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## FROM POWER PLANT TO MUSEUM: A SUSTAINABLE TRANSFORMATION

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### ABSTRACT

Throughout history, cities have needed industrialization since they emerged. Industrialization requires electric power plants because they meet the electricity demand of cities. However, old power plants failed to meet the energy demand of developing cities over time. Therefore, many were shut down, abandoned or demolished. The sustainability of buildings reflecting urban history and witnessing industrialization is an important architectural issue. Sustainable cities and sustainable architecture are made possible by reintegrating such buildings into urban life. From a material and spiritual point of view, cities and city dwellers benefit the transformation and reutilization of existing resources as well. The subject of this study is the transformation of Silahtaraga, which is located in Istanbul and the first electric power plant in Turkey. A modern example of industrial architecture built between 1910 and 1914, Silahtaraga was a coal-fired power plant that met the electricity demand of the city. It was then the first urban scale thermal power plant of the Ottoman state. However, it failed to meet the increasing demand of the city, and therefore, was completely shut down and abandoned in 1983. It was transformed and conserved through refunction in 2007. Today, it is used as a museum of energy, a museum of contemporary art and a library. The study discusses the history, transformation, significance and re-functionalization of Silahtaraga power plant built during the industrialization process. The aim of the study is to highlight the necessity of revitalization and refunction of buildings which have witnessed urban history and held a distinguished position in urban memory and identity.

**Keywords:** Power Plant, Sustainability, Transformation, Museum, Santralistanbul

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### 1. INTRODUCTION

The economic and physical aspects of restructuring in many cities are monitored to meet the needs of the era that we live in. Restructuring involves the transformation of the historic sites of cities. Industrial, religious, educational and civil buildings that have witnessed history are reintroduced to cities and citizens. Renovated buildings rejuvenate cities and reveal their historical textures.

The restructuring of cities, in a sense, enables the passing-down of their history to future generations. Spatial restructuring of cities is a result of urban preservation and sustainability. The way to ensure the sustainability of cities is to ensure their transformation.

Numerous values representing the cultural heritage disappear due to the physical destruction especially in the historical centers of cities. A sustainable texture can be achieved through urban transformation to preserve the values that make up the essence of cities.

This study addresses Santralistanbul, which is one of the transformation projects undertaken in Istanbul, which has hosted many civilizations throughout history. Santralistanbul project is different because it was the end-product of the transformation of Silahtaraga Power Plant, which was the first industrial enterprise of the Ottoman period. This transformation provides a sustainable development for the city.

The study focuses primarily on sustainability in cities and sustainable architecture in urban areas to analyse the subject matter in detail.

### **1.1. Sustainability in Cities and Sustainable Architecture**

The concept of sustainability encompasses all kinds of issues from economy to development, from social to environmental factors [1]. The concept of sustainable development refers to the continuity of development, hence the name [2].

Sustainability, which was not known until recently, has today become a concept discussed from environmental, social, financial and cultural aspects. The concept of sustainable development was first defined by a 1987 report named “Our Common Future” published by the World Commission on Environment and Development (WCED). The report defines the concept of sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [3].

New urban housing projects or improvements in existing residential buildings are being undertaken in line with urban development models aiming at sustainable urban development. The common points of all those projects regarding sustainable urban understanding are as follows: high quality of life, optimum density, multifunctional living spaces, wide public transport and pedestrian traffic, minimum use of natural resources and energy (physical properties), effective and strong local government, equal opportunities and intense social interaction (social properties) and historical and cultural continuity, strong sense of belonging/commitment/urbanity and vibrant city centers (cultural properties) [4].

In terms of design and architecture, the concept of sustainability has a significant role in natural resource utilization. Buildings have provided shelter, comfort and security throughout human history. Sustainability in architecture highlights low greenhouse gas emissions, high indoor quality and use of renewable resources and non-toxic materials in buildings. The longevity and efficiency of buildings are of great importance for the preservation of sources as well [5].

### **1.2. Architectural Dimension of Urban Transformation**

Locally and culturally relevant forms of structures used for the construction of eco-friendly living spaces also allow for the efficient use of land, climate data and natural resources, and execution of a variety of alternative designs for ecological systems and information technologies [3]. Transforming environmentally harmful buildings with low quality of life into sustainable and eco-friendly ones through alternative technologies means the restructuring of a built environment.

Urban dwellers’ perceptions of historic places as recreation areas serve the purpose of re-remembering the lost urban identity and revitalizing the urban culture. Therefore, the sustainability of historic buildings plays a key role in recognizing urban identity and reconciling the lost relationship between space and human [6]. Preserving historic buildings and ensuring their sustainability are critical for the preservation and development of the historic urban texture and its passing-down to future generations.

### **1.3. Early Industrialization in Cities**

The Industrial Revolution started with the invention of the steam engine by James Watt in 1775. The steam engine was introduced in the market after 1785 and became widespread all over the world after 1820. Coal and steam were strategic tools in the birth and expansion of industrial civilization [7].

Industry, science and technology were more advanced in the Ottoman Empire than in Western Europe in the sixteenth and seventeenth centuries. However, the Industrial Revolution, which started in Europe in the mid-eighteenth century, led to an increase in industrial production and the mechanization of production systems [8]. The Ottoman Empire was not able to keep up with the developments marked by the shift towards machine-based manufacturing in Western Europe with the industrial revolution in the eighteenth and nineteenth centuries. This led to the deterioration of the Ottoman bureaucracy and a marked shift in favor of Europe in the fields of politics, military and economy [9].

Silahtaraga Electric Power Plant is a legacy of the Ottoman Empire and a touchstone for the history of energy in Turkey. Power was supplied to production workshops around the Golden Horn in the last period of the Ottoman Empire. Street lighting provided the public with the opportunity to go out at night, go to theaters and organize social events [10]. Silahtaraga is the first industrial building and still has a significant place in the urban memory of Istanbul.

### **1.4. A Sustainable City: Istanbul**

Having hosted numerous civilizations and gone through transformation within centuries, Istanbul has become a metropolitan city not only for Turkey but for the whole world.

Istanbul bears the traces of the periods that it has witnessed, and therefore, contains numerous historical artifacts. With its squares, streets and buildings that make up the urban identity, Istanbul always maintains its charm. Most buildings that make up the historical texture of the city still stand. Renovated historic buildings with new functions are reintroduced to public service. This type of refunctionalization allows us to preserve those buildings and pass them down to future generations.

Istanbul, which has had a significant position in all periods of history, hosted the first sample buildings during the industrialization period. One of the important examples of those buildings is Silahtaraga Power Plant which was built to meet the electricity needs of the city. This study addresses Silahtaraga Power Plant, known today as Santralistanbul after the recent renovation.

### **1.5. Method**

Sustainability involves many disciplines. This section examined the concept of sustainability in detail for a better understanding of the issue. Sustainable architectural elements developed in the intersection of applications in the building industry are mostly used in the re-functionalization of historic buildings.

The scope and objectives of this study are based on literature review. Scientific publications (thesis, articles, books, databases and internet sources) on sustainability and building industry, sustainable architecture and sustainable design and construction were scanned to construct the theoretical background of the study. Afterwards, on-site observations were conducted, and photographs were taken to analyze the transformation of Silahtaraga Power Plant to Santralistanbul.

## **2. PREPARATION OF MANUSCRIPT**

Silahtaraga was the first urban-scale coal-fired power plant of the Ottoman Empire constructed by the Ganz Joint Electric Company and the French Girolou Company and supplied electricity to Istanbul between 1914 and 1983. It had lodgings for workers/civil servants/directors, a restaurant, and boiler and machine rooms. Its initial blueprint was drawn by the French and its structure was drawn by Seyfi Arkan [11].



**Figure 1.** Silahtaraga Power Plant 1933 [12].

Silahtaraga Power Plant is located between *Alibeyköy* and *Kâğıthane* creeks where the Golden Horn is bifurcated on the European side. It was the location of choice for the power plant because it was neither far from nor near the city. Besides, coal transportation was easy through the Golden Horn, which had many industrial facilities. Coal was supplied to Silahtaraga from Zonguldak and the water of the Golden Horn was used to cool its electric turbines (Figure 1).

Aksoy [13] describes the units at Silahtaraga Power Plant as follows: generation units, lodgings facilitating the social lives of employees, movie theaters or clubs for marriage or engagement ceremonies, sanitary baths for workers and a small football field with gravel floor.

The generation units and social facilities of Silahtaraga Power Plant were built in different periods, and therefore, differ in style. The generation units are similar to other industrial structures of the period in which they were built while the administration building and social facilities bear the characteristics of the First National Architecture Movement [11].

### **2.1. A Cultural Complex: Santralistanbul**

The first steps were taken for Santralistanbul project on April 14, 2004 and Silahtaraga Power Plant was allocated to Istanbul Bilgi University for 20 years (Figure 2). Silahtaraga Power Plant and its campus were transformed into a museum with the energy museum project, Santralistanbul, developed in 2004. The Second Administrative Court of Istanbul denied the objection made by the Chamber of Electrical Engineers regarding Santralistanbul project. Silahtaraga Power Plant was transferred to Bilgi University for the establishment of an educational culture and art center with a protocol signed between Bilgi University and the Ministry of Energy and Natural Resources on May 4, 2004. Bilgi University built a large cultural and educational center and named it “Santralistanbul.” The project has made the preservation of the power plant, which has quietly witnessed history, possible. Santralistanbul has a

main gallery, energy museum, library and information centers, international residence, educational buildings and recreation areas [14].



**Figure 2.** Location of Santralistanbul on the Map of Turkey

Santralistanbul plays a significant role in the preservation and refunctionalization of Silahtaraga Power Plant. The fact that the generation units of the power plant were preserved and transformed into an Energy Museum is a great achievement. Santralistanbul protects the heritage of Silahtaraga Power Plant [14].

### **3. FINDINGS AND DISCUSSION**

Silahtaraga Power Plant located in the Golden Horn was in danger of extinction. However, with the involvement of Istanbul Bilgi University, Santralistanbul has been one of the most extensive transformation projects carried out so far in the field of arts and culture in Turkey. Santralistanbul was opened on September 8, 2007 and since then has hosted numerous important artists, thinkers, festivals, launching meetings, conferences, outdoor activities and national and international exhibitions.



**Figure 3.** Santralistanbul Energy Museum [15].

Santralistanbul consists of the first industrial archaeological museum awarded by DASA in 2012, main gallery of contemporary art exhibitions and cultural events that won the 2010 International Architecture

Award, and design award-winning food and drink venues built by the transformation of the former repair shops and warehouses [16].



**Figure 4.** Cafes and study areas on the ground floor of the Energy Museum [15].



**Figure 5.** Main Gallery and Classrooms [15, 17].

Today, the Energy Museum is still up and running, however, the Main Gallery has been converted into classrooms and study areas. Machines and equipment from Silahtaraga Power Plant period are exhibited in the museum. Besides there are study areas designed for students. The former repair shops and warehouses on the ground floor have been refunctionalized into cafes and restaurants (Figures 3, 4). Silahtaraga Power Plant, which have been refunctionalized through a series of transformation, is used by Bilgi University students, museum visitors and the general public (Figure 5,6).



**Figure 6.** Santralistanbul food and drink venues (Spaced transformed from warehouses) [15].

#### **4. CONCLUSION**

Buildings with urban cultural heritage can be sustained by protecting them and passing them down to future generations.

Conserving the buildings that make up the urban fabric and passing them down to future generations is of paramount importance for uninterrupted cultural sustainability [18]. Conservation of historic buildings involves actions taken to protect buildings with social, cultural, art, historical and architectural values from negative factors and to ensure sustainability and cultural continuity. One of these actions is repurposing such buildings. Among these structures are industrial architect structures.

Silahtarağa or Santralistanbul triggers this movement in the social environments we live in and produces the most demanding energy of each period. Santralistanbul has taken into account the historical heritage of Silahtarağa Power Plant, which has a significant position in the energy history of the Ottoman Empire, is a structure, the refunctionalization of which has been meticulously carried out. It is an important example in terms of keeping the industrial heritage of the Ottoman Empire alive and visible, and renovating building according to today's production needs [10].

One of the main objectives set before the launch of Santralistanbul project is to bring cultural and artistic activities and sustainable urban transformation projects to a wide audience and to create an interdisciplinary platform in which contemporary arts is not only exhibited but also shared through production and research. Santralistanbul has achieved this objective to a great extent and made significant contributions to the dynamic structure of the city.

Santralistanbul is an important project because it has refunctionalized Silahtaraga Power Plant, renovated industrial structures and brought vitality to the city. Silahtaraga Power Plant is one of the first steps of industrialization in the Ottoman Era and is a historical and cultural heritage. Santralistanbul achieves the objective of preserving historical buildings through restoration and refunctionalization. Such architectural initiatives keep assets of historic importance alive and contribute to the sustainable development of cities.

#### **REFERENCES**

- [1] Şimşek, EP. Sürdürülebilirlik Bağlamında Yeşil Bina Olma Kriterleri Kağıthane Ofispark Proje Örneği. Master's Thesis, Istanbul Natural Sciences Technical University, Institute of, İstanbul, Turkey, 2012.
- [2] Vural, NH. Ekolojik Sürdürülebilirlik Çerçevesinde Cendere Vadisi Dönüşümünün Mimarlık Bağlamında Değerlendirilmesi Silahtarağa – Kağıthane Merkez Mahallesi Aksı Örneği. Fatih Sultan Mehmet Foundation University, Master's Thesis, Institute of Natural Sciences, İstanbul, Turkey, 2016.
- [3] Asımgil, B. Sustainable Technological Approaches in Resource Conservation and Its Affect to Architectural Form, Erciyes University, vJournal Of Institue Of Science and Technology, Volume 32, Issue 3, Erciyes, Turkey, 2016. pp. 28-39.
- [4] Çahantimur, A, Turgut Yıldız, H. Sürdürülebilir kentsel gelişmeye sosyokültürel bir yaklaşım: Bursa Örneği, ITU Journal of the Faculty of Architecture 7(2), İstanbul Technic University Publications, 2009.

- [5] Osmançelebioğlu, D. Sürdürülebilir Mimari ve Sertifikalı Yeşil Binalar. Master's Thesis, Haliç University, Institute of Natural Sciences, İstanbul, Turkey, 2015.
- [6] Kurtar, C., Somuncu, M. Kentsel kültürel mirasın korunması ve sürdürülebilirliği: Ankara Hamamönü örneği. *Journal of Ankara Studies*, 1(2), December 2013, pp. 35-47. [https://www.journalagent.com/jas/pdfs/JAS\\_1\\_2\\_35\\_47.pdf](https://www.journalagent.com/jas/pdfs/JAS_1_2_35_47.pdf), date of access: 28.01.2019.
- [7] Cipolla, C. *Ekonomi ve Nüfus*, Mehmet Sırrı Gezgin (trans.), İstanbul: Tur Publications, 1980.
- [8] Benevolo, L. *Avrupa Tarihinde Kentler*. Nur Nirven (trans.). İstanbul: Yeni Bin Yıl Publications, 1995, pp.188.
- [9] Şahin, H. *Türkiye Ekonomisi*, Ezgi Yayınları, Bursa, Turkey, 2002, pp.1-2.
- [10] Dervişoğlu Okandan, G. A Journey from the Modern to the Postmodern: Continuity and Change from Silahtarağa Power Plant into Santralistanbul, *Istanbul University Journal of the School of Business*, Vol 45, Special Issue 2016, İstanbul, Turkey, 2016, pp. 40-48.
- [11] Terece, T. 2013. Restorasyon Projelerinde İşlevsel Dönüşümün İç Mekan Kararları Üzerine Bir Sorgulama, Master's Thesis, Beykent University, Institute of Natural Sciences, İstanbul, Turkey.
- [12] Aksoy, A., Açıkbaz, F., and Akman, A. Silahtarağa Elektrik Santralinin Hikâyesi. Silahtarağa Elektrik Santrali 1902 – 2004 (The Silahtarağa Power Plant 1902 – 2004) içinde, (1-61), İstanbul: İstanbul Bilgi University Publications, 2009.
- [13] Aksoy A. Silahtarağa Elektrik Santrali, İstanbul Bilgi University Publications, İstanbul, 2007.
- [14] Budan, N. *Kültür Endüstrisi Çerçevesinde santralistanbul Örneği*. Master's Thesis, Mimar Sinan Fine Arts University Institute of Natural Sciences, İstanbul, Turkey, 2008.
- [15] Kurak Açııcı, F. Personal Photo Archive, 2019.
- [16] Santralİstanbul. <http://www.santralistanbul.org/pages/index/about/tr/>, date of access: 20.01.2019.
- [17] Kurak Açııcı, F. Personal Photo Archive, 2011.
- [18] Yalçınkaya, Ş., Bal, H.B., Cumhuriyet Dönemi Mimarlık Mirasının Sürdürülebilirliği: Karabük Yenişehir Sineması. *Journal of Social and Humanities Sciences Research*. 6(42), 2019. pp. 2685-2692.