslim	Trehantiri	Kartal		12		Coal
Orthodox	Trehantiri	Mudanya	8			Olive
Orthodox	Trehantiri	Mudanya	4			Ballast
Muslim	Lefke	İnöz		1		Tobacco
Muslim	Trehantiri	Silivri	2	3		Coal
Muslim	Trehantiri	Kartal		8		Unreadable
Muslim	Trehantiri	Dergos	5	1		Molasse
Orthodox	Trehantiri	Bandırma	5	5		Ballast

Table 14. List of Ship Entry to port of Istanbul[66]						
Captain's Religion	Type of Ship	Original Port	Orthodox Crew	Muslim Crew	Gregorian Crew	Cargo
Orthodox	Trehantiri	Marmara	9			Stone
Orthodox	Trehantiri	Topçu	7			Wood
Orthodox	Trehantiri	Bandırma	6			Mat
Orthodox	Trehantiri	Yalova	6			Wood
Orthodox	Trehantiri	Yalova	6			Wood
Muslim	Trehantiri	Ðzmit		12	2	Wood
Orthodox	Trehantiri	Maltepe	5			Legume
Orthodox	Trehantiri	Mudanya	4			Ballast
Orthodox	Trehantiri	Mudanya	4			Ballast
Orthodox	Trehantiri	Yalova	5			Grape
Muslim	Trehantiri	Kurşunlu	7	1		Onion
Orthodox	Trehantiri	Mudanya	4			Ballast
Orthodox	Trehantiri	Kapıdağ	5			Coal
Orthodox	Trehantiri	Mudanya	7			Olive

Table 14. List of Ship Entry to port of Istanbul[66]						
Captain's Religion	Type of Ship	Original Port	Orthodox Crew	Muslim Crew	Gregorian Crew	Cargo
Muslim	Five-masted	Akçaşehir		12		Wood
Muslim	Trehantiri	Varna**	5	1		Olive
Orthodox	Trehantiri	Paşalimanı		3		Loop
Orthodox	Trehantiri	Ahyolu**		6		Wood
Orthodox	Trehantiri	Mudanya		4		Ballast
Orthodox	Trehantiri	Mudanya		5		Ballast
Orthodox	Trehantiri	Ahyolu**	5			Molasse
Muslim	Trehantiri	İzmit		10	2	Wood
Muslim	Trehantiri	Ahyolu**	7	1		Wheat
Orthodox	Trehantiri	Kurşunlu	6			Olive
Orthodox	Trehantiri	Yalova	6			Wood
Muslim	Trehantiri	Yalova		5		Molasse
Muslim	Trehantiri	Karamürsel		6		Wood
Orthodox	Trehantiri	Kartal	4			Legume

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■ ENDNOTES

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2. For example, on November 1748, the *kapan* merchants struck a deal with the government to purchase grains (wheat and barley) from several Black Sea ports and deliver them to Constantinople until February 1749 with their granted 105 *şayka* and 13 big *volik*. See Lütfi Güçer, "XVIII. Yüzyıl Ortalarında İstanbul'un İaşesi İçin Lüzumlu Hububatın Temini Meselesi," İstanbul Üniversitesi İktisat Fakültesi Mecmuası, no. 11 (1952): 414-15.

3.For the information on *izn-i sefine* (sailing permission) to Russia, see İdris Bostan, "İzn-i Sefine Defterleri ve Karadenizde Rusya ile Ticaret yapan Devlet-i Aliyye Tüccarları 1780-1846," Türklük Araştırmaları Dergisi, no. 6 (1991): 21-44.

4. For the entire year of 1831, see OA A} DVN 3246 and for the year of 1849, see DMA Limanlar 4744.

5. Here is an example of a license: […] This 11 *zira* long ship, known as *çekdirme* with lateen sails and also steered by the captain Mustafa son of Belfur from Değirmendere port, can carry up to 300 *kile*s cargo. [This ship is] owned by following shareholders: over the total sum of 40 shares, 10 shares belong to Hüseyin, the muralist from Istanbul, 10 shares to Ms. Azime, the mother of aforementioned Hüseyin, and the remaining 20 shares to the aforementioned captain of the ship. Even though a *sened-i bahri* has already been issued on the 25th day of the month Şevval of the year of 1272 [29 June 1856], the captain sold his 10 shares to captain Osman from Karamürsel due a verdict issued by the court against his debts and this captain Osman holding 10 shares replaced him as the new captain, […]. OA A} DVN 117.29.

6. These exceptions are *navi,* scoleva, and goleta, where Ottoman officers did not make any distinction between hull and rig.

7. The Ottoman officers seem to pay great attention to such kind of details. For example, the ship which belonged to coal seller Ali son of Açıkgöz from Davudpaşa (Istanbul), was registered originally as a perama brig (*beşçifte brik*) in 26 June 1842, but it was corrected as *trehantiri* bow brig (*çekdirme başlı brik*) later on 19 August 1852, see OA A} DVN 78.33.

8. Some of these additional expressions were rostrum bow (*martigo başlı or gaga başlı*), with bowsprit (*sopa başlı*), perama bow (*beşçifte başlı*), *trehantiri* bow (*çekdirme başlı*), felucca stern (*filika kıçlı*), and galleon stern (*kalyona kıçlı*) to specify the alteration in bow and stern.

9. The port officers estimated the tax payable on each ship using the cargo capacities inscribed in these licenses. Thus, the officials of the Imperial Dockyard controlled whether the cargo capacities on paper matched actual cargo capacity or not. As the result of these

controls, among sample 977 ships, the cargo capacities of seventeen newly-built and nine already operating ships were corrected.

10. The Imperial Shipyard was in Istanbul, but there were several auxiliary shipyards along the Anatolian Black Sea coasts—in particular, Sinop, which was crucial as shipyard and naval base. In the seventeenth century, these auxiliary shipyards were Bartın, Akçaşehir, Gideros Ünye, Samsun, Misivri, Kemer, Lesbos Island, and Gemlik and Çingene İskelesi, see Idris Bostan, *Osmanlılar ve Deniz: Deniz Organizasyonu, Teşkilat, Gemiler* (Istanbul: Küre, 2007), 166. The early nineteenth century naval shipyards were Lesbos Island, Sinop, Ereğli, Bartın, Amasra, Misivri (Nesebar), Galati, Rhodes, Kemer, Cyprus, Limnos, Halicarnassus, Gemlik, Kale-i Sultani, Silistra, Sokhumi and Çingene İskelesi, see Tuncay Zorlu, "III. Selim ve Osmanlı Deniz Gücü'nünü Modernleşmesi," in *Türk Denizcilik Tarihi*, ed. Idris Bostan, et al. (Istanbul: Boyut Yayincilik, 2009), 68.

11. To understand how many Aegean ships were missing, this database contains only five Syran ships over 1084 actually built in Syros Island during this period, see Apostolos Delis, "Mediterranean Wooden Shipbuilding in the Nineteenth Century: Production, Productivity and Ship Types in Comparative Perspective," *Cahiers de la Méditerranée 84* (2012): 349-66.

12. This paper uses the term 'Ottoman-flagged' rather than 'Ottoman' or 'Turkish'. The Ottoman Empire was a multinational Empire, where the central bureaucracy did not take nationalities into consideration, only the religion of their subjects. Moreover, some merchants and sailors with Ottoman ancestry and who still earned their living in Ottoman lands were no longer Ottoman subjects, especially Ottoman Greeks under the protection of various countries. While the captain and the crew of such ships might have been considered as Ottoman, their ships were not Ottoman-flagged ships. Although there was a considerable amount of Ottoman-flagged ships from some Aegean Islands, especially Lesbos, Crete and the Dodecanese Islands, there was a greater maritime commerce in volume handled mainly by Ottoman Greeks, who sailed under various foreign flags.

13. The conversion between a liter of cereal into kilogram depended on the type of that cereal. Usually the nineteenth century Anatolian cereals were 10-20% lighter than the Romanian, but in order to simplify calculations official conversion rates are accepted. The Ottoman authorities declared an official conversion rate between unity of volume *kile* and unity to measure weight *okka* in 1869 for legal cases. A *kile* is equivalent to 36.8 liters and an okka to 1.282945 kilograms. The conversion rates between okkas and kiles are 22-26 okkas for wheat, 17-20 for barley, 14-16 for oat, and 23-26 for maize. For the law issued in 26 September 1869, see George Young, *Corps de droit Ottoman 4.* 4 (Oxford: Clarendon Press, 1906), 365-76.

14. Apostolos Delis, "From Lateen to Square Rig: The evolution of the Greek-owned merchant fleet and its ships in the eighteenth and nineteenth centuries," *The Mariner's Mirror 100,* no. 1 (2014): 54.

15. An average brig built from 1800 to 1899 in Provence was 162.4 tons. See Laurent Pavlidis, "La Construction Navale Traditionnelle Provençale au XIXe Siècle. Sources et Méthodes," *Cahiers de la Méditerranée 84* (2012): 345. For Oceanic brigs, see Michael W. Marshall, *Ocean Traders: from Portuguese Discoveries to the Present Day* (New York: FactsOnFile, 1990), 134.

16. Compare 51% as number and 75% as cargo capacity of Ottoman-flagged ship with 53% and 81.5% in Syros, respectively, see Delis, "From Lateen to Square Rig: The evolution of the Greek-owned merchant fleet and its ships in the eighteenth and nineteenth centuries," 44-58; and Mediterranean Wooden Shipbuilding: Economy, Technology and Institutions in Syros in the Nineteenth Century (Leiden: Brill, 2015), 252. For the case of Malta, 83 brigs with capacity of 15,329 tons, see Carmel Vassallo, "Maltese Merchant Fleet and Black Sea Grain Trade," *International Journal of Maritime History 13, no. 2* (2004): 24-25.

17. For use of barquentine to describe *navi*, see Rasim Ünlü, İnce Donanma, ed. Deniz Kuvvetleri Komutanlığı (Istanbul: Deniz Basımevi, 2005).

18. For Syros Island, see Delis, *Mediterranean Wooden Shipbuilding: Economy, Technology and Institutions in Syros in the Nineteenth Century,* 138. For Malta Island, see Vassallo, "Maltese Merchant Fleet and Black Sea Grain Trade," 24-25.

19. Delis, "From Lateen to Square Rig: The evolution of the Greek-owned merchant fleet and its ships in the eighteenth and nineteenth centuries," 44-58. For brig-rigged ships in Malta, see Vassallo, "Maltese Merchant Fleet and Black Sea Grain Trade," 24. The first Ottoman military brig ever put out on the water was in 1823, see Levent Düzcü, "Yelkenliden Buharlıya Geçiş", 49.

20. Ahmet Güleryüz, Kadırgadan Kalyona Osmanlıda Yelken: Mikyas-ı Sefain (Istanbul: Denizler Kitapevi, 2004), 73.

21. For the construction of scoleva type ships to transport coal and wood for Egyptian merchants, see OA C. İKTS 28.1387, 26 October 1826. For the legal case against the scoleva's transporting coal illegally from Pendik to Istanbul (both in Constantinople) in late-February 1749, see Ahmet Kal'a and Ahmet Tabakoğlu, *Istanbul Ahkam Defterleri: Istanbul Ticaret Tarihi* (Istanbul: Istanbul Arastirmalari Merkezi, 1997), 42-43. For the legal case on the wrecked scoleva in Tekfurdağ, which carried wood, see ibid., 74. For the court order on scoleva harboring on Istanbul port on mid-April 1752, see ibid., 64-65. See also Levent Düzcü, Yelkenliden Buharlıya Geçiste Osmanlı Denizciliği (1825-1855) (2017), 63.

22. For disappearance of scoleva in the 1860s, see Güleryüz, Kadırgadan Kalyona Osmanlıda Yelken: Mikyas-ı Sefain, 71. For observation of Denham on their existence in Lesbos Island, see H. M. Denham, "Aegean Caiques 1915–1980," *The Mariner's Mirror 72, no. 3* (1986): 284.

23. The number of Ottoman-flagged goleta from the Aegean Sea was 29, which consisted almost one third of Aegean Ottoman-flagged ships. For the Syran ships, see Delis, *Mediterranean Wooden Shipbuilding: Economy, Technology and Institutions in Syros in the Nineteenth Century,* 138.

24. Denham, "Aegean Caiques 1915–1980," 279-81.

25. OA A} DVN 85.66, 22 February 1853.

26. Ottoman chronicles wrongly recorded these ships as "*çamlıca gemisi*" (ship from Spetses or a ship made of pines) for some time because they were built in the Island of Spetses (in Turkish *çamlıca*, lit. small pinetum) made of pines during the Greek Revolution. However, real *çamlıca* was the name of another type of ship in eighteenth century. See Ünlü, İnce Donanma, 234-35. The origin of name *şehtiye* is a mystery and claimed to be Turkish, but a more plausible explication is that *şehtiye* was Turkish form of frigate-like Dutch Katt (Cat or Chat).

27. *Şehtiye* was originally the name designed for the military frigate-class ship shorter than 25 meters during the era of Selim III. The length of military frigates varied from 34 to 41.5 meters, corvettes were smaller, from 25 to 33, and *şehtiye*s were even smaller than corvettes. *Şehtiye*s were used as an auxiliary power to corvettes and frigates. See Bostan, *Osmanlılar ve Deniz: Deniz Organizasyonu, Teşkilat, Gemiler,* 170; and Ali Ihsan Gencer, *Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezâreti'nin Kuruluşu: 1789-1867* (Ankara: Türk Tarih Kurumu Basimevi, 2001), 35; and İsmail Hakkı Uzunçarşılı, Osmanlı Devletinin Merkez ve Bahriye Teşkilâtı (Ankara: Türk Tarih Kurumu Basimevi, 1988), 467-71; and Zorlu, "III. Selim ve Osmanlı Deniz Gücü'nünü Modernleşmesi," 65. However, since all the şehtiye were always brig-rigged the Ottoman Navy dropped the word "*şehtiye*" and used the expression brig to define smallest frigates during the era of Mahmud II. See Bostan, *Osmanlılar ve Deniz: Deniz Organizasyonu, Teşkilat, Gemiler*, 160, 63 and 66; and Gencer, Bahriye'de Yapılan Islahat Hareketleri ve Bahriye Nezâreti'nin Kuruluşu: 1789-1867, 106.

28. For evolution of the rigs in frigate-built, see Jean Boudriot and Hubert Berti, The History of the French Frigate, 1650-1850 (Rotherfield, East Sussex: J. Boudriot, 1993), 343-53. Fully-rigged or brig-rigged frigates were also common in British and French ships, see Mark Lardas and Peter Dennis, *British Frigate vs French Frigate : 1793-1814* (London: Bloomsbury Publishing Plc, 2013), 20.

29. For the existence of dhow-like hulls in pre-Portuguese Indian Ocean, see Pierre-Yves Manguin, "Asian ship-building traditions in the Indian Ocean at the dawn of European expansion," in *History of science, philosophy, and culture in Indian Civilization, Volume III, part 7: The trading world of the Indian Ocean, 1500-1800,* ed. Om Prakash and D. P. Chattopadhyaya (Delhi: Pearson, 2012), 602-05.

30. Ottoman Admiral Seydi Ali Reis saw merchant *kırlaç* during his expedition to Indian Ocean and described it as a sort of galiot (*kalita*), see Ünlü, İnce Donanma, 208.

31. *Şayka* was a flatted-bottom ship that sailed in the Danube, Don, and Volga rivers. For cereal transportation, 23 *şayka*s sailed from Belgrade, Tutrakan, and Isakça (Isaccea) to Istanbul in 1771, see ibid., 220-21. It was also the favorite raiding ship of Tatar lords and ayans responsible for the security of the ports along the Danube, Volga, and Rioni Rivers. For example, *ayan* of Trabzon, Kadızâde Hacı Ömer Bey and *ayan* of Atina of Black Sea (now Pazar) and Hacı Şahinzâde Ali Bey built a şayka. See OA AE, SMHD 58.3945 (1 August 1823) and A{DVN.izn 18.47 (7 August 1823), respectively. Both ships are not included in the statistics as they were built before 1831.

32. See OA C. BH 248.11496, 30 June 1783.

33. French Vice-admiral Edmond Paris pointed out that *alamna* resembled the Indian Ocean merchant ship, see Güleryüz, *Kadırgadan Kalyona Osmanlıda Yelken: Mikyas-ı Sefain,* 69.

34. Ünlü, İnce Donanma, 214.

35. Nutkî Süleyman, *Kamûs-i Bahri* (Istanbul: Matbaa-ı Bahriye, 1917), 150.

36. OA A} DVN 74.66, 27 December 1851.

37. The Greek name *perama*, meaning crossing, came from the Roman commercial port of Pérama (Πέραμα, today port of Eminönü) where the caique from Istanbul "crossed" the Bosporus. See Güleryüz, *Kadırgadan Kalyona Osmanlıda Yelken: Mikyas-ı Sefain,* 72. The Turkish name, *beşçifte,* literally means double five, originally name of the caiques rowed by five men in both side—hence the name double five—transporting humans from one continent to another in Constantinople. However, in the late-nineteenth century *beşçifte* was caique with straight bow, see Süleyman, *Kamûs-i Bahri*, 78.

38. The government ordered ayans and Tatar *ağa*s (lords) to build galleons, three-masted, brigantines instead of şayka and *şehtiye* instead of pontoons, see OA C. BH 248.11496, 30 June 1783.

39. The government complained that the shipyards along the Black Sea gave up building frigates, galleon-stern and trata type hulls and tree-masted ship, brigantine, scoleva type rigs for a while. OA. C.BH 17.850, 15 June 1803. Repetition of this order, see OA C. BH. 261.12065, 10 April 1804. The Sublime Porte warned the governor of Varna on issue that most merchant dealing commerce in Black Sea ordered the construction of *trehantiri* and perama instead of galleon-stern, şehtiye, brigantine, and scoleva. The governor should enforce these merchants to build such kind of ships at least with 220 kiloliters cargo capacity. In the case when a single merchant could not afford it, he should intermediate partnerships. See OA C. BH. 59.2779, 18 August 1803. xxx

40. OA C.İKTS.31.1548

41. OA C.BH 233.10804, 6 May 1824 and C.BH 147.7044, 7 January 1825.

42. For the perama, whose construction started in Bartın before the prohibition, see OA C.BH 59.2777, 30 September 1788. For example, Istanbul accepted to give a ship licence to a twelve-meter-long *martigo* with bowsprit (*martigana napoletana*), because it was built five years before the prohibition. OA. C.İKTS 11 November 1826.

43. Vice-admiral Paris translated perama as the ship of Constantinople, for the plans of a 14.9 x 3.8 x 1.52 meter perama from 1855, see Edmond Paris, *Collection de Plans ou Dessins de Navires et de Bateaux Anciens ou Modernes, Existants ou Disparus* (Grenoble: Éditions des 4 Seigneurs, 1886), Plan 178.

44. For a description of pirate *martigo* confiscated by the Osman Pasha, the governor of Trabzon, after the coastguards caught the ship and killed its captain on winter of 1829, see Victor Fontanier, *Voyages en Orient: Entrepris par Ordre du Gouvernement Français, de 1830 à 1833, 2e Voyage en Anatolie* (Paris: Librairie de Dumont, 1834), 287. For another vague description of a *martigo* in the Black Sea, see Sergio Bellabarba and Edoardo Guerreri, *Vele italiane della costa occidentale : dal Medioevo al Novecento* (Milano: Hoepli, 2011), 152.

45. Denham, "Aegean Caiques 1915–1980," 281.

46. Idris Bostan, Kürekli ve Yelkenli Osmanlı Gemileri (Istanbul: Bilge Yayınevi, 2005), 105.

47. In the early nineteenth century, the term *gagalı* bow had been used to refer to rostrum bow. Accordingly, there were *martigo*s registered as *gagalı* bows, like the one whose captain died during the summer of 1826 (OA A {DVN.izn 30.26). However, this bow type was so typical among the Ottoman *martigo*s that Ottoman registers started to *express same bow* type as martigo-bow instead. For usage of *gagalı* to express *martigo*, see Süleyman, *Kamûs-i Bahri,* 265.

48. OA A} DVN 70,73 and A} DVN 111,14, respectively.

49. For the comments and plans by Vice-Admiral Paris, see *Paris, Collection de Plans ou Dessins de Navires et de Bateaux Anciens ou Modernes, Existants ou Disparus,* Plan 179.

50. These three major production zones intersect in the North Aegean Sea (perama-trehantiri) and around Constantinople, (perama-trehantiri and *martigo* hybrids).

51. There might be a correlation between the distance and long run average costs. The studies on modern cargo ships generally argue that the cost-minimizing size of a ship increases with the increasing distance between the ports. Logically, if the number of the ports of call increases between the original and final port, the ship sizes decrease as well. The main economic reason is that the long-run average cost of ships with greater cargo capacity decreases when a ship spends more time on sea than port. While the ships sailing from closer distances or the ships constantly touching a port of call had to pay more port charges, the ships travelling distances enjoyed economies of scale according to cargo capacity. See Wayne K. Talley, "Optimal Containership Size," *Maritime Policy & Management 17, no. 3* (1990): 165-75.

52. The preference between martigo-hybrid with frigate-built ship seems to be geographical as well. The martigo-hybrids were mainly built in the west of Sinop and the captains of the martigo-hybrids in the traffic were again from west of Sinop, especially Bulgaria. However, it is impossible to comment on the issue before matching the traffic records with ship licenses.

53. The main obstacle to trade was that the high mountains lying parallel to the coasts prevented traffic of humans and cargos from the hinterland to the Black Sea. Accordingly, merchants always preferred the ports with easy passages to the hinterland over natural shelters like Sinop, Ünye and Tirebolu.

54. For the importance of the Danubian ports, see Paul Cernovodeanu and Beatrice Marinescu, "British Trade in the Danubian Ports of Galatz and Braila between 1837 and 1853," *The Journal of European Economic History VIII (3)* (1976); and Constantin Ardeleanu, *International Trade and Diplomacy at the Lower Danube: The Sulina Question and the Economic Premises of the Crimean War* (1829-1853) (Braila: Muzeul Brailei, Editura Istros, 2014). Odessa grew from a small town to one of the most populous cities of the Russian Empire during the nineteenth century thanks to cereal exports. See Lewis Siegelbaum, "The Odessa Grain Trade: A Case Study in Urban Growth and Development in Tsarist Russia," *The Journal of European Economic History 9, no.* (Spring 1980) (1980): 113-47.

55. ttp://ozhanozturk.com/2018/01/03/alapli-gume/

56. One was from Ağva a northern village of Constantinople and other from Ahyolu (Pomorie) in Bulgaria.

57. For the scoleva rigged ships in Lesbos Island, see Denham, "Aegean Caiques 1915–1980," 284. Goleta was an exception in addition to its presence on Aegean, for very short 45 kilometers zone between Tirebolu and Giresun, where goleta was produced.

58. Dimitrios M. Kontogeorgis, "International" and "National" Ports. The Competition between the Ports of Braila / Galati and Constanta during the Period 1878-1914," in *Port Cities of the Western Black Sea Coast and the Danube,* ed. Constantin Ardeleanu and Andreas Lyberatos (Corfu: 2016), 100-01.

59. For the six *kırlaç* in Ottoman navy as an auxiliary force in 1788, see M. S. Anderson, "Russia in the Mediterranean, 1788–1791: A Little-Known Chapter in the History of Naval Warfare and Privateering," *The Mariner's Mirror 45, no. 1* (1959): 28.

60. Padraic Colum and Willy Pogány, *The Golden Fleece and the Heroes who Lived before Achilles* (New York: Macmillan Co., 1921), 92.

61. There might be a correlation between the distance and long run average costs. The studies on modern cargo ships generally argue that the cost-minimizing size of a ship increases with the increasing distance between the ports. Logically, if the number of the ports of call increases between the original and final port, the ship sizes decrease as well. The main economic reason is that the long-run average cost of

ships with greater cargo capacity decreases when a ship spends more time at sea than port. While the ships sailing from closer distances or the ships constantly touching a port of call paid more port charges, the ships travelling distances enjoyed economies of scale according to cargo capacity. See Talley, "Optimal Containership Size," 165-75.

62. The cover error is a type of non-sampling error that the selected sample did not correspond to the target population. For example, assume that a researcher wanted to know the number of blond school children in early-twenty century Istanbul. For that purpose, the researcher visited the primary schools in Istanbul and carefully listed the children according to hair color. This data would have cover error, because since not all the girls were registered at the schools, the girl population would be undercovered. This error and generally the type of cover error in here might or might not lead to distortion in the survey because the researcher wanted to know about the school children. In the case of Ottoman-flagged merchant ships, the main issue is that the ships of Istanbul were overcovered, but by definition ships engaging on the trade in Istanbul were automatically part of long-distance trade.

63. Gelina Harlaftis, "Maritime Transport Systems in Southeastern Europe in the Nineteenth Century," in the *Economic Development of Southeastern Europe in the 19th Century*, ed. Edhem Eldem and Socrates Petmezas (Athens: Alpha Bank Historical Archives, 2011), 397-446.

64. List of non-Muslim merchant ships that sailed between Istanbul and Russia from 21 October 1826 to 2 October 1827 from the register book OA A} DVN.izn 9. All the cargo capacities were in *kile*, except 2,500 q, which represents 2,500 quintals. The entries in bold were originally left blank, but completed using the information given in other lines.

65. List of non-Muslim merchant ships which sailed between Istanbul and Russia from 21 October 1826 to 2 October 1827 from the register book OA A} DVN.izn 9. All the cargo capacities were in *kile*, except 2,500 q, which represents 2,500 quintals. The entries in bold were originally left blank, but completed using the information given in other lines.

66. The ports with (**) are the ports in the Black Sea, the rest were from the Aegean and Marmara Sea. The table is translated from Hüseyin Topuz, "19.Yüzyılın ilk Yarısı (1823) Yılı İstanbul Limanı ve Diğer Limanlarımız Arasındaki bir Haftalık Deniz Ticari Taşımacılığının Analizi," *Journal of Suleyman Demirel University Institue of Social Sciences, no. 6* (2007): 105-08.