

# The introduction of modern technology in Ottoman industry during the 18<sup>th</sup> and 19<sup>th</sup> centuries

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Any comparison of the introduction of modern technology or of the emergence of a modern infrastructure in the industries of Japan and the Ottoman empire c. 1700–1900 inevitably would be an unfavorable one for the Ottoman case. After all, Japan succeeded and the Ottoman empire failed. In the 20<sup>th</sup> century, after the period of interest to us here, the Japanese state and its industrial economy based on large scale production flourished, while the Ottoman one collapsed and disappeared from the face of the earth. Indeed, Japan is the paradigmatic example of successful high-technology industrialization outside of the “New Europes”, that is, beyond Western Europe and the states outside the European continent inhabited by significant populations of Europeans, such as the United States and Australia.<sup>1</sup>

In seeking to find the path to successful industrial modernization, contemporary states have examined the Japanese, not the Ottoman model. Let me pause here and ask if, after all the specifics are added up, we can actually understand why Japan succeeded in its industrialization? Although analysts have compiled formidable lists for Japan’s success—for example, the development of very strong group identity—the answer, probably, is no. Noting the presence of such variables describes Japan’s triumphs, but really does not, in my view, explain them. In any event, it is important to remember that Japan was the anomaly and the Ottoman empire was the norm; Japan’s example was atypical, while the Ottoman record of industrialization was the more typical one for nations outside the “New Europes” during the 19<sup>th</sup> century. In other words, might not Ottoman industrialization represent how manufacturing changes *actually* occurred across the 18<sup>th</sup>–19<sup>th</sup> century globe, while the Japanese case stands for the way that developmental economists believed *it ought* to have occurred?

In the remarks that follow, I seek to realize two goals: 1) a description of some of the factors affecting Ottoman achievement of a technologically advanced, comparatively capital-intensive industrial sector; 2) a challenge to

the way that most economists, developmentalists, and historians of Japan and the Ottoman empire have approached the question of industrialization.<sup>2</sup>

### **Factors affecting Ottoman industry**

Let me begin with the character of the Ottoman empire as the centuries-old mortal enemy of many European states. Did Western European enmity, mistrust, and fear of the Ottoman retard the transfer of industrial technology that might add to the political and military strength of an ancient foe? Probably not, since the evidence demonstrates that information and equipment moved readily from Western Europe to the Ottoman empire. There is abundant documentation concerning the flow of military technology during the 18<sup>th</sup> and especially the 19<sup>th</sup> century into Ottoman lands. Indeed, the Ottoman state effortlessly obtained the desired military technology, and even exploited rivalries among European states to do so. In the late 19<sup>th</sup> century, for example, naval assistance came from the British, and army aid from Britain's noisy new rival, the German Reich. We find the the same ease of transfer to be true in regards to manufacturing technology. The initial Ottoman adoption of many of the various industrial technologies frequently occurred shortly after their discovery or development in Western Europe. Indeed, one of the impressive features of Ottoman industrial technology transfer during the 19<sup>th</sup> century is its immediacy. Scarcely had a West European development occurred than one or another entrepreneur adopted it in an Ottoman context. And, I hasten to add, I do not mean only official state adoption of technologies, but also that by private individuals, both Ottoman and foreign. The list of transfers to Ottoman lands that took place within just a few years of their invention in Europe (or America) is a long one, and includes examples such as the railroad, the steamship, techniques involving cloth finishing, innovations in silk spinning, as well as the (Singer) sewing machine. Clearly, the channels for transmitting the technologies were both open and in use.

The problem was not in the exploratory adoption of a new technology, but instead in its proliferation. It must be said that the Ottoman industrial infrastructure was not impressive, in the sense that there were few large-scale factories employing capital-intensive equipment and substantial numbers of workers. The relatively-few factories of this type were concentrated in several urban centers such as Salonica, Istanbul, Bursa, and Izmir, as well as the Adana area, and focused mainly on textiles and food processing. During the 18<sup>th</sup> and early 19<sup>th</sup> centuries, most factories were state built and supplied official needs (see below). Thereafter, plants were established with private funds, and became increasingly active and important as the 19<sup>th</sup> century wore on. Private, often

merchant capitalized factories fall into two groups : 1) those supplying the needs of the port cities and the Istanbul capital, and 2) those serving the export market such as wool and silk spinning and tobacco processing. Altogether, Ottoman factories employing inanimate sources of power numbered not more than several hundreds and employed only a few tens of thousands of workers. Ottoman steam and internal combustion engines, for example, generated only two percent of the horsepower of factories in the Austro-Hungarian empire at the end of the century. Even countries that were quite backward by European standards—such as Spain and Russia—possessed industrial capabilities that towered over the Ottoman.

Given that the new technologies were available and known in the Ottoman lands, we need to return to the international and domestic factors that checked their more widespread adoption. In the first place, there is this question of proximity to the West European birthplace of modern industrial technology. Of all the non-“Neo Europes”, the Ottoman empire was closest to the West European lands in which massive, successful industrialization took root. On the one hand, we have seen that proximity facilitated the flow of ideas and technologies. On the other, closeness made it an early target for European manufacturers, who began dumping their goods on Ottoman shores back in the 16<sup>th</sup> and 17<sup>th</sup> centuries.<sup>3</sup> Such practices must have distorted Ottoman industrial evolution in a way that distant Japan did not experience. Later on, in the 18<sup>th</sup> and 19<sup>th</sup> centuries, proximity meant that Ottoman markets usually were the first to feel the impact of intra-European manufacturing changes. In balance, the geographical position of the Ottoman empire probably impeded the depth of Ottoman industrial development, even if it did not retard the speed of technology transfer.

Some of the factors affecting Ottoman industry were natural. Although the role of natural resources is a hotly debated issue, the presence of abundant water and human resources does seem important. Both water and people were quite scarce in most of the Ottoman lands, except for the Balkans (and in a few other limited regions). Not coincidentally, in areas where water sources and populations were most abundant, we find the greatest concentrations of Ottoman industry.

The overall lack of investment capital surely was important and we repeatedly find entrepreneurs with good ideas and knowledge of the technology being frustrated by scarce capital. The prospects for capital accumulation were reduced by the horizontal and vertical fragmentation of the Ottoman market among foreign and local merchants, spelling a decentralized and unintegrated

economy. Those few entrepreneurs with capital frequently invested it in ways that minimized risk (spreading it around in numbers of ventures), but also reduced the amount of capital available to a particular industry. Notably, foreign investors did not step in to fill the capital gap, as they did in many other regions of the globe during the 19<sup>th</sup> century. In Russia and the United States, for example, West European capital played a key, if not central role, in 19<sup>th</sup> century industrialization. But in the Ottoman empire, foreigners placed virtually all of their investments in the extractive or transportation sectors, not industry. In order to understand better why residents and foreigners invested in this manner, we must now turn to the issue of the Ottoman state and its impact.

The role of the state in economic development obviously is an important issue. On the one hand, Ottoman historians have given too much credit to the state, making it accountable for all the successes and failures of the economy. Entrapped in the government-generated documents that are their historical sources, they have seen the world through bureaucratic eyes and placed the state at literally the very center of things. In so doing, they have attributed to the Ottoman state, in both its pre-modern and more modern versions, capabilities that even late 20<sup>th</sup> century states do not possess. Even today, states do not have the economic impact that Ottoman historians attribute to the Istanbul regime of the 18<sup>th</sup> and 19<sup>th</sup> centuries. Although the role of the state has been over-emphasized, some responsibility for the fate of Ottoman industrialization nonetheless does seem to rest here.

The state both stimulated and impeded technology transfer and industrialization. On the positive side, we need to record that it founded most of the pre-1870 factories and recruited hundreds of foreign technicians to run them. It also established technical and industrial schools, at first around Istanbul but later in the Anatolian, Arab, and European provinces. (A closer look at these schools reveals that the state's vision of industry often included only furniture making, shoemaking, and tailoring.) The central government also organized expositions to popularize and disseminate innovative technology, an example later followed by many provincial governments. In addition, it granted scores of favorable concessions to industrial entrepreneurs; in the second half of the period, it consistently awarded tax exemptions and other privileges to encourage industry. And, it launched numerous programs of industrial development during the first third of the century, in the 1860s-1870s, and just before World War I. In a series of measures that worked against guilds' control over urban workspaces, the state opened up the labor market, thus making workers more available for large factory employ.<sup>4</sup>

Other government policies and attitudes surely retarded the pace of

technology transfer and industrial development. It needs to be said that virtually all of the modern, mechanized factories founded by the state were intended not as instruments of economic development, but rather as suppliers of governmental needs. Hence, the state primarily was following the dictates of economic policies (dating from the 18<sup>th</sup> century and earlier, and termed “provisionism” by Ottoman historians) aimed at self-sufficiency rather than development.<sup>5</sup> Tariff policies often seem similarly rooted in the past. The Ottoman regime, until late in the 19<sup>th</sup> century, retained or promoted tariff structures that were unfavorable to industry. While European pressure does help explain low import duties, they also originate in these earlier Ottoman state concerns to assure sufficient supplies of foodstuffs, raw materials, and other goods. The maintenance of high tariffs on the flow of goods within the empire, for its part, derives from other longstanding policies that used tariffs as income sources (“fiscalism”). The state’s policies towards guilds—vigorous opponents of concentrated factory formation—also partially clung to values dating back to earlier centuries.<sup>6</sup> The regime vacillated, variously supporting and condemning monopolies that it officially had abolished early in the 19<sup>th</sup> century. Throughout that century, the state continuously was balancing the usefulness of guilds in domestic political life, considerations of equity, and the desire for more efficient production. Moreover, at least in the late 19<sup>th</sup> century, governmental fears over concentrations of workers in factories outweighed measures against guilds that increased the circulation of labor. During the reign of Abdul Hamid, the state was very suspicious of the concentrated workforce that factories required, and dragged its feet on industrial development.<sup>7</sup>

It also seems relevant to note that, during the 19<sup>th</sup> century, the Ottoman state apparatus grew relatively stronger as the Ottoman empire became progressively weaker. Unlike in Japan, the elites focused very little on the economy and more upon the replication of themselves. Consequently, the civil and military elites vastly expanded, but they gave very little attention to industrial change.

### **Small-scale Ottoman industry**

Ottoman historical writing on industry generally has followed an intellectual tradition—one stressing big factory, highly-mechanized, capital-intensive industry—with deep roots in both Western and Middle Eastern scholarship. Since the 1970s, however, research on European industrialization has stressed low-technology, labor-intensive forms of production (often rural) and the extended period over which the so-called “Industrial Revolution” occurred. This new scholarship emphasizes efficiencies not through mecha-

nization but increased exploitation of labor as a key to understanding the industrial changes that occurred in the West during the 18<sup>th</sup> and 19<sup>th</sup> centuries. Studies demonstrated, for example, that British industrial growth derived from vast increases in production located in homes and workshops, and not merely in factories.<sup>8</sup> This framework of analysis, when brought to a study of Ottoman industry, makes clear that the manufacturing story presented so far is incomplete—that there is another chapter to be told. The Ottoman story of industrialization presented so far has been a dismal one, filled with shortcomings and unfinished transitions. But if we shift our focus from the big factory to the home and small workshop, and from the transfer of capital-intensive to that of less-expensive manufacturing technologies, a radically different and more complex picture emerges. In the Ottoman world, small-scale production in home and workshop—in both town and country—predominated. There, not in factories, is to be found most industrial production and the majority of Ottoman industrial workers during the 18<sup>th</sup> and also the 19<sup>th</sup> centuries. Big factories and large-scale production paled in importance before small-scale production, industry that was based on simpler technologies.

Also, most Ottoman industrial production aimed at the domestic market (unlike in Japan), although there are several notable exceptions. One of these was the silk reeling industry which, given its steam-powered, factory-based nature, was doubly exceptional. Unlike its Japanese counterpart, however, this industry was a minor factor in the international market. Another export-focused example, the carpet making industry, typifies the Ottoman norm of small-scale enterprises scattered about in villages and towns. Otherwise, most Ottoman industries satisfied domestic consumers, in a dense network of trading channels that crisscrossed the empire. Also, it should be noted, fierce competition among Ottoman producers for the domestic market is an important feature of its industrial sector.

The most common industrial technologies transferred to the Ottoman lands shared three features. First, they were inexpensive to buy; second, they were simple to use; equally significant, they were labor saving in nature. Like pieces of a puzzle, the strengths of these transfers matched well with the weaknesses of the Ottoman economy that was lacking in capital, technologically unsophisticated, and chronically short of labor. Notable examples of cheap, simple labor-saving technologies drawn from the textile sector are machine-made yarn, synthetic dyes, and sewing machines. An analogous example from the agrarian sector includes the cheap, simple and efficient McCormack reaper from the United States. Ottoman manufacturers adopted these humbler products of European origin—which sometimes were developed from highly sophisticated

and extremely expensive technologies—in their competitive struggle for survival with domestic and international competitors. These kinds of technology transfers played a key role in the evolution and continuation of Ottoman industry during the 19<sup>th</sup> century.

## **Conclusion**

In their assessments of Ottoman industry and its viability, contemporaries and subsequent observers too often focused only on the paucity of big factories and on the failure to industrialize according to this model. Thus, they spoke of the Bomonti brewery, the Istanbul flour mills, the tanneries and macaroni factories, the state-run shipyard and the various arsenals, the cotton mills of Adana, the railroad repair yards at Eskisehir, and the silk spinning mills of Bursa. They concluded that the low numbers of such factories meant that Ottoman industry was moribund, declining in an age of mass Western industrialization. Instead, I argue, a host of factors—natural and man-made, domestic and international—gave 18<sup>th</sup> and 19<sup>th</sup> century Ottoman industry a particular shape. It seems more constructive and useful to see Ottoman manufacturing not as a failed industrialization, but rather one that, within a given set of parameters, followed a particular trajectory.

However interesting, large-scale enterprises form a minor portion of total Ottoman industrial output and its workforce, and are only part of the overall story of Ottoman manufacturing. The bulk of the industries that survived into the early 20<sup>th</sup> century were of the type least visible to the observer, and thus too often have gone unnoticed. These were small-scale in nature, hidden away in small workshops and homes and, to boot, staffed largely by female workers. Aimed at domestic consumers and often marked by putting out networks that were not easy for a state to tax or an observer to see, small enterprises pulsed with life and vitality throughout the late Ottoman period. While some faded away and succumbed to foreign competition, many did not. Instead, Ottoman artisans and merchants shifted marketing strategies and production techniques and continued to compete against domestic and international rivals. Such modest endeavors underlay the story of industrial production and its ongoing transformations in the final Ottoman centuries.

## **Notes**

1. The term is from Alfred W. Crosby, Jr., *Ecological imperialism: the biological expansion of Europe, 900–1900* (Cambridge, 1986).
2. Earlier versions of many of the arguments traced below are presented in my *Manufacturing and*

- technology transfer in the Ottoman Empire, 1800–1914* (Istanbul, 1992) and *Ottoman manufacturing the age of the industrial revolution* (Cambridge, 1993), esp. 1–5 and 161–177.
3. Benjamin Braude, “International competition and domestic cloth in the Ottoman empire, 1500–1650: A study in undevelopment,” *Review*, II, 3 (1979), 437–451.
  4. Donald Quataert, “The social history of labor in the Ottoman empire, 1800–1914,” in Ellis Jay Goldberg, *The social history of labor in the Middle East* (Boulder, Co., 1996), 23 and 23, n. 7 and source cited therein.
  5. See the various works by Mehmet Genç.
  6. I am indebted to Mehmet Genç for his insights on the continuities in Ottoman economic policies during the 18<sup>th</sup> and 19<sup>th</sup> centuries.
  7. Donald Quataert, *Social disintegration and popular resistance in the Ottoman empire, 1881–1908* (New York, 1983). Overall, there has been little research on regulations concerning labor mobility, a key issue regarding industrialization.
  8. Quataert (1993), 1–19.