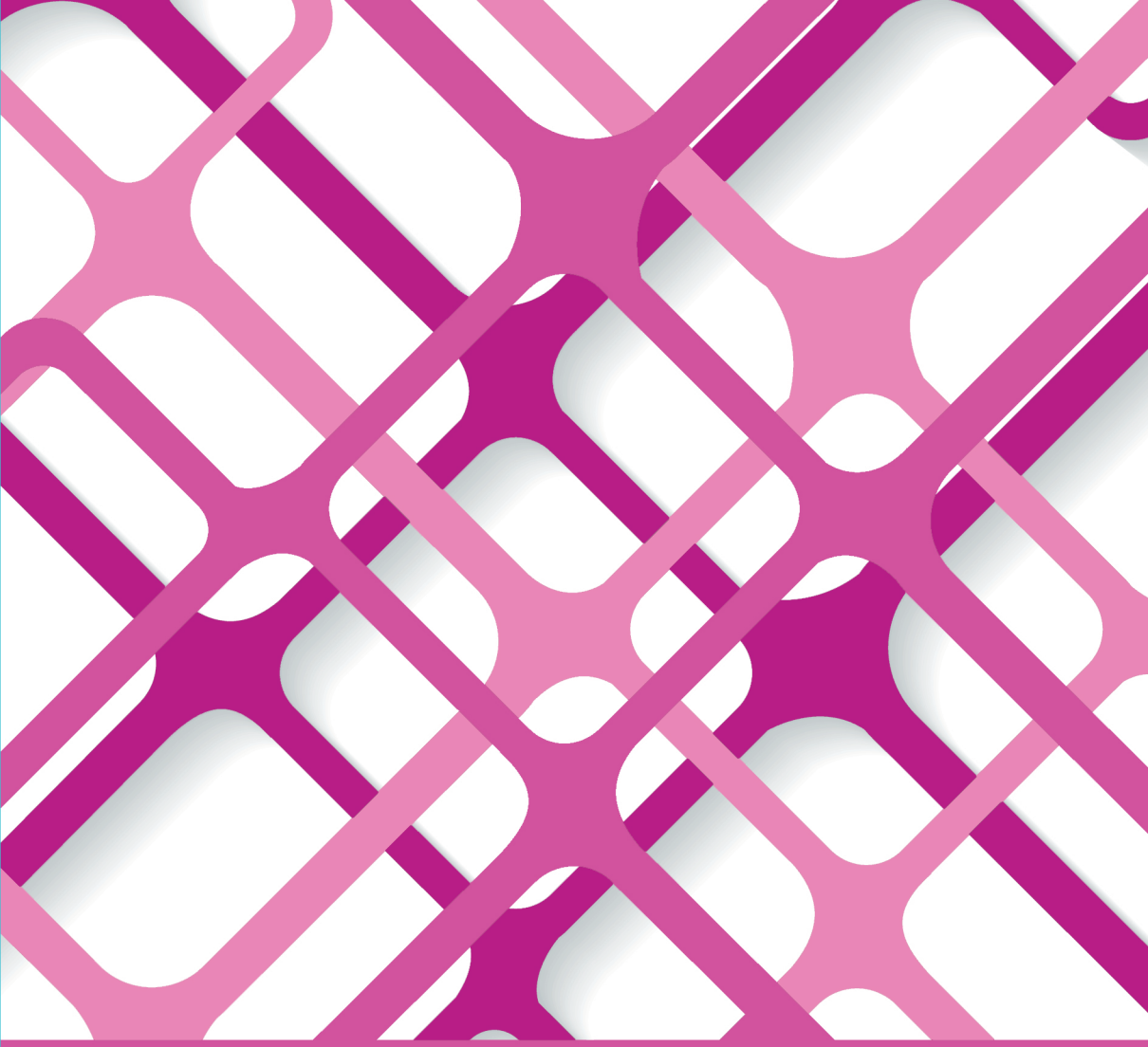

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ASSOC. PROF. DR. GÜLBİN ÇETİNKALE DEMİRKAN

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Chapter 1

USE OF WASTE ZIRCONIUM POWDER AS A PAINT ADDITIVE IN FACADE-SURFACE PAINTS IN ARCHITECTURE

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1. INTRODUCTION

Today, many studies are carried out on the evaluation of waste materials. The increase in the amount of waste as a result of the increasing human population in the world is an inevitable necessity. These wastes do not disappear spontaneously in the natural cycle. For this reason, the reuse of wastes, namely recycling, is indispensable in terms of preventing waste of resources, protecting the natural balance of the environment, and saving energy. Since the recycling process of waste is economically costly, the reuse of these waste materials in the form in which they are produced offers a more economical solution. In this respect, the reuse of waste can be used in many applications in the field of architecture, which aims to create sustainable spaces. It is possible to use waste materials in every field from mini-projects to macro projects realized by recycling waste in the field of architecture. In other words, it is possible to use waste in all kinds of architectural projects, from the smallest unit in architecture to the creation of public spaces, which are the largest urban elements. In this study, suggestions for architectural projects that can be realized with the reuse of Zirconium powder waste material, which is produced during production in various fields in the industry, are presented. It is known that zirconium is used in dental coatings or inner surface walls of nuclear reactors due to its non-conductive property of heat. As a result of this approach, it has been proved by the simulation that the zirconium powder mixed into the paint in architecture does not transfer heat to the interior when used on exteriors or that the room temperature does not decrease when used on sauna walls in luxury buildings. With the simulation made, solutions have been produced for the use of low-cost and sustainable materials that are not harmful to the environment, reduce environmental pollution, contribute to the reduction of the amount of waste.

The concept of waste defines all kinds of substances and materials that are not used, are not intended to be used, have no value, and are thrown out [1]. In all communities, people generate basic waste, which can be household waste consisting of fodder husks, animal manure, ash, broken tools, utensils, and old clothes. Such wastes can easily transform naturally in an agricultural society [2]. Today, however, more than half of the world's population now lives in cities and metropolises where non-agricultural activities take place. According to estimates, 66% of the entire population will live in the world's cities by 2050 [3]. The increasing number of people living in cities, urbanization and industrialization, and rapidly increasing and differentiating consumption habits have increased the amount and type of waste as well as many problems experienced in cities. Today's wastes are not domestic wastes that can be recycled naturally. Today's wastes include industrial wastes, medical wastes, etc. diversified into waste. The

increase in the amount of waste and the diversification of waste create environmental problems with the use of resources more than the capacity of nature [4]. The amount of waste generated annually in the world is 2.12 billion tons or more [5]. Most of the waste buried in landfills is at a level that can meet 10% of the world's electricity consumption and contains oil equivalent energy between 4-5 billion barrels [6]. It is known that natural resources are not endless and they may one day run out if they are not used carefully. Today, the reuse and recycling of waste have become mandatory in order to prevent the waste of resources [7].

The reuse of materials in the field of architecture has become a more important issue today with the sustainability movement that is popular in the world. While the waste materials used in architecture can be existing building elements such as construction wastes such as ceramics and bricks, they can be non-building materials such as plastic, pet bottles, glass bottles, paper cups, pallets, car tires, containers. Such waste materials can be used in all kinds of areas for architectural purposes.

2. WASTE MANAGEMENT AND RECYCLING

Sustainability of human existence on earth; Proper use of earth's resources, measures taken against environmental pollution, optimum architecture, and life-oriented urban policies, in short, can be achieved with nature-friendly solutions. future anxiety; has mobilized humanity to leave a clean, healthy and livable environment for future generations. For this purpose, importance is given to the efforts to reduce waste. Waste management is evaluated from the upper level to the lower levels. In other words, the first step is to prevent the formation of waste, and if this cannot be achieved, it is aimed to minimize the waste, that is, to minimize the waste material. If it is not possible to reuse the waste material, the last treatment to be done to the remaining waste is storage or incineration. Reuse in waste management is the use of the packaging for the same purpose until the end of its useful life, without undergoing any processing other than collection and cleaning, until the time when it is impossible to reuse the packaging in its own life cycle [8].

Energy recovery in waste management is the process of burning combustible wastes alone or together with other wastes in order to obtain heat and electrical energy. Compost Process in waste management is a recycling process with organic content. Composting is the biological decomposition of organic materials under controlled conditions. In the composting process, some organic materials are broken down by CO_2 and water. This process takes place at approximately 60-65°C and in specially designed sections containing around 80-90% humidity. After processing, the waste looks like a dark, fertile soil type. Thus, compostable waste is

used as fertilizer with this method. Recycling in waste management is the remanufacturing of waste materials as raw materials with various physical and chemical processes after use. Recycling ensures the protection of natural resources, saves energy, reduces the amount of waste, and the recycling process contributes to the economy.

The purpose of recycling; to prevent unnecessary use of resources, to separate waste at its source, and to reduce the amount of waste. Recycling and reuse of materials such as iron, steel, copper, lead, paper, plastic, rubber, glass, electronic waste prevent the depletion of natural resources. Recycling saves energy. For example, the reuse of used paper in paper manufacturing reduces air pollution by 85%, water pollution by 35%, and water use by 45% on average. By adding 1 ton of waste paper to the pulp, 8 trees are prevented from being cut. Since the number of industrial processes in the material obtained by recycling decreases, energy savings increase. In the recycling processes of metal beverage cans, the metal is directly melted and converted into a new product. Thus, there is no need for both the ore used for production and the processes applied for the purification of the mine. In this way, 96% energy savings are achieved from recycling an aluminum can. Similarly, when the paper obtained from solid waste is reused, it provides an energy advantage of 50%. Significant energy savings are also achieved by recycling glass and plastic waste. The energy-saving meant here means both the reduction in the number of processes and the decrease in the electrical energy consumed during these processes. [8-22].

Recycling is a productive economic investment in the long run. It prevents the emergence of economic problems as a result of the decrease in raw materials and the rapid depletion of natural resources. One of the purposes of recycling is to reduce environmental pollution as a result of reducing the amount of solid waste to be incinerated. It is important to reduce the amount and volume of solid waste, especially for countries with small surface areas that do not have enough land. Therefore, the most important step of the recycling process is separation at the source and collection by sorting.

3. MATERIAL

In this study, heat conduction was compared with the ANSYS program using the finite element method in a simulation environment for zirconium and iron. In this way, results based on scientific data will be reached about the heat transfer capacity of the surfaces in the use of zirconium powder as a paint additive in the field of architecture.

3.1 Finite element method

The finite element method is a numerical analysis method that is frequently used in engineering and mathematical models. The finite element method is especially used in problems of structural statics, heat transfer, fluid mechanics, mass transfer, and electric potential; The method is especially applied in solving two or three-dimensional partial differential equations and boundary value problems. [23].

The finite element method essentially divides a large system into smaller components called finite elements: this is accomplished by discretizing the space in which the equation is solved and dividing it into smaller regions. As a result of this formulation of the boundary value problem, a system of algebraic equations is obtained. This system is then solved with various methods such as the Rayleigh-Ritz or Galerkin method. In these methods, the results are obtained in terms of basis functions. [23-25].

Examination of a system with the finite element method is known as finite element analysis. The method was first proposed in the 1940s and began to be used in aircraft designs in the 1950s. [24, 25].

3.2 Material properties

When Table 1, which shows the properties of Iron and Zirconium comparatively, is examined, it is understood that additional advantages will be provided if Zirconium powder is used on roofs or any architectural facade. These advantages are [26-28];

- While the thermal conductivity of iron is 80.4 W/(m.K), the thermal conductivity of Zirconium is 22.6 W/(m.K). In other words, the thermal conductivity of Zirconium is 4 times lower than that of Iron. According to this feature, the surface of zirconium conducts heat very little. For example, in architecture, when a zirconium-mixed paint is applied to the wall inside the sauna, the heat loss in the sauna is reduced. One of the most important pieces of evidence supporting this view is that the inner surface of the combustion chambers in nuclear reactors is covered with a zirconium wall. In this way, the heat output out of the wall is at a minimum level.

- While the thermal expansion value of iron is 11.8 μm/(m.K) (at 25°C), the thermal expansion value of Zirconium is 5.7 μm/(m.K) (at 25°C). In other words, Zirconium undergoes a physical change by expanding about two times slower than Iron in the face of heat. Zirconium-coated or mixed products deform later. According to this feature, if sheet metal surfaces on architectural roofs or architectural facades are painted with zirconium mixed paint, sheet metal surfaces heat up in a long time. In

addition, since the expansion feature of zirconium provides 2 times more advantages than the iron surface, these surfaces can be used for a longer time.

can be sorted.

Zirconium;

- As the building material of nuclear reactors, directly in the combustion chambers of nuclear reactors, due to its corrosion resistance and low neutron absorption feature,
- Since the materials made of ZrO_2 compound in the aerospace and aviation industry are resistant to heat, in the parts of space vehicles,
- Combustion chambers, jet engine blades, and gas turbine blades exposed to high temperatures due to their high resistance to heat,
- Zirconium dioxide (ZrO_2) as a refractory material, used in casting mold processes that require high heat, metallurgical furnaces, in the construction of fire-resistant materials due to its high melting point, in the glass and ceramic industry,
- In the construction of many tools due to its corrosion resistance,

used [27]. In this study, the advantages of zirconium and iron materials were simulated using the finite element method in the ANSYS program. It was analyzed whether the results obtained in the simulation environment support the idea of using zirconium powder as a paint mixing material. Table 1 shows the comparative properties of iron and zirconium.

Table 1. *Comparative properties of iron and zirconium [26-28]*

Features	Iron	Zirconium
Physical state	Katı	Katı
Density	7.86 g/cm³	6.52 g/cm³
Melting point	1811°K	2128°K
	1538°C	1855°C
Boiling point	3134°K	4682°K
	2861°C	4409°C
Melting heat	13.81 kJ/mol	14 kJ/mol
Heat of evaporation	340 kJ/mol	573 kJ/mol

Heat capacity	25.10 J/(mol·K)	25.36 J/(mol·K)
Electrical resistance	96.1 nΩ·m (20°C)	421 n nΩ·m (20°C)
Thermal conductivity	80.4 W/(m·K)	22.6 W/(m·K)
Thermal expansion	11,8 μm/(m·K) (25°C)	5.7 μm/(m·K) (25°C)

3. METHOD

Metal sheets are used in exterior and roof coverings for design purposes, especially in architecture. Metal sheets are products made of iron ore. For this purpose, iron and zirconium materials were compared in terms of thermal conductivity in a simulation program. 2 rods made of iron and zirconium were analyzed in terms of thermal conductivity by finite element method. Iron and Zirconium bar were given equal heat and waited for a certain time. When thermal stability was achieved, temperature measurement was made for the other end (cold end) of the iron and zirconium bar. The heated ends of the Iron or Zirconium rods are called the hot end, and the end on the other side is called the cold end.

A simulation was carried out in the ANSYS Products 13.5 program for the temperature values of 673 K, 773 K, and 873 K, and the simulation results were compared for the 50 cm long bar made of Iron and the 25 cm Zirconium bar added to the 25 cm Iron that collects and heats the heat. It has been determined that the cold end side of the bar, which is formed by the combination of iron and zirconium, is about 29% less heated.

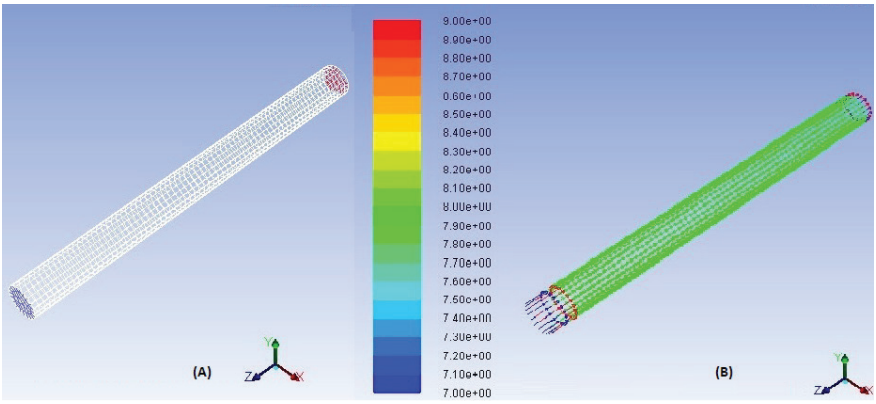
For this purpose, in the simulation carried out in the ANSYS Product 13.5 program, a 50 cm long bar made of Iron and a bar made of 25 cm Zirconium added to 25 cm Iron were compared in terms of heat conduction [23-25, 28].

For example, in the simulation carried out in the ANSYS Product 13.5 program, the welding temperature for a 50 cm long bar made of Iron was 673°K, while the cold end temperature reached 535°K after a short time. In yet another example, while the weld temperature was 773°K, the cold end temperature increased to 600°K and the cold end temperature increased to 660°K at 873°K welding temperature.

In order to prevent heat transfer in architecture, the welding temperature should be prevented from passing to the cold end side. For this purpose, the rod in the simulation is produced from two different materials, and for the heated end, Iron, a metal that collects the heat, is used, and for the cooling end, that is, the cold end side, Zirconium, which removes the heat from it immediately, is thought to be used.

For this purpose, in the simulation carried out in ANSYS Product 13.5 program, a 50 cm long cylindrical rod made of Iron and a cylindrical rod made of 25 cm Zirconium added to 25 cm Iron were compared in terms of heat conduction [39]. For example, in the simulation performed in the ANSYS Product 13.5 program, the welding temperature of the 50 cm long cylindrical bar made of Iron was at 673°K, while the cold end temperature reached 535°K after a short while. In yet another example, while the weld temperature was 773°K, the cold end temperature increased to 600°K and the cold end temperature increased to 660°K at 873°K welding temperature.

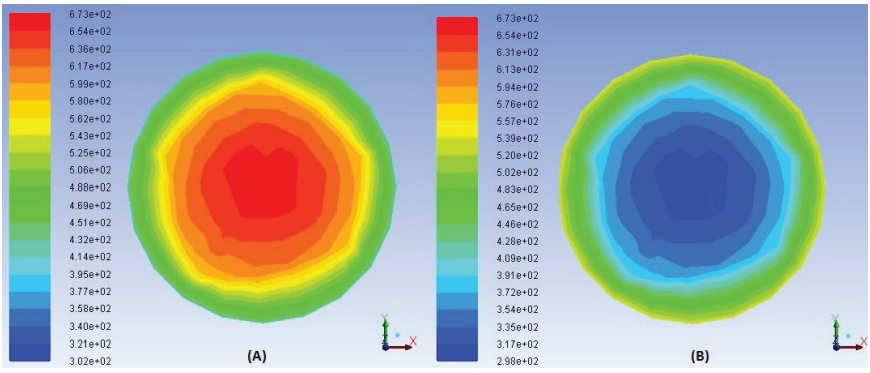
In other words, high welding temperature causes technical problems such as physical deformation, increased friction coefficient, and sealing problems. For high efficiency, the welding temperature should be prevented from passing to the cold end side. For this purpose, the cylindrical rod was produced from two different materials and added to each other. (25 cm of iron and 25 cm of zirconium). Iron, a metal that collects the heat on it, was used for the heated tip. Zirconium, which has a lower thermal conductivity coefficient, was used for the cold end side. In the simulation prepared by using the ANSYS program in Figure 1.a, meshing was performed for the cylindrical rod made of 50 cm Iron. In order to make the heat analysis of the cylindrical-shaped bar, the cylindrical bar was divided into approximately 300000 parts in the simulation environment. In this way, the temperature value of each desired point can be measured in detail. As seen in Figure 1.b, the process of heating the cylindrical bar was started [28]. Figure 1 shows the meshing and heating process for the cylindrical rod with the Finite Element Method.



(a) meshing process for cylindrical bar *(b) heating process of cylindrical bar*

Figure 1. *Mesh and heating process for cylindrical rod by finite element method*

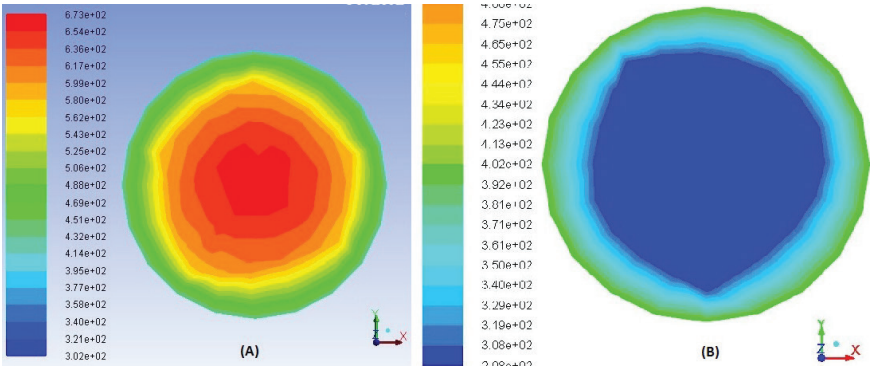
In the simulation study, a cylindrical rod made of 50 cm long Iron and a cylindrical rod made of 25 cm Zirconium added to 25 cm Iron were compared for the temperature values of 673°K, 773°K, and 873°K. While the hot end inlet temperature applied to the cylindrical rod made of 50 cm long Iron was 673° K, the cold end temperature was measured as 535° K. The hot end inlet temperature for the displacer pipe made of Iron at 673° K can be seen in Figure 2.a and the cold end temperature of the displacer pipe made of Iron at 673° K can be seen in Figure 2.b. Figure 2 shows the hot end inlet and cold end temperatures of the cylindrical bar made of Iron at 673°K.



a) Hot end inlet temperature *b) Cold end outlet temperature*

Figure 2. *Hot end inlet and cold end outlet temperatures of cylindrical bar made of Iron at 673°K*

The temperature change graph of the analysis made in the ANSYS program for the cylindrical bar made of 50 cm Iron at 673° K is shown in Figure 2. When the change in Figure 2 is examined, it is seen that the cold end temperature of the cylindrical bar is 535° K. In other words, it is seen that the inlet temperature has decreased by 138° K and is still at a high-temperature value. The hot end inlet temperature applied to the cylindrical bar made of 25 cm Iron (hot end) and 25 cm Zirconium (cold end) was measured as 673° K, while the cold end temperature was 535° K. For the displacer pipe made of Iron at 673° K, the hot end inlet temperature can be seen from Figure 3.a and the cold end temperature from Figure 3.b. Figure 3 shows the hot end (inlet) and cold end (exit) temperatures for a cylindrical bar made of 25 cm Iron and 25 cm Zirconium at 673°K.



a) Inlet temperature of 25 cm Iron cylindrical bar b) Cold end outlet temperature for 25 cm Zirconium cylindrical bar

Figure 3. *Hot end (inlet) and cold end (outlet) temperatures for cylindrical bar made of 25 cm Iron and 25 cm Zirconium at 673 °K*

The temperature change graph of the analysis made in the ANSYS program for the cylindrical bar made of 25 cm Iron (hot end) and 25 cm Zirconium (cold end) at 673°K is shown in Figure 4. When the change in Figure 4 is examined, it is seen that the cold end temperature of the cylindrical bar made of Iron and Zirconium is 383°K. In other words, the inlet temperature decreased by 290°K and it was observed that the lower temperature value was decreased.

The unheated, ambient temperature state of the cylindrical bar made of 50 cm Iron in the ANSYS simulation program is shown in Figure 5.a, and the cylindrical-shaped bar heated at 673 °K is shown in Figure 5.b. In Figure 5.c, the temperature change of only the 25 cm Zirconium part of the cylindrical bar made of 25 cm Iron and 25 cm Zirconium is shown. When Figure 5 is examined, it is observed in Figure 5.b that the outer wall of the cylindrical bar made of 50 cm Iron turns into a red color, which is a high-temperature expression, after the heating process. However, as can be seen in Figure 5.c, it is seen that the cold end side made of Zirconium only has a red color, which represents the high-temperature values of the 5 cm part made of Iron, which is in contact with the hot end. While the other 20 cm apart on the cold end side is orange, the yellow-green color, which is accepted as a low-temperature expression, is seen at the far end [28]. The temperature changes for the cylindrical rod in the simulation environment are shown in Figure 5.

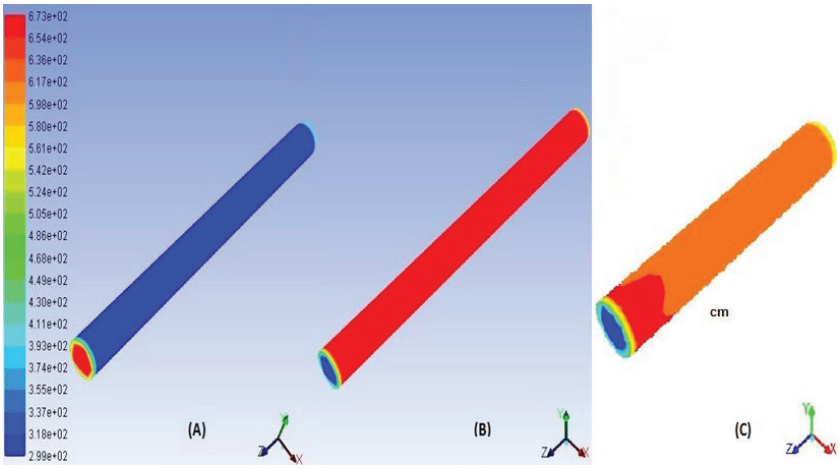
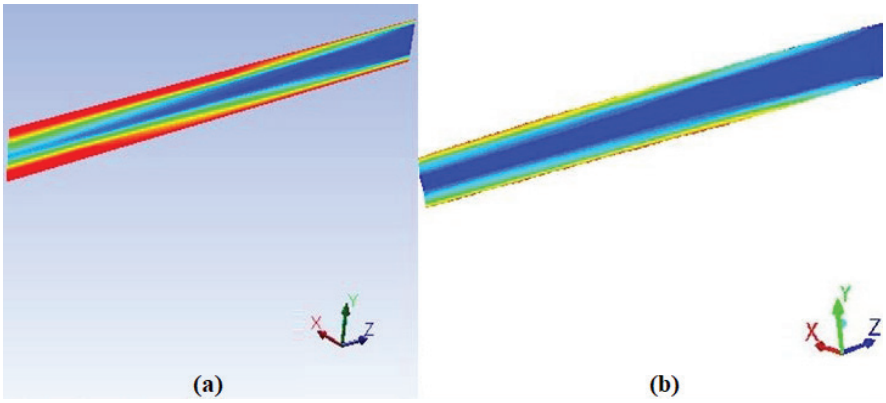


Figure 5. *Temperature changes for cylindrical bar*

This temperature change is shown in Figure 6 from the cross section of the cylindrical bar. In the side section view of the 25 cm cold end side of the cylindrical bar made of Iron in Figure 6.a, it is seen that the high-temperature expression red color continues until the end of the cylindrical-shaped bar. High-temperature values can be seen in Figure 6.a. Meanwhile, the cold end temperature measured in the simulation environment from a cylindrical bar made of 50 cm Iron is 535°K. However, as can be seen in Figure 6.b, it is seen from the side section view of the 25 cm cold end section of the cylindrical shaped bar made of Zirconium that the cold end temperature of 25 cm does not continue until the outlet end. It is seen that the blue color, which symbolizes low temperature, continues until the end of the cylindrical bar, the yellow-green color is dominant on the outer wall and the red color is not seen at all [28]. Low-temperature values can also be seen in Figure 3.b and Figure 6.b. Meanwhile, the cold end temperature measured in the simulation environment from the cylindrical bar made of 25 cm Iron and 25 cm Zirconium is 383°K.



a) Cold end made of Iron *b) Cold end made of Zirconium*

Figure 6. *Side section view of cold end for Iron and Zirconium*

In the simulation program, at 673 °K, the temperature difference between the hot end and the cold end on the cylindrical bar made of Iron is 138 °K, with a length of 50 cm. The temperature difference between the hot end and the cold end was measured as 310 °K for the cylindrical bar with 25 cm Iron on the heated side and 25 cm Zirconium on the cold end at 673 °K (total length again 50 cm) [28]. It is seen that the bar with iron raw material conducts heat. The temperature difference between the heated end and the cold end is low. The rapid heating of the relevant material is a disadvantage for the environments-surfaces that are the subject of this study in the architectural field. It is seen that zirconium provides an advantage in heat conduction, that is, it conducts heat less and traps heat on its surface. In this respect, it is understood that the use of zirconium powder, which is a waste material, as a paint additive material will provide an advantage on sauna wall surfaces, architectural facade surfaces, and roof surfaces.

5. CONCLUSIONS

As a result of urbanization, rapidly increasing and differentiating consumption habits have increased the amount of waste in the world and changed the types of waste. These wastes may not be wastes that can disappear spontaneously in nature. Therefore, the recycling of such wastes is important. Recycling should be applied for the recovery of wastes. However, even in the recycling process of waste, energy is consumed and costs are incurred. The reuse of waste is an important issue in the field of architecture, which aims to create sustainable spaces. When the projects created by the reuse of waste in the field of architecture are examined, it is seen that such materials can be used in all kinds of fields.

When the example of the reuse of waste materials is examined within the scope of this study, it is seen that environmentally friendly structures are produced in the use of low-cost and sustainable materials and the amount of waste to be released to the environment decreases.

In order to predict the advantages to be obtained in the use of Zirconium powder, which is a waste material, as a paint additive material, a simulation was made in the ANSYS program using the Finite Element Method. With the simulation made, it was observed that the heat conductivity of the zirconium material is low. Accordingly, it has been understood that zirconium powder, which is a waste material, will be advantageous in the architectural field if it is used as a paint additive. Because it has been understood that waste zirconium powder will conduct heat less when used as an additive in paint in architecture, facade cladding, sauna wall surfaces, and roof coatings. In this way, it has been proven by simulation that more comfortable, human-oriented, and sustainable environments will be created in buildings.

As a result, in the field of architecture, which is intertwined with different disciplines and has a wide application area, the recycling of wastes and the reuse of wastes prevent unnecessary use of resources. As seen in this study, recycling of waste prevents the depletion of natural resources, reduces the amount of waste, saves energy, prevents environmental pollution, and contributes to the economy through reuse.

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REFERENCES

[1] Şahin, S. ve Hatunoğlu, Z., 2016, Geri Dönüşüm Sistemlerine Yönelik Algı Düzeyi, Finansman ve Muhasebeleştirilmesi: Kahramanmaraş Sütçü İmam Üniversitesi Örneği, Ekonomik ve Sosyal Araştırmalar Dergisi, 12 (12), 2016.

[2] Taufiq, T., 2010, Characteristics of Fresh Municipal Solid Waste, The University of Texas.

[3] United Nations, 2014, World Urbanization Prospects (2014), web sayfası: https://www.compassion.com/multimedia/world-urbanization-prospects.pdf, erişim: 11.08.2021.

[4] Palabıyık, H. ve Altunbaş, D. 2004, Kentsel Katı Atıklar ve Yönetimi, Çevre Sorunlarına Çağdas Yaklaşımlar, Editörler: Ugur Yıldırım–Mehmet C. Marin, Beta Basım Yayım, İstanbul.

[5] http://www.theworldcounts.com/counters/shocking_environmental_facts_and_statistics/world_ waste_facts, erişim tarihi: 11.08.2021.

[6] Yetim, A., 2014, Geri Dönüşüm Sektörünün Dünyadaki Genel Görünümü ve Türkiye'deki Durumu, http://www.izto.org.tr/portals/0/argebulten/gerid%C3%B6n%C3%BC%C5%9F%C3%BCmsekt%C3%B6r%C3%BC_ahmetyetim.pdf, erişim tarihi,02.08.2021.

[7] Anonim, 2018, Geri dönüşüm: www.obi.bilkent.edu.tr/ekookul/pdf/geri donusum, erişim tarihi: 29.07.2021.

[8] Tandoğan, O. Atık Malzemelerinin Mimaride Kullanımı, Ulusal Çevre Bilimleri Araştırma Dergisi, 2018, 1(4), pp. 189-202

[9] Bayram, G., Kazanasmaz, Z. T. Simulation-Based Retrofitting of an Educational Building in Terms of Optimum Shading Device and Energy Efficient Artificial Lighting Criteria, Light & Engineering, 2016. V24, #2, pp. 45-55.

[10] Yıldırım, S., Yapıcı, I., Atiç, S.,Eren, M., Palta, O., Cengiz, Ç., Cengiz, MS., Yurci., Y. (2017) Numerical Analysis of Productivity and Redemption Periods in Illimunation, Imeset Book of Abstracts, Int. Mult. Sci. Eng. Tech., 1 (1), pp. 12-14.

[11] Kaynaklı, M., Palta, O., Cengiz, Ç. Solar Radiation and Temperature Effects on Agricultural Irrigation Systems, Bitlis Eren University Journal of Science and Technology, 2016, 6 , 1, pp. 53-58.

[12] Onaygil, S., Güler, Ö. Determination of the Energy Saving by Daylight Responsive Lighting Control Systems with an Example from Istanbul, Building and Environment. 2003. V38, #7, pp. 973-977.

[13] Efe S. B., Cebeci M. Power Flow Analysis by Artificial Neural Network. International Journal of Energy and Power Engineering, 2013. V2, #6, pp. 204–208.

[14] Gencer, G. Eren, M. Yildirim, S. Kaynaklı, M. Palta, O. Cengiz, M.S., Cengiz Ç. Numerical Approach to City Road Lighting Standards, Imeset Book of Abstracts, Int. Conf. Mult. Sci. Eng. Tech., 12-14 July 2017 Baku.

[15] Öztürk, L. The effect of luminance distribution on interior perception, Architectural Science Review. 2003. V46, #3, pp. 233–238.

[16] Ünver, R. Kentler, Işık ve Enerji Verimliliği, 10. Ulusal Aydınlatma Kongresi-ATMK, ISBN: 978-975-561-459-5, 2015, 33-36.

[17] Mutlu, Ş., Kurtay, C. Determination of Priority Urban Elements for City Lighting Master Plan, SETSCI Conference Indexing System, 2018. V3, pp. 641-644 ISAS 2018-Winter, Samsun, Turkey.

[18] Kılıç, Z.A., Köknel Yener, A. Re-Thinking lighting system design based on visual comfort and energy performance, Journal of Construction Engineering, Management & Innovation, 2019, 2 (4), pp. 191-203.

[19] Aykal, F.D., Gümüş, B., Ünver, F.R., Özgür, M. An Approach in Evaluation of Re Functioned Historical Buildings in view of Natural Lighting A Case Study in Diyarbakir Turkey, Light and Engineering. 2011. V19, #2, pp. 64–76.

[20] Ünver, R., Öztürk, L. Değişik yapı yüzeylerinin aydınlatılmasında temel özellikler, şehir aydınlatması kolokyumu. Kocaeli: TMMOB Elektrik Mühendisleri Odası İzmir Şubesi, 1992.

[21] Cengiz, Ç., Kaynaklı, M., Gencer, G., Eren, M., Yapici, İ., Yildirim, S., Cengiz, MS. (2017) Selection Criteria and Economic Analysis, International Conference on Multidisciplinary, Science, Engineering and Technology Bitlis Book of Abstracts,1 (1), pp. 27-29.

[22] Efe S. B., UPFC Based Real-Time Optimization of Power Systems for Dynamic Voltage Regulation. Computer Modeling in Engineering & Sciences, 2018. V116, #3, pp. 391–406.

[23] ANSYS-Simulation Driven Product Development (ANSYS 13.5). 2015. www.ansys.com (on-line Access on 6 May 2015).

[24] Zienkiewicz, Olek C., Taylor, Robert L., Zhu, J. Z. (2013). The finite element method: Its basis and fundamentals. Butterworth-Heinemann. ISBN 978-0-08-095135-5.

[25] Jin, Jian-Ming. (2014). The Finite element method in electromagnetics. Wiley-IEEE Press. ISBN 978-1-118-57136-1.

[26] Zirconium. 2012. https://en.wikipedia.org/wiki/Zirconium (on-line Access on 4 Aug, 2021).

[27] Demir. 2012. https://tr.wikipedia.org/wiki/Demir (on-line Access on 4 Aug, 2021).

[28] Cengiz, M.S. 2016. Stirling Motorlu Güneş Takip Sisteminin Tasarımı ve Fotovoltaik Panel Sistemiyle Verim Yönünden Karşılaştırılması, İnönü Üniversitesi Fen Bilimleri Enstitüsü. Doktora Tezi-2016.

Chapter 2

A PERIODIZATION PROPOSAL FOR A LEVANTINE HOUSE

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1. INTRODUCTION

A study for the restoration project of a historical house has been completed in April 2020. Three reports were prepared, first for the measured drawings illustrating the existing situation in detail, second for the restoration to explain the renewal principals and the third for the restitution project to understand the thresholds in the history of building. This article is the sum of restitution report constituted of researching, tracing, and reading the building. So, it needed a considerable amount of data collected and classified at the beginning, then a periodization proposal at the end. The aim of the study is to find what was changed in each period of the building. In this manner, not the building itself only, but the period's historical developments were the inputs also. Therefore, one has been always in correlation to the other in the text. Since the house might be constructed about 1875 and the study needs to include a timeline until now, it is scoped into approximately a 150 years period. As it is explained widely below, this period has witnessed the bright years of Levantine tradesmen in Ottoman Empire, then the establishment years of Turkish Nation State and 80's greed of building apartments.

2. METHOD OF THE STUDY

Data collection method of this study is partially the literature review. Academic sources on Karşıyaka Market Street and Levantine Houses of İzmir were the most helpful ones. Yet, it would not be sufficient without the data acquired from the old and new photographs of the building. Besides, drilling and taking out a piece of the overcoated layers on the floors, walls and ceilings, is made to find and analyze the original material. Because they are the sure signs, old photographs and drilling are in the first line of reliable data classification table. There are also official documents from and to the user, Karşıyaka Municipality and Conservation Council, which are in the second line. Evaluation of data, in other words, periodization method is the comparative analysis. In the first step, the properties of plan and facade were checked to understand the type of house. Since the historical developments are the main determinants to define the periods and thresholds in the history of building, four periods were noted as a draft in the second. In the third, two blocks of the twin house were compared to each to clarify what is similar and what is different, so what is changed and what is not. This has been conducted via the survey of traces of a removed building component or an addition conflicting to the plan order. In line with that, atypical spaces and elements which might need a correction by the reason of architectural necessity has also been evaluated. In the fourth step, all modifications and repairments were correlated to the periods and vice versa. It should be mentioned that the periodization is an interpretation eventually. That is why, it should be mentioned that there might have been more periods defined from a different point of view.

3. LEVANTINES AND LEVANTINE COMMUNITY IN İZMİR

Levantine is a French term articulated from the word Levant, means rising and sunrise, addressing to the east. By the general definition, Levantine refers to the people coming from a European family and settling to certain cities in Turkey as an Eastern Mediterranean country. Among the others, Istanbul and İzmir were the cities most preferred. Oban stated that Levantine culture was different than both Europeans and other minorities in the multi-ethnical structure of Ottoman Empire (Oban, 2007). Members of this community are English, Italian, French, Hungarian and Slav. So, Levantines as a community of tradesmen from various European countries settled and stayed on Ottoman lands for generations. Çelik mentions that they have either kept the social and cultural values of origin or blended them with the values of Ottoman society (Çelik, 2016). It is a fact that they have created a unique culture of their own.

At the end of 16th century, Levant Company had been established so as to trade between British and Ottoman Empires. Then Europeans, first English, later French, Italian, German, Austrian and Dutch tradesmen came to Ottoman lands. In time, their population increased in Istanbul, İzmir, Beirut, Cairo and Mersin which are coast cities appropriate for maritime trade. By the Royal Edict of Reform in 1868, they were given the right to own property with which they became permanently settled. İzmir was a cosmopolitan city where Levantine, Muslim, Greek, Armenian and Jewish communities live together by the 19th century. Since it has been a significant port and trade city in its historical development process, ethnicity based quarters are clearly seen in urban form. The map below indicates five main quarters on different regions of the city (Fig. 1). Most of the Levantines in İzmir were living on Frank Street, the city center or nearby, especially at the early years.

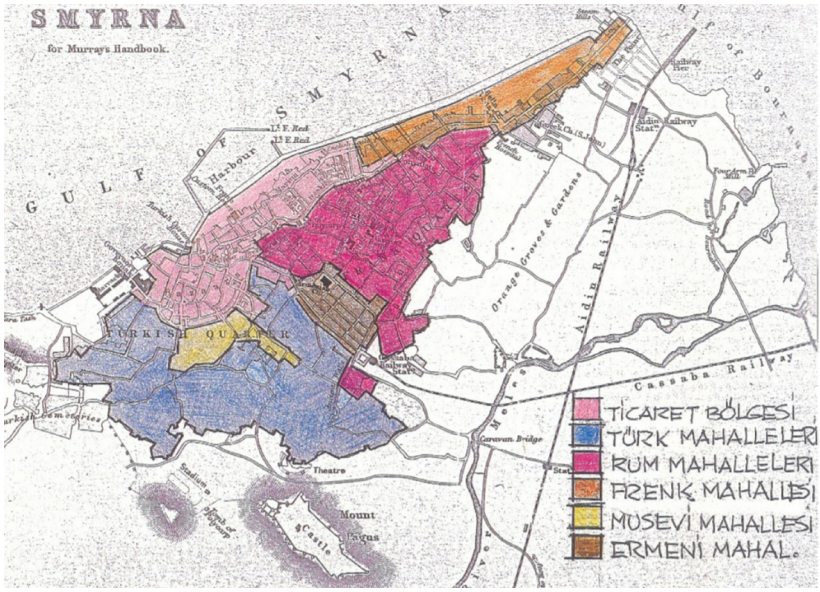

Figure 1. *Ethnicity based quarters of İzmir at the mid of 19th century, Rauf Beyru.*

In later years, related to the developments in public transportation, particularly railways, wealthy Levantine families moved to the outside of city center, to Bornova, Buca, Hacılar, Işıklar, Karşıyaka, Kokluca, Mersinli, Narlıkoy, Pınarbaşı and Gaziemir. They have got the houses built which are accessible by the railway and private horse-drawn carriages. The law code on property right has been the starter to move to these regions. Inal as well, explains that İzmir became one of the most important cities for Levantines with the development of railways in 1860's and the property right of 1868 (İnal, 2006). Increasing volume of trade between İzmir and Europa might ease the tradesmen to settle permanently.

4. KARŞIYAKA AND THE HISTORICAL BACKGROUND OF MARKET STREET

The region at the other side of İzmir Bay, one of the town centers of the city has been named as Karşıyaka by the Muslims and named as Kordelya, Cordelio, Peraia, Pera-meria or Pera-khorion by the minorities such as Levantines, Greeks and Armenians until the Republican Period of Turkey (Fig. 2). It was a marshy land with reeds as a part of Gediz Riverbed at the west even in 1860's. The coastline was extending to the skirts of Yamanlar Mountain through Çiğli and Menemen settlements at that period. Karşıyaka had become prominent as a picnic area and an excursion spot with its greenery and Yamanlar Forest sloping down to the

seashore. The railway constructed in 1865 triggers a rapid development in Karşıyaka. There were 832 houses, so approximately 4160 people were living in the region according to the state registrations of 1891. Navigations to the wooden quay in Karşıyaka by Hamidiye Lines established in 1884, has caused a jump in growth rate (Erdoğmuş Manav, 2014). There was a duality in the urban pattern of the region in these years. Levantines and foreign tradesmen have bought building lots along the coastline and started to construct houses and mansions, whereas Soğukkuyu District was opened to the physical development for the Muslims by the Cretan Hüseyin Hilmi Pasha, the local commander of İzmir. The first mayor of Karşıyaka, Çömezzade Hacı Mehmet Efendi has constructed Soğukkuyu Mosque in 1874. Seaside mansions of Levantines were being used mostly as summer houses in this period and the coastline was quite crowded and entertaining on Sundays. Bostanlı District, named as Papa Scala or Papas Village, was another quay to load the melon and watermelon to the ships, brought from a nearby settlement Menemen.

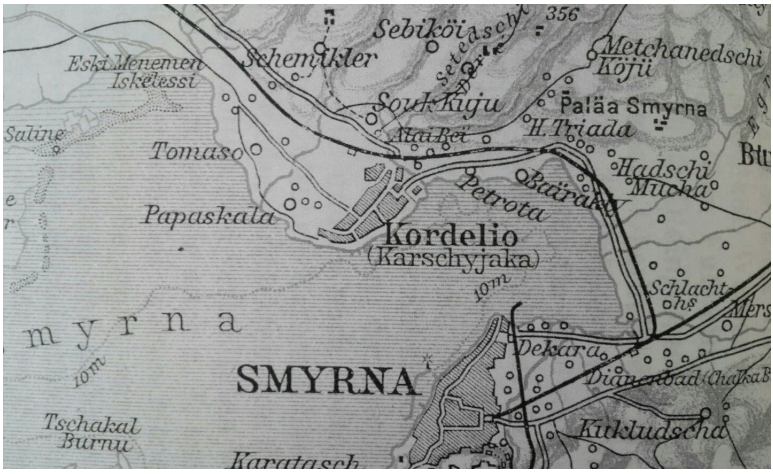

Figure 2. *Karşıyaka at the other side of İzmir Bay.*

Defined by the retail shops on both sides of a road, Karşıyaka Market Street is an easily walkable distance for pedestrians from the quay to the railway station. It is a medium sized trade center accommodating the primary functions of daily life such as apparel, shoes and food (Özsu, 2006). First tram line was the turning point in the development process of Market Street. Starting from 1906, this line was in service on the route departing from Karşıyaka quay, passing through the street and arriving at Soğukkuyu. Two new lines, one is to Bostanlı and the other is to Naldöken, have been opened in 1907.

Retail shops in the Market Street have been keeping by Levantines and non-Muslims in 1919. Documents are pointing out that the street was comprised of one or two storied buildings at the beginning. Buildings on this axis were formed starting with the 19th century and the ground floors of the buildings were being used for trading and upper floors for housing (Fig. 3). Later on, by the increase in population, upper floors were turned to commercial use (Özsu, 2006). Migration waves from the rural areas to the cities in 1950's and 1960's, speeded up in 1970's, was the main reason of an excessive development in Turkey. Related to that and within the context of Karşıyaka Market Street, high density based master plans and the rapid development of 1980's, moved this change on an extreme end. Most of the buildings were removed and apartment type multi storied buildings were constructed. Last important decision in the history of street was the road to be closed for pedestrians.

Figure 3. *Karşıyaka Market Street in 1930's.*

5. LEVANTINE HOUSES IN KARŞIYAKA

Levantine houses in Karşıyaka which was a summer houses settlement, have the same architectural properties with the houses of Levantines in İzmir. Houses in Karşıyaka, on the main roads and Coastline Street are row houses. There are big single houses in gardens at the backwards of urban pattern (Fig. 4). Row houses are not big, building lots are mostly rectangle shaped and almost all are with small backgardens. All plan types are with the side hall except for two houses. Four house types are mentioned in Akyüz's classification, considered according to the facade typology and number of stories (Akyüz, 1993).

Figure 4. *Row houses on the coastline of Karşıyaka.*

5.1. Type I: Single Story

Only one house is encountered in this type. There is an entrance door at the mid of the front facade, which creates a symmetry line, and two windows with jambs on both sides.

5.2. Type II: Basement + Ground Floor

This two stories house type has an English basement, which the lower half of the basement height is in the earth and upper half is at the above, and a ground floor. A semi-open landing was created in front of the entrance door, which is about a meter inside from the front facade. The landing is accessed from the pavement with a couple of turning steps. Steps and landing are with a wrought iron handrail. There is no stair between the stories and both are entered by separate doors. Entrance door is at the one side and windows are at the other side on the facade. Some houses in this type, because their basement heights are very less, so not functioned, their steps from the pavement to entrance door do not turn, but straight. Therefore, no landing is existed usually or quite small. Entrance door niche and the two windows order is the typical order of the facades.

5.3. Type III: Ground + First Floor

There are houses with ground floors at the same level with the pavement as well as the others with a level difference in this type and no basement. However, since the level difference is less, so the number of steps is few compared to Type II. Houses, both with bay windows and

without, are included in this type. If there is, the bay window might be at the mid or at any side of the facade.

5.4. Type IV: Basement + Ground Floor + First Floor

Type IV is comprised of Type III and a basement, and mostly bay-windowed. Entrance door is in a niche like in other house types. It is accessed by a few steps and then to the entrance hall. The reason why entrance doors are always at one side of the facade, is the Levantine houses in Karşıyaka are with the side hall plan, no central hall is detected. Basement is opened to the backgarden in some of the houses.

The case of this study, the Twin Mansion in Karşıyaka is identified as a Type IV house in Akyüz's classification and Özkan's thesis (Fig. 5) (Akyüz, 1993, Özkan, 2006).

Figure 5. *The Twin Mansion on Karşıyaka Market Street.*

6. COMMON PROPERTIES OF FACADE ELEMENTS

Entrance door in every house is placed inside of a semi-open niche on the facade. This space is usually framed by stone jambs. There are gypseries on side walls and on ceilings in some houses. Wrought iron plant ornaments on the two winged entrance doors are notable.

All windows are jambed, rectangle shaped, and the proportion is 1 to 2 or 2 to 3 in general. Window with a triangle lintel is a unique example seen only on the facades of Twin Mansion. Although the windows are rectangle, not arched, there is a fake key stone at the mid of every lintel. In some houses, window jambs are extended down to the molding level on the facade so as to have boards. Ornaments are applied on those boards

in many houses. Almost all the windows are with the shutters, mostly of sheet metal on the ground floor windows and of wood at the upper floors (Özkan, 2006).

All bay windows are constituted of three modules and constructed of wood. They are the most elaborated elements of the facades, supported by three or more wrought iron buttresses. Boards underneath the windows, are usually ornamented. Zinc plated bay window roofs have an extension to out approximately 20 cm. The moulding here is a series of wooden pouldrons tiled with a certain distance in-between.

Mouldings can be classified as roof mouldings and floor mouldings according to the place on the facade. Almost all the roof edges are ended with mouldings. They are mainly bricks placed side by side in two overlapped rows, one on the top of other, in many houses. Floor mouldings are simple than roof mouldings generally. However, floor mouldings of the Type IV are more elaborated. Finally, corner profiles on the facade, are normally made of cut stones coated in vertical rows and nearly all are ended with simple headings.

7. THE TWIN MANSION

Twin Mansion in Karşıyaka is a historical building on the Market Street, registered in the Conservation Council records as a twin house with its two separated entrance doors. The one at the corner is named as A block and the other as B block within the scope of restoration project. This typical two stories Levantine house seems to be modest with its simplicity of wooden stairs and railings, and plainness of ornaments like the ceiling roses. Since the building is actively used, it can be mentioned that it was well preserved. On the other hand, it should be noted that there are harmful additions to the building such as toilets and the room behind the annexes of A and B blocks, and the single-story storage room at the back garden of B block on the ground floor. Also, the spaces coded as BEK101, BEK102 and AEK101 next to the first floor of both annexes, and the archive room BEK201 on the first floor of B block are the additions gradually damaging the building in terms of the decay and loss of original material (Fig. 6, 7). Besides, new wooden ceiling and floor planks and wainscots of the interior walls, cable trays, connecting pipes and inlets and outlets of air conditioning, all are defacing the building.

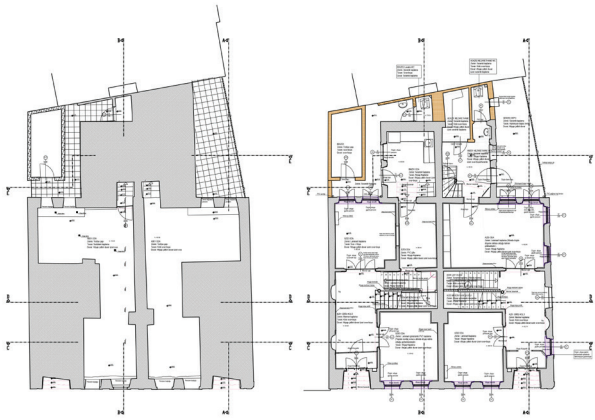

Figure 6. *Basement (left) and ground floor (right) plans.*

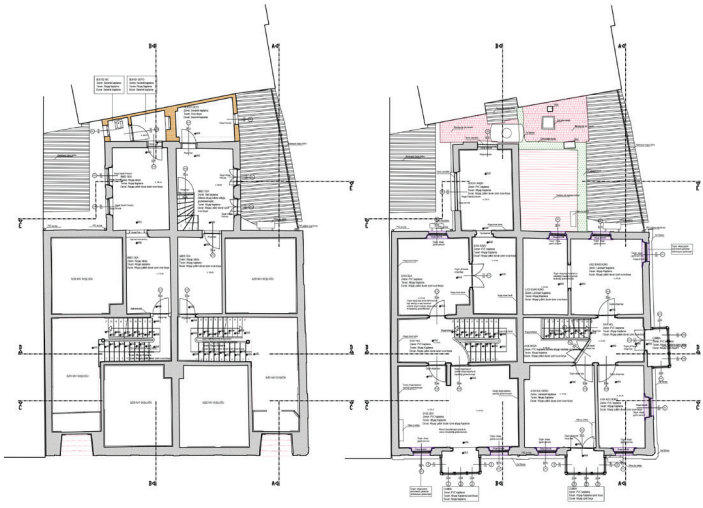

Figure 7. *Annex (left) and upper floor (right) plans.*

Furthermore, the big single room AZ05 was the two separated rooms at the time of first built, service and dining rooms. Since there is a remarkable height difference in this space and the twin has two rooms at the same part, it is understood that the wall here was removed. Similarly, the big room B102 on the first floor of B block was the two rooms and most of the wall might be taken out in a later period. Lastly, there is a platform on the first floor of A block, covering the first flight of U shaped stair. These endamage the plan order of the building.

8. PERIODIZATION

8.1. First Period: The last quarter of 19. century - 1925

The first railway which was opened in 1865, navigations to the wooden quay began in 1884 and the summer houses built by Greek and Armenian minorities and Levantines starting from the second half of 19th century are indicating that Karşıyaka had been rapidly developing at that period. In parallel to this, Market Street was being formed from the quay to the railway station, by the one two story buildings in a row on both sides. Thus, the Twin Levantine Mansion with two blocks, each has a main part with a basement, ground and first floors, and an annex with a ground and a first floor called as mezzanine floor in the project, might be constructed at the last quarter of 19th century. The first 50 years after construction can be considered as the first period of building. The fall of Ottoman Empire, Turkish independence war, the big İzmir fire in 1922 and the establishment of Turkish Republic were signifying a new period is starting. That is why, although the building was kept more or less well, a bay window was damaged only, since the most of minority house landlords had to leave İzmir, ownership of the property was changed. It is known that the building was given to a governmental agency in 1930's. A picture from that time might be the proof of damaged bay window on the front facade (Fig. 8). Briefly, the end of first period is about 1925.

Figure 8. *Front facade of the building from 1930's.*

8.2. Second Period: 1925 - 1987

After the establishment of Nation State, population in Karşıyaka has been acceleratingly increased mainly as a result of drain swamping between 1925 and 1950. There were grocery and haberdashery stores, tailors, shoemakers, pharmacy, bakeries, and patisseries on the Market Street. Migration waves started in 1950's and speeded up in 1970's has caused an unbounded development resulted with shanty towns and apartment blocks. This has transformed the Karşıyaka urban pattern in a radical way. A lot of historical buildings on the Market Street were removed and new high density building were constructed in the process (Fig. 9). But the twin house has survived in this destruction probably because of being used by the government. As it can be seen in the photo mentioned above, the wooden window shutters of the first floor are original, however the bay window on the facade of B block is demolished and used as a balcony. Windboxes at both block entrances might be added at this period. Development plan of 1984 opened another page in the transformation process of region and the street. Building permission was 7 stories on the coastline and 4 stories at the backwards (Özsu, 2006). It was raised to 8 and 5 means one floor more for the existing buildings as well as the new ones, by the plan and municipality board decisions. Unfortunately, this was a breaking point in mentality that any rule can be changed. To summarize, it was recorded that the B block of twin house has been used by General Directorate for Apprenticeship and Non-Formal Education and A block by the Tax Department from 1987. Hence a new period begins, the years between 1925 - 1977 can be identified as the second period of the building.

Figure 9. *Karşıyaka Market Street in 1977.*

8.3. Third Period: 1987 - 1993

Despite the fact that conservation started in 1970's, it was not efficient enough at the beginning and many registered buildings could not be saved until now. Especially in 1985, most of them were demolished as a result of a decision that, many houses were taken out of the registrations list. Almost all additions and changes clearly seen today might be done in that period most probably. Six photographs from a report dated to the last years of the period, draw the portrait of what were changed (Fig. 10). Hereunder, there are wooden shutters only at the first story window of the back facade of A block and iron sheet shutters at many windows of the ground floor. It is understood that the bay window of the B block front facade had been rebuilt and a parapet wall was put up on the A block annex. Furthermore, the octagon shaped skylight at the B block staircase and the archive room at the A block staircase are clearly seen. BEK201 coded room, AEKZ01, AEKZ02, BEKZ02 spaces on the ground floor and BEK101, BEK 102 and AEK101 spaces on the mezzanine are contemplated that they are the additions indicating the period's greed of building. Likewise, wooden planks in many rooms and the wainscots on the walls and ceilings do matchup with the preferences of period. As a conclusion, third period was the worst period in the history of building which was mauled a lot.

Figure 10. *Photos from the beginning of 1990's.*

8.4. Fourth Period: 1993 - 2020

The single-story addition, functions as a locker room today, at the B block back garden, and a room converted with an addition to the ground floor of A block annex as well, might be built at the early years of this period. Later, official letters, even some goes back to 1987, but many are from 2000's, requesting changes and additions are found in the archives. These are about the permission for existing toilets and kitchen which do not meet the requirements, to be modified. Also, a group of them are related to the roof which leaks and damages the structure needs to be reconstructed. However, because they are not within the scope of maintenance and repair, all were rejected, and a Restoration Project was demanded. In short, conservation procedure was activated and therefore, it can be mentioned that the house was not changed in the last 20 - 25 years.

CONCLUSION

This study draws the picture of a Levantine house by a periodization or a timeline in other words, which is divided in four periods. Each period is briefly illustrated with the changes in the region and the major historical developments of the country as well, and because all constitute a basis, what were changed in the house are correlated with them. As a result, it can be mentioned that the first period, the first 50 years was the golden years not only for the house but also for the city and Karşıyaka Market Street. Second period was not harmful on the house except for some small additions and removals, although an era closed and a new one opened in the country and the ownership of the property was changed. Third was the worst period in the history of it due to the development plan of 1984 which caused a building rush, so the originality has been partially lost. Last period is the years of nothing changed almost, since the house was registered, and the conservation procedure activated. As the last word, an expectation for a future study, if the restitution reports of other buildings on the Market Street are opened to the researchers, then it would be possible to understand the whole picture of Street's development period by period.

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REFERENCES

- Akyüz, E. (1993). *Traditional Housing Architecture in İzmir*, Unpublished Phd. thesis, İzmir: Dokuz Eylül University, The Graduate School of Natural and Applied Sciences.
- Çelik, M. (2016). *Buca Levanten Konutlarında Kültürel Değerlerin Sürekliliği / The Continuity of the Cultural Values of the Levantine Houses of Buca*, Unpublished Master thesis, İzmir: Dokuz Eylül University, The Graduate School of Natural and Applied Sciences.
- Erdoğmuş Manav, B. (2014). *Kentin Kıyısında Tarihsel/Mekansal Değişimin Yönü ve Yere Özgü Nitelikleri: İzmir – Karşıyaka / The Direction of Historical/Space Change on The City Coast and Special Features of Space: İzmir-Karşıyaka*, Unpublished Master thesis, İzmir: Dokuz Eylül University, The Graduate School of Natural and Applied Sciences.
- İnal, O. (2006). *Levantine Heritage in İzmir*, Unpublished Master thesis, İstanbul: Koç University, Graduate School of Social Sciences and Humanities.
- Oban, R. (2007). Levanten Kavramı ve Levantenler Üzerine Bir İnceleme. *Selçuk Üniversitesi Türkiyat Araştırmaları Dergisi*, (22), 337-356.
- Özkan, Z. (2006). *Karşıyaka Tarihsel Dokusunun İncelenmesi / Research of Historical Fabric in Karşıyaka*, Unpublished Master thesis, İzmir: Dokuz Eylül University, The Graduate School of Natural and Applied Sciences.
- Özsu, A. S. (2006). *İzmir Karşıyaka Çarşısında Fiziksel Dönüşümün Değişen Tüketim Alışkanlıkları Bağlamında İncelenmesi / Examining the Physical Transformation of Karşıyaka Çarşı District in İzmir With Respect to the Changes in Consumption Patterns*, Unpublished Master thesis, İzmir: Dokuz Eylül University, The Graduate School of Natural and Applied Sciences.

Chapter 3

ASSESSMENT OF ARCHITECTURAL INTERVENTIONS' INFLUENCE ON DAYLIGHT AVAILABILITY: A CASE STUDY OF A CLASSROOM

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Buildings are big contributors to energy consumption and they consume almost 40% of the world's energy, and about 25%-40% of this electricity is used for artificial lighting (Krarti, Erickson, and Hillman 2005; Gabrielle Dreyfus and Chad Gallinat 2015). Since artificial lighting usage is quite significant to be underestimated, daylight strategies should be adapted to decrease lighting energy consumptions (Mavromatidis, Marsault, and Lequay 2014; Nielsen, Svendsen, and Jensen 2011; Michael and Heracleous 2017; Kaminska and Ozadowicz 2018; Jovanović et al. 2014; Altomonte 2008). Efficient daylight usage can reduce artificial lighting consumption from 50% to 80% thus providing energy saving (Bodart and De Herde 2002). In addition to energy savings, some other advantages of daylight has been recognized in recent years; such as enhancing visual comfort (De Carli, De Giuli, and Zecchin 2008; D. H. W. Li 2010), users' well-being, productivity and satisfaction.

Due to physiological and psychological reasons daylight is the most preferred light source for visual comfort (Kang, Ou, and Mak 2017). Providing color renderings that can't be obtained by artificial light, reducing eye fatigues (Yu and Su 2015; Freewan and Al Dalala 2020), having the most correlated comfortable color temperature (CCT) with 6200 K (Shamsul, Nur Sajidah, and Ashok 2013), preventing hormonal diseases (Brainard et al. 2015), improving sleep routine (Suni 2020), enhancing human health (Knoop et al. 2020; Pinto et al. 2014), and providing visual comfort can be counted among daylight's physiological effects. Besides reducing depression (Aarts et al. 2015), increasing productivity (Jovanović et al. 2014; Xue, Mak, and Cheung 2014), improving motivation-concentration (Altomonte 2008; Ding 2017), well-being (Xue, Mak, and Cheung 2014) and socializing (Beute and de Kort 2014) can be counted as psychological influences of daylight. Thus, the importance of daylight availability has become the focus point of numerous studies (Bardhan and Debnath 2016; Doulos et al. 2019; Nasrollahi and Shokri 2016; Freewan and Al Dalala 2020). One other advantage of daylight is, it is valid during working hours (Yu and Su 2015). Since people spend most of their time in interior spaces (Bluyssen 2019; Bonnefoy et al. 2004; Höppe 2002) for requirements such as, working, education, socializing and circulation, providing efficient daylighting at a reasonable level has great importance.

Daylight usage in educational buildings has been a subject of interest since students spend almost 25-30% of their time in there (De Giuli, Da Pos, and De Carli 2012; Korsavi, Montazami, and Mumovic 2021) and daylighting conditions affect students' health, well-being, and academic performance (Pinto et al. 2014). Numerous studies highlight that in daylighting schools, students' academic performance and achievements are better compared to artificially illuminated schools (Pinto et al. 2014;

Nicklas and Bailey 1997; Freewan and Al Dalala 2020). For instance, having windows in classrooms enhanced students' conditions physically and psychologically (Choi, Beltran, and Kim 2012). Similarly, classrooms that have larger windows can increase students' performance by 15% compared to small windows (Maesano and Annesi-maesano 2013). Likewise, during preschool daylight affects cognitive skills and social behaviors positively (Yacan 2014), while providing higher scores by up to 14% (Nicklas and Bailey 1997).

Despite the advantages of daylight, it is not stable and constant illuminance levels should be provided in educational facilities to accomplish certain visual tasks and intellectual activities. When daylight is insufficient artificial lighting is used to fulfil lighting requirements. Due to a series of visual activities that are required in educational facilities, ensuring sufficient lighting quality only by daylight is a rather complex task. In addition to daylight availability, distribution, uniformity and amount of light received should be considered to prevent problems such as thermal dissatisfaction (Bakmohammadi and Noorzai 2020; Zhang et al. 2017; İnan 2013) and glare (Galasiu and Veitch 2006; Gherri 2015; Peter R Boyce 2014; Lee, Han, and Lee 2017; Pierson, Wienold, and Bodart 2018).

In educational buildings, to maximize daylight availability while providing visual comfort for users, careful daylight design should be applied in the early design phase (C. F. Reinhart and Wienold 2011; Mavromatidis, Marsault, and Lequay 2014). Daylight availability and students' exposure to daylight is associated with the buildings' locational and façade factors. Locational factors could be named as building site (C. Reinhart and Selkowitz 2006), orientation (Nabil and Mardaljevic 2006), climate (John Mardaljevic 2006), sky type (Nasrollahi and Shokri 2016; Seuntiens, Van Boven, and Sekulovski 2012), building façade height (Ng 2003), neighbor buildings (Littlefair 2001), and vegetation (Kaminska and Ozadowicz 2018). While façade factors can be listed as Window to Wall Ratio (WWR), visible transmittance (VT) (Cammarano et al. 2015; Galal 2019), window placement (Pilechiha et al. 2020), shadings (Chan and Tzempelikos 2013; L. Li, Qu, and Peng 2016), room configuration (Nasrollahi and Shokri 2016). All the above listed fenestration design and its components are significant variables that affect daylight design. For instance, having openings in various orientations, or using different glazing types and VT values can affect daylight availability significantly (Debnath and Bardhan 2016). In addition to locational and façade factors, as daylight enters the room, interior surfaces/materials have also a profound effect for distribution of daylight in interiors (Cassol et al. 2011; Nair, Ramamurthy, and Ganesan 2014; C. F. Reinhart and Canada 2002).

Examining daylight availability in relation to façade design is not a

straightforward process. For instance, a classroom may be poorly lit, but the incoming light for students sitting in the vicinity of the windows can be excessive, unbearable, and irritating (Gherri 2015). In order to prohibit glare problems in such areas, in Nocera et al.'s study double-glazed windows together with a highly-reflective and diffuse false ceiling were installed (Nocera et al. 2018). As an alternative solution to that a coating layer was also applied to all glazing systems. Yet due to change in daylight availability it resulted with increased artificial lighting usage. Thus, rather than a coating layer, study suggested using light shelves, upper windows on the corridor, and translucent material to prevent glare and distribute daylight to the back parts of deep and large classrooms (Freewan and Al Dalala 2020). It is clearly seen that dissatisfaction based on daylight can be prevented through interventions. Thus, strategies to analyze (in the early stages of design) or control daylight availability (through control systems and sensors) should be implemented (Ackley, Donn, and Thomas 2018).

One other issue is to quantify and compare different daylight availability. There are some static and dynamic metrics to assess many facets of daylight such as glare, uniformity and daylight availability (Nocera et al. 2018). Static metrics such as Daylight Factor (DF) and Illuminance (lux) only concern skylight under simplified assumptions, while dynamic metrics such as Annual Sunlight Exposure (ASE), Daylight Autonomy (DA) and Useful Daylight Illuminance (UDI) also consider daily and seasonal variations of daylight. Table 1 shows the scopes of the most commonly used daylight metrics.

Table 1. *Daylight metrics and their scopes*

Metric	Considers	Ignores	Conditions	Range
Daylight Factor (DF)	Only skylight (J. Mardaljevic, Heschong, and Lee 2009), reflected daylight (Stoffer and Brejnrod 2014)	Exposed sunlight, daylight generated under clear sky conditions, building orientation (P. R. Boyce and Smet 2014) building location (Stoffer and Brejnrod 2014))	CIE overcast sky (P. R. Boyce and Smet 2014)	2% ≤ (Stoffer and Brejnrod 2014)
Annual Sunlight Exposure (ASE)	Exposed sunlight (IESNA 2012)	Thermal comfort, thermal sensation, climatic variations, energy usage (Performance and Conference 2020)	Dynamic sky conditions (J A Jakubiec et al. 2016)	Annual Solar exposure < %10 (IESNA 2012)

Daylight Autonomy (DA)	Sun angle, exposed sunlight, geographic location (Stoffer and Brejnrod 2014)	Useful daylight range, discomfort glare, energy consequences (P. R. Boyce and Smet 2014)	Dynamic sky conditions (Stoffer and Brejnrod 2014)	300 lux ≤ , 50% ≤ of the annual occupied hours (IESNA 2012)
Useful Daylight Illuminance (UDI)	Useful daylight range, yearly energy consumption (P. R. Boyce and Smet 2014)	Discomfort glare (P. R. Boyce and Smet 2014)	Dynamic sky conditions (Stoffer and Brejnrod 2014)	100 lux< and <2000 lux (Nocera et al., 2018), at least 50% of the time (Al-Sallal, AbouElhamd, and Dalmouk 2018)
lluminance (lux)	Light quantity point in time (Chinazzo, Wienold, and Andersen 2020; Shafavi, Tahsildoost, and Zomorodian 2020)	Variations (Costanzo, Evola, and Marletta 2017)	Simple and immediate way to measure light falling on a plane (Costanzo, Evola, and Marletta 2017)	300-500 lux ≤ for teaching spaces (Syaheeza et al. 2018)

Among the mentioned daylight metrics, Useful Daylight Illuminance (UDI) provides absolute annual illuminance values predicted under realistic skies and specific climate-based conditions to the locale for buildings. Besides, it has a simple method to evaluate daylight availability and solar exposure levels with a single schema (Nabil and Mardaljevic 2006). Because of the reliability of the results it provides and the frequency of use in various studies (Lee, Han, and Lee 2017; Nocera et al. 2018; Shafavi, Tahsildoost, and Zomorodian 2020; Loche et al. 2021), UDI is the main metric evaluated in this study. The lower and upper thresholds defined for UDI are 100 lx and 2000 lx, respectively. Daylight illumination in this range is considered ‘’useful’’. Lower than 100 lx is defined as ‘’insufficient’’, while more than 2000 lx is accepted as ‘’too much’’ and defined as the upper threshold value, as it exceeds the useful range and can cause visual discomfort (Nocera et al. 2018). Besides, it is expected that UDI values must meet at least 50% of the time (Al-Sallal, AbouElhamd, and Dalmouk 2018).

One other metric that has been used within this study is Annual Sunlight Exposure (ASE) to evaluate visual comfort considering direct sunlight level and potential for glare (J A Jakubiec et al. 2016). The LEED guidelines defined the upper threshold for ASE as 10% of floor area (C. Reinhart 2015). Even though ASE ignores thermal comfort, thermal sensation, climatic variations, energy consumption (Performance and Conference 2020), it is used to evaluate exposure to sun level of the current scenario and applied alternatives in this study.

The other metric evaluated in this study is Illuminance (lux). Illuminance is the measure of the received light quantity on a surface (Chinazzo, Wienold, and Andersen 2020), and it is a point-in-time metric that needs to be considered with the applied timeframe (Shafavi, Tahsildoost, and Zomorodian 2020). Therefore, it does not give any information about annual daylight performance, and requires taking an average of calculated more than one point for reliability. Defined minimum illuminance level for teaching spaces is 300-500 lux (Syaheeza et al. 2018). In order to evaluate whether received daylight is enough for the current scenario and alternatives, Illuminance values are reached through simulations in this study.

Daylight availability changes due to certain variables like orientation, façade properties and interior light distribution (Acosta, Campano, and Molina 2016; Vanhoutteghem et al. 2015; Lee, Han, and Lee 2017). One of the major variables to determine daylight penetration are related to façade components. Reflectivity and transmittance values of glazing and window properties (such as dimensions, proportion and position) have a significant impact on daylight availability. There are several studies that examined the impact of façade components to daylight availability (Freewan and Al Dalala 2020; Nocera et al. 2018; Lee, Han, and Lee 2017). When different window positions, such as centered and upper position are compared, it is seen that windows located on the upper position provide a 9-32% increase in daylight autonomy compared to centered position. Besides when it is located in a higher position, daylight availability increases at the back of the room(Acosta, Campano, and Molina 2016). When different window widths such as 1 m, 3 m and 5 m are compared, the UDI value is large (average 70%) when 5 m width is used but when 3 m or 1 m is used, the values are almost 10% and 50% smaller than 5 m width's UDI respectively (Loche et al. 2021). In another study when different glazing VT values such as 72 and 36 are compared, it is seen that the DA value obtained with VT 36 is at least 75% less than obtained with Vt 72 (Dubois and Flodberg 2013).

Daylight availability and distribution of daylight in interiors depend on various locational and architectural factors. There is generally less to do in terms of location since it is fixed, yet during early design careful architectural interventions can influence daylight availability. The market is quite wide and a great number of options are valid for façade components and interiors. In this regard, while making these preferences, architects/ designers have to be aware of the consequences. Within this study, only three of architectural factors; WWR, VT and interior reflectance were selected to analyze their contribution to daylight availability through daylight metrics.

2. Methodology

The main aim of the study is to show the contribution of façade elements and interiors' effect on daylight availability in classrooms. Therefore, the research question is: How does daylight availability change when different VT, WWR and interior reflection values are applied? To answer this question, simulations were made in Diva for Rhino and results were compared using Illuminance (lux), Useful Daylight Illuminance (UDI) and Annual Sunlight Exposure (ASE).

2.1. Location of the classroom

To simulate the selected parameters, a rectangular shape with a one-sided façade classroom was chosen. The classroom is located in Yaşar University Izmir / Turkey (38°27'14.0"N 27°12'09.2"E) on the first floor of a South-west oriented building block, and it has a capacity of 32 students. It has only a South-west window opening with 1.6 m x 3.2 m dimensions, and the room depth is 10 m. There is no interior or exterior shading within the classroom. The total area of the classroom is 51 m^2 and the height of the classroom is 3.2 m. The characteristics of the case study classroom were given in Table 2. The walls are painted in a cream color tone, the ceiling is suspended ceiling, and the floor is blue colored PVC flooring. The exterior (Figure 1) and interior views (Figure 2) as well as plan layout (Figure 3) can be seen below.

Table 2. *Definition of classroom*

Orientation of building	South-west
Classroom	C124
Floor of classroom	First floor
Classroom capacity	32 students
Classroom dimension	5.1 m x 10 m x 3.2 m
Ceiling material	White suspended ceiling panel
Wall material	Cream paint
Floor material	Blue pvc
Glazing type	Double-glazed
Window size	1.6 m x 3.2 m
Window quantity	1

Figure 1. *Exterior view of C124*

Figure 2. *C124 Classroom*

The room has a rectangular shape and students' seats are grouped at one half of the room. Therefore, during simulations the room is assumed to be divided into two planes; general working plane and student working plane. Starting from the window, the red line (Figure 3) is called the student plane while the whole area (shown in blue line) is called the general workplane in the later stages of the study.

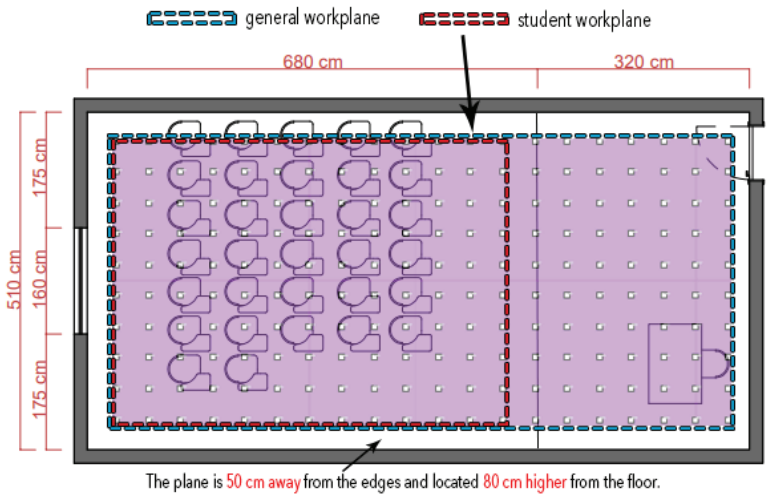

Figure 3. *The Plan of C124*

2.2. Input values of the simulations

In this study, DIVA-for-Rhino was used to evaluate daylight availability and calculate UDI, ASE and illuminance. DIVA-for-Rhino plug-in is a trusted daylight assessment tool for Rhinoceros modeling software which finds a place frequently in studies (Mora et al. 2018; Mohsenin and Hu 2015; Wagdy and Fathy 2015). It uses Radiance and DAYSIM during daylight analysis on the constructed one-zone space (J. Alstan Jakubiec and Reinhart 2011), and examines daylight quality with various geometric and physical features of spaces (Tabadkani, Banihashemi, and Hosseini 2018).

Table 3. *Defined parameters for simulations*

Daylight metric	Useful Daylight Illuminance (UDI), Annual Daylight Exposure (ASE), Illuminance (Lx)
Location and Weather Data	İzmir (Latitude 38°, Longitude 27°)
Occupancy Schedule	Weekdays
Date	21 March
Time	12 pm
Target Illuminance	300 lx
Nodes	located 80 cm higher from the floor, and 50 cm away from edges

Simulations were performed by considering Clear Sky with Sun (CIE Clear Sky) conditions, and the day 21 March Spring Equinox at 12 pm. The weather data Izmir 172180 (IWEC) obtained from the EnergyPlus website, included in the Europe region part was used for analysis. There is no electric lighting system and dynamic shading system specified for the simulations. The work plane was defined at 80 cm above the floor. The current WWR of the classroom is 31%, the window size is 1.6 m x 3.2 m, the VT of glazing is 65, reflectance level of ceiling, wall and floor are 70, 50 and 20 respectively. Classroom was modeled for six alternatives using different WWR, VT and reflectance values. For each alternative, only one variable was changed while the others were kept stable. Defined parameters that are used during simulation can be seen on Table 3. Besides, both the current and alternatives' values are given in Table 4.

Table 4. *Applied alternatives*

Alternatives	**WWR (%)**	**Window Size (m)**	**Window Quantity**	**VT (Visible Transmittance)**	**Reflectance Level of Materials**
Current	31%	1.6 x 3.2	1	65	Ceiling: 70, Wall:50, Floor:20
1	**40%**	1.9 x 3.5	1	65	Ceiling: 70, Wall:50, Floor:20
2	**50%**	2.2 x 3.7	1	65	Ceiling: 70, Wall:50, Floor:20
3	31%	1.6 x 3.2	1	**80**	Ceiling: 70, Wall:50, Floor:20
4	31%	1.6 x 3.2	1	**88**	Ceiling: 70, Wall:50, Floor:20
5	31%	1.6 x 3.2	1	65	**Ceiling: 80, Wall:50, Floor:30**
6	31%	1.6 x 3.2	1	65	**Ceiling: 90, Wall:70, Floor:50**

Consequently, this study proposes three strategies over six new scenarios for an improved daylight usage, and the first one is increased WWR. For sufficient daylight availability, 30% WWR is recommended for an educational space that is 7.2m deep (Parkin 2013). Though the case study classroom has a WWR of 31%, the room has 10 depth which reduces daylight availability for deeper parts of the room. To see the contribution of WWR increase, the first and second alternatives used WWR as 40% and 50% respectively, as shown in Figure 4.

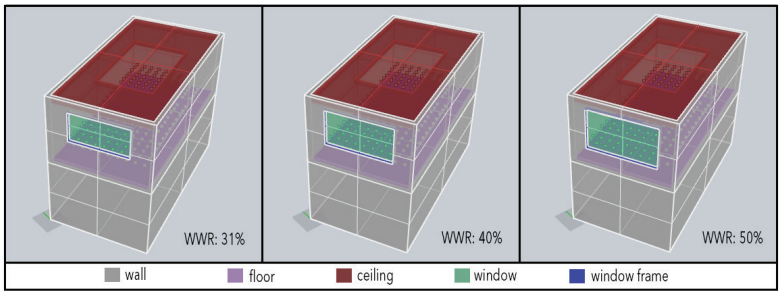

Figure 4. *WWR of the Current Scenario, Alternative 1 and Alternative 2*

A study conducted for an educational space demonstrates that increasing the VT values can have an impact on reducing energy consumption since it helps to receive daylight into the space (Gündoğdu and Cilasun Kunduraci 2019). For this purpose, in the third and fourth alternatives, VT value has been increased from 65 to 80 and 88 respectively to see the contribution.

As the third strategy, increasing interior reflectance colors was used. It is stated that 70/50/20 (ceiling/wall/floor) internal reflection must be minimum in an educational space (Parkin 2013). Therefore, in 5. and 6. alternatives, reflectance level of interior materials has been increased as shown on the Table 4.

3. Results

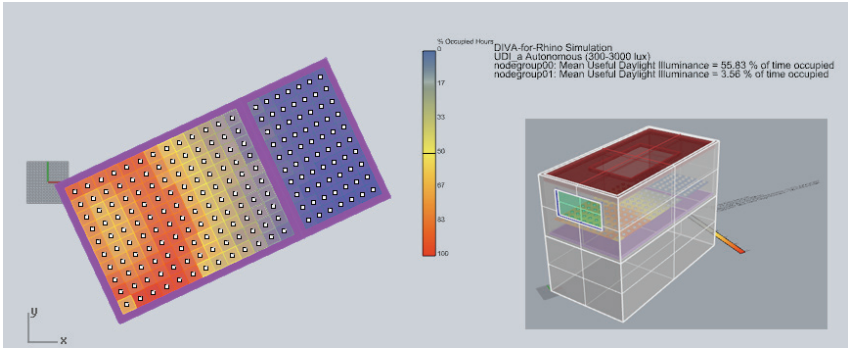

Figure 5. *Simulation of the Current Scenario*

Figure 5 shows a sample of the current scenario's modeling and simulation. After modeling the current scenario and six alternatives by using Diva-for-Rhino, the below results were achieved. Table 5 shows the UDI results of the two workplanes and Table 6 shows the Illuminance results. Besides, Table 7 shows the ASE results. ASE simulation results turned out as 0% for all scenarios which show no discomfort related to direct sunlight.

Table 5. *UDI Results of the applied alternatives*

Alternatives	**UDI Value of the whole area**	**UDI value of the student workplane**
Current	38.37%	55.83%
1	41.26%	58.45%
2	42.16%	58.56%
3	43.10%	60.53%
4	44.78%	62.41%
5	39.52%	56.28%
6	42.99%	59.16%

Table 6. *Illuminance Results of the applied alternatives*

Alternatives	**Illuminance of the whole area**	**Illuminance of the student workplane**
Current	324.83	457.59
1	417.33	593.58
2	498.19	708.15
3	410.67	581.00
4	460.74	656.57
5	339.45	481.62
6	372.92	526.86

Table 7. *ASE Results of the applied alternatives*

Alternatives	**Illuminance of the whole area**	**Illuminance of the student workplane**
Current	0 %	0 %
1	0 %	0 %
2	0 %	0 %
3	0 %	0 %
4	0 %	0 %
5	0 %	0 %
6	0 %	0 %

In alternatives 1 and 2, increasing the WWR from 31% to 40% and 50% resulted in an increase of approximately 3-4% for the UDI levels, and increased average illuminance levels by 90-170 lux for the general workplane. As for the student plane, while the increase of UDI is the same as the UDI of the general workplane, the increase of lux for student workplane becomes 135-250 lux on average.

According to the results of alternative 3 and 4, increasing the VT to more than 65 provides an increase approximately 5-6% for the UDI levels, and provides an average increase of 85-135 lux for the whole area. As for the student workplane, while the increase of UDI is 5-6%, the increase of illuminance becomes 120-200 lux on average.

According to the results of alternative 5 and 6, increasing interior reflections provides an increase approximately 1-5%, and provides an average increase of 15-50 lux for the whole area. As for the student workplane, while the increase of UDI is the same as the UDI of the general workplane, the increase of illuminance becomes 24-70 lux on average.

Figure 6 shows the simulation results of all applied alternatives on the workplane. When comparing the results of the whole area and the student plane, variations generally have a low impact on the general workplane, while the effect on the student workplane seems clearer. The fact that the class depth is 10 m and the student workplane is closer to the window

can be associated with this. After UDI and Illuminance simulations were performed, ASE simulations were also performed to evaluate the percentage of direct sunlight exposure. As a result of all variations, ASE values did not change and the results were 0%. This indicates that the level of sunlight exposure does not exceed the specified direct sunlight illuminance level for the general workplane. It is concluded that the applied variations to enhance daylight availability in this study do not pose a danger of daylight exposure.

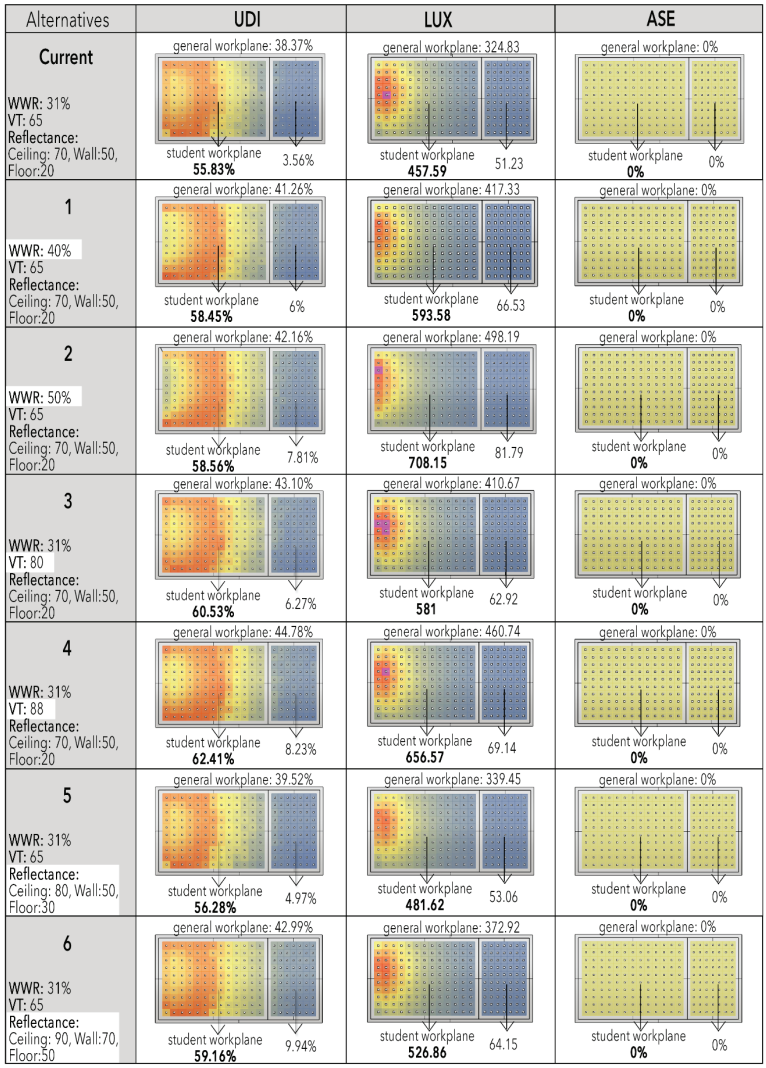

Figure 6. *Overall Results*

4. Discussion and Conclusions

Daylight has a fairly large impact on humans as shown in the literature part of the study. One of the areas where daylight is of great importance for occupants is educational buildings, since daylight can affect human behaviors positively by increasing attention, performance, well-being, etc. As it has a positive effect on human behavior as well as a positive effect on reducing energy consumption, daylight availability has been considered worthy of research within the scope of educational buildings. Careful considerations must be done in the early design phase to provide visual comfort and energy savings.

This study aimed to highlight the influence of three selected variables (VT, WWR and interior reflections) to daylight availability. A rectangular shaped classroom which has only one window on the short edge was selected as a case study. The main aim was to increase daylight availability in the deep parts of the room by changing the three variables. Diva for Rhino was used for simulations and results evaluated in terms of UDI, Illuminance and ASE. Simulation results show that increasing visible transmittance (VT) of glazing led to greater differences in terms of UDI and illuminance (compared to WWR and interior reflection variations). Increasing glazing VT values to 80 has increased UDI value of student workplane by almost 5%, while increasing glazing VT values to 88 has increased UDI value by almost 7%.

Interior reflectance affects daylight distribution since surface reflection and absorption coefficients are associated with it. Within this study increasing interior reflections to 80/50/30 has increased UDI value by almost 0,5%, while 90/70/50 has increased UDI values by almost 3%. A significant change in UDI values (from 55.83% to 59.16%) is observed in the simulations performed, especially when the interior reflectance is in the state of 90/70/50. Nevertheless, when a similar situation was tried with the values 80/50/30, the increase in UDI was limited to 56.28%.

Increasing WWR from 31% to 40% and 50% has increased UDI value by almost 3%. Alternative 1 (WWR 40%) and 2 (WWR 50%) had the least impact compared to the other alternatives. The reason might be the rectangular shape of the case study. Since room depth is 10 m, and has only one window which is located on the narrow edge of the room, increasing window area did not result in significant UDI increase. Even though the amount of light penetrating to the room increases, it is not sufficient to increase UDI in deep parts of the room.

According to the simulation results, it is correct to assume that through interventions of architectural factors meaningful daylight availability increase is possible. However, some interventions are quite invasive or

non-realistic. For instance, changing WWR is a decision that needs to be made by a holistic approach of both implementation and façade design. Increasing or decreasing WWR for one room will affect the whole façade therefore instead of individual, integrative solutions should be used. Similarly increasing visible transmittance (VT) may also lead to thermal and visual discomforts such as overheating and glare. Users may prefer to use block daylight (through shading devices) to avoid problems which may result in artificial lighting usage even during daylight hours. As mentioned, none of the simulated alternatives had excessive sunlight exposure (all scenarios had 0% ASE) yet while searching for the best solution for daylight availability, overheating and glare should not be ignored. Changing interior surface reflectance values can be effective but may not be preferred due to aesthetical or individual preferences. Thus, to maximize efficient daylight usage without confronting problems, careful considerations must be done in the early stages of design.

This study contains some limitations. As a limitation, only one classroom is evaluated, and the results belong to that particular room's location, orientation, spatial characteristics, façade design or interior surface materials. The second limitation is that artificial lighting, shading systems or heat gains were not included in the simulations, and energy consumptions were not evaluated. Besides other architectural or façade elements' (such as light shelf, exterior shading, ceiling type) influences were not investigated. Daylight availability is closely associated with buildings' components and properties therefore each above mentioned factor has to be evaluated for an extensive preparation.

Despite the limitations mentioned above, as a result of the simulations performed it is seen that all three interventions yielded an increase in daylight availability. Architects and interior designers should consider these to ensure visual comfort, user satisfaction and energy savings.

References

Aarts, Mariëlle P.J., Myriam B.C. Aries, Jochem Straathof, and Joost Van Hoof. 2015. "Dynamic Lighting Systems in Psychogeriatric Care Facilities in the Netherlands: A Quantitative and Qualitative Analysis of Stakeholders Responses and Applied Technology." *Indoor and Built Environment* 24 (5): 617–30. https://doi.org/10.1177/1420326X14532387.

Ackley, Aniebietabasi, Michael Donn, and Geoff Thomas. 2018. "Measuring the Daylight Performance of Classrooms: Can a One Point Sensor Measurement Predict the Daylight Distribution within a Space?" *52nd International Conference of the Architectural Science Association: Engaging Architectural Science: Meeting the Challenges of Higher Density*, 43–52.

Acosta, Ignacio, Miguel Ángel Campano, and Juan Francisco Molina. 2016. "Window Design in Architecture: Analysis of Energy Savings for Lighting and Visual Comfort in Residential Spaces." *Applied Energy* 168 (April): 493–506. https://doi.org/10.1016/j.apenergy.2016.02.005.

Al-Sallal, Khaled A., Amira R. AbouElhamd, and Maitha Bin Dalmouk. 2018. "Daylighting Performance in UAE Traditional Buildings Used as Museums." *International Journal of Low-Carbon Technologies* 13 (2): 116–21. https://doi.org/10.1093/ijlct/cty003.

Altomonte, Sergio. 2008. "Daylight for Energy Savings and Psycho-Physiological Well-Being in Sustainable Built Environments." *Journal of Sustainable Development* 1 (3): 3–16. https://doi.org/10.5539/jsd.v1n3p3.

Bakmohammadi, Parnian, and Esmatullah Noorzai. 2020. "Optimization of the Design of the Primary School Classrooms in Terms of Energy and Daylight Performance Considering Occupants' Thermal and Visual Comfort." *Energy Reports* 6: 1590–1607. https://doi.org/10.1016/j.egyr.2020.06.008.

Bardhan, Ronita, and Ramit Debnath. 2016. "Towards Daylight Inclusive Bye-Law: Daylight as an Energy Saving Route for Affordable Housing in India." *Energy for Sustainable Development* 34 (2016): 1–9. https://doi.org/10.1016/j.esd.2016.06.005.

Beute, Femke, and Yvonne A.W. de Kort. 2014. "Salutogenic Effects of the Environment: Review of Health Protective Effects of Nature and Daylight." *Applied Psychology: Health and Well-Being* 6 (1): 67–95. https://doi.org/10.1111/aphw.12019.

Bluyssen, Philomena M. 2019. "The Need for Understanding the Indoor Environmental Factors and Its Effects on Occupants through an Integrated Analysis." *IOP Conference Series: Materials Science and Engineering* 609 (2). https://doi.org/10.1088/1757-899X/609/2/022001.

Bodart, M., and A. De Herde. 2002. “Global Energy Savings in Offices Buildings by the Use of Daylighting.” *Energy and Buildings* 34 (5): 421–29. https://doi.org/10.1016/S0378-7788(01)00117-7.

Bonnefoy, Xavier, Isabella Annesi-Maesano, Luis Moreno Aznar, Matthias Braubach, Ben Croxford, Maggie Davidson, Véronique Ezratty, et al. 2004. “Review of Evidence on Housing and Health,” no. April: 24.

Boyce, P. R., and Kag Smet. 2014. “LRT Symposium ‘Better Metrics for Better Lighting’ - A Summary.” *Lighting Research and Technology* 46 (6): 619–36. https://doi.org/10.1177/1477153514558161.

Boyce, Peter R. 2014. *Human Factors in Lighting - 3rd Edition*. Third edit. Boca Raton, FL: CRC Press Taylor & Francis.

Brainard, Jason, Merit Gobel, Benjamin Scott, Michael Koeppen, Tobias Eckle, and D Ph. 2015. “And the Potential for Daylight as Therapy,” no. X: 15–20.

Cammarano, Silvia, Anna Pellegrino, Valerio Roberto Maria Lo Verso, and Chiara Aghemo. 2015. “Assessment of Daylight in Rooms with Different Architectural Features.” *Building Research and Information* 43 (2): 222–37. https://doi.org/10.1080/09613218.2014.922359.

Carli, Michele De, Valeria De Giuli, and Roberto Zecchin. 2008. “Review on Visual Comfort in Office Buildings and Influence of Daylight in Productivity.” *Indoor Air*, no. August: 17–22.

Cassol, Fabiano, Paulo Smith Schneider, Francis H.R. França, and Antônio J. Silva Neto. 2011. “Multi-Objective Optimization as a New Approach to Illumination Design of Interior Spaces.” *Building and Environment* 46 (2): 331–38. https://doi.org/10.1016/j.buildenv.2010.07.028.

Chan, Ying Chieh, and Athanasios Tzempelikos. 2013. “Efficient Venetian Blind Control Strategies Considering Daylight Utilization and Glare Protection.” *Solar Energy* 98 (PC): 241–54. https://doi.org/10.1016/j.solener.2013.10.005.

Chinazzo, G., J. Wienold, and M. Andersen. 2020. “Influence of Indoor Temperature and Daylight Illuminance on Visual Perception.” *Lighting Research and Technology* 52 (3): 350–70. https://doi.org/10.1177/1477153519859609.

Choi, Joon Ho, Liliana O. Beltran, and Hway Suh Kim. 2012. “Impacts of Indoor Daylight Environments on Patient Average Length of Stay (ALOS) in a Healthcare Facility.” *Building and Environment* 50: 65–75. https://doi.org/10.1016/j.buildenv.2011.10.010.

Costanzo, Vincenzo, Gianpiero Evola, and Luigi Marletta. 2017. “A Review of Daylighting Strategies in Schools: State of the Art and Expected Future Trends.” *Buildings* 7 (2). https://doi.org/10.3390/buildings7020041.

Debnath, Ramit, and Ronita Bardhan. 2016. “Daylight Performance of a Naturally Ventilated Building as Parameter for Energy Management.”

Energy Procedia 90 (December 2015): 382–94. https://doi.org/10.1016/j.egypro.2016.11.205.

Ding, Fei. 2017. "Daylight Integration and Visual Comfort in Sports Halls in Norway." Norwegian University of Science and Tehcnology.

Doulos, L. T., A. Kontadakis, E. N. Madias, M. Sinou, and A. Tsangrassoulis. 2019. "Minimizing Energy Consumption for Artificial Lighting in a Typical Classroom of a Hellenic Public School Aiming for near Zero Energy Building Using LED DC Luminaires and Daylight Harvesting Systems." *Energy and Buildings* 194: 201–17. https://doi.org/10.1016/j.enbuild.2019.04.033.

Dubois, M. C., and K. Flodberg. 2013. "Daylight Utilisation in Perimeter Office Rooms at High Latitudes: Investigation by Computer Simulation." *Lighting Research and Technology* 45 (1): 52–75. https://doi.org/10.1177/1477153511428918.

Freewan, Ahmed A.Y., and Jackline A. Al Dalala. 2020. "Assessment of Daylight Performance of Advanced Daylighting Strategies in Large University Classrooms; Case Study Classrooms at JUST." *Alexandria Engineering Journal* 59 (2): 791–802. https://doi.org/10.1016/j.aej.2019.12.049.

Gabrielle Dreyfus, and Chad Gallinat. 2015. "Rise and Shine: Lighting the World with 10 Billion LED Bulbs." U.S. Department of Energy. 2015. https://www.energy.gov/articles/rise-and-shine-lighting-world-10-billion-led-bulbs.

Galal, Kareem S. 2019. "The Impact of Classroom Orientation on Daylight and Heat-Gain Performance in the Lebanese Coastal Zone." *Alexandria Engineering Journal* 58 (3): 827–39. https://doi.org/10.1016/j.aej.2019.07.003.

Galasiu, Anca D., and Jennifer A. Veitch. 2006. "Occupant Preferences and Satisfaction with the Luminous Environment and Control Systems in Daylit Offices: A Literature Review." *Energy and Buildings* 38 (7): 728–42. https://doi.org/10.1016/j.enbuild.2006.03.001.

Gherri, B. 2015. "An E Xtensive Daylight Assessment T Hrough Quantitative Appraisal and Qualitative Analysis." *Experiencing Light*, no. February: 1–4.

Giuli, Valeria De, Osvaldo Da Pos, and Michele De Carli. 2012. "Indoor Environmental Quality and Pupil Perception in Italian Primary Schools." *Building and Environment* 56: 335–45. https://doi.org/10.1016/j.buildenv.2012.03.024.

Gündoğdu, Elif, and Arzu Cilasun Kunduraci. 2019. "Effect of Window Glazings' Visible Transmittance to Daylight Factor and Energy Efficiency in An Architecture Studio." In *7th International Conference on Embracing Capacity Building Opportunities in the Modern Day Dispensation*, 26:1–4. Cape Town. https://doi.org/10.1007/s11273-020-

09706-3%0Ahttp://dx.doi.org/10.1016/j.jweia.2017.09.008%0Ahttps://doi.org/10.1016/j.energy.2020.117919%0Ahttps://doi.org/10.1016/j.coldregions.2020.103116%0Ahttp://dx.doi.org/10.1016/j.jweia.2010.12.004%0Ahttp://dx.doi.org/10.1016.

Höppe, Peter. 2002. "Different Aspects of Assessing Indoor and Outdoor Thermal Comfort." *Energy and Buildings* 34 (6): 661–65. https://doi.org/10.1016/S0378-7788(02)00017-8.

IESNA. 2012. "IES Spatial Daylight Autonomy (SDA) and Annual Sunlight Exposure (ASE), Daylight Metrics Committee. Approved Method IES LM-83-12." *Illuminating Engineering Society of North America*.

İnan, Tuğba. 2013. "An Investigation on Daylighting Performance in Educational Institutions." *Structural Survey* 31 (22): 121–38. https://doi.org/10.1108/02630801311317536.

Jakubiec, J. Alstan, and Christoph F. Reinhart. 2011. "DIVA 2.0: Integrating Daylight and Thermal Simulations Using Rhinoceros 3D, DAYSIM and EnergyPlus." *Proceedings of Building Simulation 2011: 12th Conference of International Building Performance Simulation Association*, 2202–9. https://doi.org/10.1017/CBO9781107415324.004.

Jakubiec, J A, K Van Den Wymelenberg, M Inanici, and A Mahic. 2016. "Accurate Measurement of Daylit Interior Scenes Using High Dynamic Range Photography." *Proceedings of CIE 2016 "Lighting Quality & Energy Efficiency,"* no. 2006.

Jovanović, A., P. Pejić, S. Djorić-Veljković, J. Karamarković, and M. Djelić. 2014. "Importance of Building Orientation in Determining Daylighting Quality in Student Dorm Rooms: Physical and Simulated Daylighting Parameters' Values Compared to Subjective Survey Results." *Energy and Buildings* 77: 158–70. https://doi.org/10.1016/j.enbuild.2014.03.048.

Kaminska, Aniela, and Andrzej Ozadowicz. 2018. "Lighting Control Including Daylight and Energy Efficiency Improvements Analysis." *Energies* 11 (8). https://doi.org/10.3390/en11082166.

Kang, Shengxian, Dayi Ou, and Cheuk Ming Mak. 2017. "The Impact of Indoor Environmental Quality on Work Productivity in University Open-Plan Research Offices." *Building and Environment* 124: 78–89. https://doi.org/10.1016/j.buildenv.2017.07.003.

Knoop, M., O. Stefani, B. Bueno, B. Matusiak, R. Hobday, A. Wirz-Justice, K. Martiny, et al. 2020. "Daylight: What Makes the Difference?" *Lighting Research and Technology* 52 (3): 423–42. https://doi.org/10.1177/1477153519869758.

Korsavi, Sepideh Sadat, Azadeh Montazami, and Dejan Mumovic. 2021. "Perceived Indoor Air Quality in Naturally Ventilated Primary Schools in the UK: Impact of Environmental Variables and Thermal Sensation." *Indoor Air* 31 (2): 480–501. https://doi.org/10.1111/ina.12740.

Krarti, Moncef, Paul M. Erickson, and Timothy C. Hillman. 2005. "A Simplified Method to Estimate Energy Savings of Artificial Lighting Use from Daylighting." *Building and Environment* 40 (6): 747–54. https://doi.org/10.1016/j.buildenv.2004.08.007.

Lee, Kyung Sun, Ki Jun Han, and Jae Wook Lee. 2017. "The Impact of Shading Type and Azimuth Orientation on the Daylighting in a Classroom-Focusing on Effectiveness of Façade Shading, Comparing the Results of Da and Udi." *Energies* 10 (5). https://doi.org/10.3390/en10050635.

Li, Danny H W. 2010. "A Review of Daylight Illuminance Determinations and Energy Implications." *Applied Energy* 87 (7): 2109–18. https://doi.org/10.1016/j.apenergy.2010.03.004.

Li, Li, Ming Qu, and Steve Peng. 2016. "Performance Evaluation of Building Integrated Solar Thermal Shading System: Building Energy Consumption and Daylight Provision." *Energy and Buildings* 113: 189–201. https://doi.org/10.1016/j.enbuild.2015.12.040.

Littlefair, Paul. 2001. "Daylight, Sunlight and Solar Gain in the Urban Environment." *Solar Energy* 70 (3): 177–85. https://doi.org/10.1016/S0038-092X(00)00099-2.

Loche, I, C Bleil de Souza, A B Spaeth, and L O Neves. 2021. "Decision-Making Pathways to Daylight Efficiency for Office Buildings with Balconies in the Tropics." *Journal of Building Engineering* 43: 102596. https://doi.org/https://doi.org/10.1016/j.jobe.2021.102596.

Maesano, C., and I. Annesi-maesano. 2013. "Impact of Lighting on School Performance in European Classrooms." In *CLIMA 2013*, 1–14. http://www.velux.com/~/media/com/articles/pdf/light and performance_whitepaperfinal 1.pdf.

Mardaljevic, J., L. Heschong, and E. Lee. 2009. "Daylight Metrics and Energy Savings." *Lighting Research and Technology* 41 (3): 261–83. https://doi.org/10.1177/1477153509339703.

Mardaljevic, John. 2006. "Examples of Climate-Based Daylight Modelling. In CIBSE National Conference." *CIBSE National Conference 2006: Engineering the Future 21-22 March 2006, Oval Cricket Ground, London, UK*, no. 67. http://climate-based-daylighting.com/lib/exe/fetch.php?media=academic:mardaljevic_cibse_paper.pdf.

Mavromatidis, Lazaros Elias, Xavier Marsault, and Hervé Lequay. 2014. "Daylight Factor Estimation at an Early Design Stage to Reduce Buildings' Energy Consumption Due to Artificial Lighting: A Numerical Approach Based on Doehlert and Box–Behnken Designs." *Energy* 65 (February): 488–502. https://doi.org/10.1016/j.energy.2013.12.028.

Michael, Aimilios, and Chryso Heracleous. 2017. "Assessment of Natural Lighting Performance and Visual Comfort of Educational Architecture in Southern Europe: The Case of Typical Educational School Premises

in Cyprus." *Energy and Buildings* 140: 443–57. https://doi.org/10.1016/j.enbuild.2016.12.087.

Mohsenin, Mahsan, and Jianxin Hu. 2015. "Assessing Daylight Performance in Atrium Buildings by Using Climate Based Daylight Modeling." *Solar Energy* 119: 553–60. https://doi.org/10.1016/j.solener.2015.05.011.

Mora, T Dalla, A Leorin, G Nardo, N Busatto, F Peron, and P Romagnoni. 2018. "Daylight Performances in Typical Inner Spaces with Climate-Based Daylight Modeling Approach Department of Design and Planning in Complex Environments , University IUAV of Venice , IT Abstract." *International Building Simulation Performance Association*, no. September: 11–12.

Nabil, Azza, and John Mardaljevic. 2006. "Useful Daylight Illuminances: A Replacement for Daylight Factors." *Energy and Buildings* 38 (7): 905–13. https://doi.org/10.1016/j.enbuild.2006.03.013.

Nair, M. G., K. Ramamurthy, and A. R. Ganesan. 2014. "Classification of Indoor Daylight Enhancement Systems." *Lighting Research and Technology* 46 (3): 245–67. https://doi.org/10.1177/1477153513483299.

Nasrollahi, Nazanin, and Elham Shokri. 2016. "Daylight Illuminance in Urban Environments for Visual Comfort and Energy Performance." *Renewable and Sustainable Energy Reviews* 66: 861–74. https://doi.org/10.1016/j.rser.2016.08.052.

Ng, Edward. 2003. "Studies on Daylight Design and Regulation of High-Density Residential Housing in Hong Kong." *Lighting Research & Technology* 35 (2): 178–79. https://doi.org/10.1191/1477153503li087oa.

Nicklas, Michael H, and Gary B Bailey. 1997. "Student Performance in Daylit Schools." *Innovative Design*.

Nielsen, Martin Vraa, Svend Svendsen, and Lotte Bjerregaard Jensen. 2011. "Quantifying the Potential of Automated Dynamic Solar Shading in Office Buildings through Integrated Simulations of Energy and Daylight." *Solar Energy* 85 (5): 757–68. https://doi.org/10.1016/j.solener.2011.01.010.

Nocera, Francesco, Alessandro Lo Faro, Vincenzo Costanzo, and Chiara Raciti. 2018. "Daylight Performance of Classrooms in a Mediterranean School Heritage Building." *Sustainability* 10 (10). https://doi.org/10.3390/su10103705.

Parkin, Andrew. 2013. "Designing Institutions for the Future." In *Greening Education Conference*.

Performance, Building, and Analysis Conference. 2020. "Belal Abboushi , Ph . D ., LEED AP BD + C 1," no. Hmg 2012: 358–65.

Pierson, Clotilde, Jan Wienold, and Magali Bodart. 2018. "Review of Factors Influencing Discomfort Glare Perception from Daylight." *LEUKOS* -

Journal of Illuminating Engineering Society of North America 14 (3): 111–48. https://doi.org/10.1080/15502724.2018.1428617.

Pilechiha, Peiman, Mohammadjavad Mahdavinejad, Farzad Pour Rahimian, Phillippa Carnemolla, and Saleh Seyedzadeh. 2020. "Multi-Objective Optimisation Framework for Designing Office Windows: Quality of View, Daylight and Energy Efficiency." *Applied Energy* 261 (December 2019): 114356. https://doi.org/10.1016/j.apenergy.2019.114356.

Pinto, Manuel, Ricardo Almeida, Paulo Pinho, and Luís Lemos. 2014. "Daylighting in Classrooms - the Daylight Factor as a Performance Criterion." *ICEH 2014 - 3rd International Congress on Environmental Health*. http://repositorio.ipv.pt/handle/10400.19/2410.

Reinhart, Christoph. 2015. "Opinion: Climate-Based Daylighting Metrics in LEEDv4 - A Fragile Progress." *Lighting Research and Technology* 47 (4): 388. https://doi.org/10.1177/1477153515587613.

Reinhart, Christoph F., and Jan Wienold. 2011. "The Daylighting Dashboard - A Simulation-Based Design Analysis for Daylit Spaces." *Building and Environment* 46 (2): 386–96. https://doi.org/10.1016/j.buildenv.2010.08.001.

Reinhart, Christoph F, and Council Canada. 2002. "Effects of Interior Design on the Daylight Availability in Open Plan Offices." In *Conference Proceedings of the ACEEE Summer Study on Energy Efficient Buildings*, 1:1–12. Pacific Grove, CA., USA.

Reinhart, Christoph, and Stephen Selkowitz. 2006. "Daylighting-Light, Form, and People." *Energy and Buildings* 38 (7): 715–17. https://doi.org/10.1016/j.enbuild.2006.03.005.

Seuntiens, P., M. Van Boven, and D. Sekulovski. 2012. "Effect of Skylight Configuration and Sky Type on the Daylight Impression of a Room." *WIT Transactions on Ecology and the Environment* 165: 53–61. https://doi.org/10.2495/ARC120051.

Shafavi, Nastaran Seyed, Mohammad Tahsildoost, and Zahra S Zomorodian. 2020. "Investigation of Illuminance-Based Metrics in Predicting Occupants ' Visual Comfort (Case Study : Architecture Design Studios)." *Solar Energy* 197 (November 2019): 111–25. https://doi.org/10.1016/j.solener.2019.12.051.

Shamsul, Mohd Tamrin Bahri, S. Nur Sajidah, and S. Ashok. 2013. "Alertness, Visual Comfort, Subjective Preference and Task Performance Assessment under Three Different Light's Colour Temperature among Office Workers." *Advanced Engineering Forum* 10: 77–82. https://doi.org/10.4028/www.scientific.net/aef.10.77.

Stoffer, Sophie Anne, and Katharine N. Brejnrod. 2014. "Daylight Metrics and Their Sensitivity."

Suni, Eric. 2020. “Light and Sleep.” Light & Sleep: Effects on Sleep Quality. 2020. https://doi.org/10.1007/s11818-019-00230-y.

Syaheeza, R. N., E. M. Husini, F. Arabi, W. N.W. Ismail, and M. Z. Kandar. 2018. “Secondary School Classrooms Daylighting Evaluation in Negeri Sembilan, Malaysia.” *IOP Conference Series: Materials Science and Engineering* 401 (1). https://doi.org/10.1088/1757-899X/401/1/012024.

Tabadkani, Amir, Saeed Banihashemi, and M. Reza Hosseini. 2018. “Daylighting and Visual Comfort of Oriental Sun Responsive Skins: A Parametric Analysis.” *Building Simulation* 11 (4): 663–76. https://doi.org/10.1007/s12273-018-0433-0.

Vanhoutteghem, Lies, Gunnlaug Cecilie Jensen Skarning, Christian Anker Hviid, and Svend Svendsen. 2015. “Impact of Façade Window Design on Energy, Daylighting and Thermal Comfort in Nearly Zero-Energy Houses.” *Energy and Buildings* 102: 149–56. https://doi.org/10.1016/j.enbuild.2015.05.018.

Wagdy, Ayman, and Fatma Fathy. 2015. “A Parametric Approach for Achieving Optimum Daylighting Performance through Solar Screens in Desert Climates.” *Journal of Building Engineering* 3: 155–70. https://doi.org/10.1016/j.jobe.2015.07.007.

Xue, Peng, C. M. Mak, and H. D. Cheung. 2014. “The Effects of Daylighting and Human Behavior on Luminous Comfort in Residential Buildings: A Questionnaire Survey.” *Building and Environment* 81: 51–59. https://doi.org/10.1016/j.buildenv.2014.06.011.

Yacan, Safak. 2014. “Impacts of Daylighting on Preschool Students’ Social and Cognitive Skills.” *Interior Design Program: Theses* 2 (1): 63. http://digitalcommons.unl.edu/arch_id_theseshttp://digitalcommons.unl.edu/arch_id_theses/11%0Ahttp://digitalcommons.unl.edu/arch_id_theses/11.

Yu, Xu, and Yuehong Su. 2015. “Daylight Availability Assessment and Its Potential Energy Saving Estimation –A Literature Review.” *Renewable and Sustainable Energy Reviews* 52 (December): 494–503. https://doi.org/10.1016/j.rser.2015.07.142.

Zhang, Anxiao, Regina Bokel, Andy van den Dobbelsteen, Yanchen Sun, Qiong Huang, and Qi Zhang. 2017. “Optimization of Thermal and Daylight Performance of School Buildings Based on a Multi-Objective Genetic Algorithm in the Cold Climate of China.” *Energy and Buildings* 139: 371–84. https://doi.org/10.1016/j.enbuild.2017.01.048.

Chapter 4

LANDSCAPE DESIGN STUDY OF ÇANAKKALE HALK BAHÇESI ACCORDING TO FENG-SHUI PRINCIPLE

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1.Introduction

While the city was simple in the early days of its formation, it has become complex with its development, and today it is a variable concept with different features (Akyol, 2006; Gürer and Uğurlar, 2017). It is not only a physical, but also a production area that has socio-cultural, economic and political characteristics (Ali and Nawawi, 2006; Gürer and Uğurlar, 2017). Today, increasing urbanization with the increase in industrialization causes urban users to move away from nature and disappears one by one with the inclusion of areas that meet people's natural needs in the urban environment (Polat and Önder, 2004).

It was thought that conditions such as sound pollution, air pollution and deterioration of natural balance related to the increase in technological developments with the increase in population in the urban environment would not affect the people who were kept separate from nature at first; however, environmental problems occurring in different ways have caused bad results on people in terms of mental and physical. In addition, urban users have begun to feel the need to approach nature more than before (Mamuti, 2010; Ayhan, 2019).

Urban users have started to prefer natural areas that appeal to users from all age groups, include different kinds of activities, and make them feel good spiritually in order to get away from all the bad effects that occur. Urban parks are one of the areas that provide active and passive recreation opportunities to the people living in the city, increase the quality of life in the city and respond to the need for green spaces (Aytaç and Dinemiş, 2015; Karadeniz, 2019).

Urban parks are areas that meet the active and passive activity needs of users, such as education, entertain, socialize and relax. Urban parks that can fulfill these functions make a great contribution to the development of a society (Ocak and Perçin, 2014). Urban parks are also public spaces that have increased in order to provide the city-nature relationship with the increase of urbanization, and have important and different functions for regaining the connection between nature and users (Kızılaslan, 2007).

According to Gold (1980), urban parks are social spaces where urban users can easily reach, get away from the intense use of the city and meet their active and passive entertainment needs (Ayhan, 2019). Urban parks are an important element in terms of increasing the quality of urban areas and affecting the living standards of this quality. In order for a city park to be successful and of high quality, it is necessary to pay attention to the planning, design, implementation and maintenance conditions (Yücel and Yıldızcı, 2006).

Feng-shui architecture is a very broad principle which concerns different professional disciplines from the architecture including the concept of design such as landscape architecture to the landscape architecture. Feng-shui is an approach that also includes space design elements, the main principles of which are to achieve harmony with nature, not to harm nature and to observe nature. Feng-shui is an approach that also includes space design elements, the main principles of which are to achieve harmony with nature, not to harm nature and to observe nature. Its design principles prevent Feng-shui from being seen only as a mystical belief, art or occupation. The basis of ecological planning, sustainable design, ecological settlements and ecological design approaches, which have a very important place today, is connected to the philosophy of Feng-shui, which was first found in the Far East centuries ago (Erdoğan and Erdinç, 2009).

According to an ancient Chinese philosophy, Feng-shui is the arrangement of buildings and their surroundings. The main elements of this arrangement design are astronomy, nature observation, geography and human movements. In design, buildings aim to achieve harmony by providing a balance between the user and nature. At the same time, other researchers working on this subject describe it as a design principle that aims to provide luck by creating harmony between building, user, space and nature (Mak and Thomas, 2005; Erdoğan and Erdinç, 2009).

Freng-shui is the use of Yin and Yang balance, which is the basis of Far Eastern philosophies, while creating the environment and buildings together with natural elements. In the feng-shui principle, vertical areas (hills, mountains, etc.) symbolize Yang energy, and horizontal areas (water surfaces, etc.) symbolize Yin energy (Too 1997; Özçalık, 2019). Feng-shui, which is a Chinese philosophy and started to be used by the west as time goes on, is the "art of settlement". The design created by integrating all the elements to be used with nature and positioning them in their exact place is explained as the art of living (Mak and Thomas, 2005; Erdoğan and Erdinç, 2009).

For different types of design-related professional disciplines, how they revealed the design principles of feng-shui for interior or exterior design is arranged according to different sources. Based on the studies that have been done, feng-shui's own design principles according to landscape design are as follows:

- Feng-shui gardens should be natural and create natural feelings, and this should be done using natural elements,
- As one of the most important philosophies, yin-yang (the philosophy of contrast), should be balanced and in tune,

- Natural sunlight should be utilized as much as possible,

In feng-shui garden design, the main landscape elements are composed of 4 elements: hillock, structural material, water element and plant material,

It is essential to add vitality to the space with the element of water,

The realization of designs according to the color, shape, texture and scent qualities of herbal elements turns the space into a much more peaceful, comfortable and positive space,

The materials used in the design and the forms given to them should be a whole and a continuation of nature (Özçalık, 2019).

The main purpose of feng-shui garden design is not to design natural areas for recreation, listening and entertainment, but to get closer to nature with the materials to be used in nature and the shapes given to them, and to reflect the spirit of nature with the garden form to be created (Erdoğan and Erdinç, 2009).

Feng-shui, from the earliest times until today, has played a major role in increasing the quality of the landscape, in making decisions about landscape restoration, in optimizing the human-nature relationship, in having a spatial identity of the area, in maintaining and maturing this identity. Feng-Shui garden design is an understanding that emerged in order to create a basic model for the general structure, architectural structure and garden structure of the city. It played a great role in the development and shaping of the landscape (Wang, 2012; Öztürk and Polat, 2018).

1.1. Ba-Gua Map

Ba-Gua (also called Pa-Kua) map, also known as the Eight Trigram, is a variation of Yin and Yang. Bagua is a map of Feng Shui. Its origin is based on the I Ching (yijing) book of changes. In the I Ching, the main eight trigrams, each of which contains yin and yang properties, the five elements of nature; directions, color, etc. are brought together in an octagonal scheme, taking into account the qualities (Figure 1). There is a yin yang symbol in the middle of the Ba-Gua map. This means that the forces opposing each other at the very center are in a certain balance. This octagonal diagram is a symbol of nature. It is used in space arrangement in Feng Shui design (Şahin, 2007).

The map is designed in octagonal form and consists of 9 categories. This map is used as a place layout guide in Feng-shui and reveals the relationship of the natural environment with daily life. These are respectively; career, knowledge, family, health, fame, relationships, children, guide and wealth (Figure 1). These categories divide the space as imaginary and define

the parts. Each of them has a certain place, indoors and outdoors. While determining areas in line with these categories, 5 elements (wood, fire, earth, metal, water) should be used in balance (Lawler and Ziegler, 2004; Erdoğan and Erdinç, 2009).

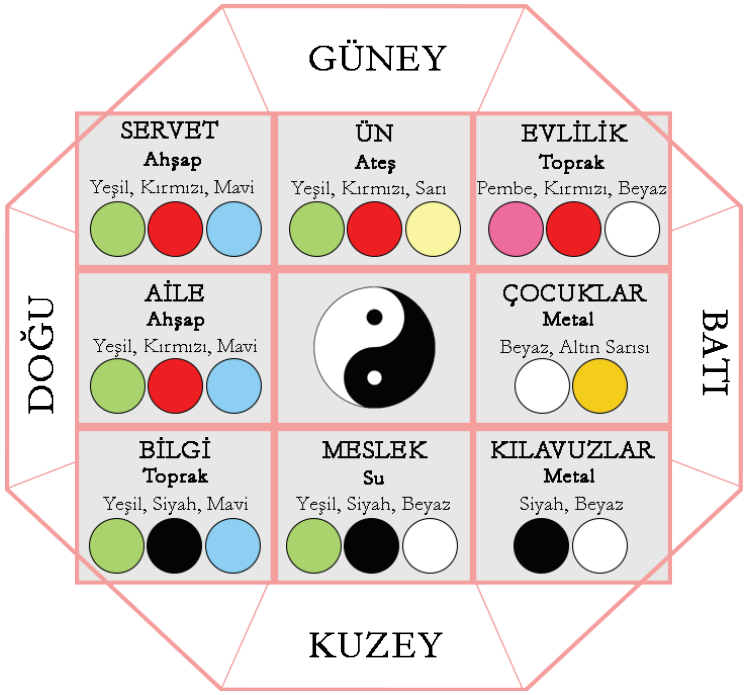

Figure 1. *Ba-Gua map (modified from: Webster, 2000; Erdoğan and Erdinç, 2009; Zhang, 2008; Öztürk and Polat, 2018)*

1.2. Five Elements

The five elements in the map analyze and harmonize the Chi of the person or place (Rossbach, 2006; Öztürk and Polat, 2018). Chi emerges as Yin or Yang energy. The five powers are also known as the five phases or the five elements. These elements are fire, earth, metal, water and wood. Although they are referred to as elements, none of them represent a substance. They are five different elements that are always in motion and transfer energy with each other (Levitt, 2003; Öztürk and Polat, 2018).

Wood is a symbol of flexibility. In line with feng-shui principles, wood varieties such as bamboo, reed, cotton and linen are recommended. Fire is a symbol of vitality and strength. In line with feng-shui principles, natural and artificial light sources can be used for the fire element. Water is a symbol of innovation. The water element can be provided not only with the water element, but also with various glass and mirrors. Metal is recommended to be used in the material of reinforcement elements

according to Feng-shui principles. Earth can take place in the field in forms such as clay, ceramic, stone, marble, granite (Erdoğan and Erdinç, 2009).

These five elements have emerged as a result of the study of natural events. It is the symbolization of the characters of the concrete world. According to this teaching, all the matter found around us has been revealed by the combination of these five elements, according to belief. Three qualities should be considered when describing the elements. These are "creative cycle", "controlling cycle" and "destructive cycle" (Şahin, 2007).

In this study, the Public Garden in the city of Çanakkale was examined in terms of feng-shui principles under the titles of site selection, entrance and circulation, plant elements, color and landscape reinforcement elements. It is aimed to bring design proposals for the arrangement of the Public Garden, which is one of the most important open green spaces for the city of Çanakkale, within the scope of Feng-shui landscape design.

2. Material and Method

2.1. Material

The material of the research is the Public Garden, which is connected to the Cevat Pasa District of the city of Çanakkale. The altitude of the research area is 12 meters. The Public Garden is located at latitude 40.150749 and longitude 26.406519. GPS coordinates ar; 40° 9′ 2.6964" and 26° 24′ 23.4684" (Haritamap, 2021).

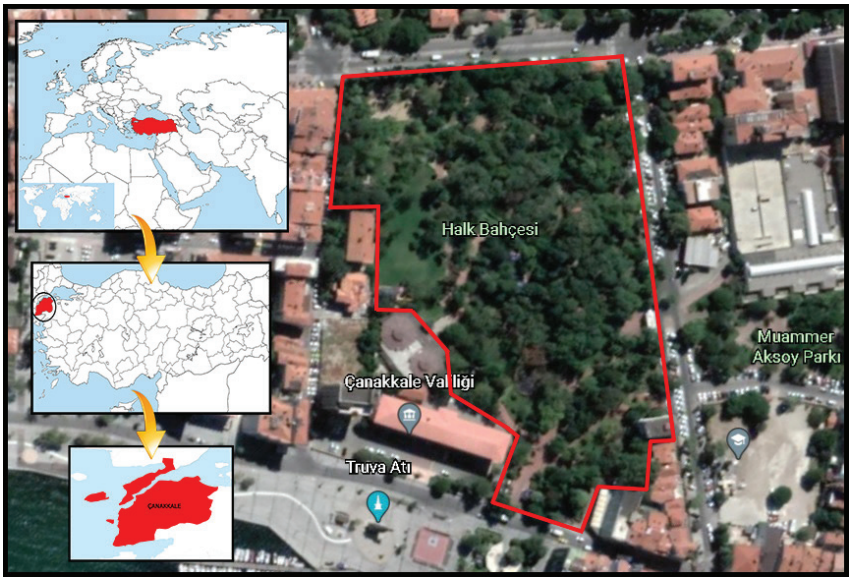

Figure 2. *Study area (modifying from Google Earth 2021)*

There are uses such as buffet, cafe, restaurant, children's playground, various equipment and sports equipment in the Public Garden. The Public Garden is one of the first areas preferred by the citizens to get away from the city life and meet their recreational needs, as it provides various activities. Thanks to the variety and density of plants it contains, it makes a great ecological contribution to the city. The area has been chosen as the study area because it contributes to the identity of the city and preserves its naturalness from the past to the present.

2.2. Method

Landscape research method based on survey, data collection, analysis and synthesis will be used in the study (Türkan and Önder, 2011). The work will be carried out in 4 stages.

In the first stage of the research, a detailed literature search will be conducted to collect data on the subject of the study. In the second stage, on-site investigations will be made and the use of the structural and plant landscape design elements of the public garden in the area will be photographed. In the third stage, the compatibility of the Public Garden landscape design with the Feng-shui design principles will be examined based on the resource research and field investigations. In the final stage, design proposals will be made for the identified potential areas where Feng-shui can be applied.

3. Findings

3.1. History

The Public Garden is an area of historical importance for Çanakkale. The beginning of the Public Garden dates back to the Calvert family of Maltese origin, who lived in Çanakkale in ancient times. It is known that the Public Garden, which is the garden of the mansion where the Calvert family lived, was approximately 5 times the size of the present day and reached from the coastal region to the Sarıçay River in the old period (Çanakkale Belediyesi, 2020b; Sağlık, Baytan, Bayrak, Temiz and Kelkit, 2020).

The oldest known data of Çanakkale Public Garden consists of information and visuals given by Elizabeth Bacon, who lives in Calvert Mansion in Çanakkale. Calvert and family members lived in the mansion near the Dardanelles in the 1840s. The Public Garden is the part of the garden belonging to this family's mansion that has been preserved until today. The garden, also known as the garden of the Calvert family, is spread over a very large area, arranged according to the English Garden design principles (Anonim, 2009).

Covering an area of 34188 m2, the Public Garden has the characteristic of being the largest urban park in Çanakkale. Therefore, most of the park and recreation needs of the city of Çanakkale are met here (Demirel, Çamoğlu, Sağlık, Genç and Kelkit, 2018). The area has preserved trees and a wide variety of plant species from the earliest times of the garden. The existing ornamental pool in the area was designed based on its old shape. Considering the plant species added to the area, along with the plants preserved until today, it has been observed that there are 85 species of woody ornamental plants (Anonim, 2009).

3.2. Analysis of the Study Area

3.2.1. Location Selection

Located in the city center of Çanakkale, the surroundings of the Public Garden are covered with structural examples that have survived from previous periods. Due to these structures, the area is in the middle of visual pollution (Sağlık and Kelkit, 2014). For this reason, the study area is located in an area surrounded by buildings, with vehicle roads passing all around it. This situation is not suitable for Feng-shui garden location selection. The Public Garden is a sheltered area isolated from city life by using tall and leafy trees as border elements (Figure 3). The fact that the form of the area is close to the square form provides convenience in adapting the Ba-Gua map for the area. In addition, the fact that the area is the only area in the sense of a city park and that it is separated from the other areas in this aspect disrupts the harmony and balance in terms of Feng-shui.

Figure 3. *Bird's eye view of the area (modifying from Google Earth 2021)*

3.2.2. Entry and Circulation

There are 4 entrances to the area. One of them is the Zübeyde Hanım Gate, which is the main entrance (Figure 4). The fact that the main entrance is large and welcoming suggests that it is an area where users are well received. Since three of the entrances to the area are large and spacious, meeting the openness criterion by not having too many plant elements, it is in accordance with the Feng-shui design principle. The intermediate entrance, which is another entrance used to access the area, is not suitable for Feng-shui design. Narrow entrances leave a boring and negative effect on people (Figure 6). Also, paths at field entrances are not suitable for Feng-shui garden design. While informal forms were preferred on the roads at the feng-shui entrances, more formal forms were used in the Public Garden.

Figure 4. *Zübeyde Hanım Gate*

Figure 5. *Side entry*

Figure 6. *Intermediate entry*

Figure 7. *Entry next to the Governor's Office*

3.2.3. Herbal Design

In general, the well-maintained and well-kept plants in the park add positive energy to the area. With the plants used, the light and dark balance of the area is also well provided. The fact that the material of the trash cans and seating elements used in the area is wood, also supports the naturalness and contributes to the plant design. Since the plant species used in the Public Garden are mostly green, and plants that will provide

seasonal effects are generally not preferred, the desired effect of the field in Feng-shui gardens does not meet the effect of creating a different effect every season. Colorful plants should be used in garden entrances designed with feng-shui philosophy; but when we look at the area in general, mostly green plants were preferred at the entrances. In addition, while the hard floors in the area emit Yin energy, the plants give Yang energy. The ratio of hard floors to plants used in the Public Garden ensures that Yin-Yang is in balance within the area.

Figure 8. *Herbal design*

3.2.4. Color

The colors corresponding to the south direction on the Ba-Gua Map are green, red and yellow. According to feng-shui principles, green represents harmony, peace and calm, red represents vitality, attraction and adrenaline, and yellow represents warmth, movement and health. When the south angle of the Public Garden is examined, it is observed that the only color that dominates the area is green. For this reason, peace and tranquility are at the forefront throughout the area. The absence of red and yellow elements has taken the space away from the elements of vitality, attraction and movement. For this reason, the south direction of the Public Garden is insufficient when examined according to Feng-shui principles (Figure 9).

Figure 9. *South direction*

The colors corresponding to the north direction on the Ba-Gua Map are green, black and white. According to feng-shui principles, green represents harmony, peace and calm, black represents power and authority, and white represents balance and confidence. When the northern direction of the area is examined in terms of color, it is seen that green color dominates the area and black and white colors are not included. Therefore, harmony and peace prevail throughout the Public Garden. The absence of black and white elements also left the feelings of authority and trust in the field lacking. For this reason, the northern direction of the area is insufficient according to the Feng-shui garden understanding, as it does not provide the balance in the Ba-Gua map (Figure 10).

Figure 10. *North direction*

The colors corresponding to the east direction on the Ba-Gua Map are green, red and blue. According to feng-shui principles, green represents harmony, peace and calm, red represents vitality, attraction and

adrenaline, and blue represents confidence, peace and relaxation. When the eastern aspect of the Public Garden is examined, it has been observed that the dominant colors of the area are green and blue. While the green color provides dominance in the area with its vegetal design, the sky is integrated into the area as a result of the low use of tall, wide-crowned trees. The great effect of the color blue in the field has also been revealed. In this direction, peace, calmness and the feeling of trust created by the area on the users are at the forefront throughout the area. The absence of red elements has taken the space away from the elements of vitality and attraction. For this reason, when the eastern direction of the Public Garden was examined according to Feng-shui principles, it is still insufficient even though it met 2 colors (Figure 11).

Figure 11. *East direction*

The colors corresponding to the west direction on the Ba-Gua Map are white and golden yellow. According to feng shui principles, white represents balance and confidence, and golden yellow represents warmth and movement. When the western direction of the area is examined in terms of color, it is seen that the yellow color is given a little place, and the white color is not used at all. For this reason, the feelings of warmth, movement, balance and trust are lacking in the Public Garden. Therefore, the western direction of the area is not suitable for the Feng-shui garden concept (Figure 12).

Figure 12. *West direction*

The colors corresponding to the south-west orientation on the Ba-Gua Map are pink, red, and white. According to feng-shui principles, pink represents joy and harmony, red represents vitality, attraction and adrenaline, and white represents balance and confidence. When the southwest angle of the Public Garden is examined, it is observed that there is no pink and white color in the area. The red color information sheet used in the area is quite insufficient for the red color to dominate. In this direction, the feelings such as harmony, vitality and trust, which will be brought to the area with red, pink and white colors, have been missing. For this reason, the south-west direction of the Public Garden is insufficient when examined according to Feng-shui principles (Figure 13).

Figure 13. *Southwest direction*

The colors corresponding to the southeast direction on the Ba-Gua Map are green, red and blue. According to feng-shui principles, green represents harmony, peace and calm, red represents vitality, attraction and adrenaline, and blue represents confidence, peace and relaxation. When the southeast

direction of the area is examined in terms of color, it is seen that mostly green trees are included in the area, red color is not used, and blue color is added to the area thanks to the gaps created by the tree branches. Therefore, a sense of harmony and peace prevails in the area in general. The absence of red elements left the sense of vitality and attraction in the area lacking. The feeling of trust and peace provided by the color blue shows its effect in the field, albeit a little. For this reason, the southeast direction of the Public Garden is insufficient according to the Feng-shui garden concept (Figure 14).

Figure 14. *Southeast direction*

The colors corresponding to the northwest direction on the Ba-Gua Chart are black and white. According to feng-shui principles, black represents power and authority, and white represents balance and confidence. When the northwest angle of the Public Garden is examined, it is observed that there is no black and white color in the area. In this direction, the feelings such as power, authority and trust, which will be brought to the area with black and white, have been missing. For this reason, the south-west direction of the Public Garden is insufficient when examined according to Feng-shui principles (Figure 15).

Figure 15. *Northwest direction*

The colors corresponding to the southeast direction on the Ba-Gua Chart are green, black and blue. According to feng-shui principles, green represents harmony, peace and calm, black represents power and authority, and blue represents trust, peace and rest. When the northeast direction of the area is examined in terms of color, the blue color effect of the sky dominates the area due to the less frequent use of green trees and trees. Black color is not included in the field. Therefore, harmony, peace, confidence and relaxing feelings dominate the area in general. The absence of black elements left the feelings of power and authority in the area lacking. Therefore, when the northeast direction of the Public Garden was matched with the Ba-Gua map, the balance could not be achieved due to the lack of black color. Therefore, the area is insufficient according to the Feng-shui garden concept (Figure 16).

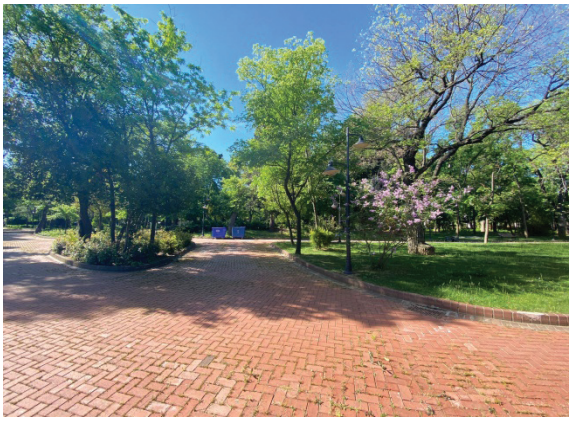

Figure 16. *Northeast direction*

3.2.5. Use of Landscape Reinforcement Elements

Landscape reinforcement elements were examined in accordance with the 5 elements (fire, earth, metal, water and wood) determined according to the Feng-shui principle.

The element of wood has been used as the main material in the informative signage used in the area. Wood represents health and vitality. Since the area is light green, the use of nature-friendly wood material has brought the area closer to nature. Therefore, according to the feng-shui garden concept, the use of the boards is appropriate (Figure 17).

Figure 17. *Informative signage*

Wood and metal elements have been used as the main materials in the trash cans in the area. Wood represents health and vitality, while metal represents clarity and sharpness. The use of wooden materials in terms of harmony with the naturalness and green area has provided health and vitality in the area. The use of metal material, on the other hand, has provided the sharpness by indicating the location of the trash cans. Therefore, according to the feng-shui garden concept, the use of trash cans is appropriate (Figure 18).

Figure 18. *Trash can*

Wood and metal elements have been used as the main material in the seating elements used in the area. While wood represents health and vitality, metal represents clarity and sharpness. The use of wood brings the space closer to nature, while metal strengthens the seating element and makes it noticeable by creating selective perception with its clear image. Therefore, the use of seating elements is appropriate according to the feng-shui garden concept (Figure 19).

Figure 19. *Seating element*

Wood and earth element have been used as the main materials in the sitting areas. Wood represents health and vitality, while earth represents determination. In terms of harmony with nature, the use of wooden materials in the living area ensures that the area remains healthy and lively. The earth element has been used as a concrete material in the living area. The concrete material has provided the stability as it forms the skeleton of the seating elements. Therefore, the sitting area is suitable according to the feng-shui garden concept (Figure 20).

Figure 20. *Sitting area*

The earth element has been used as the main material in the fountain elements in the area. Earth represents stability. In the reinforcement element, it is seen that the earth element was designed in the form of stone. The main material of this reinforcement element, where people meet their water needs, is stone, making the element more robust and stable, increasing the sense of trust on users. Therefore, the use of fountains is appropriate according to the feng-shui garden concept (Figure 21).

Figure 21. *Fountain*

Metal element has been used as the main material in the lighting elements in the area. In addition, lighting elements meet the light fire element they provide. Metal represents clarity and sharpness, while fire represents strength and vitality. The light emitted by the lighting elements

used provides the power feature in terms of giving direction to the users at night, while the direction of lighting the dark places meets the vitality feature. At the same time, the use of metal material adds sharpness to the lighting element, as it helps the lighting elements to be noticed. For this reason, it is appropriate to use lighting elements according to the feng-shui garden concept (Figure 22).

Figure 22. *Lighting elements*

The earth element has been used as the main material in the plastic object in the area. Earth represents stability. In the plastic object, it is seen that the earth element is designed as clay. The use of the plastic element in the area where the dominant color is green enriches and differentiates the area, while providing dominance and stability to the area due to the material type and weight. Therefore, it is appropriate to use plastic objects according to the feng-shui garden concept (Figure 23).

Figure 23. *Plastic object*

The earth element has been used as the main material in the floor coverings in the area. Earth represents stability. It is seen that the earth element is designed in the form of block-stone and slate stone in the floor coverings. In the area where the intense activity is sitting and walking, the use of earth element in the flooring makes the floor more solid and reliable. Therefore, floor coverings are appropriate according to the feng-shui garden concept (Figure 24).

Figure 24. *Floor tiles*

Water and earth elements have been used as the main material in the ornamental pool in the area. While water represents innovation, fluidity

and freshness, earth represents stability. The earth element that makes up the pool is the block-stone flooring and the marble material used in the pool. In the ornamental pool, fluidity and freshness are provided thanks to the mobility that the water element adds to the space. At the same time, it meets the stability criterion since the earth element is the material that makes up the skeleton of the pool. For this reason, the use of an ornamental pond is appropriate according to the feng-shui garden concept (Figure 25).

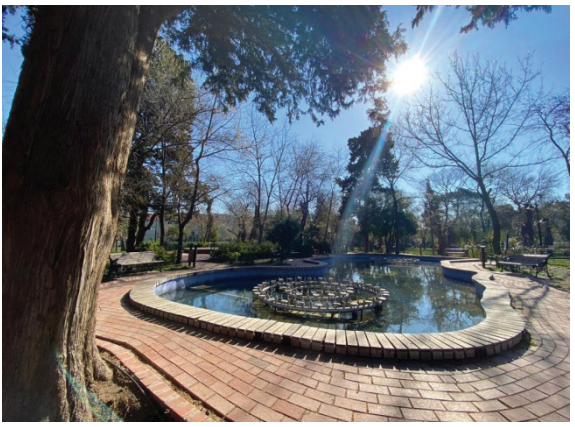

Figure 25. *Ornamental pool*

4. Conclusion and Recommendations

In line with the examinations made at the end of the study, the conclusion reached and the design suggestions given within the scope of Feng-shui principles are listed below:

- Due to the fact that the study area is surrounded by active roadways and densely located buildings, the area does not comply with the Feng-shui garden site selection principle. Trying to isolate the area with limiting elements was not enough to move it away from city life. The square form of the field is convenient as it is a shape that can be integrated into the Ba-Gua map. The area should be preferred as an isolated area far from city life, intertwined with nature and cut off from external ties.

- The 4 entrances of the area provide direct access to the area. Due to this feature, the entrances correctly meet the principle of openness in line with the principles of Feng-shui. The entrances, which should be informal according to feng-shui principles, are used very sharply and formally in the area. Also, except for three entrances, the other entrance is quite narrow. Instead, informal entrances and circulations that can create more relaxing effects in the human subconscious, softly finished, wide and slow flow of energy should be created.

• It has been observed that the care of the plants in the area is sufficient. No drying or rotting plants were found in the area. These maintenance and repair activities should be carried out regularly in the area. It meets the garden concept of Feng-shui in that the area has a sufficient number of various plant species, these plants add naturalness to the area, and provides balance of the living and the inanimate, and the softness to the sharp corners.

• Due to the fact that the plant species used in the Public Garden are mostly green, and plants that will provide seasonal effects are generally not preferred, the area does not meet the effect of creating a different effect in every season, which should be in Feng-shui gardens. When the images taken from 8 different directions are examined, it is seen that they do not meet most of the desired colors in the Ba-Gua map. For this reason, the suggestions given in order to establish the dominance of the colors indicated on the map and to establish the balance are as follows:

• Green: The green texture that dominates the area was found to be sufficient according to the Feng-shui garden design.

• Red: The use of plants such as *Malus domestica* (Apple), *Punica granatum* (Pomegranate) and *Tulipa gerneirana* (Tulip) should be intensified in order to activate the red color in the area and create an appropriate Feng-shui design.

• Blue: The use of *Lavandula officinalis* (Lavender) and *Nymphaea cerulea* (Water Lily) should be increased in order to activate the blue color in the space and create an appropriate Feng-shui design. The water element to be used in forms such as ornamental pools, artificial lakes and streams will also add blueness to the area. In addition, a balanced positioning of the use of tall trees will make the area close to the sky and increase the blue intensity considerably.

• Yellow: Plants such as *Prunus persica* (Peach), *Prunus armeniaca* (Apricot) and *Chrysanthemum Morifolium* (Chrysanthemum) should be used to activate the yellow color in the space and create a suitable Feng-shui design. In addition, the preference of yellow color in wooden reinforcement elements will increase the intensity of this color in the area.

• Pink: *Paeonia turcica* (Peony) and *Chrysanthemum Morifolium* (Chrysanthemum) plants must be used to activate the pink color in the area and create a suitable Feng-shui design.

• White: In order to create a suitable Feng-shui design by activating the white color in the area, the use of white color plants such as *Odontoglossum granda* (Orchid), *Narcissus pseudonarcissu* (Daffodil), *Pelargonium hybrida* (Sardinia) and *Magnolia grandiflora* (Magnolia)

should be preferred. In addition, the white details to be used in the flooring will increase the white color intensity in the area.

- Golden Yellow: The use of *Citrus sinensis* (Orange) plant should be preferred in order to create a suitable Feng-shui design by activating the golden yellow color in the area. In addition, golden yellow color should be preferred for the metal parts of the reinforcement elements to be used on the area, and the use of this color should be increased.

- Black: Black color can be preferred for the metal details of the reinforcement elements in order to create a suitable Feng-shui design by activating the black color in the area. In order to create a strong color effect, its balanced use is important at this point.

- When the material usage of the landscape reinforcement elements in the Public Garden is examined in line with the 5 elements used in Feng-shui, it has been determined that they are suitable and meet the conditions according to the Feng-shui garden design.

As a result, when the Public Garden was examined in terms of Feng-shui garden design principles, it was found that it did not meet these principles and remained incomplete. In order to eliminate these deficiencies, it is necessary to choose the right place, to arrange the entrances and circulation in an informal way according to Feng-shui principles, and to provide the color balance of the area.

References

Akyol, E. (2006). Kent Mobilyaları Tasarım ve Kullanım Süreci. *Istanbul Technical University, Institute of Science and Technology* (Master's Thesis), İstanbul.

Ali, S.M., Nawawi, A. H. (2006). Factors That Influence Users' Satisfaction on Urban Park. *Built Environmental Journal*, 3(2), 42-57

Anonymous (2009). Çanakkale Public Garden. Accessed on (29.03.2021): https://www.canakkaleili.com/canakkale-halk-bahcesi.html

Ayhan, A. (2019). Giresun Kenti Parklarının Peyzaj Tasarım Kriterleri Açısından İncelenmesi. *Ordu University Graduate School of Natural and Applied Sciences* (Master's Thesis). Accessed on: http://earsiv.odu.edu.tr:8080/xmlui/handle/11489/1178

Aytaç, G., Kuşuluoğlu Dinemis, D. (2015). Kent Parkları. Accessed on (20.05.2021): https://www.plantdergisi.com/doc-dr-gul-en-aytac/kent-parklari-4.html

Erdinç, E. and Erdoğan, L. (2009). Peyzaj tasarımı ve Feng-shui. *Journal of Tekirdag Agricultural Faculty*, 6(3), 291-301.

Demirel, K., Çamoğlu, G., Sağlık, A., Genç, L. and Kelkit, A. (2018). Çanakkale İli Peyzaj Alanlarındaki Sulama Sistemlerinin İncelenmesi: Özgürlük Parkı ve Halk Bahçesi. *Journal of Agricultural Faculty of Uludag University*, 32 (1), 127-139.

Gold, S.M. (1980). Recreation planning and design. *McGraw-Hill*, New York, USA, 322 pp.

Gürer, N. and Uğurlar, A. (2017). Kent Parklarında Kullanıcı Memnuniyeti: Ankara Kuğulu Park Örneği. *Megaron*, 12(3), 443-459.

Haritamap. (2021, 11 Nisan). The Public Garden Map. Accessed on: https://www.haritamap.com/yer/halk-bahcesi-merkez

Karadeniz, Z. (2019). Peyzaj Tasarım Kriterleri Açısından Samsun Kent Parklarının İncelenmesi. *Ordu University, Graduate School of Natural and Applied Sciences*, (Master's Thesis). Accessed on: http://earsiv.odu.edu.tr:8080/xmlui/handle/11489/1309

Kızılaslan, S. (2007). Trabzon Kenti Park Ve Bahçelerinin Peyzaj Tasarım Kriterleri Açısından İncelenmesi. *Ankara University Institute of Science and Technology* (Master's Thesis). Accessed on: https://dspace.ankara.edu.tr/xmlui/handle/20.500.12575/28773

Lawler, J. & Ziegler H. (2004). Feng-shui Your Garden, 288p.

Levitt, S., (2003). Teen Feng Shui: Design Your Space, Design Your Life. *Rochester, Vermont, Bindu Books*, s. 5- 110.

Mak, Y. M. & Thomas, S. (2001). The Art and Science of Feng Shui-A Study on Architects' Perception. *Building and Envir*, 40 (3): 427-434.

Mamuti, M. 2010. Yi He Yuan (Summer Palace Park) Koruma Çalışmalarının Peyzaj Tasarımı Açısından Değerlendirilmesi. *Ankara University, Institute of Science and Technology* (Master's Thesis). Accessed on: https://dspace.ankara.edu.tr/xmlui/bitstream/handle/20.500.12575/30756/MayilaMAMUTI.pdf?sequence=1&isAllowed=y

Ocak, R. Ö. and Perçin, H. (2014). Kent Parklarının Tasarım Anlayışlarının Yurtiçi ve Yurtdışı Örneklerinde İncelenmesi. *Selcuk J Agr Food Sci,* 1(1), 12-20.

Özçalık M. (2017). Çin Felsefesinde Feng-Shui Ve Peyzajda Uygulanması. *Social Sciences Studies Journal,*3(7), 221-224.

Öztürk, K. and Polat, A. T. (2018, Mayıs). Feng Shui Felsefesi: Bir Ev Bahçesi Peyzaj Tasarımı Örneği. *The Book Of Internatıonal Green Capıtals Congress*. Konya. Accessed on: https://www.researchgate.net/publication/326914262_FENG_SHUI_FELSEFESI_BIR_EV_BAHCESI_PEYZAJ_TASARIMI_ORNEGI

Polat, A. T. and Önder, S. (2004). Kent Parkı Kavramı Ve Konya Kenti İçin Bir Kent Parkı Örneği. *Selcuk Journal of Agriculture and Food Sciences*, 18(34), 76-86.

Sağlık, A., Baytan, N., Bayrak, M. İ., Temiz, M. and Kelkit, A. (2020). Çanakkale Halk Bahçesi'ndeki Aydınlatma Donatılarının Enerji Verimliliği Açısından Optimizasyonu. *Kent Akademisi*, 13(4), 599-608.

Sağlık, A. and Kelkit, A. (2014). Çanakkale Kent Parklarının Yaşam Kalitesi Üzerine Etkilerinin Belirlenmesi . *COMU Journal of Agriculture Faculty*, 2 (2), 41-53.

Şahin, B. (2006). Feng Shui Paradigması Olarak Mekansal Deneyim. *Istanbul Technical University Institute of Science and Technology* (Master's Thesis). Accessed on: https://docplayer.biz.tr/4823489-Istanbul-teknik-universitesi-fen-bilimleri-enstitusu-feng-shui-paradigmasi-olarak-mekansal-deneyim-yuksek-lisans-tezi-mimar-bilge-sahin.html

Too, L. (1997). The Complete Illustrated Guide to Feng Shui. *Great Britain: Element Books Inc, Shaftesbury. Pp: 224.*

Türkan, E. E., & Önder, S. (2011). Balıkesir Kenti Çocuk Oyun Alanlarının İrdelenmesi. *Journal of Tekirdag Agricultural Faculty*, 8(3), 69-80.

Wang, Y., (2012). A comprehension of Feng-shui and its relevance to landscape architecture, MS Thesis, *Swedish University*, Alnarp, 2-7.

Yücel, G. F. and Yıldızcı, A. C. (2010). Kent Parkları İle İlgili Kalite Kriterlerinin Oluşturulması. *Journal of ITU/a*, 5(2), 222-232.

Chapter 5

DOWNTOWN REDEVELOPMENT, BUSINESS ELITES AND THE OLYMPIC EFFECT: THE CASE OF ATLANTA[1]

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1 This article is produced from the doctoral dissertation titled "Olympic Strategy of Downtown Atlanta Business Elites: A Case Study of the 1996 Atlanta Summer Olympics" written by Tuna Batuhan at Florida State University under the advisory of Jeffrey Brown.

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1. Introduction

This research examines how the business elites of downtown Atlanta attempted to transform Atlanta from a regional-national hub into an international touristic and corporate headquarters center. The author lays out the picture before the Olympics by taking an in-depth look at the urban regime, by introducing the regime actors in Atlanta, and by explaining how the regime was shaped and has evolved over decades. The author also examines the short- and long-term impacts of the 1996 Summer Olympics from the business elites' perspectives and highlights the dynamics between politicians, business elites, and other stakeholders.

The research follows a logical flow of activities from the preliminary activities and the development of theoretical framework through the data collection and analysis. The research aim is to: 1) evaluate the regime that was already in place in Atlanta; 2) investigate the engaging political process in shaping, planning, and manipulating planning decisions; and 3) explore the business elites' strategy for using the Olympics to keep their power in stay and to facilitate the primacy of downtown Atlanta. This research establishes a connection between the Olympic bidding idea, mega-event strategy of Atlanta, and the changing power of downtown Atlanta business elites.

The author first reviews and synthesizes the past literature to build a theoretical framework suggesting that the downtown Atlanta business elites used the Olympics as a convenient vehicle to implement their own vision for downtown revitalization. Then, the author presents the story of elites in Atlanta trying to shape policies in order to further their objectives in the phase of external factors (suburbanization/decentralization); how the regime is shaped and evolved, who the elite actors are, and how they affected the policy making process. Next, the author discusses how the Olympic Games provided an opportunity for downtown business elites to overcome the lost of interest in downtown Atlanta and to increase their power in manipulating policy decisions. Lastly, the changing policy dynamics and shift in power structure are examined. The paper concludes that the Olympic bid created a golden opportunity for the downtown business elites to revitalize and attract attention again to the downtown area. The Olympic organizers used the key strengths of Atlanta such as the convention facilities, rapid-rail system, the airport to get the Olympics, but they failed to address political, economic, and social problems because of the short-term vision and lack of planning during the Olympic preparation process.

2. Theoretical Background

In this section, the author reviews and synthesizes the past literature to build a theoretical framework suggesting that the downtown Atlanta business elites used the Olympics as a convenient vehicle to implement their own vision for downtown revitalization. This framework engages a wide literature on theories of urban politics – especially regime theory–. The theories of urban politics literature refer to those works that primarily focus on how business interests are integrated into governing coalitions, especially Floyd Hunter's (1953) and Clarence Stone's (1989) studies of Atlanta and other related works. Furthermore, the urban planning narratives involve those discourses that have shaped the future of Atlanta; namely the vision of elected officials, how those visions are stated in comprehensive plans, and the implementation of these visions. The examination of these intimately related literatures set the stage for the analysis of the business elites' interest on downtown revitalization.

Four major theories—pluralism, regime, elite, and electoral theory—provide alternative frameworks for explaining policy outcomes of the urban political process. The Merriam-Webster Dictionary defines pluralism as "a situation in which people of different social classes, religions, races, etc., are together in a society but continue to have their different traditions and interests." Pluralism proposes that city politics are defined by fragmentation and the influence of a variety of different actors in different spheres (Judge et al., 1995). Instead of a central business elite or coalition controlling all decisions, NGOs and community groups have access to government actors.

Pluralism argues that the power should be dispersed, whereas elite theory argues that the power should be concentrated. Elite theory presents the idea that one single, powerful actor or a small group can have a dominant influence on the policy process. They rely on reputation, charisma, and access to top levels of government and business. Electoral theory points to the desire for re-election as providing the explanation for policy outcomes. This is similar to classic machine politics where political parties back candidates and when elected they deliver patronage. Regime theorists argue that policy outcomes are the product of a dual dependency and control between business elites—the central focus of growth machine theory—and city officials. Regime theory borrows from both growth machine theory and pluralist theory in developing its analytical tools (Judge et al., 1995). "Regime theory changes the focus of the pluralist-elitist debate from 'social control' or 'power over' to 'social production' or 'power to'. It directs our attention away from the question of 'who rules' to the question of how public purposes are accomplished and, in particular, to how long-term effective governing coalitions to achieve such purposes

are constructed and sustained" (Judge et al., 1995, p.6).

Floyd Hunter (1953), Stephen Elkin (1987), and Clarence Stone (1989) are the pioneer scholars who studied the theories of urban politics. Floyd Hunter (1953) applied elite theory in his reputational analysis of Atlanta. In Atlanta, "institutions and the formal associations play … a vital role in the execution of determined policy … but the formulation of policy often takes place outside these formalized groupings. Within the policy-forming groups the economic interests are dominant" (Hunter, 1953, p.82). Hunter (1953) focused on "growth coalition" and described Atlanta as a city with the business power structure where businessmen and manufacturers have the power to influence all important public policy decisions. Hunter (1953) distinguishes the difference between policy-making and policy-execution in "Regional City" and argues that some individuals and organizations have the power to affect policy decisions: "policy decisions tend to center in the actions of a relatively few men in the community. These men are highly conscious of their position as community leaders, and they use all the propaganda media and the various devices … to keep established policies settled." (p.208). In his follow up study, Hunter (1980) "views Atlanta in transition" and questions "How does it differ from that of 1950?"

According to Elkin (1987), the key point in understanding the growth politics in a city is that "public officials choose—and feel obligated—to consult land interest." The officials feel obligated to consult the "privileged" businessmen's interests because "officials believe that their cooperation is necessary and that their own electoral prospects are tied to the benefits engendered by development efforts; and businessmen believe that they rightfully have a special place in the city's politics." (p.46) Elkin (1987) argues that his explanation "are structural in the sense that the choices open to political leaders are understood to be constrained by the economic arrangements in which the city is situated." He continues: "But, not only do I argue that political leaders have choices in how to respond to this economic context; I contend that they also have other considerations in mind, most notably how to pursue their political ambitions and how to get and continue to be elected. … The result of these various factors, I argue, is that there is a strong tendency for political leaders and businessmen, particularly those concerned with land-use matters, to find themselves in tacit or open alliance. The results of this, in turn, are the foreshortened public agenda alluded to above, the corresponding problems of systematic bias and ineffective problem solving, and a citizenry ill-suited to the running of the sort of republic that we wish to be." (p. 8)

Clarence Stone applies the regime analysis into his work. Stone (1989) focuses on "urban regime," "the informal arrangements by which public bodies and private interests function together to make and carry out

governing decisions" (p.179). Stone (1989, 1993) characterizes "regime" as a complex and fragmented system with no consensus and no formal hierarchy. Stone (1988) is concerned with "social production" – how to achieve a governing capacity: "What is at issue is not so much domination and subordination as a capacity to act and accomplish goals. The power struggle concerns, not control and resistance, but gaining and fusing a capacity to act – power to, not power over" (Stone, 1989, 229).

Stone (1987) identifies three factors that shape the specifics of local urban growth: 1) the composition of the community's coalition for growth; 2) the relationships among the members; and 3) the resources available to the coalition. He also identifies four types of regimes: 1) maintenance regimes attempts to preserve what is already in place rather than making major changes (suburban regimes), 2) development regimes (the regime in Atlanta) seeks for more resources to "promote growth or counter decline" (p. 18), 3) middle-class progressive regimes prioritize environmental protection and neighborhood preservation over growth, and 4) lower-class opportunity expansion regimes require more resources to achieve mass mobilization that would involve "enriched education and job training, improved transportation access, and enlarged opportunities for business and home ownership" (p.20).

According to Stone (1988), two groups dominate the regime: the elected officials and the downtown business elites – "the banks, the utilities, the major department stores, the daily newspapers, and Coca Cola, in particular, have a long history of acting in concert, and they draw other businesses that may be new to the Atlanta scene into the same pattern of unified public action" (p.169). Other groups include community interests (neighborhood associations) and technical/professional officials. In Atlanta, "the policy-makers are few in number, and generally the underlying population has acquiesced to their decisions regarding actions affecting the whole community." (Hunter, 1980, p.14)

On the other hand, growth machine theory, as an attempt to develop a political economy of place, emphasizes the critical role of the business community as well as the importance of individuals and interests groups. The focus is more on "who has the greatest influence", not on "who rules?" The theory emphasizes the role of a land-based elite, who sought local or regional growth through the intensification of land use by attracting investments that otherwise would have moved to other localities. The main premise of the Growth Machine Theory is that land development issues are not simply one issue of concern to an elite coalition but the essential, formative agenda. Because most major cities are now surrounded by other smaller, incorporated cities, the room for outward expansion is very limited.

Regime theory is the theoretical foundation on which the author builds this study. The competition among local governments in the United States to attract businesses leads to the promotion of growth of cities, and this growth orientation creates motivated and determined coalitions that are engaged in politics more than ever (Altshuler and Luberoff, 2003). As a result, the projects that are implemented are mostly the ones with a political support and business coalition. In the case of Atlanta, we see a similar situation where the winning projects were the ones that the business coalitions promoted. Most of the decisions are made through public-private partnerships. Thus, for a city, "an Olympic bid does not involve all the individuals who may be part of the informal governing structure of a city, but it does illustrate in a concrete fashion how business resources and governmental authority come together to undertake a policy initiative" (Burbank et al., 2001, p. 158).

The regime that already existed in Atlanta created a situation where the politicians and businesses acted and functioned together on governing decisions that promoted economic growth. In the case of the Olympic planning, Atlanta Games are seen as the examples of negative social impacts of Games on host cities (Lenskyj, 2000). Atlanta Olympics includes the features of Los Angeles Games with a minimum of new public investment and a maximization of private profit (Rutheiser, 1996), mainly because the Games were privately funded. "No new taxes" pledge was in the heart of the Olympic Organization to get and keep public support for the Games and it limited government involvement on major decisions (French and Disher, 1997).

3. The Story of Elites in Atlanta

In 1920s, a Chamber of Commerce strategy determined the economic character of Atlanta as it is today (Thomas, 1988). In 1926, leading members of the Chambers of Commerce formed the Forward Atlanta Commission (Duffy, 1995) and launched a revolutionary four-year, $825,000 national advertising campaign called "Forward Atlanta" to sell Atlanta's advantages to the rest of the country (Thomas, 1988). The publicity resulted in bringing hundreds of new businesses to the city and strengthening the "distribution center" identity of Atlanta (Thomas, 1988). Atlanta's urban booster campaigns stretching from the Forward Atlanta campaign also aimed at lobbying for an international airport in the 1940s, infusing new life into the city with a large-scale rapid-transit system, and to the more global coverage associated with hosting the Olympics in 1996 (Konrad, 2009).

Another example for the influence of business community on urban policy decisions in 1920s is that the Georgia Railway and Power Company

used its power to eliminate the jitney services in Atlanta by convincing the city's alderman to pass an ordinance (Hartshorn, 2009). All early transportation planning documents in Atlanta (the Beeler Report-1924, Atlanta Traffic Survey-1929, and the Lochner Report-1946) had in common been that they focused on the downtown area – "all roads lead downtown" - served as the dominant principle in 50s and 60s and continued in the 1970s (Hartshorn, 2009).

Atlanta's growth has been a result of its geographic location and accessibility in the Southeast and its developed capacity from that vantage point to provide services crucial to growth of the region (Vetter, 1977). Atlanta has been a rail center historically. The city became an air hub after the airport and a transportation hub after the three major interstates that intersects in Atlanta were completed (Rose et al., 2009). Much of Atlanta's growth is directly tied to the Hartsfield Airport. The city's phenomenally convenient air service is the single factor businesses most of the credit with leading them to choose Atlanta (Thomas, 1988). In 1962, the airport had been renamed Hartsfield International although its only international flight was to Mexico. By the 1980s, Hartsfield was the second largest airport in the world in terms of air traffic movements. The airport became even more accessible when MARTA Airport station opened in 1988.

Atlanta's location at a crossing point provided advantages for transportation operations and commercial activities. By the middle of the twentieth century, Atlanta was truly the crossroads of the Southeast. Atlanta's population increased by 47 per cent between 1950 and 1960 - the Atlanta region's population reached one million by 1960– and the city became the commercial, industrial, and administrative capital of the Southeast (Banfield, 1965). Mayor Allen describes Atlanta in 1960s as follows: "You could use "tremendous" or "fantastic" or "incredible," and you would be correct, but you would still be understating the situation. In that short span of ten years Atlanta grew as much as it had in all of its previous history, moving from being a somewhat sluggish regional distribution center to a position as one of the dozen or so truly "national cities" in the United States" (Allen, 1971, p. 145).

From the early days of the civil rights movement through its Olympic bid, the promoters of the city have created an image of a city where different ethnic and racial groups work hard and live together in peace and harmony. Dameron and Murphy (1997) show that, in reality, things are not that simple or straightforward. Despite the best efforts of the city power brokers to smooth over racial and ethnic divides, Atlanta has a history of conflict and segregation. It is primarily the city's downtown business leaders who influence elected officials and control local politics. This political environment in Atlanta leads to the policy decisions that

often neglect public interests and undermine regional and social needs because of a narrowly defined private interests (Keating, 2001). Limited vision, class and racial segregation, along with the lack of attention to the fundamental issues created serious problems that are transferred to the future decision makers of the city.

Mayor Allen describes Atlanta as "the city of the sixties in America" and he lists the reasons why Atlanta grew more than any other cities: "for one thing Atlanta faced the racial issue realistically while many others (including, by all means, its former rival, Birmingham) tried to act like it wasn't there or else became adamant in its attitude to it. As the sixties came along, Atlanta, too, was not so provincial as most other cities outside the East; we had a goodly number of branch offices in town already… And we had always had a geographical edge on the rest of the Southern cities; between mountains and coasts, transportation center, good climate, national resources, abundant recreation facilities. We also had that hard core of business and civic leaders who had the benevolent attitude that whatever was good for Atlanta was good for them" (Allen, 1971, p. 148).

"Ordinary citizens of Atlanta have generally, if somewhat vaguely, assumed that a group, "they," somewhere downtown would, as a matter of course, see to getting those things done downtown that needed to be done. It was rather widely suspected that among the "they" would be representatives of at least the Coca-Cola Company, the Trust Company of Georgia, the Georgia Power Company, the First National Bank, the Chamber of Commerce, Rich's department store, the mayor—a list sometimes expanded more recently to include the fast-growing Citizens and Southern Bank, and a half-dozen other names." (Hunter, 1980, p.14)

3.1. The Civic-Business Elites

Up to the late 1960s, the politics and business of the city were pretty much intertwined. The mayor of the City of Atlanta relied on the support of the business community for their elections. Members of this downtown elite wielded power not by holding political office but by influencing major decisions made by elected officials. One exception to this was Ivan Allen Jr., a prominent member of the downtown elite who serves two terms as mayor in the 60s.

Another important but behind-the-scenes figure was Robert Woodruff of Coca-Cola. Robert W. Woodruff is presumed to be at the top of the "power structure" (Banfield, 1965). Woodruff was the head of both the Coca Cola Company and the Trust Company of Georgia. "No major projects was executed in Atlanta during the 1940s and through the 1970s without Woodruff money" (Hunter, 1980, p.54). Mayor Hartsfield had only Woodruff's picture on his office wall (Banfield, 1965). In addition to

Woodruff, "Dick Rich had been a leader of every major community projects in Atlanta since at least the 1950s." (Hunter, 1980, p.59) Many people knew him as "Mr. Atlanta". Newspapers and businessmen associations play influential role by being in favor of progress and civic improvement. Two principal newspapers – the morning Atlanta Constitution and the evening Atlanta Journal – and the combined Sunday Journal and Constitution mostly shared the views of the business community and have been a main support of Atlanta.

Mayor Allen explains the success of Atlanta in 1960 as follows: "Yet, I submit that no major city in America has ever been guided by a group of men who were so totally dedicated—albeit, pragmatically, benevolently, and paternalistically—to the welfare and prosperity of their city. That was the secret to Atlanta's success in the sixties. When I look back at what happened during the decade I can find few major efforts that were accomplished without the totally unselfish support of the business community" (Allen, 1971, p. 239).

3.2. The Mayor

Two figures dominated the politics of Atlanta in the time period from 40s to 70s: William B. Hartsfield, mayor from 1937 through 1961, and Ivan Allen, Jr., mayor from 1962 to 1969. Both of them had good relations with the business elites of Atlanta.

"Since 1953, at least, Atlanta's mayors had been chosen by a coalition composed of virtually all black voters, most of the middle and upper-middle class whites who live on the northside of the city, and a minority of whites elsewhere ... The previously successful coalition of blacks and northside whites was shattered in 1969 ... Upper-middle class whites and the city's traditional "power structure" lost their former position of influence ..." (The Atlanta Elections of 1969, a study by Voter Education Project, Inc., Atlanta. Cited in Allen, 1971, p. 219).

Banfield (1965) characterizes the power of the mayor like a three-legged stool; the press, the 'white' business power structure, and the Black community. These three "legs" came together and formed the stool starting with Hartsfield mayoral term: "he instituted businesslike fiscal practices, found a way to finance operating costs from current revenues, and inspired such confidence in the business community that the local bankers bailed the city out. … Although not a liberal on race matters, he saw very early that a 'good government' regime needed a heavy Negro vote in order to stay in office, and he responded realistically. … To save him and the coalition he had put together, leaders of the business community are said to have persuaded the newspapers to endorse him for reelection, something they had not planned to do" (Banfield, 1965, p. 23-24).

3.3. The Biracial Coalition

From 1940s to the early 1970s, wealthy, white downtown business leaders dominated city government. Throughout most of this period the government depended on the support of a biracial coalition. In 1950s, while William Hartsfield was mayor, and the 60s, while Ivan Allen Jr. was mayor, the white downtown business elite managed to hold on to city hall by maintaining an informal political alliance with the city's middle class African American political leadership (Keating, 2001). Business involvement was always in place in Atlanta. Business leaders run for political offices, they frequently end up being the mayor (e.g. Ivan Allen from 1962 to 1970). For much of the history of Atlanta, the business leadership class and the political influential had a common ground. Even the election of black mayors (first Maynard Jackson from 1974 to 1983 and from 1990 to 1994, then Andrew Young from 1982 to 1990) did not result in a big shift.

The white elite supported elements of desegregation and the civil-rights struggle, and expansion of housing for middle-class blacks. In return, black, middle-class political leaders secured the African American vote for Hartsfield and Allen, providing the electoral margin the white elite needed to stay in power (Keating, 2001). Mayor Allen carried on the tradition of visionary leadership. In addition to building the Atlanta-Fulton County Stadium and bringing major league sports to the city, he played an important role in the city's transition from a segregated to a free and equal society (Thomas, 1988). Mayor Sam Massell, the city's first Jewish mayor, also made significant contribution to the Atlanta we know today. Mayor Massell realized a need for a modern public transportation system, which would provide a framework for the city's future growth, and he was influential in the passage of the MARTA referendum.

Another reason for the success of Atlanta's biracial coalition has been the social cohesiveness of both the city's white business elite and the city's black, middle-class leadership. Institutional resources that allow mobilization on particular issues compose an extensive list in Atlanta. Over the last few decades, the two major organizations representing the interests of the white downtown business elite have been Central Atlanta Progress and the Atlanta Chamber of Commerce. There are no similar organizations in the African American community, which is one of the reasons for white business dominance within the coalition. Both the Atlanta Urban League and the Atlanta Business League have very small staffs that concern themselves primarily with the immediate issues of affirmative action and the particular problems of smaller black-owned firms. Central Atlanta Progress, an advocacy group for the central business district, maintains a professional staff of planners, researchers, and specialists

in several areas. Likewise, Atlanta Chamber of Commerce maintains a staff of planners, researchers, and specialists. These institutions support the public policy and development objectives of the business elite more cohesively and effectively than the city's planning department or any of the much smaller environmental, homeless, community-development, and social-justice advocacy groups.

4. Business Elites in Action

In Hartsfield's view, only growth could provide the wealth the city needed to become great. In the 50s, the Hartsfield administration began construction of a highway system radiating from downtown. In the 60s, the Allen administration built a baseball stadium and a civic center close to the downtown area. It also promoted a metro-region rapid-rail system. Mayor Allen made extensive use of federal urban renewal and other public monies to build the necessary public infrastructure to attract private investment and put Atlanta on the map as a city of national significance, a "major league city" (Stone, 1989). These features included a stadium for major league sports teams, extensive hotel and convention facilities, and a mass transit system focused on downtown. In the case of Atlanta, the mega projects that are implemented are mostly the ones with a political support and business coalition; the winning projects were the ones that the business coalitions promoted. The regime that already existed in Atlanta created a situation where the politicians and businesses acted and functioned together on governing decisions that promoted economic growth.

However, the business elites became less interested in downtown Atlanta and found the surrounding suburbs more attractive for business. The surrounding suburbs, containing more than 80 percent of the regional population, enjoy more new economic development, better-funded governments, and political opportunities. The numbers in 1980s show the fact that 80% of future net employment growth in Atlanta will take place outside the city limits. The city's ability to survive and continue its development depends on the ability of city industries to maintain their unique role in the greater region. At the same time, the central business area of the city is losing retail employment, mainly because the central business area retail locations cannot compete with the regional shopping centers (Vetter, 1977).

According to Vetter (1977), Atlanta has optimized its economic base by providing a very pleasant business and residential environment at a low cost. It can continue to build on this base and maintain its regional function under two conditions: 1) if there is continued growth of industry and trade in the immediate Georgia and Southest regions and 2) if it continues to create competitive, efficient, and pleasing work and residential environment. It

will attract a first rate work force and provide a competitively low cost of business (Vetter, 1977, p.64). The City's economy is highly dependent upon the larger regional economy. The basis of Atlanta's economy is its activity as a regional service center, providing specialized professional, administrative, support and infrastructure services to the immediate and Southeast region. The availability of these services at a central place makes possible the generation of growth in a broad geographic area. This growth in turn generates a demand for more extensive, specialized and complex services in the City (Vetter, 1977, p. 64).

The downtown needed new roles to replace many jobs lost in downtown, showing its adaptability and resilience. Hospitality (tourism and conventions) is seen as a key industry for the city, and is associated with it long standing position as the center of commerce for the southeast mainly as a result of three factors: the ease of access provided by Hartsfield-Jackson International Airport from anywhere in the US and in the world; the expansion of "Mart" buildings, and the World Congress Center (Rose et al., 2009). These factors generated significant economic impact in convention businesses in Atlanta, such as jobs in hotels, restaurants, and other related services.

Atlanta has also the potential to become a unique and great convention center. Hurst (1977) calls the convention business as "an industry without a smokestack" since it does not pollute, and it allows Atlanta to take the city to a maximum level of usage of its hotel and infrastructural capacity. Hurst (1977) concludes that the city of Atlanta needs to develop new activities to attract and satisfy its visitors, since the convention industry is one of the largest industries operating in Atlanta, and its growth has no limits or bounds. The result of improved convention industry would be a vibrant economy with a lively downtown area and a greater economic force in the residential areas. The ultimate goal was to attract new business and residents, and to entice conventioneers to add a day or two of tourism to their stays (Thomas, 1988). Plans range from the modest to the mega and Olympics can be seen as one of these mega plans, since the Olympics "provides an ideal platform for a local development agenda because it allows growth proponents access to the popular symbolism of international sports and makes opposition to development projects associated with those symbols more difficult" (Thomas, 1988).

5. The Road Led to the Olympic Games

Cities' interest in global networking and the increasing competition among cities are merged into economic strategies and hosting a mega-event like the Summer Olympic Games is seen as a convenient vehicle to achieve the economic goals of a city such as image creation, tourism, and business

investments. The difficulties that the city government and the business leaders face within the broader political and economic environment and within the changing forces in international economy requires American cities to play an entrepreneurial role. Thus, hosting a mega-event like the Olympic Games became a major way to help any city achieve local economic goals (Burbank et al., 2001). In contemporary American cities, staging the Olympic Games is not simply an international sporting event but a tool for implementing the vision of a world-class city by providing opportunity for growth (Burbank et al., 2001).

In this sense, Atlanta's bid for hosting the Olympic Games can be understood as the product of an active growth coalition that already existed in Atlanta. For Atlanta, the vision and the central motivation among growth elites was to show that Atlanta was a "world-class" city capable of hosting the Olympic Games. The city leaders and the business elites used tourism and convention to promote the city's economic development and attract tourists and business investments. In order to justify local development in Atlanta, public policy strategies promoted tourism, and the Olympic Games provided that promotional means to reach a broader population (Burbank et al. 2002). For Atlanta, the Olympic bid was not just about hosting a major sporting event, but about transforming the city into a world-stage player.

The downtown business elites were the force behind Atlanta's bid for the Olympics. Atlanta was able to host the 1996 Olympics through a real estate attorney and former baseball player Billy Payne's vision and determination, along with the support of his friends known as the "Crazy Atlanta Nine" who later formed the Atlanta Organizing Committee (AOC) (Rutheiser, 1996). In Atlanta, the Olympic bid occurred because of an urban regime existed to offer a way to overcome the limitations of city government and benefit from businesses (Burbank et al., 2001). The projects that met the desires of both public and private entities were undertaken and completed with a coalition (e.g. the Olympic Stadium and the Centennial Olympic Park). In other words, the Olympic bid created a golden opportunity for the downtown business elites to revitalize and attract attention again to the downtown area.

An Olympic bid was a logical next step for Atlanta to grow and put the city in the world map. Although Atlanta put a priority to create a world-class city image instead of creating permanent physical legacies, the city itself and its Universities – particularly Georgia Tech and Georgia State University – benefit form some of the physical facilities that are built for the Olympics. New dormitories that will be used by Georgia Tech and Georgia State University after the Games were constructed by $47 million ACOG contribution, a new $24 million natatorium was built on the Georgia

Tech campus, and ACOG spend $1.5 million to renovate Georgia Tech's Alexander Memorial Coliseum, the Olympic Boxing venue (Humphreys and Plummer, 1995).

Many public and private construction projects took place during the Olympic preparation phase but they cannot be credited entirely to the Olympics (Humphreys and Plummer, 1995). Among all, most notable legacies from the Games include:

- The Centennial Olympic Park: The Park is one of the important marks of the Games. The park became a catalyst to revitalize its surrounding area with commercial and residential development after the Games (Rutheiser, 1996; Keating, 2001).

- Olympic Stadium: The 83,100-seat Olympic Stadium of Atlanta used for the opening and closing ceremonies and for some athletic competitions. It is converted to a 45,000-seat stadium, renamed Turner Field and became the home of the Atlanta Braves after the Games as planned (ACOG, 1997).

- Georgia Tech Aquatic Center: This new sport facility was the site of many events and is being used for student recreations after the Games.

- 12 Upgraded pedestrian corridors: This will better link visitors with MARTA station and downtown district and five parks and plazas (MARTA, 1996; Humphreys and Plummer, 1995).

- Hartsfield International Airport completed a new international concourse and a central atrium (MARTA, 1996).

- The ITS System: Another legacy fact for the city is that the advertising of the ITS services has resulted in a continuing high usage rate following the Games and this advanced technology will benefit the community in the future.

6. The Picture after the 1996 Atlanta Olympic Games

Atlanta's Olympic primary effort aimed to meet the IOC requirements in a most efficient way from Games organization to architecture with limited infrastructure investment. In the words of Dixon (1995), "Atlanta's objective, for better or worse, was just the boost it could get, economically and psychologically, from accommodating the games effectively. Even if Atlanta had been seeking more far-reaching civic improvements, there is no way it could have amassed such billions for them."(p. 104).

On one hand, the 1996 Atlanta Olympic Games created negative social impacts on low-income residents, intensified social problems and deepen existing divides among residents; on the other hand, the Games created opportunities for the construction of new sporting facilities as well

as the improvement of the physical environment of the host city, generated civic pride, provided an opportunity to generate world recognition and contributed to transforming the image of Atlanta (Malfas et al. 2004).

The goal of the Atlanta Games was to promote business growth, create a world city image, and attract international business to the city without paying enough attention to residents' needs (Hiller, 2000) and this goal was achieved. The Games was a success story for Atlanta business elites at least for the short-term benefits. It was also successful in terms of sports and financing. The Games would add 5.14 billion to state's economy between 1991 and 1997 (Humphreys and Plummer, 1995). Moreover, the Atlanta region is growing and the region has attracted millions of people especially after the Olympics. The Olympics had an impact on downtown residential improvements. Economic revitalization around the Olympic Park resulted in new housing units, new hotel rooms, and additional retail spaces, all of which had been the goal for downtown business elites.

Additionally, the Olympic transportation planning experience changed the perception on transit and proved the capacity of MARTA system, the airport, and the convenient location of Atlanta. Although transportation was one of the biggest challenges for an auto-oriented city like Atlanta, Atlanta's existing transportation plan, especially the rail system, was a vital part of their proposed transportation plan, which played an important role in Atlanta's winning bid for the Olympics. Based on the argument that Atlanta's transportation system prior to the Games was deficient for providing service to millions of people, MARTA formulated a transport plan on using existing bus and rail systems with the support of a temporary bus system to operate during the Games. Atlanta has not been regenerated through Olympics, instead Olympics is one of the beneficial outcomes of having a good rapid rail system. In MARTA's history, it was the first time that the transit system has been used with its highest capacity.

Because of the tight deadlines of the Games, cities can do much work in a short time. Games are the excuse to guarantee to complete the infrastructure on time. Within its unique planning environment, the Olympics help to make the process faster with the positive affect of highest cooperation and coordination among different agencies and authorities. The Olympic Games was also played a catalyst role for some improvements. Atlanta had the right policy settings before the Olympics, but did not have the pressure to implement some of the improvements that are needed. For example, In Atlanta, in cooperation with other states and federal agencies and private sector partners, a $16 million ITS system was installed by MARTA before the Olympics with a grant from FTA. The Empowerment Zone was established in Atlanta in 1994 mainly because of the Olympic effort in place to revitalize some of the poor neighborhoods.

On the other hand, the Games did not increase the quality of life for the residents of Atlanta, especially the poor. Atlanta focused more on "Olympics-as-sport" side and the needs of communities are disregarded (Andranovich et. al, 2001) The goal of the Atlanta Games was to promote business growth, create a world city image, and attract international business to the city without paying enough attention to residents' needs (Hiller, 2000). For example, the Centennial Park construction dislocated many businesses without assistance for relocating and Olympic Stadium construction inflicted further damage on the low-income black neighborhoods in the area and their limited role in Olympic Planning prevented local governments to take action and protect these people from damage (Keating, 2001). Focusing and engaging on international business to create a world city image also resulted in losing local identity and neglecting local issues (Keating, 2001).

If there was any planning for the Olympics in Atlanta, it was very short-term oriented and temporary and it was gone when the Olympics are over. Atlanta's Olympic experience is an American way of making a justifiable government decision (Dixon, 1995). Since the problems caused by the Olympics are temporary, it becomes easier to agree on a "potentially controversial strategy" for each agency or authority; but once the games are over, disagreements can easily rise again (Giuliana et. al, 1987). Many of the changes in the way of thinking and operating do not retain after the Games. As a reflection of the existing regime in Atlanta, the lack of public involvement and public funding also meant that implementing comprehensive, log-term oriented, and integrated planning was limited in Atlanta Olympic planning process. The Atlanta Olympics showed that Olympic Games may have a limited impact on renovating the host city. Even though the economic and physical benefits of the event were clear, development patterns did not change significantly because of the lack of a comprehensive planning effort and funding.

7. Conclusion

This research examined how the business elites of downtown Atlanta attempted to transform Atlanta from a regional-national hub into an international touristic and corporate headquarters center. The author laid out the picture before the Olympics by taking an in-depth look at the urban regime, by introducing the regime actors in Atlanta, and by explaining how the regime was shaped and has evolved over decades.

In Atlanta, the business elites had the power and resources to shape and manipulate the planning decisions in downtown to increase their business interests. This regime was established in 1950s and was in good shape until 1980s. However, starting from 1980s, the local, national and

international dynamics limited the power of elites in downtown policy-making process. In this policy environment, Olympics as a new strategy provided a means to facilitate the primacy of downtown Atlanta. This new strategy was partially successful mainly because of other external factors.

The Olympic bid created a golden opportunity for the downtown business elites to revitalize and attract attention again to the downtown area. First, the Olympic bid was a logical result of the existing regime in Atlanta, and hosting the Games helped to turn the weaknesses of local government into an advantage for downtown businesses. The Olympics is seen as a convenient vehicle to promote the growth regime goals. Local political dynamics and power structure creates a distinctive policy agenda that is long-lived. As a result, the local elites have the power to implement changes and set the vision for the city of Atlanta.

Additionally, the elites seized the opportunity presented by a potential Olympic hosting in Atlanta to make promises and implement a vision that promotes the downtown area. They used the hosting of the Olympics as the means of gaining control over urban planning processes to implement their vision. The main objective of an Olympic bid for business leaders was to create a commercial legacy by attracting private investment through encouraging companies to locate their regional and national headquarters and offices in Atlanta. The awarding of the 1996 Olympics to Atlanta generated more attention and interest to the downtown area that the city and the business elites have sought for decades.

Moreover, the Olympics were one last shot for downtown business elites to keep the downtown area vibrant, attractive, and lively. Olympics enabled elites of Atlanta to implement the vision they had been unable before. The vision predated the Olympics, but elites were not able to implement the vision until the Olympics altered the local context. However, the impact of the Olympics was not long-lasting; If there was any planning for the Olympics in Atlanta, it was very short-term oriented and temporary and it was gone when the Olympics are over.

In conclusion, the 1996 Atlanta Olympic Games created negative social impacts on low-income residents, intensified social problems and deepen existing divides among residents; on the other hand, the Games created permanent physical legacies e.g. the Centennial Olympic Park, Olympic Stadium, Georgia Tech Aquatic Center, 12 Upgraded pedestrian corridors, a new international concourse and a central atrium at Hartsfield International Airport, and the ITS System. The Olympic Games was a logical next step for Atlanta to grow and put the city in the world map and the city generated civic pride, provided an opportunity to generate world recognition and contributed to transforming the image of Atlanta.

References

Allen, Ivan Jr. with Hemphill, Paul. 1971. Mayor: Notes on the Sixties. New York: Simon and Schuster.

Banfield, Edward C. 1965. Big City Politics: A Comparative Guide to the Political Systems of Atlanta, Boston, Detroit, El Paso, Los Angeles, Miami, Philadelphia, St. Louis, Seattle. New York: Random House.

Burbank, M., Andranovich, G., Heying, C., 2001. Olympic dreams: the impact of megaevents on local politics, Lynne Rienner Publishers, Boulder, Colorado.

Burbank, M., Andranovich, G., Heying, C., 2002. Mega-events, Urban Development, and Public Policy. The Review of Policy Research, Fall 2002. 19 (3), 179-202.

Dameron, Rebecca J. and Murphy, Arthur D. 1997. An International City Too Busy To Hate? Social And Cultural Change In Atlanta: 1970-1995. Urban Anthropology and Studies of Cultural Systems and World Economic Development, 26 (1). Atlanta: Capital of the 21st Century, 43-69.

Dixon, John Morris. 1995. No frills, no thrills: Atlanta's pragmatic Olympics. Progressive Architecture, Jul 1995, 76 (7), 51-104.

Elkin, Stephen L. 1987. City and Regime in the American Republic. Chicago: The University of Chicago Press.

Giuliana, G.K., Habaian, K., Prashker, R. J., and Racker, W. 1987. Evaluation of 1984 Los Angeles Summer Olympics Traffic Management. Final Report, California Department of Transportation , Sacramento, California,.

Hartshorn, Truman A.. 2009. Transportation Issues and Opportunities Facing the City of Atlanta. Chapter 6 in Sjoquist, David L. 2009. Past Trends and Future Prospects of the American City: The Dynamics of Atlanta. Lexington Books.

Hiller, H. Harry. 2000. Toward an Urban Sociology of Mega-Events. Research In Urban Sociology, 5, 181-205.

Humpreys, Jeffrey M. and Plummer Michael K. 1995 Update: The Economic Impact on the State of Georgia of Hosting the 1996 Olympic Games. Prepared for the Atlanta Committee for the Olympic Games (ACOG), June 1995.

Hunter, Floyd. 1953. Community Power Structure: A Study of Decision Makers. Chapel Hill: The University of North Carolina Press.

Hunter, Floyd. 1980. Community Power Succession: Atlanta's Policy-Makers Revisited. Chapel Hill: The University of North Carolina Press.

Judge, David., Stoker, Gerry., and Wolman, Harold. 1995. Urban Politics and Theory: An Introduction. Chapter 1 in Judge, David., Stoker, Gerry., and Wolman (eds.) Theries of Urban Politics. SAGE Publications.

Keating, Larry. 2001. Atlanta: Race, Class And Urban Expansion. Temple University Press

Konrad, Miriam F. 2009. Transporting Atlanta: The Make of Mobility Under Construction. Albany: State University of New York.

Logan, J. R., & Molotch, H. 1987. Urban fortunes. Berkeley: University of California Press.

Malfas, M., Theodoraki, E., and Houlihan B. 2004. Impacts of the Olympic Games as mega-events. Municipal Engineer, 157 (3), September 2004, 209-220.

Metropolitan Atlanta Rapid Transit Authority (MARTA). 1996. The Way to the Games: A Report on Mass Transit During the 1996 Summer Olympic Games.

Molotch, Harvey. 1976. The City as a Growth Machine: Toward a Political Economy of Place. The American Journal of Sociology, 82 (2) Sep., 309–332.

Rose, Glenwood; Sqoquist, David L. and Wooten, Matthew. 2009. Tracking the Economy of the City of Atlanta: Past Trends and Future Prospects. Chapter 3 in Sjoquist, David L. 2009. Past Trends and Future Prospects of the American City: The Dynamics of Atlanta. Lexington Books.

Rutheiser, Charles. 1996. Imagineering Atlanta: The Politics of Place in the City of Dreams. Verso.

Stone, Clarence. N. 1988. Preemptive power: Floyd Hunter's community power structure reconsidered. American Journal of Political Science, 32, 82 – 104.

Stone, Clarence. N. 1989. Regime politics: Governing Atlanta, 1946–1988. Lawrence, KS: University Press of Kansas.

Stone, Clarence. N. 1993. Urban regimes and the capacity to govern. Journal of Urban Affairs, 15, 1 – 28.

The Atlanta Committee for the Olympic Games (ACOG). 1997. Official Report of the Centennial Olympic Games, Volume One: Planning and Organizing.

Thomas, Diane C. 1988. Atlanta: A City for the World. Northridge, California: Windsor Publications, Inc.

Vetter, Fred. 1977. Atlanta's Economic Development: Past and Future. In Edwin N. Gorsuch and Dudley S. Hinds. The Future of Atlanta's Central City. Research Monograph No. 73. Georgia State University College of Business Administration.

White, Dana F. and Crimmins, Timothy J. 1980. How Atlanta Grew: Cool Heads, Hot Air, and Hard Work. Chapter 1 in Andrew Marshall Hamer (ed.) Urban Atlanta: Redefining the Role of the City. Research Monograph – College of Business Administration, Georgia State University; no. 84.

Chapter 6

LANDSCAPE PLANNING AND DESIGN APPROACHES IN RECLAIMED MINING AREAS

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Introduction

People take many actions on the environment in order to meet their own needs. These actions create direct or indirect impact and pressure on the environment. As the severity of this impact and pressure on the environment increases, the size and scope of landscape change and the possibility of the landscape to return to its former state also change. Before the 20th century, due to the narrow scope of mining activities, the small surface area of the mining areas and the remoteness of the eyes, the effects and pressures of these activities on the environment were underestimated, and environmental problems did not attract the attention of people (Borand, 2012). However, the environmental problems brought about by open coal mining have come to the fore as a result of the expansion of open coal mining enterprises, the expansion of their scope and scope of work, and the fact that these areas, which were far from cities in the past, became neighbors to their living spaces.

Serious environmental problems occur during and as a result of all stages used in open coal mining. Because, in an open coal mining ecosystem, there are intense, complex, effective and mutually negative interactions and disruptions between all landscape elements directly or indirectly. The impact areas of these interactions and disruptions can be local and regional, as well as on a global scale (Atmaca, 2001). However, it is known that environmental problems caused by very severe pressures affecting the environment will never remain within local or regional boundaries (Aber & Jordan, 1985; Atmaca, 2001). It can be summarized as in Table 1, basing these negative impacts and pressures on existing landscape elements, interaction and deterioration, impact areas and cause-effect relationship.

Table 1. Result of negative effects of open coal mining on landscape elements problems (Atmaca, 2001; Borand, 2012; Gillarová & Pecharová, 2009; Görcelioğlu, 2002; Mummey, Stahl, & Buyer, 2002; Passariello et al., 2002; Younger, 2004)

TOPOGRAPHIC FEATURES		
AREA OF IMPACT	WHY	PROBLEM
Local	The technique used during raw material extraction	In the natural topography of the area, serious and irreversible changes occur
Local	Excavation of the topsoil	Mass losses occur
EDAFIC FEATURES		
AREA OF IMPACT	WHY	PROBLEM
Local	Raw material extraction	Imbalances in terms of texture and structure occur in the lower layers of the soil.
Local-Regional	Use of explosives	Landslides and collapses occur

Local-Regional	Removal of fertile topsoil	Fertile and arable land is lost
Local-Regional	Removal of fertile topsoil	The natural structure of the soil is disturbed. Changes occur in the structure of the soil, its salinity and pH value
Local	Removal of upper vegetation	Water, wind and soil erosions occur
Local	Stripping and removal of nutrient-rich topsoil	The ecosystem of the soil is disturbed. Ecological instability occurs in the short or long term
CLIMATIC FEATURES		
AREA OF IMPACT	WHY	PROBLEM
Local -Regional-Global	Combustion of coal left in the field	Air pollution occurs
Local -Regional-Global	Mixing of substances such as SO_2, CO_2, NO_X into the atmosphere resulting from the combustion of coal	There is an increase in greenhouse effect formation and acid rain rates
Local-Regional	Destruction of vegetation	Climate and microclimate (wind, humidity, temperature, conversion, etc.) change
HYDROLOGICAL FEATURES		
AREA OF IMPACT	WHY	PROBLEM
Local-Regional	Changes in the topographic structure of the land	Changes occur in the capacity, quality and flow directions of ground and surface waters
Local	Soil compaction by construction machinery	Surface waters cannot penetrate deep into the soil. This increases the intensity and capacity of surface water and causes floods. Groundwater cannot be fed and droughts occur
Local -Regional-Global	Combustion of coal left in the field	Water pollution occurs
Local -Regional-Global	Mixing of washing water resulting from coal processing into groundwater	Pollution occurs in groundwater
BIOTIC FEATURES		
AREA OF IMPACT	WHY	PROBLEM
Local	Digging and stripping of vegetation and cutting of plant masses	Flora and fauna attached to plants are lost
Local-Regional	Use of explosives	The fauna living in the area and in its immediate vicinity becomes uneasy. Fauna habitats disappear
Local	Removing the top cover	Living things in the soil disappear
SOCIO-ECONOMIC AND CULTURAL FEATURES		
AREA OF IMPACT	WHY	PROBLEM

Local	Topographic structure of the land and interventions to the natural appearance	Decreases in visual landscape value and ruptures in the integrity of nature are experienced
Local	Landslides and collapses	There may be uneasiness in the immediate and distant surroundings of the area, the inhabitants and the fauna, as well as material damage to the buildings
Local-Regional	Removal of fertile topsoil	The reduction of fertile land and agricultural lands directs residents to sectors where they can generate other economic gains
Local -Regional-Global	Removal of the cover layer and operation of construction equipment in unstabilized areas	Noise, vibration, dust and visual pollution occur. The resulting pollution affects human health. Chronic health problems may occur
Local-Regional	Evacuation of residential areas entering the production area	Socio-economic and cultural problems arise. These problems create an extensive and pervasive burden for local and regional government
Local	Wastes generated after mining	Environmental pollution occurs and human health is affected by it
Local-Regional	Disruption of landscape integrity during production	The recreational potential of the area and its surroundings is reduced. Unidentified domains appear

Considering the problems caused by the negative effects of open coal mining on landscape elements, it is seen that all landscape elements are interconnected. Landscape elements, which are exposed to severe pressures and the problems they cause, undergo a negative change that takes time and is very difficult to return. It is necessary to organize the landscape and the changing landscape values created by these negative results with a careful and planned improvement (improvement/repair) work, to reprogram the deteriorated system and to make it ecologically, aesthetically and functionally "usable" (Görcelioğlu, 2002). Therefore, the rehabilitation (repair) works carried out in such areas are beyond a standard improvement work, to bring a dynamic balance to the landscape, which is formed quite differently from the old landscape, to construct the ecosystem in a holistic manner and to define the landscape values.

Post-Mining Improvement-Repair Concept

As a result of mining activities, which are necessary to meet raw material and energy needs, the environment is destroyed and ecosystems are damaged (Hobbs & Norton, 1996). However, in order to meet today's needs without compromising the ability of future generations to meet their own needs, and to transfer natural resources and a clean environment to future generations, the new landscape, which was destroyed after surface

coal mining, needs to be functional and balanced. When the degraded environment is left to nature's ability to heal and renew itself, it may take a long time for the environment to establish a stable and functional ecosystem (Borand, 2012). Therefore, landscape improvement (repair) works are planned and implemented in order for the degraded environment to regain its balance in a short time.

Briefly, landscape improvement (repair); It can be defined as the implementation of the plans consisting of stages such as shaping the degraded land, solving the drainage problem, gaining the fertile top soil and regaining the vegetation system to the area with the appropriate planting technique (Kalaycı & Uzun, 2017), as well as the restoration of the deteriorated parts of the landscape and the negative effects of natural-cultural activities. It can also be defined as the preparation and implementation of plans to mitigate the effects (Kalaycı & Uzun, 2017; Köseoğlu & Özkan, 1984). In addition, plans to be implemented with biological, technical or biotechnical methods in order to realize the objectives such as landscape restoration, restoration of the landscape elements and the ecosystem affected by the problems caused by human activities or natural events, before the factors and pressures, or to transform the new landscape into another land use. It is an applied science that implements management plans covering maintenance, control and monitoring activities (Kalaycı & Uzun, 2017; Uzun, 2014; Zhenqi, Peijun, & Jing, 2012).

In order for the landscape improvement (repair) works to reach their goals, environmental problems should be eliminated, the pressures and factors that negatively affect the landscape elements should be removed and the degraded areas should be brought back into balance. This is achieved through the development of reliable and practical strategies. Rehabilitation (repair) works include detailed, comprehensive and effortful plans and many concepts. Landscape restoration, landscape rehabilitation and landscape reclamation are among the frequently encountered concepts (Kuter, 2013).

Landscape restoration; It is a concept mainly used in repair works for improvement and strengthening, and aims to restore the degraded ecosystems, environmental structure and functions to their pristine state before negative impacts and pressures (Kalaycı & Uzun, 2017). In order for the restoration works to reach their goals and successful results, the plans must be realistic and original in the light of correct information. In addition, the fact that the works contain appropriate strategies and have attainable targets also affects the success of the restoration works (Lindenmayer et al., 2002). Restoration may not restore the deteriorated ecosystem, but it can also establish functional and healthy new ecosystems that fit the environmental conditions, economy and cultural structure (Ren, Peng, & Wu, 2003). Restoration does not allow for flexibility in land use,

as it aims to return the land to its pre-disposal state. This causes the study to result in high costs.

Landscape rehabilitation is a concept that means making degraded areas useful again after negative impacts and pressures. It covers all of the landscape restoration works used in areas that are irreversibly damaged (Kalaycı & Uzun, 2017; Kuter, 2013). Rehabilitation is the most flexible repair concept in new land use.

Landscape reclamation, in short, refers to the conversion to another use (Kalaycı & Uzun, 2017).

All these concepts are units of landscape restoration studies and their aims are similar. The main purpose of the landscape restoration work planned and to be implemented in the area where open coal mining is or will be done, should be to bring the area to the region in the most appropriate way in terms of economic, ecological, cultural and aesthetic values, rather than restoring the landscape formed after mining. In mining, it is expected that the planning strategies of a logical and applicable reclamation work should not only focus on permanent, stable, aesthetic and ecological values, but also be aware of degraded land, prioritize land use and multi-functional functionality. In planning strategies, the primary goal should be to transfer the reclaimed area to future generations with maximum benefit (Kuter, 2013). Other goals can be listed under the leadership of the main goal (Cao, 2007; Görcelioğlu, 2002; Wood, 1997);

• Taking measures against risks that may endanger the environment and human health,

• Elimination of pollutants,

• Isolating and controlling dangerous factors that cannot be destroyed,

• Improvement of affected water resources,

• Remodeling of degraded land on a benefit-benefit basis in accordance with the planned land use,

• Recovery of unproductive, dead material that comes to the surface during mining, which is not suitable for living and plant growth,

• Maximum utilization of both environmental and socio-economic advantages of the post-mining area according to its landscape potential,

• To make mining activities sustainable, thus encouraging the efficient production and use of energy and natural resources,

Landscape restoration (rehabilitation) works of the deteriorated areas as a result of surface mining activities are carried out according to the following stages (Uzun, 2014);

• Determination of targets

• Analysis and determination of factors that will affect landscape restoration

• Determination of ecological, economic and cultural needs

• Post-mining land use planning

• Planning of repair alternatives in line with land use planning

• Determination and development of the most suitable landscape restoration method for the area

• Implementation of the developed landscape restoration plan

• Management planning, control and maintenance

In order for the landscape repair (rehabilitation) work to provide maximum benefit, the rehabilitation (repair) works should include all these stages.

Land use alternatives, one of the most important parts of open coal mining landscape restoration works, are determined according to the natural, cultural and socio-economic conditions of the area.

Landscape Planning and Design Approaches

With the development of technology, the expansion of cities and the increase in basic needs, today's concerns about environmental problems that did not seem to be important in the past, the decrease in the rate of green tissue and degraded ecosystems are increasing. Accordingly, there are demands and requirements for the recovery of degraded areas resulting from mining activities, which have serious effects on all landscape elements, and this issue gains importance. Recycling studies on these areas, whose basic ecological relations have deteriorated after mining, which have undergone significant changes in their original landscape, whose topography has changed significantly and whose biological diversity has decreased, cover two main issues. The first of these is the issue of rehabilitation (repair) and renewal of these areas, which are frequently encountered in the literature. The second is the issue of identifying and designing alternative land uses of reclaimed mining areas, which are less studied in the literature. The issue of identifying alternative land uses and designing them according to use is defined as a memoryless landscape with impaired ecological stability, no aesthetic value and reduced recreational potential (Sklenička & Kašparová, 2008), which will increase the visual quality of these areas, bring ecological balance to the new landscape, and the recreational potential of the landscape. It includes methods, strategies, and design decisions to evaluate. When these two basic issues are effectively applied to the field, it

is thought that the value of the landscape by the rehabilitation and design studies after the mining activity is higher than the landscape value before the mining activity.

K.L., one of the leading researchers in the planning and design of the landscape formed after the reclamation and rehabilitation of the degraded lands after mining activities. Schellie developed planning and design principles for these surface coal mining areas (Burley & Bauer, 2000). He gathered these principles under five headings. These principles are as follows. Defining mining activities as a temporary use of land, Coordinated progress of mining activities and reclamation works, Determination of land use alternatives after mining activities, Landscape formed after mining activities, Evaluation of the possibility of being more valuable than the landscape that existed before mining activities, giving the opportunity to use multiple areas in the landscape.

From many perspectives, the landscape formed after mining activities is considered to be a plastic environment that contains many different features and can be adapted to many possible formations. However, it should be known that unless the planning and design approaches of these areas are ecologically, culturally and aesthetically linked, the work done will bring more harm than good (Berger, 1990; Dorney, 1984). The main purpose of landscape planning and design approaches in reclaimed mining areas is to achieve sustainable results that meet people's wishes and needs, protect life and the environment, and are shaped according to ecological, economic, aesthetic and cultural values (Borand, 2012; Haigh, 1993; Mborah, Bansah, & Boateng, 2015).

Ecological, Aesthetic and Sustainable Landscape Design Approaches

All open space planning and design work, including in reclaimed areas after open coal mining, fundamentally addresses the development of land, the conservation and optimal use of resources, the management of sustainability of resources, as well as public safety and well-being (Burley & Bauer, 2000). There are many design approaches to evaluate the landscape potential of reclaimed areas after mining.

Imitation of nature is a very common method in design approaches (Gülpınar Sekban & Bekar, 2019; Güneroğlu & Bekar). The ecological landscape design approach includes the construction of natural elements and natural processes, and the correct operation of these systems. Natural elements are dominant in the ecological design approach. The density of herbal elements in the designs draws attention. However, the paucity of human activities and influences is advocated. As a result, it is expected that the visual landscape value originating from natural elements in the design

will be high (Kaplan & Kaplan, 1989). In ecological landscape design approaches, it is expected that the landscape quality is directly integrated with naturalness and ecosystems. The basis of this design approach is based on the assumption that natural areas that are free of human influence and undisturbed by humans have a high landscape potential.

Ecological design approaches can characterize the landscape in terms of flora and fauna diversity, but since such approaches depend on ecological events and natural elements, generalizations cannot be made in design approaches (Bekar, Yalcinalp, & Meral, 2020; Güneroğlu, Bekar, & Kaya Şahin, 2019). They are difficult to apply to general and all landscapes. Special studies are made for each area, and ecosystems and natural processes are specially designed.

It is the visual quality and character of the landscape, that is, the aesthetic value of the landscape, which creates people's dreams of living in rural areas and their need to find rural and natural areas attractive and spend time here (Brabec & Smith, 2002; Gülpınar Sekban, Bekar, & ACAR, 2018). The aesthetic value of a landscape is the first element under threat as a result of human activities. This threat is evident during and after surface coal mining activities. Mining activities negatively affect the aesthetic value and visual quality of the landscape. Landscape is perceived as a visual resource and the holistic view of the landscape includes visual and cultural elements as well as spatial and structural elements (Krause, 2001). Therefore, aesthetic value is very important in post-mining planning and design studies, and it is very important to protect the aesthetic function of the landscape as well as to define and evaluate it. Accordingly, it is an important criterion in evaluating the success of post-mining land use plan and designs.

All environmental problems, including environmental problems caused by mining activities, are not created by nature, but by humans. However, solutions to environmental problems always include scientific approaches, and cultural approaches are minimized. However, in order to permanently solve environmental problems, it is necessary to consider designs from cultural, aesthetic and artistic aspects. Therefore, sustainable landscape design is very important in landscape design approaches after open coal mining.

Sustainable landscape design approach covers all ecological and aesthetic landscape design approaches. A successful post-mining land use plan and design work is expected to have a holistic approach that includes ecological and aesthetic contexts. That is, all parts of the projects designed for these areas should be coordinated within a sustainable land use strategy. Sustainable landscape design is not just ecological design, sustainable

development or ecological restoration (Bekar & Güneroğlu, 2016; Meyer, 2008), it is a cultural product shaped by ecological principles, art, design and aesthetic approaches and certain socio-cultural influences (Güneroğlu & Onur, 2020). It translates cultural values and ecological principles into landscape forms. In design, it is the creation of the design with ecological events and natural processes rather than imitation of natural forms. It has to include design approaches that aim to transfer natural resources to future generations within the protection-use balance, comply with the laws of the country, the physical, cultural and socio-economic structure of the area, and respond to the needs.

Ecological, aesthetic and sustainable landscape design approaches may have many suggestions on the post-mining use plan and design of the degraded area formed after open coal mining activities. However, there are errors in the general point of view. Not every natural-looking design is aesthetic, nor is it ecological design. Moreover, not every natural-looking ecological design approach is sustainable landscape design. The use of these three design approaches in the right proportions, with the right strategies and with the right compositions, in the determination and evaluation of the landscape potential of the reclaimed mining areas, is the responsibility of the landscape architect, among many professional disciplines.

Conclusion

It is necessary to have a multidisciplinary study in the planning and design of land use after open coal mining activities. It is necessary to examine the data and values of the field from a versatile and broad perspective by different professional groups. In the breeding and post-processing studies, it was seen that the perspective of the groups consisting only of scientists and engineers was quite technical and did not have aesthetic concerns. However, after the rehabilitation works of degraded areas created by open coal mining, land use planning and design are largely related to landscape ecology, aesthetic value, landscape planning and design issues and are related to the fields of expertise of landscape architects. In addition, the integration of social experience and socio-cultural data, which is the basis of a healthy and permanent solution to ecological problems, with ecological systems (Temeng & Abew, 2009) is the most important task of landscape architects in this field. Landscape architects should evaluate the use of mining areas according to needs and legal conditions, and create attractive and aesthetic environments with high quality of life.

Landscape architects have the ability and professional skills to integrate the methods and tools of science into the field with the rich diversity of the designers, with aesthetic concerns and creative perspectives (Arbogast, 2007). Creating suitable environments for living things and ecological

systems with different perspectives is among their primary duties, and after defining the problems, they must interpret raw information, produce alternatives according to them, and evaluate these alternatives in terms of both ecological, aesthetic, economic and socio-cultural aspects.

In the afforestation technique, which is one of the most used methods in field improvement studies, landscape architects have very important duties in the selection of plant species, the application of planting technique, and the improvement of the soil. In addition to these, their duties can be stated as follows in the stages before and after the breeding work (Uzun, Karadağ, & Gültekin, 2010);

• In the analysis of legal obligations, determining the restrictive regulators related to the use of land,

• Planning and implementation of land use preparation before and during the production phase of the coal mine,

• Before the coal mine starts to produce actively and during the production phase, the field improvement works and the post-use costs are removed,

• Determining the effects of environmental problems that will occur after mining and taking precautions against these problems,

• Preparation of the final land use plan at the stage of administrative detail analysis,

• In the stage of landscape planning of transportation routes, planning, designing, drawing and applying the application details of the circulation line,

• Incorporating the wetlands into the ecological systems during the rehabilitation of the wetlands formed in the mines, evaluating their recreational use potential,

• Determining the landscape potentials of the new landscape formed after mining and planning and designing their use in line with the needs,

• Establishing management plans in order to ensure the sustainability of the planned land use studies and designs and to adapt to the conditions created by the varying processes.

The landscape architect profession should evaluate the events with a sensitive, protective, detailed and aesthetic point of view, no matter what stage of the works.

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References

Aber, J. D., & Jordan, W. R., III. (1985). Restoration Ecology: An Environmental Middle Ground. *BioScience, 35*(7), 399-399. doi: 10.1093/bioscience/35.7.399

Arbogast, B. (2007). Designing The Reclaimed Landscape. In A. Berger (Ed.), *Interrogating A Landscape Design Agenda In The Scientifically Based Mining World* (pp. 74-82). New York: Taylor & Francis.

Atmaca, M. (2001). *Afşin-Elbistan Termik Santrali Açık Linyit İşletme Alanının Madencilik Sonrası Olası Alan Kullanım Alternatiflerinin Değerlendirilmesi, .* (PhD Thesis), Çukurova University, Adana.

Bekar, M., & Güneroğlu, N. (2016). Utilization of Living Walls in Urban Ecosystems. In R. Efe, I. Cürebal, A. Gaf, & B. Toth (Eds.), *Enviromenthal Sustainability and Landscape Management* (pp. 467-482). Sofia: St. Kliment Ohridski University Press.

Bekar, M., Yalcinalp, E., & Meral, A. (2020). Analysis of the Contribution of Rainwater Recycling (RWR) to the Campus Area of KTU, Trabzon Turkey. *Fresenius Environmental Bulletin, 29*(04), 2112-2122.

Berger, J. (1990). *Environmental restoration science and strategies for restoring the Earth*. Washington: Island Press.

Borand, M. N. (2012). *Açık ve Kapalı Maden İşletmeciliğinde Çevresel Etki, Doktora Tezi, İstanbul Teknik Üniversitesi, Kimya Mühendisliği Ana Bilim Dalı İstanbul.* (PhD Thesis), Istanbul Technical University, Istanbul.

Brabec, E., & Smith, C. (2002). Agricultural land fragmentation: the spatial effects of three land protection strategies in the eastern United States. *Landscape and Urban Planning, 58*(2), 255-268. doi: https://doi.org/10.1016/S0169-2046(01)00225-0

Burley, J. B., & Bauer, A. M. (2000). Kenneth l. Schellie, A Landscape Architectural Reclamation Pioneer *Proceedings American Society of Mining and Reclamation*, 172-177.

Cao, X. (2007). Regulating mine land reclamation in developing countries: The case of China. *Land Use Policy, 24*(2), 472-483. doi: https://doi.org/10.1016/j.landusepol.2006.07.002

Dorney, R. S. (1984). Reclamation sometimes the 'cure' is as bad as the 'disease'. *Landsape Architecture, 74*(3), 120.

Gillarová, H. H., & Pecharová, E. (2009). An assessment of the environmental impact of the proposed Medard lake project. *Journal of Landscape Studies, 2*, 33-41.

Görcelioğlu, E. (2002). *Peyzaj Onarım Tekniği*. İstanbul: İstanbul Üniversitesi Orman Fakültesi Yayınları.

Gülpınar Sekban, D. Ü., & Bekar, M. (2019). Konutlar için açık alan alternatifi yeşil çatı. *The Journal of Academic Social Science, 7*, 355-362.

Gülpınar Sekban, D. Ü., Bekar, M., & ACAR, C. (2018). Evaluation of Trabzon's High Plateau Tourism Potential and Examination From Awareness. *Journal of The International Scientific Researches-IBAD, 3*(1), 349-361.

Güneroğlu, N., & Bekar, M. Agricultural Landscape Values of Turkey. In R. Efe, I. Cürebal, A. Gad, & B. Toth (Eds.), *Environmental Sustainability and Landscape Management* (pp. 119-137). Sofia: St. Kliment Ohridski University Press.

Güneroğlu, N., Bekar, M., & Kaya Şahin, E. (2019). Plant selection for roadside design: "the view of landscape architects". *Environmental Science and Pollution Research, 26*(33), 34430-34439.

Güneroğlu, N., & Onur, M. (2020). Tasarım Sürecinin Bitkisel ve Yapısal Katman Dâhilinde Çözümlenmesi. *Journal of Bartin Faculty of Forestry, 22*(1), 9-21. doi: 10.24011/barofd.632743

Haigh, M. J. (1993). Surface mining and the environment in Europe. *International Journal of Surface Mining, Reclamation and Environment, 7*(3), 91-104.

Hobbs, R. J., & Norton, D. A. (1996). Towards a Conceptual Framework for Restoration Ecology. *Restoration Ecology, 4*(2), 93-110. doi: https://doi.org/10.1111/j.1526-100X.1996.tb00112.x

Kalaycı, M., & Uzun, O. (2017). Madencilik sonrası maden alanlarının rekreasyonel amaçlı değerlendirilmesi. *Uluslararası Bilimsel Araştırmalar Dergisi (IBAD), 2*(2), 232-244. doi: 10.21733/ibad.2131

Kaplan, R., & Kaplan, S. (1989). *The Experience of Nature: A Psychological Perspective*. New York: Cambridge University Press.

Köseoğlu, M., & Özkan, B. (1984). *Peyzaj Onarım Tekniği,* . İzmir: Ege Üniversitesi Ziraat Fakültesi Yayını.

Krause, C. L. (2001). Our visual landscape: Managing the landscape under special consideration of visual aspects. *Landscape and Urban Planning, 54*(1), 239-254. doi: https://doi.org/10.1016/S0169-2046(01)00139-6

Kuter, N. (2013). *Reclamation of Degraded Landscapes Due to Opencast Mining*. London: InTech.

Lindenmayer, D. B., Manning, A. D., Smith, P. L., Possingham, H. P., Fischer, J., Oliver, I., & McCarthy, M. A. (2002). The Focal-Species Approach and Landscape Restoration: a Critique. *Conservation Biology, 16*(2), 338-345. doi: https://doi.org/10.1046/j.1523-1739.2002.00450.x

Mborah, C., Bansah, K. J., & Boateng, M. K. (2015). Evaluating Alternate Post-Mining Land-Uses: A Review. *Environment and Pollution, 5*(1), 14-24.

Meyer, E. K. (2008). Sustaining Beauty. The Performance of Appearance. *Journal of Landscape Architecture, 3*(1), 6-23.

Mummey, D. L., Stahl, P. D., & Buyer, J. S. (2002). Microbial biomarkers as an indicator of ecosystem recovery following surface mine reclamation. *Applied Soil Ecology, 21*(3), 251-259. doi: https://doi.org/10.1016/S0929-1393(02)00090-2

Passariello, B., Giuliano, V., Quaresima, S., Barbaro, M., Caroli, S., Forte, G., . . . Iavicoli, I. (2002). Evaluation of the environmental contamination at an abandoned mining site. *Microchemical Journal, 73*(1), 245-250. doi: https://doi.org/10.1016/S0026-265X(02)00069-3

Ren, H., Peng, S. L., & Wu, J. G. (2003). Ecosystem Degradation and Restoration Ecology in China. In M. H. Wong & A. D. Bradshaw (Eds.), *The Restoration and Management of Derelict Land* (pp. 190-210). USA: World Scientific.

Sklenička, P., & Kašparová, I. (2008). Restoration of Visual Values In A Post-Mining Landscape. *Journal of Landscape Studies, 1*, 1-10.

Temeng, V. A., & Abew, J. K. (2009). A Review of Alternative Livelihood Projects İn Some Mining Communities In Ghana. *European Journal of Scientific Research,, 35*(2), 217-228.

Uzun, O. (2014). *Peyzaj Onarım Süreci: Kurumsal Temeller ve Bazı Biyoteknik Yöntemler.* Paper presented at the Ulusal Mermer ve Taş Onarım Teknikleri Sempozyumu, Isparta.

Uzun, O., Karadağ, A., & Gültekin, P. (2010). *Coğrafi Bilgi Sistemlerinin Ve Uzaktan Algılama'nın Peyzaj Planlamada Kullanımı*. Paper presented at the III. Uzaktan Algılama ve Coğrafi Bilgi Sistemleri Sempozyumu, Kocaeli.

Wood, P. A. (1997). *Contaminated Land and Its Reclamation, Remediation Methods for Contaminated Sites*. Cambridge: Thomas Telford Press.

Younger, P. L. (2004). Environmental impacts of coal mining and associated wastes: a geochemical perspective. *Geological Society, London, Special Publications, 236*, 169-209. doi: 10.1144/GSL.SP.2004.236.01.12

Zhenqi, H., Peijun, W., & Jing, L. (2012). Ecological Restoration of Abandoned Mine Land in China. *Journal of Resources and Ecology, 3*(4), 289-296. doi: 10.5814/j.issn.1674-764x.2012.04.001

Chapter 7

INVESTIGATION OF CITY FURNITURE ACCORDING TO SUSTAINABLE DESIGN PRINCIPLES

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People who settled down in the early ages sought aesthetic qualities in their environment after meeting their basic needs, and with this concern, they sought to regulate their environment (Erdoğan, 2006). Urban areas formed by natural and cultural elements have been experiencing a constant change since the first day. These spaces must not only have functionality that meets the biological needs of people, but also aesthetic qualities that meet their psychological and intellectual needs. The ability of people to establish harmonious, balanced, healthy, safe and meaningful relationships with themselves, their environment and others in a multifaceted, complex and dynamic structure in cities is based on the aesthetic planning of urban areas (Güreman 2011). In this context, urban furniture, which is designed to be located in the urban space and made original, should also create a systematic within the urban furnishing areas (Aksu 2012).

Increasing urban population, climate change, natural disasters etc. have created negative effects on people physically and psychologically. However, urban area uses cover an important part of our lives and reinforcement elements are needed for needs and activities. Urban furniture is objects that facilitate the individual and social life of people in the urban fabric, provide interpersonal communication, give identity to the space, have different features, define and complete the space. (Güreman 2011; Bulduk 2012). Urban furniture symbolizes the city and sometimes gives information about that city. In addition to their functional use, these reinforcement elements provide the identity of the cities, their harmony with the architectural structure and their imaginative features over time, depending on the lifestyle of the society (Aksu 2012; Karaca, 2020).

It is among them that the natural environment is being damaged by human interventions, and solutions are tried to be produced by taking precautions. With the emergence of the concept of 'sustainability' (Atıl et al., 2015) as a result of the studies carried out by the United Nations Environment and Development Commission, there has been a significant increase in environmental awareness. At the same time, it is seen that the protection of natural resources and their transfer to future generations have gained importance. After the detection of the hole in the ozone layer, especially after 1960, with the deepening of ecological destruction, environmental problems that increasingly surround all areas of daily life have become a popular research topic that attracts attention in many areas (Berber, 2012).

Today, with the rapid depletion of resource reserves, the increasing importance of environmental pollution and social issues, sustainability has become inevitable in the strategies and policies of businesses (Mangla et al. 2013; Sağnak 2020). Increasing energy consumption has made it necessary to use new and alternative energy sources in the 21st century

lifestyle. In order to reduce the energy need of buildings, which constitute a large part of energy consumption, the "energy sensitive building" approach, which is referred to under different titles such as "sustainable architecture, ecological architecture, green architecture, energy efficient building", was born (Göksen vd. 2017). Today, decreasing green areas, unqualified construction, increasing population etc. factors has brought to the forefront the concept of sustainability (Göksen at. al 2017, Bekar et. al. 2018, Gülpınar Sekban *et. al.* 2019a; Gülpınar Sekban, Düzgünes 2021).

The concept of sustainability includes the awareness of environmental and natural resource values with rational methods, taking into account the rights and benefits of present and future generations (Tosun 2009). Since the past, different materials, different solutions and different techniques have been used in furniture design. With the emergence of the concept of sustainability, environmental awareness has increased, but it is also seen that the protection of natural resources and their transfer to future generations have gained importance. Reducing the damage to the environment in furniture designs can be achieved by choosing ecological materials (Şahin, 2018). For an urban furniture to be ecological (environmentally friendly), it must have certain features. Many features such as being made of recyclable materials, production techniques that do not disturb the balance with nature, consuming less energy in the ecosystem, producing recyclable energy, and being produced from waste materials in nature determine that furniture is sustainable. In today's world, where the environmental problems the world is facing have increased, the ability of designers to create products that respond to needs with designs from ecological materials, which are environmentally friendly sustainable approaches, will make a significant contribution to our future. (Kılıç, Sungurlu 2021). Many design approaches are also made in line with sustainable design principles, goals and objectives (Acar et. al. 2017, Gülpınar Sekban, Acar 2021; Gülpınar Sekban et al 2019b).

Kılıç, Sungurlu 2021, on the other hand, discussed the necessary parameters for a furniture to be sustainable under 5 headings.

Table 1. Sustainibility parameters (Kılıc, Sungurlu 2021)

1	Ecological material
2	Easy maintenance
3	Durability
4	Relationship with the place
5	Economical material
6	Recyclable material

Urban furniture has the task of meeting the basic requirements of public space. At the same time, these equipments make positive contributions to social life as elements that make city life more enjoyable and meaningful and offer comfort and aesthetics. These furnitures, which have social, cultural and economic qualities, should produce solutions for the needs of the user along with their physical and functional features (Kurdoğlu ve Çelik 2016). Today, there are many furniture approaches in original and creative furniture design, such as smart furniture designs and environmentally friendly furniture designs (Bekar et. al. 2017). It is very important that active green areas are shaped according to user requests and have a high potential to respond to needs (Gülpınar Sekban 2020). That's why smart furniture, healing environments, etc. There are many ecological approaches.

2. Method

Within the scope of this study, primarily the designs were grouped by benefiting from the work of Kılıç and Sungurlu 2021. According to the design and literature studies, the designs were examined in this group. In the second stage of the method, these designs were scored in terms of functionality. Functionality evaluation criteria were obtained from literature studies. The tables with the parameters were evaluated by making use of the literature studies of the designs. Thus, it has been examined both in terms of sustainability and aesthetics (Table 1). Examined examples were compiled in terms of compilation and literature knowledge.

Table 1. Method diagram

Stages	Yöntem açıklaması
Stage 1	Tasarımların sürdürülebilir parametrelerine göre incelenmesi
Stage 2	Tasarımların işlevsellik açısından değerlendirilmesi

3. Findings

The findings obtained according to the method stage within the scope of this study are shown in Table 2-3-4-5-6-7-8-9-10-11-12-13-14-15-16. Table 2 is analyzed according to the parameters of the sustainable design principle. After the literature review, 15 furniture samples were found that could serve as an example for the study. These furniture samples were examined according to stage 1 and stage 2. In the last stage of the method, 15 samples were examined according to the functionality parameters. These analyzes were made in line with the literature and research information obtained.

Table 2. Sürdürülebilir tasarım ilkelerinin 15 örnek üzerinde incelenmesi

	1	2	3	4	5	6
	Ecological material	Easy maintenance	Durability	Relationship with the place	Economical material	Recyclable material
Design 1	•		•		•	•
Design 2	•	•	•	•		•
Design 3	•	•	•	•		•
Design 4	•	•	•	•		•
Design 5	•	•				•
Design 6	•	•	•	•		•
Design 7	•	•	•	•		•
Design 8	•	•	•	•		•
Design 9	•	•	•	•		
Design 10		•	•	•		
Design 11	•	•	•	•		•
Design 12	•	•	•	•		•
Design 13		•		•		
Design 14		•	•	•		
Design 15		•	•	•		

Web addresses of pictures; URL-1,2,3,4,5,6,7,8,9,10,11,12,13,14,15

Table 3 shows the results obtained for example 1. The score obtained from these parameters is 56.

Table 3. Functionality parameters for example 1

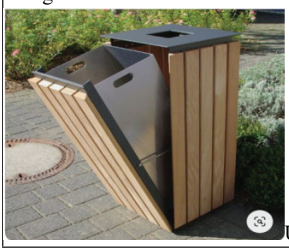
Design 1  URL-1	+									-
	10	9	8	7	6	5	4	3	2	1
An original design										•
Functional design			•							
Easy to use		•								
Safety	•									
Practical	•									
Continuity effect									•	
An effective design			•							
Suitable for today's designs								•		
Easy to clean				•						
Total score:56										

Table 4 shows the results obtained for example 2. The score obtained from these parameters is 66.

Table 4. Functionality parameters for example 2

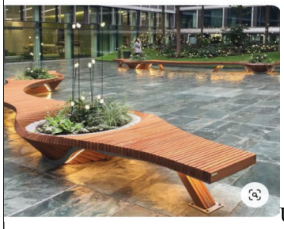
Design 2  URL-2	+									-
	10	9	8	7	6	5	4	3	2	1
An original design			•							
Functional design			•							
Easy to use			•							
Safety			•							
Practical			•							
Continuity effect			•							
An effective design			•							
Suitable for today's designs			•							
Easy to clean									•	
Total score: 66										

Table 5 shows the results obtained for example 3. The score obtained from these parameters is 71.

Table 5. Functionality parameters for example 3

Design 3  URL-3	+					-				
	10	9	8	7	6	5	4	3	2	1
An original design		•								
Functional design				•						
Easy to use				•						
Safety		•								
Practical		•								
Continuity effect		•								
An effective design		•								
Suitable for today's designs		•								
Easy to clean								•		
Total score:71										

Table 6 shows the results obtained for example 4. The score obtained from these parameters is 51.

Table 6. Functionality parameters for example 4

Design 4  URL-4	+						-			
	10	9	8	7	6	5	4	3	2	1
An original design					•					
Functional design					•					
Easy to use					•					
Safety				•						
Practical			•							
Continuity effect							•			
An effective design						•				
Suitable for today's designs					•					
Easy to clean								•		
Total score:51										

Table 7 shows the results obtained for example 5. The score obtained from these parameters is 37.

Table 7. Functionality parameters for example 5

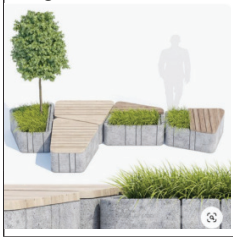
Design 5  URL-5	+						-			
	10	9	8	7	6	5	4	3	2	1
An original design										•
Functional design								•		
Easy to use				•						
Safety				•						
Practical				•						
Continuity effect								•		
An effective design								•		
Suitable for today's designs								•		
Easy to clean								•		
Total score: 37										

Table 8 shows the results obtained for example 6. The score obtained from these parameters is 64.

Table 8. Functionality parameters for example 6

Design 6  URL-6	+			-						
	10	9	8	7	6	5	4	3	2	1
An original design		•								
Functional design		•								
Easy to use		•								
Safety		•								
Practical		•								
Continuity effect									•	
An effective design				•						
Suitable for today's designs				•						
Easy to clean								•		
Total score: 64										

Table 9 shows the results obtained for example 7. The score obtained from these parameters is 40.

Table 9. Functionality parameters for example 7

Design 7  URL-7	+					-				
	10	9	8	7	6	5	4	3	2	1
An original design									•	
Functional design									•	
Easy to use							•			
Safety				•						
Practical				•						
Continuity effect				•						
An effective design										•
Suitable for today's designs							•			
Easy to clean					•					
Total score: 40										

Table 10 shows the results obtained for example 8. The score obtained from these parameters is 65.

Table 10. Functionality parameters for example 8

Design 8  URL-8	+					-				
	10	9	8	7	6	5	4	3	2	1
An original design			•							
Functional design			•							
Easy to use			•							
Safety			•							
Practical			•							
Continuity effect									•	
An effective design		•								
Suitable for today's designs		•								
Easy to clean						•				
Total score: 65										

Table 11 shows the results obtained for example 9. The score obtained from these parameters is 73.

Table 11. Functionality parameters for example 9

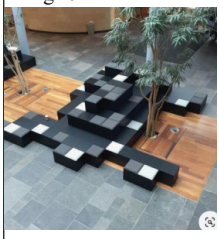
Design 9  URL-9	+					-				
	10	9	8	7	6	5	4	3	2	1
An original design		•								
Functional design		•								
Easy to use		•								
Safety		•								
Practical					•					
Continuity effect	•									
An effective design		•								
Suitable for today's designs		•								
Easy to clean								•		
Total score: 73										

Table 12 shows the results obtained for example 10. The score obtained from these parameters is 74.

Table 12. Functionality parameters for example 10

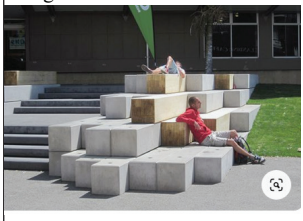
Design 10  URL-10	+					-				
	10	9	8	7	6	5	4	3	2	1
An original design		•								
Functional design		•								
Easy to use		•								
Safety					•					
Practical		•								
Continuity effect		•								
An effective design		•								
Suitable for today's designs		•								
Easy to clean						•				
Total score: 74										

Table 13 shows the results obtained for example 11. The score obtained from these parameters is 67.

Table 13. Functionality parameters for example 11

Design 11  URL-11	+						-			
	10	9	8	7	6	5	4	3	2	1
An original design							•			
Functional design			•							
Easy to use			•							
Safety		•								
Practical		•								
Continuity effect		•								
An effective design		•								
Suitable for today's designs		•								
Easy to clean								•		
Total score: 67										

Table 14 shows the results obtained for example 12. The score obtained from these parameters is 62.

Table 14. Functionality parameters for example 12

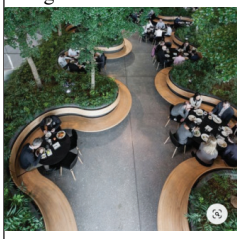
Design 12  URL-12	+						-			
	10	9	8	7	6	5	4	3	2	1
An original design								•		
Functional design			•							
Easy to use			•							
Safety			•							
Practical			•							
Continuity effect		•								
An effective design					•					
Suitable for today's designs			•							
Easy to clean							•			
Total score: 62										

Table 15 shows the results obtained for example 13. The score obtained from these parameters is 52.

Table 15. Functionality parameters for example 13

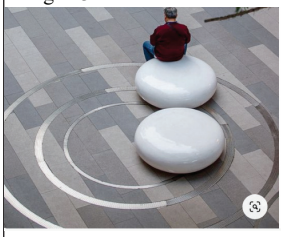
Design 13  URL-13	+							-		
	10	9	8	7	6	5	4	3	2	1
An original design					•					
Functional design			•							
Easy to use			•							
Safety								•		
Practical				•						
Continuity effect								•		
An effective design				•						
Suitable for today's designs				•						
Easy to clean								•		
Total score: 52										

Table 16 shows the results obtained for example 13. The score obtained from these parameters is 70.

Table 16. Functionality parameters for example 14

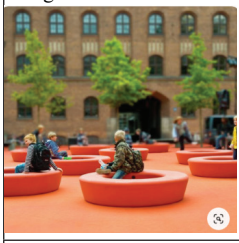
Design 13  URL-14	+							-		
	10	9	8	7	6	5	4	3	2	1
An original design			•							
Functional design			•							
Easy to use			•							
Safety				•						
Practical				•						
Continuity effect			•							
An effective design			•							
Suitable for today's designs			•							
Easy to clean			•							
Total score: 70										

Table 16 shows the results obtained for example 15. The score obtained from these parameters is 51.

Table 16. Functionality parameters for example 15

Design 15  URL-15	+						-			
	10	9	8	7	6	5	4	3	2	1
An original design							•			
Functional design						•				
Easy to use				•						
Safety				•						
Practical				•						
Continuity effect				•						
An effective design							•			
Suitable for today's designs					•					
Easy to clean							•			
Total score: 51										

4. CONCLUSION and RECOMMENDATIONS

A detailed literature study was conducted within the scope of the study. The results obtained from the study are summarized in the tables given below. The third, ninth and tenth samples received the highest scores in terms of functionality (Table 17).

Table 17. Functional parameters result table

Designs	**Total scores**
Design 1	56
Design 2	66
Design 3	71
Design 4	51
Design 5	37
Design 6	64
Design 7	40
Design 8	65
Design 9	73
Design 10	74
Design 11	67

Design 12	62
Design 13	52
Design 14	70
Design 15	51

Figure 1. The 3 highest scoring examples

When we examine the relationship between the parameters, the highest score is respectively; an effective design, compatibility with today's designs, usability, ease of use and safety parameters.

Table 18. Comparison between parameters

Parametres	Total points
An original design	87
Functional design	106
Easy to use	115
Safety	113
Practical	119
Continuity effect	92

An effective design	132
Suitable for today's designs	132
Easy to clean	59

Table 19. The relationship between sustainable design principles

Sürdürülebilir tasarım ilkeleri	Total point
Ecological material	11
Easy maintenance	15
Durability	13
Relationship with the place	13
Economical material	1
Recyclable material	10

The recommendations to be made within the scope of the study are as follows;

• While urban furniture can keep up with today's designs, it also has many approaches that can be compatible with its ecological parameters.

• Urban furniture should be designed to contribute to the sustainability of the city.

• Urban furniture contributes to the ecological process of the city.

• Natural resource consumption can be minimized in environmentally friendly urban furniture designs.

• Designs that allow easy maintenance should be made.

• At the same time, designs that will serve the visual perception of the users should be made.

• It provides a healthy environmental design.

• It should be designed in accordance with universal design rules.

• Made with natural, recycled or recyclable material

• It should be designed in accordance with the multi-functionality criteria.

• It should save water in its production and use.

• It should have low ecological and economic cost.

As a result, this study is a literature study on the subject. Sustainability, environmentally friendly designs and urban furniture are very important issues in each of their fields. This study sets an example for future studies.

There are many criteria for designing a design. Climate, user potential, population, etc. there are many factors. This study is a literature study on this subject. As a result, if we consider the principle of harmony with nature in every design, it will be easy to reach the right design.

References

Acar, H., Gülpınar Sekban, D. Ü. , & Acar, C., (2017). Sustainable Design Approaches İn Children's Playgrounds. Sustainable Landscape Planning And Design (Pp.33-43), Frankfurt: Peter Lang Publishing.

Aksu, Ö. V. (2012). Kent Mobilyaları Tasarımında Özgün Yaklaşımlar, İnönü Üniversitesi SanatVe Tasarım Dergisi, ISSN: 1309-9876 E-ISSN: 1309-9884, Cilt/ Vol. 2 Sayı/No. 6 (2012): 373-386.

Atıl, A., Gülgün, B. ve Yörük, İ. 2005. Sürdürülebilir Kentler ve Peyzaj Mimarlığı, Ege Üniv.Ziraat Fak. Derg., 42(2):215-226, ISSN 1018-8851.

Berber, F. (2012). Ekolojik Malzemenin Tasarımdaki Yeri ve Ekolojik Malzemeyle Mimari Konut Tasarımı. İstanbul.

Bekar, M., Kaya Şahin, E., & Güneroğlu, N., (2017). Solar Cell Applications İn Urban Reinforcements. Journal Of Balkan Ecology , No.20, 80-92.

Bekar, M., Gülpınar Sekban, D. Ü. , & Acar, C., (2018). Planting Along Area Sides Of Highway, Trabzon Coastal Case, Turkey. Journal Of Balkan Ecology , Vol.21, No.4, 443-463

Bulduk, B. 2012. An analysis of the use of urban furniture in city advertising in terms of aesthetic/visual appreciation training: City design, Procedia - Social and Behavioral Sciences 46, 3279 – 3283.

Erdoğan, E. 2006. ÇEVRE VE KENT ESTETİĞİ, ZKÜ Bartın Orman Fakültesi Dergisi, Cilt:8 Sayı:9

Gülpınar Sekban, D. Ü. , Bekar, M., & Acar, C., (2019a). Evaluatıon Of Sustaınabılıty Potentıal Accordıng To Cıttaslow Crıterıa In Turkey/ Trabzon. Fresenıus Envıronmental Bulletın , Vol.28, No.7, 5435-5446.

Gülpınar Sekban, D. Ü. , Akyol, D., & Özkan, D. G. , (2019b). Sustainability Of The Urban Landscape: An Investigation Of Theeffects Of Ecology On Urban Parks Within The Scope Of Integratedlandscape Approach. New Approaches To Spatial Planning And Design Planning, Design, Applications (Pp.199-210), Berlin: Peter Lang.

Gülpınar Sekban, D. Ü. , (2020). Şifa Bahçelerinin Karadeniz Teknik Üniversitesi Kanuni Kampüsü Çerçevesinde Değerlendirilmesi. Uluslararası Sosyal Araştırmalar Dergisi , Vol.13, No.74, 568-575.

Gülpınar Sekban, D. Ü. , & Düzgüneş, E., (2021). Planting Design Approach İn Sustainable Urban Planning. Internatıonal Journal Of Buılt Envıronment And Sustaınabılıty , Vol.8, No.2, 63-71.

Gülpınar Sekban, D. Ü. , & Acar, C., (2021). Determining Usages İn Post-Mining Sites According To Landscape Design Approaches. Land Degradatıon & Development , Vol.32, No.8, 2661-2676.

Gökşen, F., Güner, C., & Koçhan, A. (2017). Sürdürülebilir Kalkınma İçin Ekolojik Yapı Tasarım Kriterleri. *Akademia Disiplinlerarası Bilimsel Araştırmalar Dergisi*, *3*(1), 92-107.

Güreman L 2011. Kent Kimliği Ve Estetiği Yönüyle Kentsel Donatı Elemanlarının Amasya Kenti

Özelinde Araştırılması, e-Journal of New World Sciences Academy, Volume: 6, Number: 2, Article

Number: 3C0073.Kılıç, M. (2021). Sürdürülebilir Kent Mobilyaları. Online Journal of Art and Design, 9(2).

Karaca, O., Bolkaner, M. K., İnançoğlu, S., & Asilsoy, B. (2020). Kent Mobilyası üzerine Bir Çalışma: Yakın Doğu Üniversitesi Kampüsü. *Yakın Doğu Üniversitesi Yakın Mimarlık Dergisi*, *4*(1), 34-44.

Mangla, S., Madaan, J. Ve Chan, F.T. (2013). Analysis Of Flexible Decision Strategies For Sustainability-Focused Green Product Recovery System. International Journal Of Production Research, 51(11), 3428-3442

Kılıç, M. (2021). Sürdürülebilir Kent Mobilyaları. Online Journal of Art and Design, 9(2).

Kurdoğlu, B. Ç. Ve Çelik, T, 2016. Yerleşke donatı bilgi sistemi (YEDBIS) oluşturulması üzerine bir çalışma, Artvin Coruh University Journal of Forestry Faculty, ISSN:2146-1880, e-ISSN: 2146- 698X.

Sağnak, M. (2020). Mobilya Sektöründe Sürdürülebilir Tedarik Zinciri Yönetimi Performans Değerlendirmesi. *Uluslararası İktisadi Ve İdari İncelemeler Dergisi*, (26), 97-114.

Şahin, S. (2018). Mobilya Tasarımında Ekolojik Malzeme Açısından Kağıt Kullanımı. *Mimarlık Ve Yaşam*, *3*(1), 53-61.

Tosun, E.K. 2009. Sürdürülebilirlik Olgusu Ve Kentsel Yapıya Etkileri, Paradoks, Ekonomi, Sosyoloji Ve Politika Dergisi, (E-Dergi), Http://Www.Paradoks.Org, Issn 1305-7979, Yıl:5 Sayı:2

URL-1,. https://tr.pinterest.com/pin/238268636524516659/

URL-2, https://tr.pinterest.com/pin/293085888251125806/

URL-3 https://tr.pinterest.com/pin/658088564291770544/

URL-4 https://tr.pinterest.com/pin/694609942526208822/

URL-5 https://tr.pinterest.com/pin/575546027377323764/

URL-6 https://tr.pinterest.com/pin/530439662346477332/

URL-7 https://tr.pinterest.com/pin/299770918938684349/

URL-8 https://tr.pinterest.com/pin/57280226500308413/

URL-9 https://tr.pinterest.com/pin/525021269058441778/

URL-10 https://tr.pinterest.com/pin/272327108694877203/

URL-11 https://tr.pinterest.com/pin/A5GMawEQwCMGq3E7_7A45qQ/

URL-12 https://tr.pinterest.com/pin/43699058874672836/

URL-13 https://tr.pinterest.com/pin/363032419970110053/

URL-14 https://tr.pinterest.com/pin/285345326373777709/

URL-15 https://tr.pinterest.com/pin/329044316524013938/