

PROCUREMENT OF NAVAL SUPPLIES DURING THE SIXTEENTH CENTURY: VENETIAN ARSENALE AND THE OTTOMAN *TERSANE* COMPARED

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Introduction

In our preceding work, we studied shipbuilding within the Venetian *Arsenale* and the Ottoman *Tersane-i Amire* during the long sixteenth century. Our work was informed by the conceptual and analytical tools of contemporary industrial organization studies. We demonstrated that both the Venetians and the Ottomans produced highly similar ships in their impressively-scaled shipyards. However, when the comparison came to the actual organization of the shipbuilding processes within the confines of these massive enterprises we were shaped with a sharp contrast. The Venetian shipyard constituted a ‘factory’-type enterprise with an ‘assembly-line’ around which the principle of the division of labor was meticulously organized, whereas its Ottoman counterpart seemed to bring together, metaphorically speaking, under one roof, a vast number of simultaneously operating parallel ‘workshops’ benefiting from the advantages of a so-called ‘industrial district’ yet within the parameters of a highly flexible organization of production. In other words, both the Venetians and the Ottomans built the same ships in giant enterprises, yet the organizational logic of their enterprises differed sharply. Given the high level of interaction between the two powers, this was indeed a puzzling finding as the Ottomans could have copied the Venetian model just as they copied Venetian ships, if only they truly wished to do so. Therefore, this major

difference we identified in the ‘vertical’ integration of shipbuilding operations within the shipyards begged for an explanation. Before we attempted such an explanation however, we better had first looked beyond the shipyards. It therefore remained to be seen whether this was the only major difference between the two shipbuilding traditions. In this follow up study we now turn to the shipbuilding-related activities concerning the procurement of naval supplies that entail a horizontal stretch beyond the limits of the actual shipyards. Once again, we approach the study of Ottoman provisioning of resource materials with the already well-studied Venetian model at the back of our minds. We want to see whether and to what extent the Ottoman practice of procurement of naval supplies converged to, or diverged from, this Mediterranean trend-setting model.

A Brief Description of the Venetian Model

The Venetian procurement model for naval supplies attained its most mature form during the sixteenth century under the pressure of increased naval warfare at a time when the inevitable long-term trend in resource depletion had already made itself felt. The most important single resource for the shipyards was the availability of nearby forests from which timber could be obtained. With the wide range of forestry products, masts formed the ultimate bottleneck. As far as timber in general is concerned, transportation costs were as important as physical availability. Relatively short and smooth overland transport combined with navigable waterways facilitated the economic exploitation of timber resources. The Arsenal competed with the merchant marine as well as other local and private interests for the exploitation of these resources. Venetian ships were built of oak, larch and fir of which oak was the one most widely used especially for the hull. Even so, fir was used for masts and spars and posed

the ultimate bottleneck to shipbuilding. Fir and larch came from the Rhaetian and Carnic Alps. In the late sixteenth century, Venetians depended on the same regions that they had already tapped in the thirteenth century. The number of large fir trees suitable for masts gave some concern especially at times of massive naval build up. The arsenal had a fortunate recourse to additional supplies in the neighboring Habsburg territories. The sources of oak timbers were more varied (Trevisana, Friuli, as well as Istria across the Gulf of Venice) yet also more quickly depleted. Already at the end of the fifteenth century supplies of these regions was diminishing alarmingly. Restrictions were posed on tree cutting, policies were adopted for forest conservation and even replanting and a census of oaks was intended. In spite of it all, destruction of oak forests continued throughout the sixteenth century. The Arsenal was assigned forests and trees suitable for shipbuilding. For the timber cut for the Arsenal, the villagers were obliged to avail without pay themselves as well as their wagons and animals for transport to the nearest waterway. After 1520 the Arsenal was given the exclusive right to grant licenses to cut oak. The first complete cadastre of oaks came next in 1568, thereafter periodically repeated until 1660. Private shipbuilders were increasingly forced to search for supplies abroad especially after 1559, as the Arsenal came to monopolize the domestic resources and to actively manage them especially on the eve of the War of Cyprus. In Arsenal's reserves the much needed curved timbers were specially prepared to take the desired form. As the century proceeded the original rights of communes on behalf of the Arsenal were repealed and the Arsenal put in their place a direct mode of administration. Soon after, these policies were extended from oak forests to beech, fir and larch. Meanwhile, the radius of the territory from which timber was procured continued to increase. New and further sources were explored and brought into the orbit of the Arsenal. The distance barrier was most easily violated when it came to the quest for quality fir masts without which the Arsenal could not do.

The tow or oakum was driven by the caulkers employed in the shipyard into the seams of the ship which was then covered with pitch. In general the hull was covered with tar or grease. The blackest pitch was applied to the whole wooden structure including the ropes for the sake of protection against rot by the water. Availability of pitch did not become a serious concern since in 1546 it cost less rather than more in comparison with the past. Nevertheless, within a decade, we are told of a certain Piero Pegolotto in 1560 who claimed to have found a new way of cleaning the pitch so that 10 % more could be saved. He was hired by the Arsenal for less than what he demanded (Lane, 1934/1992: 165-166n, 217). This incident that did not go unnoticed in the annals of Venetian shipbuilding indicates the increasing concern with a more economizing use of naval supplies by recourse to piecemeal innovations. Within the arsenal there were two storehouses, one for pitch received and the other for heating it and for storing this prepared pitch ready for application.

The ropes were used for working the sails as well as for the anchors. Within the walls of the Arsenal, there existed a closely supervised state rope factory, the famous Tana, because of the quality concerns about the ropes and cables needed. The Admiral himself was expected to make sure that all ropes and cables were properly manufactured at the desired length and thickness. In tune with the demands of this rope factory, the native hemp industry was encouraged as well as highly regulated. Even so, from time to time, Venetians had to comprise from these standards. As early as in the beginning of the sixteenth century, a rope-spinner was hired by the Arsenal to manufacture ropes of low grade hemp that the Tana was traditionally forbidden to use (Lane, 1934/1992: 169).

The ironworks were hierarchically divided up with the most important remaining within the Arsenal while the least being commissioned out to private enterprise. Hence, nails and anchors were made by masters working for daily wages in the Arsenal. In addition, there were others employed for piecework. Moreover, there were ironsmiths who worked in their own shops outside the Arsenal but who were supplied with quality iron and paid by the piece in return.

The one resource-processing activity that was definitively removed from the Arsenal in the course of the sixteenth century was the manufacture of sailcloth. Whereas before 1504 sailcloth was made in the Arsenal itself, afterwards it was gradually discontinued and dispersed to the district and beyond. The product was purchased as needed from suppliers and stored in the Arsenal when not in actual use. This may well have to do with the need for economizing from the positive externalities created by the vast private textile sector in Venice, but especially from women's part-time work especially for the occasional repair work. Obviously, a strong force in favor of decentralization of this production process was at work so long as no shortage of the resource material was faced.

The Ottoman Provisioning of Naval Supplies

From the moment of its establishment the Ottoman Imperial Arsenal brought under its orbit a vast stretch of imperial lands for the supply of its numerous shipbuilding materials. During the classical era, the provisioning policies of the state ensured the unremitting supply of these materials through the system of *ocaklık*, which required that the tax-paying population of a given judicial district (*kadılık*) is to fulfil their tax obligations by way of

supplying resource materials to the state. The state also resorted to another system, namely *Avarız*, which in some ways overlapped with the practice of the *ocaklık* system, in order to meet the urgent needs of its military machinery particularly during war times. In this regard a variety of extraordinary taxes, paid in much the same way, were demanded from the imperial subjects in addition to their regular tax obligations. The collection of the *ocaklık* obligations as well as extraordinary taxes took place by the hands of the financial officials who were dispatched from the centre and collaborated with the provincial authorities (*sancakbeyi* and *kadi*). They realized the procurement of the demanded materials at the point of production. It should be noted that the valuation of these materials took place according to a fixed price system which showed little or no variation over the years. It was therefore not an unusual occurrence that the tax-payers tended to evade those obligations by way of selling their produce to the interlopers who offered the market value of these goods. The state acted promptly to control clandestine activities for the bigger part of the sixteenth century; but with the increased scope of these activities towards the end of the sixteenth century it became more and more difficult to effectively respond to the flow of these materials away from their intended destinations. The Registers of Important Affairs in the Prime Ministry's Ottoman Archives in Istanbul contain a good deal of orders dispatched from the seat of the Empire to the provincial authorities for the prevention of illicit trade, particularly, in timber destined originally for the Imperial Arsenal.¹ From the late sixteenth century onwards, sources of finance became more diversified and the state purchased some of its materials from merchants at market rates with the revenues obtained from the tax-farms.² We also have evidence to suggest that in addition to the *avarız* taxes which were used mainly for the supply of material for ship construction, arbitrary fees were levied on the subject populations of certain *sancaks*

¹ BOA MD, 24, Evaili/za/1002 (1593), A. Refik, *11. Hicri Asırda İstanbul Hayatı*, p. 12. Also MD, 62, 9 Cemayizilahr 1016 (1607) A. Refik, *11. Hicri Asırda İstanbul Hayatı*, p. 32.

² BOA, Cevdet/Belediye (CB), 8729, 26 S. 1015/3.7.1606. This order states that the cost of the material to be used in the construction of a galley and a horse-ship in the Süzebolu iskele was to be drawn from the tax-farms located in the seaside towns of Ahıyolu and Midye.

to meet the cost of the timber that would be used in ship construction during the seventeenth century.³ However, in the eighteenth century, problems associated with the procurement of timber, iron, pitch, tar, resin, hemp, sails and other shipbuilding materials from the provinces through the provisioning mechanisms caused the state to increasingly obtain its needs from merchants at market rates. By the time the reform of the navy was launched around the late eighteenth century, the traditional provisioning mechanisms had already been dismantled and all the materials used in the construction of ships were purchased from producers via the mediation of merchants.

Where the needs of the Imperial Arsenal were concerned, the principal item of demand was timber which came primarily from the mountainous areas along the Sea of Marmara (Propontus) and the Black Sea.⁴ The neighbouring regions (*sancak*) of Kocaeli and Bursa which included settlements with large forests such as İznikmid, İznik, Yalakabad, Sabanca, Akyazı Geyve and Akhisar supplied most of the timber needed by the Imperial Arsenal. The quality of its wood coupled with the favourable conditions of overland and seaborne transportation played a crucial role in the designation of these locations as the principal supplier of timber. The transportation of timber from the İznikmid region, around one hundred kilometres to the east of Istanbul, was realized by ships from the port of Izmit which acted as the principal point of transit for the timber that was brought from the forests in the neighbouring regions. Although timber was found in abundance, it was quite difficult to find wood suitable for the masts. The fir trees used in the making of masts were also obtained largely from the area of İznikmid, more specifically from the areas of Ada, Akyazı, Sarıçayır, Akhisar and Geyve. For the procurement of such highly specialized items as masts, the Ottomans did not hesitate to make use of distant and diverse sources of supply such as

³ BOA, MD, 83/96, 20 L. 1037/23.06.1628; MD, 83/99, 21 L. 1037/24.06.1628.

⁴ Hezarfen Hüseyin Efendi, *Telhisü'l-Beyan fi Kavanin-i Al-i Osman* (prepared for publication by Sevim İlgürel), (Ankara, 1998), 162-169.

Albania, the Carpathian Mountains in the Balkans, Wallachia, Moldovia and the Taurus Mountains in southern Anatolia.⁵ When the demand was great, these new locations were designated also to send ordinary wood to supplement the regular shipments from the neighbouring districts of Istanbul. For example in 1565 and 1571-72 timber from Crimea, previously not a major source of timber, was brought in bulk numbers from Caffa to furnish the ships in the Imperial Arsenal.⁶ In 1559, the authorities in Istanbul sent an order to the provincial authorities in Rhodes to exploit the possibility of locating trees suitable for the construction of galleys.⁷

Where the methods of procurement were concerned, the subject populations (*reaya*) of the districts designated as *ocaklık* were obliged to provide the state officials (*kereste emini*) with sufficient timber –these people were not only responsible for felling the trees but also for cutting them into shape-- to construct the number of ships planned for a particular year. Although the amount of timber was expressed in monetary terms, the type and number of the timber were also specified in the relevant official registers. (*Beher sene meremmat için üç yük akçalık kereste ve levazım ocakdır, tahsil olunur*). For each year, the amount of timber to be drawn from a given district was adjusted according to the military circumstances as the number of ships envisioned for a specific year varied accordingly.⁸ The great naval campaigns such as the Djerba expedition of 1560, the siege of Malta in 1565, the sieges of Chios and Cyprus led the government authorities to mobilize all the arsenals throughout the imperial domain (Imber, the Navy, 17). Certain unusual events such as the destruction of the major

⁵ Saffet, "Karadeniz-Izmit Körfezi Kanalı," *Tarih-i Osmani Encümeni Mecmuası*, sene 3, cüz 13-18, p. 949.

⁶ BOA MD, 6/1289, 19 Zilkade 972 (1565). BOA MD, 6/1103, BOA MD 6/411.865.

⁷ BOA, MD, 3/596, 967 (1559). BOA, MD, 3/463, 28 Muharrem 967/30.10.1559. For the small arsenals, the procurement of wood was less of a problem. Since the high cost of transportation led small arsenals such as the ones in Basra and Sinop to rely exclusively on the supply of timber from the neighbouring areas. While the Basra Arsenal secured its wood supplies from the mountains of Maraş, the arsenal at Sinop relied on the supply of timber from its own hinterland as well as the Black Sea forests further away

⁸ In the mid-seventeenth century, the construction of a galley or galleon required roughly 7,000-10,000 units of timber costing between 56,000 and 86,000 *akçes*.

part of the Imperial Navy at Lepanto in 1571 also necessitated the mobilization of all the shipyards to make up the loss, causing them to double or triple their production capacity. For example in 1572, all the judges of the neighbouring districts (Şile, Sabancı, Akyazı, Konrapa and Göynük, Bender, Ereğli, Yenice-i Taraklu, Geyve and Akhisar) were urged to ensure the supply of timber sufficient in amount to rebuild 10 galleys.⁹ These circumstances in turn exerted significant pressure upon the populations of the designated districts who were held responsible not only for the supply of local arsenals but also that of the Imperial Arsenal in Istanbul. As it is attested by the archival documents, some settlements were deserted owing to excessive demands of the government authorities. The authorities, in turn, tried to restore the number of households back to its former level.¹⁰ In the same vein, there was apparently a tendency to run off among the labouring populations (e.g., *marangoz*, *bıçkıcı*, *baltacı*, *bıçakçı*) who were recruited to fell the trees and shape them into timber as well as among those who were compelled to work in the local arsenals such as the one in Kandıra.¹¹ It should also be pointed out that under the pressing circumstances the government authorities intensified their efforts to keep the nomads (*yörüks*), gypsies and farmers away from the forests designated for the use of the Imperial Arsenal on account of their potential to damage the trees. To this effect many orders were dispatched to the governors and judges of the districts where such forests were located.¹²

During the sixteenth century, when the Ottoman navy was involved with large scale naval campaigns, the large woodlands along the Sea of Marmara supplied most of the wood for building the ships at the Imperial Arsenal, leading to the gradual deforestation of that

⁹ BOA, MD 18, 26 Şevval 979 (1572), Konrapa, *Bolu Tarihi*, p. 236.

¹⁰ BOA, MD 12/98, 979 (1571). Apparently the government authorities closely watched the movement of populations. They seem to have had a precise information as to the number of households in this location. The subject of the document is the village of Küreci in Lapseki which had 45 households and now recorded to have decreased to 19. The local authorities are urged to restore the original number of households.

¹¹ BOA 12/1209 979 (1572).

¹² BOA MD 26, 8/R/979 (1571). Ahmet Refik, *Anadolu'da Türk Aşiretleri*, p. 14. Also BOA, MD, 6/1103. BOA MD, 3/285, 966 (1559).

region. By the mid-seventeenth century the problem had gained a more serious outlook, urging the district officials to ask the Porte to waive a certain portion of the timber demanded. The Porte must have taken this request into consideration as it began to exploit other possibilities to procure timber for the use of the Imperial Arsenal. By the end of the seventeenth century, the principal source of timber had been shifted from the Marmara region to the forest areas of Bolu, several hundred kilometres to the east of Istanbul. The declining size of forest areas in the Marmara region prompted state officials to include in the provisioning network of the Imperial Arsenal the other forested areas of the Black Sea such as Samsun, Sinop, Çayağzı, Kitros and Alaçam.¹³

In the list of shipbuilding materials iron was only second to timber. It was used in the making of nails, hulls, anchors (each galley required three) and other metal accessories for ships. It is reported that an amount of 80-100 kantars¹⁴ of nails was needed for the construction of a galley. That number showed significant variation for the construction of larger ships such as *başarda* which required almost five times more nails than a galley. The most important source for the supply of iron, nails and other iron parts was the Bulgarian town of Samokov, located in the *sancak* of Sofia, which was accorded the status of *ocaklık* in the early sixteenth century and maintained its role during the period under consideration.¹⁵ Similar to timber, iron was procured from the local populations through the *ocaklık* system or in return for their *avarız* payments, the amount of which was adjusted to the circumstances by the Porte. When the required supply of iron could not be obtained through the *ocaklık* or *avarız*, the government resorted to the purchase of the remainder on market value from the merchants (*miri mübaya*).

¹³ BOA, MD, 12/70, 978/1571.

¹⁴ Hezarfen Hüseyin Efendi, *Telhisü'l-Beyan fi Kavanin-i Al-i Osman*, 163. One kantar of nails is sold at 610 akçes. One kantar is equal to approximately 56,5 kilograms.

¹⁵ The iron mines and foundries continued to operate well into the modern times. For the working conditions in these mines and foundries during the early nineteenth century see Todorov, *The Balkan City*, 410-414.

Samokov had both iron mines and iron foundries. The Ottoman state run its own iron foundry in the town under the supervision of a centrally appointed *emin*, who was responsible, among other things, for the arrangement of transportation of the materials to Istanbul. For transportation purposes camels were widely used in addition to carts (run by buffalos) that were hired locally. As for the production of nails, the local judge (*kadı*) was in charge of recruiting the blacksmiths in the area to manufacture nails and other metal parts with a view to being dispatched to Istanbul. The Imperial Arsenal in Istanbul had also its own workshops and employed ironsmiths for making nails and other iron parts. Here the ironsmiths manufactured different types of nails out of raw iron that was brought not only from Samokov but also from other regions of the Empire such as Sofia, Rodoscuk, Erzurum, Sinop and Bartın. The latter locations did not have any iron mines but simply acted as centres for the storage and transport of used iron (*hurda*) brought from the neighbouring settlements (Bostan, 124). Given the fact that the amount of iron demanded from Samakov was not limited to the needs of the Imperial Arsenal and that the iron mines in the town had to supply the Imperial Artillery as well, the scope of burden upon the inhabitants of the town becomes comprehensible. However the available sources on hand do not present any information as to the ways the local populations coped with this pressure.

Pitch was another major shipbuilding material that was consumed in great amounts by the Imperial Arsenal. It was used primarily for caulking the hulls. The Porte secured the pitch supplies of the Imperial Arsenal from diverse locations throughout the Empire but more specifically from the region of Avlona in Albania.¹⁶ This was supplemented with the pitch coming from the island of Mythilene, Gallipoli and Lapseki. The procurement of pitch also took place within the framework of the *ocaklık* system in which the local populations made

¹⁶ BOA, MD, 3/272 26 Zilkade 966/30.8.1559.

the payment of their tax obligations in kind to the government authorities. As it was mentioned above, following the defeat at Lepanto, the growing demand for raw materials prompted the government to exploit some new locations for the supply of the Imperial Arsenal. In the case of pitch the Imperial Arsenal kept large stocks in its warehouses which enabled it to continue its shipbuilding activities. But the uncertain situation in the Adriatic Sea following the defeat at Lepanto led the government authorities to procure a certain portion of required pitch from Walachia and the coastal settlements of the Black Sea such as Sinop, Samsun, Bartın and Bafra. To illustrate the amount of pitch procured from a single location per annum we have the information for Mytilene for the year 1647-1648. The total amount of pitch destined for Istanbul from the island of Mytilene for that particular year was about 300 kantars (Bostan, p. 130).

The cloth accessories of the ships built at the Imperial Arsenal had to be replaced every two to three years. Therefore the regular supply of sail-cloth and other textiles was critical to the building and maintenance of ships. The Imperial Arsenal's demand of sail-cloth was met by supplies from İzmir and Manisa in western Anatolia and Euboea, Athens, Thebes and Levadhia in Greece. Different types of cloth were used for the ships built at the Imperial Arsenal. For the making of sails and tents a raw cloth known as *kirpas* was widely used. When the demand for cloth was great, the government authorities also sent orders to such regions as Cyprus, Egypt and Aleppo to supplement the materials brought from western Anatolia and Greece. During the sixteenth century, Aleppo rose to supply some of the cloth needed at the Imperial Arsenal via Adana. Another location, namely, Gallipoli, came into the picture in the seventeenth century to supply the greater portion of the sail cloth required by the Imperial Arsenal. The silk cloth used in fitting out the ships came from Bursa. Another kind of textile, namely broadcloth (*çuka*), was usually obtained from Salonica.

Similar to other shipbuilding materials, the procurement of sail cloth was realized through the *ocaklık* system to be supplemented by the *avarız* taxes but the government also resorted to the direct purchase from the producers by the hands of local officials, primarily the *kadi*. The cash for the purchase and transport of the material came directly from the Imperial Treasury or was raised locally. Towards the end of the seventeenth century, there was a significant development as to the source of cloth for the Imperial Arsenal. Then the Porte resorted to foreign merchants, particularly French, for the purchase of raw cloth to be used in the making of sails.

Fibre products constituted yet another group of materials required by the Imperial Arsenal. Particularly for cordage, a large crop of fibrous plants were procured from locations such as Samsun, Sinop, Küre and Ayandon along the coast of the Black Sea where “humid climate favoured their cultivation” (Imber p. 20). Hemp was the most needed fibre material and the government authorities had no difficulties in the procurement of this resource material through the *ocaklık* system for the bigger part of the sixteenth century. It was brought from the designated locations to the Imperial Arsenal with a view to being manufactured into rope but there is evidence to show that hemp was also worked at the point of production and “sent as fully prepared rope” to the Imperial Arsenal (Imber p. 21). Obviously the intensification of shipbuilding efforts in the post-Lepanto era made hemp, similar to other shipbuilding materials, a direly needed item of construction. Such locations as Aytos, Vize and Pomorie in eastern Thrace as well as the Bulgarian coastal settlements, which had been previously marginally used for the procurement of hemp, began to be more vigorously exploited by the Ottoman state. In the first half of the seventeenth century, there is evidence to suggest that the state failed to meet the demand of the Imperial Arsenal and a certain portion of the required hemp was imported, together with wax, from Italy. But Katip Çelebi and Hezerfan Hüseyin

Efendi, both writing in the mid-seventeenth century, refer to Samsun as the principal supplier of hemp (7000 *kantars* annually) to the Imperial Arsenal to be supplemented with the supplies from Ahtabolu, İzmir, Mihalıç, İnebolu, Salonica, Misivri, and Bartın.

Conclusion

In light of the above description we would now like to return by way of a comparison to the questions we raised as our intellectual point of departure in our introductory remarks. First of all, it is quite clear that the Ottoman model of procurement converged to the Venetian model as far as its overall characteristics are concerned. In both cases, we observe a certain shift in, and an expansion of supply zones in accordance with the increasing demands of the naval shipyards and the exhaustion of, if not nonrenewable than certainly not so easily renewable, resources. This is most clearly case with timber in general and the masts in particular. As far as other supplies were concerned, the methods of procurement were similar yet geographical specialization was more often the case than major shifts in supply points. This is to do with the fact that other resources were not as easily exhaustible at least over as short a period as a 'long' century. Secondly, in both cases, the state control of resources tended to increase at the expense of communal and private interests as needs became all the more pressing. Indirect modes of procurement left their place to direct state administration and exclusive monopoly as soon as the circumstances of pending scarcity dictated so. Thirdly, in both cases, the shipyards relied on the use of local manpower and animal power whenever they could via the authority of the state in order to reduce their costs. Fourthly, whenever cases like sailcloth making--but also occasionally ironware such as nails and anchors--were concerned, there was a tendency to resort to artisans and workers outside of the

shipyards in order to benefit from the presence of existing subsidiary industries. To put it differently, the shipyards sought to reap the positive externalities presented by the already existing industrial districts—oftentimes conveniently located—in their vicinities. Much work remains to be done on this issue. Finally, there was a general awareness that shipbuilding required the coordinated presence of procurement activities together with the actual onsite construction of ships and thus organizational precautions were a must for the success of naval buildups. This brings us to the ultimate question of how the extra-shipyard activities impacted upon the organization of within the shipyard activities. From this study we infer that the Venetians were more constrained by the scarcity of their resources than the Ottomans with a vast territory were. As a consequence, the Venetians were forced to move from the extensive exploitation of these resources by way of the expansion of their procurement zones to a more intensive exploitation of resources within a given geography. In contrast, the Ottomans could by and large continue along the extensive exploitation of their domestic during the period under study. Because they trusted their supplies they could treat the ships they built as renewable. This explains why they did not care as much as the Venetians did about the quality of their ships during the war-ridden sixteenth century. Furthermore, it seems to us that a further consequence of pending resource scarcity in Venice had been to strengthen the vertical, highly centralized and all-encompassing organization of the *Arsenale* in accordance with the principles of strategic storage of supplies, economizing logic and the subsequent obsession with quality control. In contrast, the Ottoman *Tersane* could afford a more flexible organization of production in conformity with the relative ease with which resources could be tapped in a vast empire the internal territorial connections of which were facilitated by seaways. Hence, in the last instance, the difference in the organization of the two major shipyards reflected also the relative positions of the two states in procuring the necessary naval supplies.

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