Imported construction materials and techniques in 19th century Ottoman architecture

Uzay Yergün & Aynur Çiftçi
Department of Architectural Restoration, Faculty of Architecture, Yıldız Technical University, Istanbul, Turkey

ABSTRACT: European societies created the model for the modernization period that began in the Ottoman state in the eighteenth century and continued during the so-called “westernization” period of the nineteenth century. The construction of new types of buildings such as military buildings, western style palaces turned into a reform movement which took western architecture as its model. Due to its conservative structure, the Ottoman State could not completely subscribe to the intellectual movements in the west so it remained tied to the industrial goods that Europe manufactured. For this, after the first quarter of the nineteenth century solid bricks, tiles, metal beams and similar building materials were imported from countries like Britain, France, Belgium, Italy, Germany and Austria. Many buildings of the period that remain have been registered as essential cultural assets have faced various problems. The interventions undertaken have damaged construction techniques and the originality of the imported materials.

1 INTRODUCTION

With the repercussions of the French Revolution, European societies developed in a new direction from the end of the seventeenth century. By the mid-eighteenth century, a traditional economy based on agriculture and handicrafts developed into a modern manufacturing economy and there began the “Industrial Age” in Europe. The Ottoman State’s “Westernization” period beginning in the eighteenth century and continuing into the nineteenth century was influenced by developments taking place in Europe.

In an attempt to catch up with the modernizing changes taking place in Europe, The Ottoman State first established close relations with European States to reorganize its military corps, then the lifestyle in the palace and its immediate circle was influenced which consequently led to conceptual changes in architecture. With the proclamation of the Gülhane Edict in 1839, the Ottoman State officially inaugurated the Tanzimat or “Re-ordering” era, and it is the turning point for modernization and architecture in the Ottoman State.

The Gülhane Edict sped up the reform process and it was felt that Istanbul needed to change its image from “Oriental” city to “Western” capital. While traditional techniques were used for the predominantly wooden dwellings and solid mason monumental buildings, structures for military, administrative, official and public purposes were built with western techniques. The use of solid masonry blocks and timber framework in traditional Ottoman architecture did not suit the principles of western architectural design, therefore modern building materials and techniques were used for these new structures.

With the Gülhane Edict and the establishment of the Tanzimat, the years between 1840–1860 and 1860–1876, the steps taken toward modernization may be characterized by a “process of industrial strengthening” taking place in the Ottoman State. However for both internal and external reasons, the newly established factories and institutions were not productive enough and the Ottoman State continued to be dependent on European technical aid and manufactured goods for building (Önsay, 1988). In order to acquire the Ottoman market for the sale of manufactured goods, European countries endeavored to establish treaties of alliance and trade with the Ottoman State with the result that from the beginning of the nineteenth century countries like England, France, Belgium, Italy, Germany and Austria were exporting a variety of industrially produced tools besides machine-made bricks, metal supports made with advanced metallurgical techniques and clay tiles etc... for building and interior decoration to the Ottoman State.

The names and addresses of local producers and the companies and offices importing building materials for Ottoman use are published in the Ottoman trade...
annuals of the nineteenth century such as “Apel Gülbenkian”, “P. Gülbenkian & Cie”, “S. Capou & J. Pelletan”.

2 IMPORTED CONSTRUCTION MATERIALS

2.1 Imported bricks

Bricks used in Ottoman architecture before the industrial age fell into three groups: “tuğla-i carşu” (full-sized bricks), “tuğla-i miri carşu” (half-sized bricks) and “tuğla-i hareç carşu” (outsized bricks) denoting the three different sizes in which bricks were produced (Arseven, 1965). The dimensions of full-sized bricks were 24 × 24, 28 × 28, 30 × 30 cm in length and 3, 3.5, 4 and 4.5 cm thick (Fig. 1). Since the Byzantine period, the most important production sites were located on the shores of Büyükder and along the Golden Horn in Piripasa and Kırkağaç (İnciciyan, 1976).

With the technological advancements taking place in nineteenth century Europe, brick production develops analogously as its physical attributes are highly resistant and all of the bricks industrially produced were of standardized compactness and density. Industrially produced modern bricks measuring 6 − 8 × 10 − 12 × 21 − 23 cm were the preferred building material because they were inexpensive, practical to use and fire resistant compared to wood and could support solid wall structures.

The Russian Embassy was the first building to be constructed in İstanbul with modern bricks in 1838 and it was highly appreciated by the reformers of the Tanzimat era. The Swiss architect G.T. Fossati was hired for the project and after the completion of the Russian Embassy, in 1841, he was entrusted with the construction of the Military Hospital at the Imperial Gate and this was the first Ottoman structure made with modern bricks completed in 1843. The Balyan family had been the palace architects until that time and it is significant that a European architect was hired for an imperial project (Can, 1993). Many European architects besides G.T. Fossati, such as W.J. Smith, G. Fossati, M.A.A. Bourgeois, G.B. Barborini and others as well as European educated architects of the Balyan family were entrusted with building projects (Yergün, 2002).

These architects were instrumental for the development of imported bricks and modern building techniques in the Ottoman State during the 1840s as Ottoman traditional building techniques were replaced by European techniques and materials. The transition from wooden buildings to modern masonry techniques was achieved in secular architecture with modern bricks through legal settlements and various incentives.

Research has shown that the bricks used in nineteenth century buildings in İstanbul generally measuring 6 − 7 × 10 − 12 × 22 − 24 cm dimensions came from Saint-Heni and Saint André, two villages near Marseille, France. In the mid-nineteenth century these two villages were internationally known as brick production centers. Bricks stamped with “GUICHARD FRERES St HENRY MARSEILLE” (6.5 × 10.5 × 21.5 cm) are proof of this (Fig. 2). It is well documented that the Çırağan Palace (1863) was built with bricks imported from Marseille measuring 6.5 × 11 × 23 cm.

The Darülfünun (İstanbul University) dated 1845–1854 and Princess Adile’s Palace dated 1876 used bricks measuring 5 − 6 × 14 − 15 × 30 − 32 cm and documentation shows that they came from Livorno, Italy (Fig. 3). Certainly, transporting bricks from Marseille and Livorno to İstanbul by ship was also easy and fast.

The “FRATELLI ALLATINI SALONICCO” company was another important producer of bricks for buildings in Istanbul was located in Salonica (now Greece) (Fig. 4). The Allatini family was of Jewish origin and had emigrated from Livorno to Salonica in 1802 and set up the company in 1836. It was this
same company that owned “Roller mill” and “pottery” and later became the “Ottoman Industrial and Commercial Company of Thessaloniki S.A.” in 1897. This company also was trading in other realms and in 1926 was transferred to Greek businessmen. In 1964, the “Allatini S.A.” and “Ceramics Allatini S.A.” companies separated from the parent company and continues to produce ceramics today.

In the last quarter of the nineteenth century, the Ottoman state began producing bricks and tiles industrially. Karamağc in 1874 and Büyükdere, Feriköy and Hasköy in 1876 became production centers in Istanbul while outside of Istanbul in the towns of Mürrefte and Ecebat brick and tile factories were set up in this period (Mori, 1906; Sandalcı, 1997; Can & Girardelli 1996).

2.2 Imported tiles

Studies on some of the Ottoman buildings using locally “alaturka” produced tiles show that these are of different dimensions and shapes than those tiles imported from Marseille, Salonica and Livorno. The producer's name and sometimes the date and images are stamped onto the tiles.

The roof tiles covering the mid-nineteenth century Taşkışla building are stamped with “ARNAUD ETIENNE Cie 1890 MARSEILLE St HENRI”, “SACCOMAN FRERES St HENRI MARSEILLE” (stamped with the image of a lighthouse), “GUICHARD CARVIN & Cie SEON St ANDRE MARSEILLE” (stamped with the bee image that is still used by the Lafarge company) and also tiles produced by “GUICHARD & PIERRE FRERES SEON St HENRY MARSEILLE” as well as “FRATELLI ALLATINI SALONICCO”. A total of five different companies’ tiles were used for this single structure. Dated to 1900–1901 the Topkapı Palace Police Station’s roof tiles were imported from two companies: “GRANDE ECAILLE POUR TOITURE, BREVETES S.G.D.G. St. HENRY-MARSEILLE, ROUX-FRERES” (stamped with a heart image) and “FRATELLI ALLATINI SALONICCO” (Figs 5–8).

The Marble Mansion (1860) used tiles from the “GUICHARD FRERES SEON St HENRY MARSEILLE” company measuring 42 × 25 × 4.7 cm and a stamped glass tile was found that belonged to a building dating to the end of the nineteenth century produced by the “SOCIETE GENERALE DES TUILLERIES DE MARSEILLE ET Cie MARSEILLE FRANCE” measuring 42 × 25 × 4.7 cm. In the Cibali Tobacco Factory also a stamped glass tile was found (Figs 9–10). In Istanbul, the Büyükdere factory production costs were high and the quality of the tiles was
poor. For these reasons tiles and bricks from Livorno were considered better as well (Önsoy, 1988).

2.3 Imported metal supports

Iron was wrought from the fourteenth century on and by the mid-eighteenth century cast iron technique was used for shaping metal but after the Industrial Revolution, steel replaced iron (Ökten, 1995). In Ottoman architecture, iron was not used on its own to bear weight but rather as a supporting component (Tanyeli, 1990). From the last quarter of the nineteenth century on, imported metal supports of varying shapes and sizes were used in buildings of many floors having rooms of large dimensions in Istanbul. Examples of these found in Istanbul were imported primarily from England and Belgium after trade agreements were made between these countries and the Ottoman State in 1838.

The English engineer Sir William Fairbairn (1789–1874) came to Istanbul in 1839 and he made various orders for the Unkapanı bakery and flour mills. In 1841, Fairbairn made a three-story building for milling corn entirely of cast iron and wrought iron including the supports, the walls and the roof structure and exhibited it in his factory. This was the first building of this type in England and became a prototype for iron churches, houses and storage spaces.

According to Batur, this structure was disassembled and brought to Istanbul in 1841 by ship. The building measured 8.10 × 15.50 m was three stories, only the foundations and the wall supporting the inner machinery were masonry. The floors and the roofing were supported by cast iron and beams (Batur & Batur, 1981). This structure no longer stands today.

Since 1855s, especially after 1870 imported metal products from Belgium came to Istanbul and other eastern ports by regular steam ship routes from the Port of Anvers. The “Feshane-i Amire Factory” was set up in order to manufacture fezes and broadcloth for the soldiers of the Ottoman army in the last quarter of the nineteenth century. The metal roofing of the weaving hall of the factory was supported by 274 cast iron columns measuring 25 cm in diameter, bearing the stamp of “PROVIDENCE MARCHIENNE BELGIQUE” (Figs 11–12). “Les Forges de la Providence in Marchienne-au-Pont” factory was established in 1838 and with the convergence of the Cockerill-Ougrée factory in 1966 became one of Belgium’s most important industries. The English industrialist, John Cockerill (1790–1840) established a company in the region of Wallonia in 1817 and this company exists today as “Cockerill Maintenance&Ingénierie” since 2004.
The Maçka Armory was built in 1874–1875. The weight bearing system consisting of cast-iron columns with bases and capitals and beams are believed to have been imported (Fig. 13). They did not survive since the flooring of each storey was replaced by concrete in 1955 (Çiftçi, 2004). Cast-iron columns are found also in other factories and the commercial buildings of this period (Figs 14–15).

From the last quarter of the nineteenth century on, a construction technique known as jack arch began to be used for horizontal supports. The jack arch is formed by brick vaults between “I” shaped steel beams which are placed on the short sides of the buildings (Fig. 16). The cross section of the “I” shaped beams of the buildings studied varies between 5.5−9.5 × 16.5−22.5 cm.

The first buildings in Istanbul to use the jack arch, as far as can be determined, are the German Embassy (1874–77), the German Hospital (1874–78), the Europe Passage (1874) and the “Cité de Péra” (1874–76) (Yergün, 2002). The “I” shaped beams in the “Mekteb-i Tıbbiye-i Bahane” (a Military Medical School) dated 1895–1900 are stamped with “Burbach 22 NP” (Fig. 17). The “Burbach Iron and
Steelworks” was first founded in 1856 by Luxembourger industrialists as the “Société en participation des Forges de Sarrebruck”. Other metal elements of the building came from the Belgian factory of “Cockerill” (Batur, 1994).

An international competition was launched in 1892 for the architectural elements of the Saint Stephen Church designed by Hovsep Aznavor. The R. Ph. Waagner Company of Vienna, Austria won the competition and produced the iron construction parts for the project in 1893. These parts were transported by ship to Istanbul along the Danube River to the Black Sea and construction was completed in April of 1896 (Kuruyazıcı & Tapan, 1998). “R. Ph. Waagner Vienne” is written on the side of some of the pilaster bases while “BURBACH 30 NP”, “BURBACH 16 NP” stamps are found on the beams (Figs 18–20). This building still exists as the sole example of its kind in Istanbul. The Waagner Company was founded in 1854 and merged with the Biró Company in 1905. The company continues to operate today as the “Waagner-Biró Stah”.

Large numbers of arms and tools were imported from the German Krupp company founded in 1811. Steel products of this company were used for the construction of the Ottoman Railroads and railroad buildings especially in the last quarter of the nineteenth century (Kösebay, 2007). The company took the name “Thyssen-Krupp AG” in 1999 continues to manufacture goods.
3 CONCLUSION

A forceful change occurred in design philosophy and construction techniques in Ottoman architecture in the nineteenth century due to improved economic and political relations between the Ottoman State and European countries and the introduction of imported materials such as modern bricks and metal supports. However, some of the buildings from this period have collapsed without ever being thoroughly documented from an architectural viewpoint. Many of the existing structures dating to this period are on the brink of disaster and require immediate attention even though they have been registered as cultural assets.

Some of the interventions carried out with the aim of protecting them have further damaged both the construction technique and the original imported materials. The original bricks are disappearing because the walls have been opened up and additions have been made of solid masonry. The most wide scale incursions occur from removing the metal elements which support the flooring and the roof structures, and then pouring concrete flooring. The registration of these structures is also lacking. Many of the original elements were removed before the building was sufficiently documented. It has been noted that when the roofs were being repaired, even tiles that were in good condition were replaced with new ones without any documentation. The imported bricks and all of the metal elements are the architectural elements that bear witness to construction techniques used at the time and they need to be documented and preserved because they reflect an era in Ottoman architecture.

Generally, the construction materials are not conserved as required in the buildings that have been observed. The two main causes of the decay are the materials conditions and external causes. Due to the conditions and locations of the materials like bricks, tiles and metal supports can be conserved by cleaning methods and consolidation. If the material has lost its feature as a structural element due to the internal causes, the material should be replaced. The new bricks, tiles or metal elements must have the same shape, same dimensions and same constitutional features as to keep the harmony with the original ones. In addition to this, the new materials should be distinguished from the originals by its texture, color etc. according to the restoration and documentation criterion.

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