

# Architectural Sciences and Spatial Design

November - 2022

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## PREFACE

Within the scope of Architectural Sciences, an International Book Chapter Series has been determined in different themes in order to make the Scientific Publication studies permanent and to reach the large masses. In this Scientific Book, the theme of “Architectural Sciences and Space Design” is handled. After the open call, the book included 16 Book Chapters written by twenty-eight authors.

In today's information and technology age, the concept of Architecture has turned into a versatile and diverse branch of science and art. It includes many disciplines at different scales rather than a single discipline. On the other hand, space, which exists over and over again in every cycle within this diversity, is the most basic concept that always comes up with different meanings or stories in architecture. In this context, the book "Architectural Sciences and Space Design", which examines the relationship between architecture and space under various titles, has been published by IKSAD Publishing House.

Book chapters touch on space design at different points; While starting with space and woman, it is seen that to touch on issues such as ecopsychology in space design, color in space design, and materials in interior space. In the subject of museum shops and emergency services, there are studies that examine the organization of space. In addition to these, topics such as the design of the future, smart homes and biophilic design appear with different approaches. There are also studies in which the universal design is examined in the subject of boat design, and there are studies that analyze the spatial changes in mass housing. On the other hand, starting with the concept of urban space, various scientific studies and spatial analyzes on urban landscape and landscape design in public open spaces contribute to the literature. We are happy to share with you our book on all these topics. We would like to thank all authors for their contributions to academic production in our field and all our readers for their support.

## EDITORS

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## Architecture For and With Women

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## 1. Introduction

Since the existence of humanity, men and women have been shaping life and the world together. Over hundreds of thousands of years, men and women have undertaken this task together, sharing work and life. Thus, there has been great effort, contribution and participation of both sexes in all aspects of life. With the creation, both sexes were given the task of establishing life together and ensuring the continuation of the generation together. Thus, men have been made indispensable for women and women for men. Whether a woman or a man is a mother/father, sister/brother or child, lover, wife/husband or co-worker, boss/employee or people who have never met each other without knowing it or have met each other involuntarily, they have formed the society to be a part of. Men and women of all ages, education, culture and religion have collaborated, shared, made and implemented decisions for their common future during their limited lives. Thus, men and women, who are actually the two guarantees of life and the two partners of life, developed and changed together. In this whole process, men and women sacrificed for each other, loved, respected and valued. Men and women did not hesitate to produce values for each other, regardless of whether they are big or small, expensive or cheap. At the same time, this is a stance of respect for all the gains in life, all the sacrifices and all the efforts, a sign of loyalty and a proof of love. All human values learned, gained and developed over time taught that it is necessary to work for everything valued and that the value given should

be shown. With the addition of love and respect to these human value judgments, men and women have made many works for each other.

The woman has also been honored with many qualities by the Creator, has been the recipient of many praises, and has been identified with the attributes of heaven and paradise. The man, too, offered his gratitude for the existence of the woman with both his mind and heart sincerity and materialized it with his skill. The expression of these relevance and feelings has been through poetry, novels, painting, architectural structures, cities or wars for the sake of women as it has been throughout history. Being aware of the fact that life is not eternal for anyone, human beings have transformed everything valuable into things that can be passed on for generations. Like everything else of value, men also monumentalized and built works to immortalize the love, respect, passion and longing for women. When the item and purpose is women, it is both extremely easy and extremely difficult to monumentalize and transform it into a work. The elegance, beauty, subtle spirit and qualities of women facilitate the process of transforming women or women's values into works. The greatest energy of men in shaping himself and his work has been the love and interest he felt for women. The external beauty of the woman is blended with the inner beauty and reflected in various fields of art and architecture. Thus, the woman and her qualities and feelings have been immortalized. Iconic artifacts from many corners of the world and from various periods of history have survived to the present day. Many of

these structures were built for the purpose of love, affection, sadness, commemoration, keeping their memory alive, expressing their feelings, showing privilege and respect, making them comfortable or glorifying them. Thus, the buildings both gave the desired message in their own time and turned into important works of modern time. These structures are also an indication of the value that men give to women and the importance of women in the life of men. At the same time, all these are important in terms of revealing the place of women in social life depending on the social structure and culture.

The aim of this study is to compile works that are made for women, glorify women and show the meaning of women in the life of men, some of which are world heritage and some are from the seven wonders of the world. The starting point of the study is to draw attention to the lesson stories of each work and the meaningful place of women in society and men's lives through them.

## **2. Architectural Works Devoted to Women**

There are many examples of architecture made for and dedicated to women from the known periods of history to the present day. While some of them have not survived and disappeared, some of them continue to exist under protection today.

### **2.1. Buildings Devoted to Women**

#### **Hanging Gardens of Babylon, Hille, Iraq**

Hanging gardens of Babylon, one of the most important and magnificent structures dedicated to women, were built between 630-

562 BC. It was built by the Babylonian king Nebuchadnezzar II because his Iranian wife Amytis missed her hometown. Some sources write that Babylon's hanging gardens were built by another female figure, the Assyrian Goddess Queen Semiramis. However, the dates do not match on this issue. The gardens are recorded as one of the seven wonders of the world (Çelik and Örkün, 2019).

The hanging gardens of Babylon were designed in the closest way to today's green roof systems. Information about the building, which has not survived until today, can only be accessed from its descriptions (Savaşir and Cengiz, 2018). It is thought that the garden attracts everyone's attention with its different design and has the characteristics of the first botanical garden with its plant diversity (Çelik and Örkün, 2019). Structurally, it was built on columns rising to the sky (Akyüz, 2018). The garden consists of vaulted terraces rising on cube-shaped pillars and deep cavities filled with earth to allow the planting of the largest trees. Columns, vaults and terraces are made of baked brick and asphalt (George, 2020). In order not to disrupt the irrigation system in the gardens, the terraces were plastered with tar and pitch. It is thought that there are plants such as acacia (*Acacia* sp.), palm (*Washingtonia* sp.), cypress (*Cupressus* sp.) and poplar (*Populus* sp.) in the gardens (Aklıbaşında et al., 2011).

In the depictions, it is seen that large statues are positioned in the gardens. There are also motifs created with fine handwork and ornamental pools.



### **Taj Mahal, Agra, India**

The Taj Mahal, located in Agra, India, is known as a monument of love. It is the monument built by the Mughal emperor Shah Cihan for his wife, Ercümen Banu Begüm, who died while giving birth to her 14th child. The building he built one year after his wife died is seen as a representation of the eternal love of two people (Kışmir, 2021; Kumar, 2014). It is thought that the Taj Mahal depicts paradise because it is located in the garden next to the Jumra River (Fidan, 2007). The Taj Mahal took 22 years to complete. The building draws attention with the use of natural light at different times of the day depending on the position of the sun and moon. The dome of the monument, whose architectural appearance is similar to a jewel, is decorated with precious stones such as rubies, emeralds and diamonds. The interior and exterior of the dome is made of white marble and resembles a pearl. Thus, it was requested that the top of Banu Begüm's tomb depict the starry nights. The interior walls of the monument are detailed with flower motifs (Fidan, 2007). In terms of landscape features, it reflects the characteristic structure of the Mughal period in terms of adopting the charbagh garden structure (the 4-fold division model) (Özler, 2020). In the magnificent garden structure, 16 flower beds and 400 flowers were used in each section (Aklıbaşında et al., 2011). The Taj Mahal is located at the end of the garden structure. In order to support the magnificent structure, a reflection pool is placed in front of it. The pool is also depicted as a mirror reflecting the beauty of Banu Begüm along with

the building. The building, which draws attention with its architecture, was added to the UNESCO world heritage list in 1983 and was taken under protection.

### **Eleanor Monuments, England**

These are the monuments built by King Edward I for his beloved wife Eleanor between 1291-1295. Known as Eleanor of Castile, the queen has been with her husband on many trips during their 36-year marriage. The king, who was very sad that the queen died in 1290, had 12 monuments built for the queen's funeral cortege. Monuments were positioned along the road to mark the places to stay overnight (Wikipedia, 2021). Monuments do not have the same details in terms of craftsmanship. All of them are thin and long. And it was designed to stand on the steps. They are also known as the "Crosses of Eleanor" due to the sign of the cross on each monument. The monuments were made by many sculptors. General features of the monuments; It can be listed as the hexagonal planning of the base, its 3-stage structure, reliefs and handwork.

### **Nezahat Gökyiğit Botanical Garden, Istanbul, Turkey**

Nezahat Gökyiğit Botanical Garden is located on the Anatolian side of Istanbul, at the junction at the intersection of Anatolian, Fatih Sultan Mehmet and Atatürk highways. With this location, it is unique in the world. It was built by Ali Nihat Gökyiğit for his wife in 1995 as a souvenir park. It was later developed as a botanical garden by changing plant selection and planning. The botanical garden was opened to

visitors in 2002. One year after its opening, its name was changed to "Nezahat Gökyiğit Botanical Garden" (Nezahat Gökyiğit Botanical Garden, 2021). The botanical garden consists of 8 islands (centre, promenade, Ertuğrul, Istanbul, arboretum, oak, Anatolia, Thrace) built on 32 ha. Gardens, collections and areas with different qualities have been created on these islands. These; bulbous plants collection, rock garden, hedge garden, arid and barren garden, lotus ponds, cactus and succulent plants greenhouse, perennial plants area along the canal, rock crack garden, hidden garden, sakura trees, culvert gallery, hydrangea collection, useful plants collection, Black Sea garden, discovery garden, bamboo labyrinth, Istanbul plants collection and fruit collection (Karaşah, 2014). In addition, there are picnic areas, viewing terraces, a library and an amphitheater in the area. Nezahat Gökyiğit Botanical Garden, besides providing active green space for Istanbul, has the quality of an education and research center. The botanical garden is older and more active when compared to other botanical gardens in our country (Vardar and Ünal, 2012).

### **Mihrimah Sultan Mosque, Istanbul, Turkey**

It is the mosque built by Suleiman the Magnificent for Mihrimah Sultan, his daughter from Hürrem Sultan. There are two mosques named Mihrimah Sultan Mosque in Edirnekapı and Üsküdar in Istanbul. There are contradictions about the construction dates of the mosques. It is known that the mosque in Üsküdar was built after the 1540s, and the mosque in Edirnekapı was built 14 years after the first

mosque. Mosques built by Mimar Sinan are remembered for their love story (Arıkan and Kızılözen, 2017; Pınarbaşı, 2017) and their unique architecture (Demiriz, 1980; Sav and Kuşüzüm, 2014; Akgün and Türk, 2008). It is said that Mimar Sinan symbolized the name Mihrimah with the works he made on both sides of the Bosphorus due to his love for Mihrimah Sultan. While the sun sets over one of the mosques built against each other, the moon rises from the other. Thus, the name Mihrimah, which means moon and sun, becomes immortal in the city (Arıkan and Kızılözen, 2017). In the center of Mihrimah Sultan Mosque in Edirnekapı, there are courtyard, primary school, double bath, madrasah, tomb and arasta. The mosque dome is 37 meters high and 20 meters in diameter. The weight of the dome, which rests on four basic elephant feet, reaches the carriers with small domes opening to every side. The side mahfils are placed on six columns. The building also attracts great attention with the workmanship of the mihrab and pulpit (Sav and Kuşüzüm, 2014). The Mihrimah Sultan Mosque in Üsküdar consists of a complex, madrasah, primary school, hammam, soup kitchen, caravanserai, fountain, tomb and burial ground. The space, which is covered by a dome supported by four semi-domes, is in the form of a square. It is designed to take place in a small number of wide rows while praying. The mosque was planned considering the land situation. It is important that the mosque does not have the inner courtyard structure found in all mosques of the period and that it is close to the sea (Demiriz, 1980).

### **Gevher Nesibe Hospital and Madrasa, Kayseri, Turkey**

The Gevher Nesibe Hospital in Kayseri was built in 1206 by Gıyaseddin Keyhusrev to fulfill the last wish of his sister, Gevher Nesibe Sultan. According to rumors, Gevher Nesibe Sultan fell in love with the chief cavalryman of the palace. However, Sultan Gıyaseddin opposes their marriage. And he sends the young man his sister fell in love with to war. Gevher Sultan, who received the news of martyrdom during the war, became very sick from his sadness and fell into bed. Meanwhile, her older brother comes to her and apologizes, and asks if she has any requests from him. Thereupon, the Sultan says that he wants a hospital built with her own wealth and that people who are sick like her find healing. Upon the death of Gevher Sultan, her elder brother fulfills her will (Hayırlıdağ, 2021; Kutlu, 2017). It is also known as "Çifteler", "Çifte Madrasa", "İkiz Madrasah" among the people due to the fact that the Gevher Nesibe Hospital and Gıyaseddin Madrasa were built adjacent. It is a rare practice that two madrasahs are adjacent to each other. For this reason, it is among the structures that draw attention with its architectural aspect (Kutlu, 2017). Among the adjacent buildings, the one in the west direction was used for health and the one in the east direction was used for educational purposes. İkizler Madrasa stands out with its plain architecture. The building is designed with indoor and outdoor courtyards. There is a crown door at both entrances of the building. There are geometric ornaments on the doors and an inscription on the marble floor above the outer arch (Çıtak, 2020). There are

madrasah, Turkish bath, medical school and operating theaters in the building (Hayırlıdağ, 2021). Today, the Gevher Nesibe Hospital has been restored and opened to the public as a museum (Dündar vd. 2019).

### **Coral Castle, Homestead, Florida, USA**

In the early 1920s, a man named Ed Leedskalnin is dumped by his fiancée the day before their wedding. Although his heart is broken, he cannot forget his love. Leedskalnin works alone to commemorate his lost love for 28 years and leaves an immortal legacy. According to the legend; Despite his poverty and lack of education, he wanted to prove to his love and the world that he could do something remarkable. He only works at night and carries tons of stones. He eventually builds a stunning coral castle for his lost lover. The castle consists of megalithic stones without mortar and still stands. The castle has a tower, rocking chairs, a throne, a heart-shaped table, a crescent moon, a water fountain, a sundial, a bed and a revolving door that can be opened even with a finger, although it is made of rock. The structure, which still preserves its mystery with its construction technique, was made by processing coral rock weighing 1100 tons. At the entrance of the castle, there is a quote by Edward Leedskalnin; "You will be watching an extraordinary achievement" (Radford, 2018, Coral Castle Museum, 2022).

## **2.2. Buildings Made For Women**

### **Perili Mansion (Yusuf Ziya Pasha Mansion), Istanbul, Turkey**

The construction of Yusuf Ziya Pasha Mansion, which was started to be built in 1900 and popularly known as the haunted mansion,

continued for many years. Yusuf Ziya Pasha falls in love with a young and very beautiful woman. Thinking that he can get the woman he loves, he decides to build a mansion with an extraordinary and magnificent architecture. Most of the mansion, which encountered many problems during its construction, is finally completed and the young, beautiful woman moves to the mansion. According to rumors, the woman living in the mansion is very beautiful and many young people wait at the door to see the woman. Yusuf Ziya Pasha, who was very jealous of this situation, locked his wife in the tower of the mansion and did not even complete the stairs of the tower. When it comes to 1914, the first world war breaks out and everyone who works in the construction of the mansion is called up for military service. With the economic difficulties experienced during the war, Yusuf Ziya Pasha took his wife with him and fled to Egypt and left the most magnificent mansion in Istanbul. His wife leaves Yusuf Ziya Pasha in Egypt. Thereupon, the pasha realizes how much he has upset his wife and made it difficult for his wife's life. For this reason, the pasha wills that his tomb be built with the stones in the tower of the mansion when he dies. Upon the will of the pasha, who died in 1926, the stones of the tower were removed and used as a tombstone (Emlak Yaşam, 2022). There are two different rumors about the mansion being called a haunted mansion. The first rumor is that Yusuf Ziya Pasha lived in the mansion, which was empty for many years, and the young woman's voice was heard. The second rumor is that Ziya Pasha's wife is as beautiful as a

fairy, and it is believed that the name of the haunted mansion was taken (İnan, 2013). Haunted Mansion is a remarkable building with its different architecture and color. The first and fourth floors of the building, which has 6 floors with its cylindrical tower, were completed, but the remaining floors could not be completed due to financial insufficiency. Stone and brick cladding was used on the exterior of the mansion. During the restoration work in 1993, three floors were found under the ground, which were later filled. The mansion, which is seen as six floors from the outside, was renovated as 9 floors with the decision of the Monuments Board (Kara, 2018). The mansion, which was rebuilt by the architect Hakan Kıran, was completed in accordance with its original form. Today, the mansion serves as an office during the week and a museum where contemporary art works are exhibited at the weekend. It also has the distinction of being Turkey's first office-museum (Pektaş, 2012).

### **Kellie's Castle, Batu Gajah, Malaysia**

It is the oldest fort in Malaysia. Scottish William Kellie Smith built it for his wife, Agnes Smith, as proof of his love for her. The building was built in 1915 in Greco-Roman, Moorish and Indian styles. While construction was going on, the Spanish flu epidemic started and construction stopped for a while as many workers died. After construction began, Kellie Smith traveled to Portugal to get a lift to the castle tower. However, construction of the castle was not completed when Kellie Smith died of pneumonia on this voyage shortly



afterwards. Today, the ruins of this castle, which was started for love but remained unfinished, are said to be haunted (Archute, 2022, Malaysia Traveler, 2022).

### **Dobroyd Castle, West Yorkshire, England**

Dobroyd Castle in England is among the most famous structures built for love. It was built as a castle at the request of the young girl in the middle of the 18th century, after a wealthy businessman, John Fielden, fell in love with Ruth Stansfield, a worker's daughter. It is said that the couple who got married and settled in the castle moved away from each other in time and a chalet was built for Ruht. Eight years after the completion of the castle, Ruht passed away (Wikipedia, 2022). The castle, whose construction took three years, was designed as a 2-storey structure with 66 rooms with 4 towers at the corner points. The top of the hall part of the castle, which was built by keeping aesthetic concerns in the foreground, is covered with glass domes. While marble was preferred in the columns and fireplace of the castle, hand carvings with depictions of the cotton industry were placed on four stones in the hall (Wikipedia, 2022).

### **Boldt Castle, New York, USA**

Boldt Castle is located in the 1000 Islands region of New York. Built by George Boldt as a symbol of his love for his wife, Louise, the castle was built on a heart-shaped island with natural beauty. Boldt, who wanted the castle to be perfect, commissioned many engineers and architects for the castle. He attributes deep meanings to his design with

his interest in the project. He symbolized the embrace of lovers by having eleven additional structures built in a column. It also brought the best quality materials from all over the world to be used during construction. The castle was built with 6 floors and 129 rooms. In the plan of the castle, there is a tower where only children can play, Italian gardens and a promenade that stands out with its landscape design. Boldt wants to give the gift to his wife, Louise, on Valentine's Day in 1905. But a year before construction was completed, 41-year-old Louise dies. After the death of his wife, Boldt abandons all the construction and then never visits the island. Today, the completed castle serves visitors and is used for outdoor weddings (Sardone, 2022; Weburbanist, 2022).

### **The Petit Trianon, Paris, France**

Located on the grounds of the Palace of Versailles and built in the mid-18th century, the building was built by Louis XV for his lover. However, the life of the king's lover was not enough to complete the construction. Later, King Louis XV presented the palace to his new lover, Madama du Barry (Karabaş, 2009). Upon the king's death from smallpox, Louis XVI, who came to the throne, made changes on this structure and especially in the exterior design, and gave it to his wife as a gift (Chateau De Versailles, 2022). The Trianon is shown as a good example of the Neoclassical movement with its period and architectural features. When the architectural features of the building are evaluated, it is concluded that every detail has been considered. The building was

constructed in a square shape and as two floors. The grand staircase on the ground floor was designed in accordance with the character of the building. There are billiards room, warming room, silverware room, chapel, dining rooms and guest rooms in the building. While designing the landscape, greenhouses were added near the building and exotic fruits, vegetables and shrubs were grown. The garden was developed a lot thanks to the king's great interest in gardening and training in agriculture and botany (Williams, 2001). Today, the Pavillion is open to visitors as a memory place of France.

### **Brighton (Royal) Pavilion, Brighton, England**

It is the mansion built by George IV at the beginning of the 19th century for the purpose of partying in the south of England. Initially, George IV was visiting the structure due to health problems. The building later became the place where the king met his socialite lover, who was impossible to marry legally because he was a Catholic. When the king's lover moved to Brighton, the king made the decision to expand the lodge. The drawings for this renovation were first made by the architect Frederick Crace and then redesigned by John Nash. In the middle of Brighton, the building, which immediately catches the eye with its Indian style, is the design of Nash (Karabaş, 2009). While the mansion was being built, care was taken to ensure that it was luxurious, and the most modern equipment was preferred especially to illuminate and heat the interior. During the rebuilding of Nash's pavilion, the king's apartment, which became ill, was moved to the ground floor (north

end). The bedroom, wardrobe, bathroom, library and vestibule are connected by a connection and hidden stairs are placed in the servants' rooms (Rutherford, 1998). The Pavilion also draws attention with its exterior architecture. The building was built in the Indo-Sarecenic (Indo-Gothic) style. This trend, which is widespread in India, aroused great interest in England. The architect supported the view by using a minaret and a dome on the exterior and placed a cast-iron frame over his previous construction (Rutherford, 1998).

### **Ashton Memorial, Lancaster, England**

The Ashton Monument was built by Lord Ashton as a tribute to his deceased wife Jessy. Completed in 1990, the monument was designed by John Belcher. The main construction material of the monument, whose outer dome is made of copper and steps of granite, is portland stone. White, black and red marble is used in the flooring. In the interior of the dome, there are paintings by George Murray that have meanings such as art, history and commerce (Law, 2013). The Ashton monument is 50 meters high and placed in a position visible to its surroundings. For this reason, the building has been seen as the 'Taj Mahal of the North' and 'England's greatest madness (Ashton, 1991).

## **2.3. Women-Inspired Buildings**

### **Statue of Justice (Themis, goddess of justice)**

Mythologically, Themis represents the rules that are seen as unchangeable, universal and immortal in the eyes of the gods. Themis, the daughter of Ouranos and Gaia, is a female titan. She gave birth to

Horas, Parkas and Metis by marrying Zeus. Themis, known for its laws in the sight of the gods, represents not temporary, but permanent, universal, immortal laws (Görür, 2015). Themis, known as the goddess of justice today, has been the symbol of law and order. Themis statue is symbolized as a blindfolded woman holding a sword in one hand and a scales in the other. Blindfolded symbolizes neutrality. The sword in hand symbolizes the deterrent effect of punishments, and the scales symbolizes fair and equal distribution. In addition, being a woman and being a virgin are characterized by independence.

### **Statue of Liberty, New York, USA**

The Statue of Liberty is a statue that has become the symbol of New York. The neoclassical statue placed on Liberty Island was made in 1886. The statue made of copper is 93 meters long and weighs 260 tons. It was gifted to America by France (Uz & Uz, 2017). The Statue of Liberty was inspired by the Roman Goddess Libertas. It is important to associate Libertas with the concept of freedom and to build the statue on the writing of America's declaration of independence. While the sculpture was designed, many meanings were loaded. The statue, which is tall and magnificent, has a serious expression in its eyes. The seven ends of the crown on her head symbolize the continents (universality). She has a torch in her right hand and an inscription in her left hand. On the inscription, it is written July 4, 1776, the date of the declaration of independence. There are 168 steps inside the statue (Yellin, 1986). The statue, which was brown when it was first made, took its current color

over time. The statue, which is used as an observation tower today, is open to visitors. It was included in the UNESCO world heritage list in 1984. There are small copies of the statue in many parts of the world.

### **The Little Mermaid Statue, Copenhagen, Denmark**

The mermaid statue is located in Copenhagen, Denmark. Designed by Edvard Eriksen, the statue is 1.25 meters tall and weighs 175 kilograms. Jacobsen, who watched the work adapted from Christian Andersen's tale of the little mermaid at the Royal Theater, was very impressed by the story and decided to have the statue made. According to the story, a mermaid falls in love with a human and goes on the shore. However, the prince she fell in love with does not want to marry her and the mermaid returns to the sea. For this reason, the statue is positioned to face the shore in the hope of seeing the prince (Uz & Uz, 2017). The Little Mermaid is a very ancient cultural icon, but today it has become an urban icon. Every year, many tourists visit Copenhagen to see the statue (Bom, 2012).

### **Kodaiji Temple, Kyoto, Japan**

It is a structure built by a woman for love. The temple was founded in 1606 by Kita-no-Mandokoro (1548-1624) in memory of her husband Toyotomi Hideyoshi (1536-1598) who died. Kita-no-Mandokoro was also known as Nene. She later became a nun and took the name Kodaiin Kogetsuni. The temple has richly decorated interiors and is surrounded by beautiful Zen gardens. One of the gardens is a rock garden consisting of a large area of raked gravel intended to represent the vast ocean. The

other garden is an impressive tsukiyama style garden with a pond, artificial hills, decorative rocks and beautiful pines and maples. The garden transforms into bright shades of red and orange in the fall season. Inside this garden is the Kaizando (memorial hall) where Nene prayed for Hideyoshi and now houses wooden images of both (Japan Guide, 2022). There is the Kaizando (memorial hall) in this garden. The memorial hall is where Nene prayed for Hideyoshi and now houses wooden images of both.

### **3. Conclusion**

Many works revealed in the world were made for a purpose or desire. In line with this study, works made for or inspired by women were examined. Although women have always been an important building block of the universe, they have also assumed important roles in society. Although these roles have changed over time, women have always instinctively put forward an effective stance and a social role. This stance, in addition to being expressed with words such as "women's hand touched", "the female bird makes the nest" in the social structure, also showed itself from time to time with architectural elements. Making designs for or inspired by women has given a different meaning to architectural structures or spaces. This meaning has taken its place in the minds and gained importance with the original stories underlying it (Kışmir, 2021). In this study, structures dedicated to women were compiled under three headings. These titles are; Buildings built for women, structures dedicated to women, and structures inspired by

women. Buildings for and dedicated to women were mostly built with the aim of impressing women, keeping their names alive, and providing welfare and comfort. Buildings inspired by women have different meanings. These meanings highlight women's strong stance, multi-tasking ability, courage, justice and commitment. This study sheds light on the cultural reflections and perceptions of the buildings that have come from the past to the present and have an architectural value. It exhibits the concepts of 'woman', 'man' and 'architecture' existing in society with the cultural point of view of the period. In this direction, it is important to reveal the existence of women in cultural heritage through architectural values.

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The article complies with national and international research and publication ethics.

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All authors contributed equally to the article. There is no conflict of interest.



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## Ecopsychological Approach in Place Design

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## 1. Introduction

It is known that the rapid urbanization movements experienced in recent years have caused the decrease and even disappearance of natural areas in cities. With this situation, it is seen that the pandemic process that emerged in 2019 has increased the tendency of people to be close to nature. People want to live in cities that are the center of social and economic developments, but they do not want to be isolated from nature and natural elements. The mentioned desire is an indicator of people's need for nature in order to stay healthy both physically and psychologically. The concept of nature protection is a concept that does not lose its currency in every period. With new measures in the political and social field, it is tried to protect the sustainable environment and the natural (Metin and Gül, 2020). Numerous studies show that living in harmony with nature contributes to people having a healthy psychological structure. It is known that this interaction is the subject of study in the field of environmental psychology (Kaplan, 1993; Gonzalez et al., 2011). A study conducted in the United States on the different improvement times of patients revealing that patients who have plants in their rooms and whose windows overlook gardens full of flowers and birds recover faster than patients who stay in rooms with a view of the building and parking lot (Hablemitoğlu, 2015). Studies in environmental psychology show that environments with high aesthetic value significantly affect people's overall well-being. (Galindo & Rodriguez, 2000). It is observed that studies on the



healing benefits of contact with nature on human psychology have revealed the concept of "ecotherapy" and studies in this field have become widespread in European countries (Hilary et al., 2017). Ecotherapy is defined as applied ecopsychology as a term used for treatment methods involving mutual healing and development relations in the natural world (Chalquist, 2013). Graham Game, who has developed ecotherapy workshops since the 1980s, and Jeny Grutt, who developed pioneering therapy studies for refugees and asylum seekers in the 1990s and combined powerful metaphors of working with the land as part of healing the human spirit, are recognized as pioneers in this field (Hilary et al., 2017). It is known that there are many programs that provide a healthy relationship with nature, such as wildlife therapy, green exercise, animal-assisted therapy. These programs are located all over the world and include farmland, livestock, pet shelters and urban parks. It is known that the general effect of these programs is to establish an improved relationship between nature and human beings. It is also the aim of the program to provide a stronger link between all participating species (Wordpress, 2017).

In recent studies, it is seen that one of the important aims of ecological approaches is to stop unilateral destruction by re-establishing the lost relationship between human and nature. Among the aims of the ecopsychology approach, first of all, there is the re-discovery of the

instinct to live by respecting the nature that exists in human nature (Dindaroğlu, 2014).

It is known that especially people living in cities strive to be close to nature in order to stay psychologically, physically and cognitively healthier, and this closeness has become a necessity. It is seen that the closeness of human to nature and contact with nature are at the basis of the philosophy of ecopsychology.

## **2. Material and Method**

In this study, it has been tried to present design suggestions for the psychological health of urban people in the context of Ecopsychology. In line with the purpose of the study, the concepts of Ecology, Psychology, Ecopsychology, ecological place design have been revealed by the literature review. In especially, it has been tried to present design suggestions in the context of Ecopsychology philosophy so that urban people can lead a healthier life physically and psychologically.

### **2.1. Ecology**

It is known that the term ecology is derived from the Greek words "oikos" meaning "home" and "logia" meaning "science". Ecology is defined as a field of science that investigates the structure and function of nature, examines the places where they live with organisms and their interrelationships and ecosystems (Çepel, 1992). Ecology is defined by Muslu (1983) as "a branch of science that deals with the interactions of living and non-living beings with each other,

their relationships and interactions with their environment, and all environmental events (Feyzioğlu, 2011).

Ecology investigates the conditions necessary for living things to continue their lives in a healthy way. Ecology examines how living things provide their shelter and nutrition needs, what kind of interaction other living and non-living things interact, and how individuals of the same species are in an organization (Dartma, 2005). In line with the definitions made, it is possible to say that the research area of ecology is quite extensive. When the definitions are examined, it can be said that the common point is "the correct evaluation of all living and non-living beings in nature, the relationship between these beings and other species and their habitats".

## **2.2. Psychology**

It is known that the term psychology is derived from the Greek words "ψυχή -psiyçē" meaning "breath, spirit" and "λογία - logia" and was first used in the middle of the 16th century (Dictionary, 2020). According to Morgan (1981), psychology is a science that studies human and animal behavior and uses scientific methods to understand these behaviors.

When evaluated behaviorally, psychology is defined as a purely objective experimental branch of natural science. It is known that the goal of psychology is the prediction and control of behavior (Watson, 1913). The common point of the definitions of psychology is the

scientific study of the way the human mind works and how it affects behavior or the influence of a particular person's character on their behavior (Url,1). Research in the field of psychology aims to describe, explain and predict human behavior and mental processes (Karakelle, 2014). In addition to the directly observed behaviors of organisms, non-observable behaviors are also included in the research field of psychology (thinking, visualizing, imagining, remembering) (Karakelle, 2014; Zimbardo, 2013; Alkan, 2013).

### **2.3. Ecopsychology**

Ecopsychology is defined as a scientific discipline that tries to combine the fields of ecology and psychology (Greenway, 2009). It is known that the idea of ecopsychology began to appear in England in the mid-1990s. The term ecopsychology was coined by cultural historian Theodore Roszak in his 1992 book "The Voice of the Earth". In the book "Restoring the Earth Healing the Mind" (1995) by Roszak et al., it is stated that Ecopsychology is an explored area (Hilary et al., 2017).

Concentrating on the idea of ecopsychology, Roszak proposes to explore the soul against the materialist western culture. Roszak's statement "We need a new discipline that can meet the needs of the planet and man, we need a discipline that will allow us to connect with other created things" shows that he is trying to combine psychology and ecology (Hablemitoğlu, 2015). Those working in the field of ecopsychology enrich ecopsychology as a field that is not isolated

from science, mental health or global current events (Merrit, 2012). It is emphasized that ecopsychology carefully tries to break down the distinction between "spirit here" and "nature there" (Woodbury et al., 2012). The philosophy of ecopsychology focuses on the interaction between the inner world of the individual and the universe in the most comprehensive sense, for the mental health of the individual (Brown, 1995). According to Harding (2006), the global problem is stated as the disconnection of people from the global ecosystem. According to Khan 1992, one way to solve the global ecosystem problem is to reunite individuals with their identities identified with nature (Weaver, 2015).

Theodore Roszak, the creator of the term ecopsychology, defines the philosophy of ecopsychology with eight rules in his book called "The Voice of the Earth" (Url,2; Yürcü, 2016)

- 1- *"The core of the mind is the ecological unconscious"*
- 2- *"The contents of the ecological unconscious represent, in some degree, at some level of mentality, the living record of cosmic evolution, tracing back to distant initial conditions in the history of time".*
- 3- *"The aim of ecopsychology is to awaken the knowledge of the interrelationship of nature and man, which is inherent in the ecological unconscious of man"*

4- *"The vital stage of human development is childhood. Ecopsychology aims to awaken the environmental consciousness that the child has not yet forgotten in adults.*

5- *"With the development of the ecological ego, man has a sense of moral responsibility towards nature and other people. Ecopsychology aims to have this sense of responsibility have a say in social relations and political decisions"*

6- *"One of the most important therapies of ecopsychology is to reconsider and correct the "masculine" character traits that see nature as an outsider and try to dominate it, which is also the source of political power".*

7- *"While ecopsychology questions the destructiveness of industrial culture, it does not oppose technology that makes our lives easier. In this mean, Ecopsychology has a post-industrial rather than anti-industrial structure.*

8- *"Ecopsychology holds that there is a synergistic interplay between planetary and personal well-being. The needs of the planet are the needs of the person, the rights of the person are the rights of the planet.*

When the definitions and evaluations about ecopsychology are examined; It is revealed that people should live in contact with nature throughout their lives and live as a whole with nature. This requirement is important both for the physical and psychological health of people and for the sustainability of nature. In today's

conditions where rapid and intense urbanization is seen, the importance of the philosophy of Ecopsychology is increasing.

#### **2.4. Place and Ecological Place Design**

A place that separates people from the physical environment to a certain extent and is suitable for the continuation of certain specific action. It is the decisive environment formed by the limitation of the space. Space is the certain extent that separates human being from physical environment and an emptiness that being able to maintain sufficient actions. Not only limiting and dividing elements, but also light and shadow are included in the formation of space (Duman, 2018). It is known that the human being, who is a social creature, has more intense interaction with the place after he has settled life (Kahraman, 2014). The place perceptions of individuals determine the physical characteristics of the place and their level of knowledge. The perception of place affects the behavior of the individual in the place (Özen, 2012). In this direction, since place has behavioral, social, psychological and physical effects on individuals, the design and planning of space gains importance for a healthier life (Kavak, 2010). Designs made by considering the aforementioned effects not only contribute to the quality of life of individuals, but also create positive effects on urban aesthetics and ecological sustainability. It is seen that the designs made in this direction provide the emergence of the concept of "Ecological Design".

Ecological design is defined as "designing the artificial environment to integrate it with the natural environment" (Gökşen et al., 2017). Ken Yeang (2008) defines ecological design as "developing the design by being aware that everything in the ecosystem creates a chain, and that interfering with the rings of the chain affects the ecosystem both locally and globally" (Aklanoğlu, 2019).

Today, it is seen that the excessive population growth in cities, climate changes in parallel with global warming, and the increase in epidemics increase the demand of people living in cities for natural areas. In line with this demand, it is necessary to include more green and natural areas, especially in urban planning. This requirement is important for human health and well-being, as well as contributing to sustainable ecological development. In addition to providing sustainable resource management and economic benefits, ecological designs allow people to live in harmony with nature without losing their connection with nature. Ecological design is important in terms of making cities more livable places, minimizing energy use, It is important in terms of providing maximum benefit with minimum resource use and sustainability of nature.

## **2.5. The Relationship Between Ecopsychology and Place Design**

Ecopsychology focuses on the negativities caused by the struggle for life, especially with modernity. Ecopsychology proposes nature as a solution to the mental and spiritual wear and tear that humans are exposed to (Ayaz, 2014). Being in touch with nature, dealing with



gardens and animals shows healing effects on psychological symptoms (such as depression, frustration) (Chalguist, 2013).

Today, it is observed that natural areas are decreasing, especially in urban areas with dense construction. According to the philosophy of ecopsychology, people should lead a life in contact with nature in order to maintain their healthy physical and psychological state. But dense urbanization makes it difficult for people to reach natural areas. Harley Perloff, one of the first to study the impact of the urban environment on the quality of life, argues in 1969 that the quality of life of people gathered around an urban environment is determined by the interaction of the natural and man-made environment (Aklanoğlu, 2019).

It is known that another way of connecting people with nature is to provide sensory contact with nature indoors. Dravigne (2008) states in his study that employees prefer offices where plants can be accessed from their windows and live plants are seen from their windows. According to Bringlismark (2011), offices without natural landscape view are more preferred when equipped with indoor plants than offices without plants. Khan et al (2005) arranged the education classes with suitable indoor plants in their study. They concluded that academic performance improved by 76.8% in classes organized with plants.

When the studies are evaluated, it can be said that there is a parallel relationship between the well-being of individuals' cognitive and

psychological states and being close to nature. Ensuring this relationship is important for humans as well as for sustainable nature. It should not be forgotten in designs that there is a synergetic relationship between the well-being of the world and the person, which is one of the principles of ecopsychology.

### **3. Findings and Discussion**

Ecopsychology represents living with nature while respecting nature. The basis of this approach is based on the fact that human beings have lived a life interactive with nature since their existence. It is stated that people can stay physically and psychologically healthy by accepting that they are a part of nature.

Studies show that contact with nature can be achieved not only with touch but also with all sense organs, and this kind of contact has positive effects on human health. From this point of view, in addition to protecting natural resources, including these resources in interior design can have a positive effect on the psychological health of the individual. This positive effect should not be ignored, especially in the design of physical environments such as offices, homes, educational institutions, where people spend most of their time. Studies have shown that individuals are healthier and less tired in working environments where they can see green areas and natural landscapes. (Fjeld et al.1998; Kaplan,1993; Khan et al.,2005). Another effect of using plants in interior design is the increase in individuals' interest in nature. Khan (2005) observed an increase in student participation in

planting campaigns and donations for indoor plant purchases in classes organized with plants. Dravigne et al. (2008) observed that employees in offices with plants and windows feel better about their work and have a higher quality of life.

#### **4. Conclusion and Suggestions**

Today, it is seen that the principles of ecopsychology are neglected in unplanned, fast and densely built cities. As a result of this neglect, natural areas are decreasing or even disappearing, and people have difficulty in reaching nature. According to Roszak, people who move away from nature are psychologically unhappy and people are actually harmed by the damage done to nature.

In order to enable individuals to lead a healthier life physically and psychologically and to contribute to the preservation of ecological balance;

- Artificial areas and natural areas can be planned in a balanced way in cities.
- Based on the principle of ecopsychology that childhood is the most important stage of human development, natural areas that are especially suitable for children can be protected or these areas can be enriched with the contribution of artificial elements to increase their attractiveness.
- Individuals can be encouraged to engage in recreational activities related to nature in their daily lives.

- It can be ensured that houses, offices, education classrooms, hospitals have nature views.
- A balanced distribution of natural areas such as hobby gardens, urban forests and urban parks can be achieved in densely populated and built cities
- Establishing farms where people living in cities can come into contact with animals
- Considering the positive effects of dealing with soil on human psychology, creating urban agricultural areas and increasing these areas
- Supporting nature-related civil-society organizations by governments and sponsor companies and increasing their activities
- The use of colors, textures, objects, visuals and live plants reminiscent of nature in interior designs
- To promote the use of renewable energy resources in the context of human health, ecological balance and economy
- Collaboration of disciplines such as interior architecture, environmental engineering, landscape architecture, architecture, especially in urban planning, due to the impact of space designs on the environment and human health
- It's recommended that Ecopsychology should be dissemination as a social movement

It is known that people are more willing to take actions that benefit them. In line with this information, it can be emphasized that people can lead a healthier life physically and psychologically by being in contact with nature. Thus, the application of ecopsychology principles can be increased. In this way, it is thought that ecological sustainability will be protected. Ecopsychology principles are guiding in new designs for healthy individuals and healthy environment.

**Information Note**

The article complies with national and international research and publication ethics. Ethics Committee approval was not required for the study.

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## ‘House of the Future’ in Post-Information Age

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## 1. Introduction

Starting from the Industrial Revolution, metropolis and daily life are undergoing a rapid change in line with developing technology. In consequence of globalization, which can be described as the increase in connections with the developing communication tools; human's work, life, education, entertainment, etc. habits changed rapidly. In the 21st century, which is defined as the Post-Information Age, Information Technologies play an active role in daily life.

During the 20th century, architects who cannot remain indifferent to these developments have put forward their prototypes of the 'House of the Future', through new lifestyle scenarios depending on different conditions of each period. With the pace of development, in addition to various innovations in materials and technology, different formal and spatial searches for 'future house' have emerged in design field. However, these experimental works appealed to a limited group and were not widely accepted. Briefly, while life has changed so much, the house has generally remained static within the architectural framework until 21st century (Onbay & Aksoy, 2013).

Today, it has become an economic and social necessity to adapt the house which places changing human life to new technologies and systems. The new daily life order which emerged with the development in Information Technologies, makes its superiority felt in every field, and while the widespread use of the internet reshapes human life, house gains different functions.

However residential environments, which usually take on a standard and monotonous appearance due to the mass-production techniques emerged from the beginning of the 20th century, cannot sufficiently benefit from the advantages brought by Information Technologies. The most important innovation in the field of housing is the 'smart home', which became popular after the 1980's. A smart home is the integration of various control and communication systems into the existing residences but does often not introduce innovation in design and construction methods.

Today it is not a utopia anymore, but a technologically possible opportunity, that the house becoming a living organism responding to the wishes of the user, learning with him, befriending him while adapting to the developments and new technologies in control, communication, multimedia, and energy systems. In that case, is it a necessity for the house, which is the most special space created by human, to remain so conventional in the face of developments in Information Technologies? If not, what kind of design works are being done to make the 'future house' a user-friendly and personalized environment?

## **2. Material and Method**

Although it is the closest place to human life, the house has remained unchanged in architectural terms, in the face of developments in information technologies and transformation in lifestyle from the

'Information Age' began in the mid-20th century until today which is defined as the 'Post-Information Age' (Negroponte, 1995).

The purpose of the study is to examine the recent experimental studies within the framework of the 'House of the Future' concept, which accepts this situation as a problem, and which are prepared to adapt the house to new technologies. Based on contemporary predictions it will be also tried to open new discussions for the future,

In this context, firstly, the idea of 'House of the Future' will be emphasized, and the trials to create a revolution in the field of housing, starting from the first quarter of the 20th century when the first extraordinary proposals began to emerge, will be briefly summarized. Then, the reflection of technology & new inventions which emerged as a social need in the process, recently the rapid change in lifestyle and the effects of information technology on housing will be mentioned.

As a result of this continually progress, it will be tried to reveal the differences between the 'future house' utopias of the 20th century and the recent similar themed projects, by analysing the new meanings of 'the house of the future' in parallel to development of information technologies. It will be also discussed that how the functions of the residential space and the house & user relationship may change in the future through selected projects and scenarios.

### **3. The Concept of 'House of the Future'**

The concept of 'house of the future' represents an unpredictable vision. As a prophecy or prediction, utopias about 'future house' design also

guide the development of architecture. Cultural publications, changes and developments that define the current era, influence the way how people of this era think about the future. Moreover, future vision of each era gives clues about the contemporary life of its period.

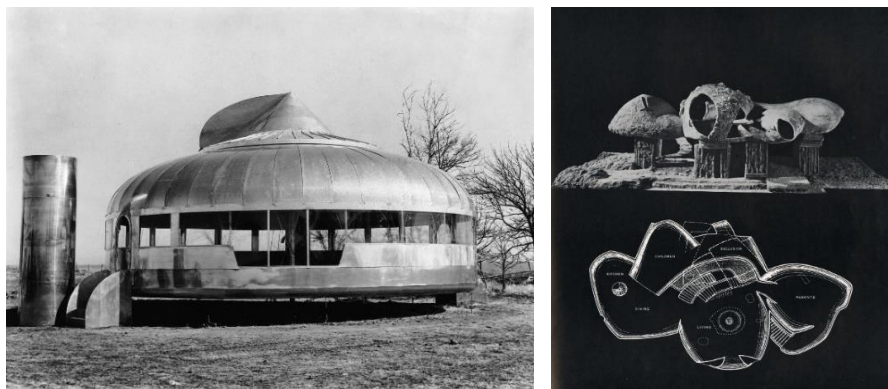
Prototypes for house of the future are often fantastic. Each era that determines its own vision of 'progress' also produces a relative progress of the housing prototype as well. In addition to the technology, materials, and possibilities of the age, definitions related with identity are also influential on these future predictions.

Designers have never been at peace with the status quo. In this process, while people expect engineers to produce objects which they will use in the future, it is the designers who tell what the future will look like. If we look briefly at the history of future predictions, we can see that it is often defined by materials and technologies. While utopian projections and ideals have improved architectural practice over the centuries, a more intense effort has emerged to predict the future with the advent of Modernism (Addington & Schodek, 2005).

### **3.1. Brief History of 'House of the Future' in 20th Century**

The attempts to fulfil the increasing demand of housing by means of mass production since 1930's, caused the emergence of monotonous environments. Architects, who were willing to overcome the monotony, recommended designs that were found too fantastic and could not be accepted by masses. In this age when the housing firstly met with the new technologies, an effort of predicting the 'house of the future' had

also aroused, the fairs and exhibitions had turned out to be the environments which present the predictions of the change that the new materials, technologies, communication, and transportation tools will re-shape the life. During this period that ‘the house of the future’ was described as an ‘industrial product’ and a ‘machine for living’ and the idea of automation inside the house start to appear.



**Figure 1.** Dymaxion House, B. Fuller, 1930 (Dymaxion, 2022)

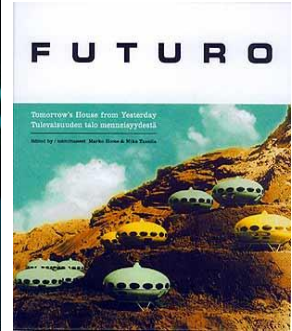
**Figure 2.** Endless House, Frederick J. Kiesler, 1950 (Rosa, 2003)

By the 1960's, the development in the information and communication technologies accelerated, on the other hand, the period of peace after World Wars and race of the Space between USA and SSCB, caused the appearance of a belief that the technology would make the human life easier and offer more free time to human beings. However, this space age madness transformed the concept of ‘house of the future’ to futuristic consumption images.





**Figure 3.** Underwater House, Futurama, 1964 (Futurama II, 2022)



**Figure 4.** Futuro House, 1968 (The Futuro House, 2022)

Depending on the energy crisis of the 1970's, 'smart buildings' conserving energy appeared, and the idea of a future consisting of the sustainable 'smart houses' automated to handle the household chores has aroused. But the problems associated with the programming of the 'smart buildings' hindered this technology to be widespread. Self-sustaining 'Dome Houses' many of which would be soon abandoned due to difficulties of usage created another fantastic image of this era.

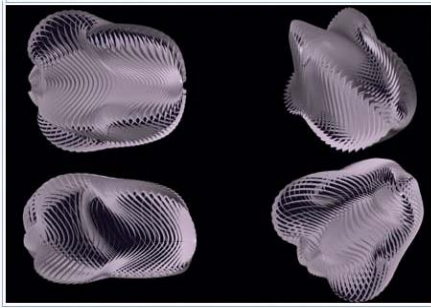


**Figure 5.** House of the Future, C. Schiffer, 1979 (Architect, 2022)



**Figure 6.** Cape Romano Dome House, 1980 (Cape Romano, 2022)

By the 1990's, with the use of computer as a design tool in architecture, the tendency of creating non-linear and unaccustomed forms, became a reality of the architectural production. While digital design and production techniques allow designers to create objects with unique and complex forms economically, the concept of 'mass-customization' which is developed instead of 'mass-production', changed the way of imagining 'house of the future' (Larson et al., 2006).

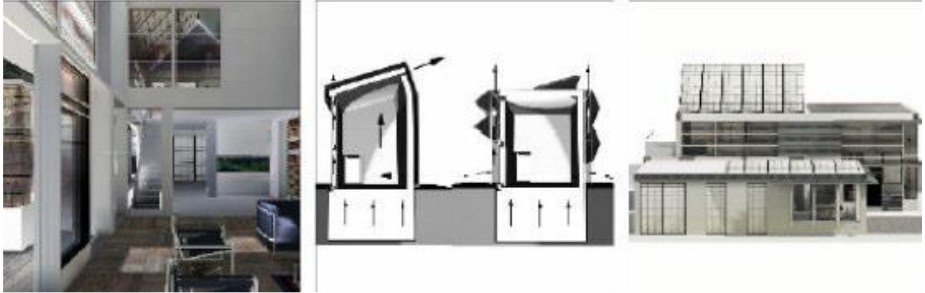


**Figure 7.** Embriological Houses, Greg Lynn, 1998 (Kolarevic, 2003)

**Figure 8.** Chimerical Housings (Mass Customized Housing), Kolatan / Mac Donald Studio, 1999 (Kolarevic, 2003)

During the 20th century, the concept of 'house of the future' was based on the idea that the automation would save the people from the daily tasks, however this idea shifted to a different direction by the 21st century. The prototypes of 'house of the future' generated in the academical experiments like House\_n (MIT) or The Adaptive House (University of Colorado) are designed as interactive environments that

recognize the user by the help of sensors and fulfil the demands of him/her interactively.



**Figure 9.** House\_n, MIT-USA, 2000 (Intille, 2002)

Within the developments of information technologies, different meanings have already been added to the housing space. Just like the ‘home office’ concept that brought by the Internet; shopping, entertainment, education, and health services are accessible through the structure of the house. According to the current projections of the ‘house of the future’, house in the future will turn out to be ‘a prothesis that is carrying the flow of information to the human body’, ‘not only a limiter for the space but also an environment provider for the technology’, and ‘an industrial product that is designed and personalized by the user in the Internet environment’ (Intille, 2002).

### **3.2. Introduction of Information Technologies to the Housing**

The concept of 'Information Technology' is used for innovations that occur with the combination of 'computer' and 'communication' technologies and cause significant changes in human life. When Information Technology is mentioned, the first thing coming to mind is

the inventions that have left their mark on the last 50 years, such as computers and the Internet.

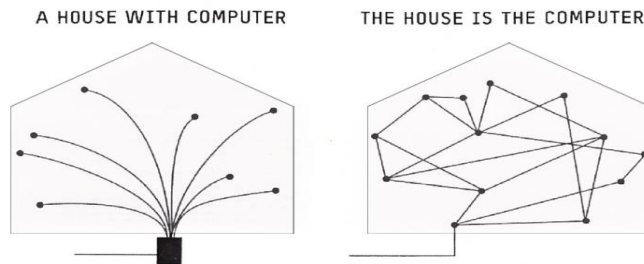
'Information Age' as a period, began in the mid-20<sup>th</sup> century characterized by a rapid shift from traditional industry established by the Industrial Revolution to an economy primarily based upon Information Technology. On the other hand, in the 'Post-Information Age', the era we are living in, everything is being produced to order, and information becomes extraordinarily personalized. With the widespread use of the Internet, borders disappear, large groups of people are getting smaller, and individuality comes to the fore.

Due to developments in Information Technology, every corner of the world has become parts of an interconnected network, and as a result, functions of the living spaces also started to change. Thus, house, which was a simpler 'information and communication' environment in the period between 1930 and 1980, turned into a 'point in the network' after 1995.

'Information Technologies' includes communication, data storage, retrieval, computing technologies and their direct and indirect applications. The 'Information Technology' in the house fulfils three basic functions for the household: interpersonal communication, information acquisition/processing and entertainment.

Salazar & Gausa defines 21<sup>st</sup> century's house in transformation as a veil of programs, needs, and fantasies. House is no longer just a space constraint, but also a medium for technology (Salazar & Gausa, 1999).

In the image named Media House, which can be shown as an example of this definition, the house is not an object that is separate from the information network in which it floats and connected to it only with some intermediate cables, but an extension of the information network that is enveloped and encrusted.



**Figure 10.** Change in Housing-Computer Relationship (Guallart & Cantarella, 2005)

#### **4. 'House of the Future' in Parallel with the Developments in Information Technologies**

House has undergone various changes over the centuries and has adapted to the needs of life in every period. Especially after the Industrial Revolution, daily life has changed at a faster pace than ever before and because of industrialization, house has met with technology. In the last 50 years, while innovations under the name of Information Technology have adapted to all areas of life, social and family structure, work, education, shopping, and entertainment habits have rapidly gained new qualities.

Despite all these changes in daily life, it cannot be said that there have been radical changes in the layout and form of the house in the last 100 years. The fact that the house, which is the most special space where human life takes place, is also the most resisting space to the developing technology and the transformations in the lifestyle, pushes the architectural designers to search for different solutions in this regard. As one of these pursuits, many projects are being produced to turn the house into an interactive space that can offer the advantages of information technologies to its users and respond to needs, as well as to transform it into an industrial product that can be personalized by them. In the scope of this study, changes that information technologies cause on today's understanding of the concept of 'future house' and its effects on the world of design will be evaluated through architectural examples found important in the literature, under two headings:

#### **4.1. Functional Change of Housing Space with the Effect of Information Technologies**

Today, due to developments in information technologies, different functions have been added to the housing space. Since the mid-1990's, the introduction of computers into house has made it possible to carry out some work that could only be done in offices before, as well as from home. Especially working, entertainment, education, shopping, the continuation of many actions in the housing space reveals the necessity of the house to adapt to this new situation with various equipment. Thus, the function and scope of the house changes.

Looking at the process, in the 20th century, while 'information-processing' gained importance as a defined job, efficient communication and transportation systems also eliminated distances. Thus, offices moved away from factories and concentrated in 'central business areas'. As a result, mass transportation rituals were formed, repeated every day, required by the business areas concentrated in the city centre and the dwelling settlements spreading outward. The binding power of this complex structure is the necessity of face-to-face business meetings, the need to be close to information processing tools and the obligation to access the information gathered only at the centre. However, the increasing efficiency of telecommunication begun to dissolve and reconstruct this coexistence in new ways. The fact that some jobs can be done with 'remote control' from outside the office has enabled most employees to turn into 'high-tech nomads' and move away from the city centre.

In fact, work activities away from the city centre, was envisioned by James Martin and Adrian R.D. Norman, in the 1960s, before computers gained momentum: 'We can experience a return to the town industry. We may see computers taking the place of the wheels' Martin & Norman, 1960 (Martin & Norman, 1973).

With the widespread use of the internet after 1993, remotely managed jobs at home have increased more. Thus, today, the distinction between working and living environments has disappeared, and news, entertainment, education, business, shopping, banking, and many social

interactions have become able to flow into and out of homes. The potentials of Information Technology became more clearly noticeable during the pandemic process in 2020's.

With communication networks, houses have become places where information, news and entertainment can be easily reached. The systems offered by information technologies gather all communication media together and enable the establishment of an office environment at home. It is possible for audio-visual communication to fulfil the requirements of face-to-face relationship with facilities. Home-oriented living styles will spread when the necessities of going out decrease. This change, which dissolves the boundaries of public and private spaces, will also erase traditional urban thresholds.

As a result of the cultural, economic, and political activities that have started to be performed virtually, societies have begun to turn into data 'bits', and boundaries between working and living spaces are about to be erased. The use of communication networks, access to shared memory, internet, e-mail, etc. bring many office functions to the home. Thus, individuals can work freely at the hours they want, communicate, and reach wherever they want.

William Mitchell is one of the first to draw attention to this transformation of lifestyle in his book 'The City of Bits': 'I realized that I no longer must go to work. It's because work comes to me, I don't have to go every morning to the mines, the fields, and the factories, or the



offices, as my ancestors did for generations. I just carry a laptop that gives me access to the tools I work with' (Mitchell, 1995).

The living room, which turned into a smaller, formal hall in time almost disappeared today and is being replaced by a flexible space that can accommodate different functions such as working, resting, and communicating. Although these changes in the house are tried to be achieved with small adaptations over the existing fiction, the functional fiction of the house is disintegrating.

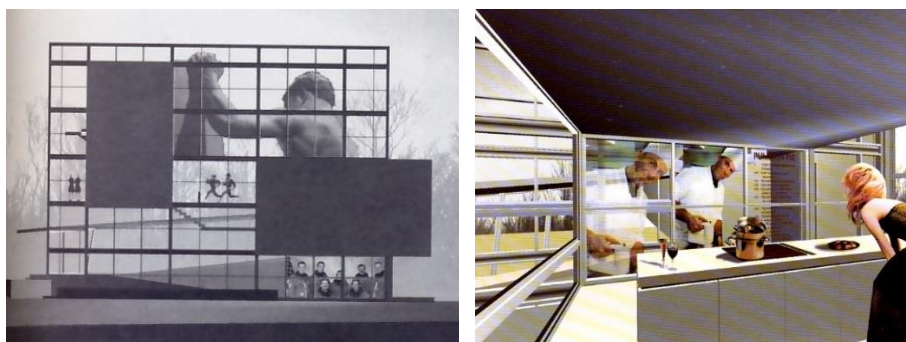
With the effect of new technologies, the house will not only be the place of life from now on, but it will also have a quality that includes all aspects of life. Business, shopping, entertainment, education, health services are becoming accessible within the housing and this transformation will accelerate soon (Riley, 1999).

To make a comparison with the approaches in the preceding process, which were briefly summarized before, in this section, projects that reveal the current understanding of the concept of 'House of the Future' are examined.

### **The Digital House, Hariri & Hariri, 1998**

The Digital House was designed by Gisue and Mojgan Hariri to demonstrate the impact of new technologies on housing. The design encompasses a central structural core built on the land and volumes called 'plug-ins' produced at the factory that will respond to various programmatic requirements for bedrooms, living spaces and workspaces. These rooms, which will be transported to the land by

truck, are considered as tools that can be added and removed to reflect the new situations related to the house. The function of the central core is not only structural. The main walls will be composed of liquid-crystal screens, which the architects call the 'building blocks of the future'. These screens have the capacity to subvert ideas about time and space. For example, a virtual chef in the kitchen can help prepare meals, or users can dine with friends thousands of miles away.



**Figure 11.** Digital House, Hariri&Hariri, 1998 (Riley, 1998)

This project is not just a digital enhancement of existing home innovations. Apart from this, the concept of housing is considered as an extension of the body and as a 'smart' environment characterized by interactive surfaces and tools, not by the presence of different computers. House also becomes an extension of the mind as the sender and receiver of the information (Riley, 1999).

### **‘Kramlich Resid. & Media Collection’, Herzog&De Meuron, 2000**

One of the examples, including different functions in the living space is the 'Kramlich Residence and Media Collection' project. The structure is conceived both as a residence for a couple and as a venue for them to display their electronic art collections. The long gallery, accessed by descending half a floor, was described by the architects as ‘a black box that returns to life only with the illuminated projections of the artists’. The partitions that define the rooms are also screens on which movies, videos and digital art can be projected. In the house, interior, exterior and artistic images flow into each other (Riley, 1999).



**Figure 12.** ‘Kramlich Residence and Media Collection’, Herzog&De Meuron, 2000 (Riley, 1999)

### **4.2. Change in User and Housing Relationship with the Effect of Information Technologies**

Information technologies also change the relationship / interaction between the user and the house. Housing is turning into one of the technological prostheses such as laptop computers and smart cars that carry the flow of information to the human body at the unmatched speed of the metropolis. In this transformation, housing gradually gains a

quality that responds to the needs of the user. Thus, the user and the house become two friends who support each other in mutual interaction. One of the key concepts in this close relationship between the user and the residence is 'mass-customization'.

Mass-customization is one of the methods developed to break the monotony of mass-production. Nowadays, clothes, computers and cars are becoming customizable, and companies offer their customers many options by using the advantages of the internet so that they can buy the most suitable product for their tastes and budgets. Studies are carried out and various suggestions are put forward so that the house, which is perhaps the most important investment that a person has made throughout his life, can also benefit from the advantage of customization offered by the industry.

For economic reasons, most people do not benefit much from architectural services when building or buying a house. In addition, metropolitan people who work with a busy schedule do not have time to deal with the construction of their own house. For this reason, programs and interfaces are being developed that will allow users to design their homes on their own via the Internet. These programs transfer the architect's conversation with the user to the virtual environment before the design phase. By the questions of the program, the user enters his personal characteristics, economic situation, tastes, and preferences into the system, and then designs his house as he wishes

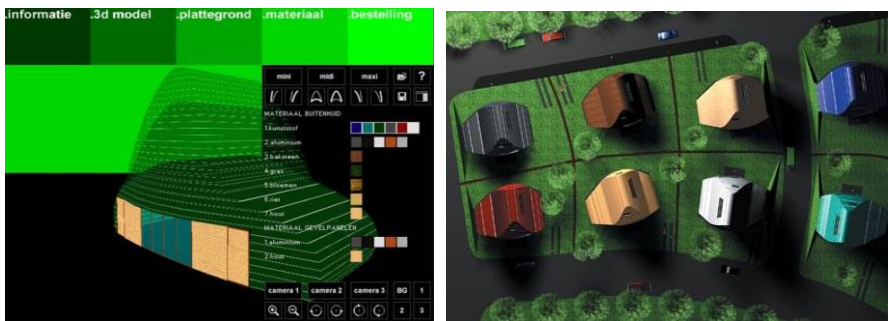
with the guidance of the program. Below are some projects that can be evaluated in this context.

**Variomatic Houses, K. Oosterhuis, Netherlands, 2000**

Variomatic Houses project, designed by Kas Oosterhuis, is an interactive website; a new concept developed to make catalogue type residences flexible and variable in all directions. That's why it was named 'Variomatic'. Consumers can choose their preferred format using the website. The elastic geometry of Variomatic Houses is linked to a database where dimensions, volumes and estimated costs are managed. After customers have sculpted their Variomatic House, they can order a scale model, drawings or apply for a building permit. Variomatic Houses brings a new, interactive approach to catalogue housing. The users can benefit from numerous material and colour options to complete the volumes of the Variomatic Houses and to shape them according to their vision.

Oosterhuis argues that today architecture has become a game played by users. Planning, construction, interior design, and urban design are ready to be developed as real-time games. During the design process, the game is designed by the architect and played by all parties. During the life cycle of the building and in the built environment, the game is played by users, visitors, and the built environment itself. Visitors become participants by experiencing the space. Participants set the parameters themselves by playing the game. Each player adds a new data to the database. The building takes new data from this database and

reformats itself in terms of form, content, or both. Thus, it is possible to say that the building will find itself in a state of ongoing operation. The building, consisting of numerous programmable elements working together, will act as a cluster. Building elements will swarm, keeping an eye on the nearby actor, always ready to act and interact. Here a new slogan for architecture is proposed: ‘Game, set and match’. Architecture turns wild to be played over and over (Oosterhuis, 2002).



**Figure 13.** Variomatic House Interface, Kas Oosterhuis, 2000.

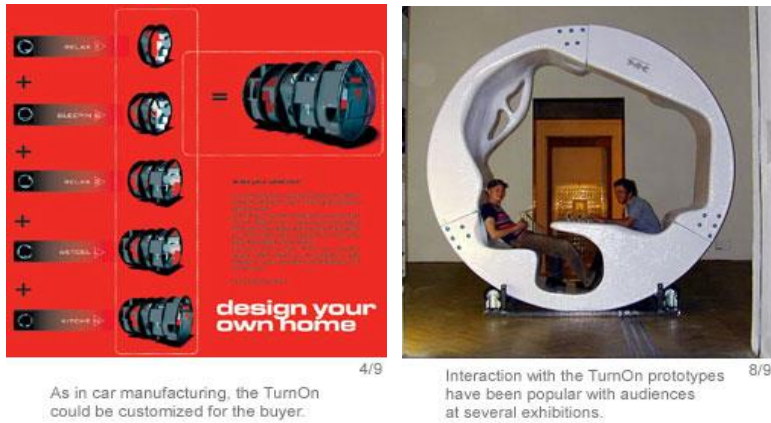
(Brayer&Simonot, 2002)

Another stage of the game starts at the usage stage after the design process is over. The user, who can intervene in the design process by participating in the design of his own home, will also intervene in the editing process in some cases. In the future, the house will interact with the user during the usage process and will be reshaped according to his needs and desires. As another example, the TurnON project, which consists of a series of modules selected by the user from the catalogues, the residence is a product shaped by the user's movements.

### **‘TurnON’, AllesWirdGut, 2000**

Designed by AllesWirdGut for an exhibition in Vienna, TurnON was presented as an alternative solution to the typical ceiling, floor and four-wall structures, where the idea of housing was rethought. It is attempted to create something not only new, but also interactive and fun.

Car manufacturers are making progress by sharing their ideas online, creating car designs that turn what might once have been considered science fiction into reality. However, in the field of architecture, new designs and ideas are rarely cooperated. While the houses still use the parameters of a century ago, such as flat surfaces surrounded by angular walls, AllesWirdGut proposes a denser and more circular plan. At first glance, TurnON resembles a human-sized hamster circle. The arrangement consists of many modules that are interconnected. Each module is equipped to have a special function. When the circle is fully rotated, the position and function of the module also changes. For example, the sofa can become the ceiling, the dining table can become a wall. The bathroom unit has a toilet, shower and bathtub, and the user can select one of the functions he wants to use by rotating the module. The potential of the automotive industry to mass-produce its products, parts, and tailor them to their customers can be seen at TurnON. Just as he customizes a car, the user can also customize his home according to his own tastes and payment terms. He can choose colours, add technologies such as monitors, arrange modules in an infinite number of combinations (Greenberg, 2006).



**Figure 23.** ‘TurnON’, AllesWirdGut, 2000. (Greenberg, 2006)

### ‘Flux Haus’, IAAC Future House Studio, 2019

In a metropolis as dense as Hong Kong, to dream of a better way to use and enjoy compact spaces; Kammil Carranza, Jitendra Farkade and Vinay Khare designed an alternative construction for the cage homes and partitioned flats of the city. They developed Flux Haus as part of the Institute for Advanced Architecture of Catalonia's (IAAC) Future House studio, for which designers were asked to use AI and technology to solve the problem of space scarcity.

This innovative ‘parasitic housing scheme’ is designed to offer individual pods as a dignified solution to minuscule rooms. While the number of pods and configurations of constructions are variable, an abundance of communal spaces are also available. Powered by AI and an advanced swarm robotic system, furniture in each pod can be constructed and deconstructed based on each occupant’s living behaviour. The state-of-the-art technology allows inhabitants to swiftly



transform the space from a bedroom into a living room, or other specific areas as required. Fitted with CoeLux artificial windows to simulate natural light and the SlinkyBot project (a robot that creates objects and interiors for homes), Flux Haus is exploring uncharted territory for future living as a mass housing prototype (Lai, C., Cheng N., 2019).



**Figure 24.** 'Flux Haus', IAAC Future House Studio, 2019 (Lai, C., Cheng N., 2019).

## 5. Conclusion

As a result of the changes created by the Information Revolution, which is also accepted as the Second Industrial Revolution, everything in human life becomes the products of the computer environment. The increasing quality of information, which bombards business and entertainment from every angle, has transformed the parameters of life. Today's concept of 'future house' is also related to this information explosion. On the other hand, conventional housing must change radically to integrate technological developments into daily life.

Depending on the developing Information Technologies, different meanings have already been attributed to the housing space. In recent

years, apart from the fact that shopping services, entertainment and some professional works can be managed (Home Office) through the Internet or education services can be carried out from home as in the recent Pandemic process, health services will also be accessible within the houses soon. However, housing, as it exists today, cannot fully respond to the opportunities offered by technological developments. The 'house of the future' proposals produced by the architects who continue to work to fill this gap show that the functions of the residential space and the house-user relationship will be reshaped soon. According to these proposals, house of the future will be:

- > a prosthesis that carries the flow of information to the human body,
- > not only a space constraint, but an environment provider for technology, designed by the user in the internet environment,
- > a customizable industrial product.

With the effect of new technologies, the house space will no longer remain only as the place of life at home but will also have a quality that includes all aspects of life. In this transformation, housing gradually gains a feature that responds to the needs of the user. In the scenarios examined, the user and the house become two friends who support each other in mutual interaction. In some suggestions, the user, who can intervene in the design process by participating in the design of his house, will also intervene in the setup of the house whenever he wants. Soon, the house will be able to be reshaped according to the needs and desires of the user by interacting with him/her.

After a long era in which mass-production techniques and efforts of producing different forms have shaped the 'house of the future', today computation-based systems and manufacturing tools can offer the customers satisfaction of personal preferences and initiative. Digital technologies can replace inflexible mass production and inadequate labour-intensive site production with dynamic mass-customization, with forms and technological possibilities unimaginable before. Moreover, automated design tools may allow architects to take part in the design of mass housing, not just those of the adventurous and wealthy people.

Conversely, although the year of 2000 was seen as the beginning of the 'Space Age' in the middle of the 20th century depending on the speed of technological development, today's houses mostly do not reflect any futuristic images. In fact, the imagination of the world that was once expected to exist in the 2000's is not a technically impossible phenomenon today. However, 'house of the future' proposals continues to exist in the 'digital environment, but they have not been popular in the social dimension. The idea of automation in the home, which has been a popular research topic since the 1930's, has not yet reached the masses. Despite the change in technology, this stagnation in the housing space recalls the possibility that the 'house of the future' proposals can remain as prototypes in the near future.

The fact that people follow the developing technology and extraordinary housing prototypes with interest in environments such as

exhibitions or movies, but do not give up on conventional houses in real life may be the result of concerns that technology may cause the 'home', the most special place in human life, to lose its special meanings. On the other hand, the fact that technology which is expected to change the life in the houses of the future is still expensive for most societies and families, can be shown among the reasons why it has not become widespread as expected.

At this point, when we look at the 'House of the Future' themed projects developed recently, it is seen that, unlike the utopias of the last century, functional approaches that will increase the quality of both the physical environment and human life by the help of sensor technologies come to the fore rather than futuristic lifestyles and fully automated space setups targeting to rescue the human from daily chores.

From now on, while the technological development continues to increase, the houses will be affected by the change like other architectural products. Even if a radical revolution in house designs, as predicted by the utopias of the 20th century, does not take place in a way that will be widely accepted, a future is not far away in which the inclusion of technology in human life will accelerate, the functions of the house will diversify, and the house & user relationship will develop further by gaining an interactive quality.

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## Factors Affecting Color Selection in Space Design and The Effects of Color Selection on The User

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## 1. Introduction

Color is one of the concepts that accompanies us in every aspect of our lives, from the products we use to the clothes we wear and the places we live in, and that gives meaning to all the visual components around us. Color is one of the most influential factors on visual perception among design elements. It is an element of excitement that appeals to the senses more closely and effectively (Altınçekiç, 2000). We perceive everything we see in color, without words, color is the language the environment uses to communicate with us; It is one of the perceptual bridges between us and the environment. As the colors of the objects around us change, the messages we receive from the environment, our perception and the emotions we feel at that moment also change. The shape of this change is related both to the characteristics of the colors and to the user-specific variables. In other words, it can be said that each color and each combination of these colors with other colors create different effects according to the user, the place where this color is used and the way it is applied.

The concept of color has a very important place in many design-based disciplines such as architecture, interior architecture and environmental design, fashion design, graphic design, product design (DeLogn & Martinson, 2012). The bridge between their designs and the user can be built much more solidly when designers give the concept of color the

place it deserves in the design decision process, and decide which colors to use where and how they will be used in their designs, taking into account the parameters that change the user's perception.

No matter which design methodology is used in the formation of the space, the design preferences that the designer deals with with many parameters are fundamental. Color is one of the important tools of the designer in space design. Color has important roles such as emphasizing the sections to be highlighted in the space, ensuring the division of the space into functions without even using a distinctive design element, and making the user feel different emotions in each part of the space.

### **1.1. The importance of color in space**

Space is a formation that emerges as a result of the feeling of protection, which is one of the instincts of human beings, and strengthens this feeling. Due to the enormous size of the boundlessness and the sense of fear it has given to human beings, human beings have felt the need to define and limit their own place and to be protected from the natural environment. As a result of this need, the space has emerged (Alici, 2019).

Places gain meaning with the equipment and functions it contains, and the colors used in its designs have a psychological effect on its users and thus a spatial identity emerges. The colors used in the design of the space are a communicative bridge between the space and its user (Alici & Göker Paktaş, 2020). The use of color in this role as a bridge is a very

important parameter in space design and plays a major role in creating the desired effect on the user in terms of spatial perception. Therefore, the choice of color is an issue that the designer should pay attention to. With the power of successful color selection, the user can be encouraged to apply the desired action to spaces with different functions, while this can be achieved if the user is desired to feel in each part of the space. For example, at the entrances of the venues, it is desired that the curiosity of the users to the space increases and they progress further in the space; When the right colors for this purpose are applied correctly in the right parts, the user can be drawn into the space. Color also contributes to the development of sense of space by expressing the function of space. Relationship between the individual and the places around him; It is defined by complex functions consisting of three types of functions: utility function, aesthetic function and information function. In order to express and perform these functions, it is necessary to benefit from the psychological effects of colors (Kıran, 1986).

## **1.2. Importance of color selection in design and classification of selection criteria**

In order to successfully establish the bridge between the space and the user, the designer must have a good command of both the qualities that the space should have and the qualities of the user. Because with the differentiation of the qualities they have, some users can feel an

emotion with some colors, while some users can feel different emotions in a place with the same color design. While the same user feels very different emotions in a space with a different function, this user may enter into a different mood in a space with another function where the same colors are applied. Considering all these, there are many factors that the designer should consider in color selection decisions for a successful design. These factors should be categorized in a wide range ranging from space characteristics to user identity. In order to classify these factors, while examining the variables that affect color selection, it is also important to examine and categorize the ways in which color selection affects users. When the studies on the factors affecting the color selection are examined, it is seen that the classification is diversified.

It was observed that all these factors were examined under different main headings by the researchers.

If we take a closer look at the classification systems in the studies; Tülay Özdemir, in her article titled "Criteria Affecting Color Selection in Design", defines these criteria as psychological effects, conditioned reflexes, user identity, fashion, period styles, age and gender, value judgments and belief effects of society, symbolic and functional meanings of colors, suitability for the function of space and space categorized under ten main headings (Özdemir, 2005).

Ferda Yamaner, in her master's thesis titled "Evaluation of Approaches to the Use of Color in Different Functions", touched on the subject of color selection under two main headings: "Color-Human-Space Relationship" and "Approaches to the Use of Color in Different Functions". Psychological effects of the title, the factors affecting the color taste (relationships and influences in the past, traditions, fashion, cultural level, age, gender, habits and past experiences, geographical region, area-texture-form, suitability of color to the subject), space-color relationship and the factors affecting color quality. The title of "Approaches to the Use of Color in Different Functions" has been collected under five titles as perception of space, the effects of different color combinations, the atmosphere of the space, the image created by the color and the use of color suitable for the function. Under all these titles, he explained how the choice of color was affected by these aspects (Yamaner, 2001).

Mario De Bertoli and Jesus Maroto gathered the criteria to be considered in the color selection decision under two main headings as Color Selection and Color Perception in their paper titled "Colours Across Cultures: Translating Colors in Interactive Marketing Communications". Color theory, content, linguistic relationship, climate, gender, age criteria under the title of Color Selection; Under the title of Color Perception, sectoral meanings of colors, meanings of colors according to countries, symbolic meanings of colors, color

codes, places where colors are used in the language, meanings of colors in different religions, and non-cultural factors (meanings of color combinations, the form of the object to which the color is applied, the health conditions of the user and technology use frequency of user) have explained the criteria (Russow & Barbereau, 2001).

Ceyhun Şekerci, Elif Özgen and Zeynel DüNDAR have grouped these criteria under three main headings: Criteria Affecting Color Selection, Factors Increasing the Importance of Color Perception, and Effects of Colors on Space Perception in their paper titled “The Importance of Color in Space Design”. Under the main title of Criteria Affecting Color Selection, conditioned reflexes, fashion, period styles, age and gender, social value judgments and the effect of belief, symbolic and functional meanings of colors and the criteria of conformity to the function of space; Under the main title of factors increasing the importance of color perception, texture, material, form and light criteria; Under the main title of the Effect of Colors on the Perception of Space, the characteristics of the lighting system and the criteria related to the function of the space (space volume, the level of illumination required by the space, the qualities of the action in the space, the effects of color on spatial psychology) were discussed (Çekerci et al., 2016).

Nedim Alici, in his master's thesis titled "Interior Color and the Effects of Colors on Human Psychology", revealed the criteria that should be considered in color selection through the effects of colors on people and

these factors were determined by Human Psychology, Psychological Effects of Colors, Use of Color in Space and its Psychological Effects, Use of Color in Space, and Sociological Effects and Perceptual Effects of Color on Individuals in Spaces. Under the title of Human Psychology, he talked about how individual color psychology and social color psychology are factors, and under the main title Psychological Effects of Colors, he discussed the different effects of color types as a criterion; Under the title of Use of Color in Space and Its Psychological Effects, past experiences and educational status, characteristics of color, space lighting, the difference in contrast between the colors used together, the character of the space and the emotion and material criteria that the space is desired to reflect; Under the title of Use of Color in Space and Its Sociological Effects, color messages that have a place in social life, use of color in language, intercultural color interaction, the effect of tradition and belief differences on color (cultural partnership, political and historical partnership, religion and legends, linguistic differences, current uses and fashion); Under the title of Perceptual Effect of Color on Individuals in Spaces, the relationship of colors used together, color sensitivity, reflection factor of colors, color-light type relationship, the effect of color on the perception of space dimension, the sound level to be perceived, the perception of time spent, the criteria of the space element to which the color will be applied (Alici, 2019).

Yelda Zeren Alakuş, in her master's thesis titled "The Phenomenon of Color and Its Place in Contemporary Architecture", categorized the criteria to be considered in color selection under two main headings as "Psychological Perception and Effects of Color" and "Space and Color". Psychological Variables in Color Appreciation (user identity, habits and conditioned reflexes, fashion and style, age and gender), Psychological Perception of Color (hardness and softness of colors, shapes expressed by colors, visibility and readability of colors, symbolic color and functional meanings), the Effect of Colors on Human Psychology by Type (main, intermediate neutral colors, warm-cold colors, complementary, harmonic, contrast colors) have classified the factors that need to be addressed in the sub-headings. He divided the main title of "Space and Color" into two sub-titles: Space and Color, Architecture and Color; He classified the criteria under the subtitle of Space and Color as Use of Color in Indoors (function of the space, area size, location, lighting and colors, equipment of the space) and Effects of Color on Perception of Space (heat effect, mass effect, temporal effect, auditory effect, spatial effect). The criteria under the main heading of Architecture and Color are Factors Affecting the Color Decision in Architecture (form, surface, material, texture), Architectural Function, Factors Affecting the Use of Color in Architecture on the Facade (architectural style of the building, function of the building, environment of the building, climate of the region



where the building is located and topographic conditions (Alakuş, 2009).

At the end of all this literature review, when these classification systems are examined from a general framework, it is understood that when it comes to color selection, it is seen that both the variables that need to be addressed and the angles where color selection makes a difference on user perception.

## **2. Material and Method**

In this study, the categorization systems in the studies on the criteria to be considered in color selection in space design were examined and synthesized and these criteria were categorized with a new approach. In addition to the parameters depending on the user and the place, the ways in which the use of color affects the users and from which angles it directs their perceptions constitute the criteria to be considered in the selection of colors; However, in this categorization system, it was decided that it would be more appropriate to gather these two issues under two main headings, and the place and importance of each of the criteria in this categorization system in guiding the color decision of the designers was explained.

## **3. Findings and Discussion**

### **3.1.Criteria affecting color selection in design**

In the study, the general classification of color selection criteria in line with the data obtained as a result of a comprehensive literature research

on color selection in space design, criteria depending on individual differences of users, social variables, variables related to space, psychological effects of color, effects of color on environmental perception and factors affecting the perception of color. covered under six headings. Later, these titles are divided into sub-titles in their own scope (Table 1).

**Table 1. Classification of color selection criteria in space design**

COLOR SELECTION CRITERIA IN SPACE DESIGN		
CRITERIA DEPENDING ON INDIVIDUAL DIFFERENCES OF USERS	User ID	Culture Level Age Gender Educational Status Life style Personality User's Health Conditions
	Psychological Variables in Color Likes	Psychological Status of the User Past Experiences and Relationships User's Memories Conditioned Reflexes Individual Color Psychology
EFFECTS ON ENVIRONMENTAL PERCEPTION OF COLORS	Thermal Effect	
	Mass Impact	Dimensional Impact Proportional Effect Formal Impact
	Temporal Effect	
	Auditory Effect	
	Spatial Impact	Distance Perception Image Perception of the Space
FACTORS AFFECTING COLOR PERCEPTION	Spatial Factors	Where Color is Used in Space Equipment Using Color in Space The Size of the Area where Color is Used
	Color Quality	Color - Texture Relationship Color - Material Relationship Color - Form Relationship Color - Lighting Relationship
	Characteristics of Color	Color Type and Tint Color Hardness Level Visibility and Readability of Colors

**Continue of Table 1.**

SOCIAL VARIABLES	Regional Effects	Climate Topography and Geolocation
	Sociological Effects	Society's Value Judgments and the Effect of Belief <ul style="list-style-type: none"> <li>▪ Social Symbolic Meanings of Colors</li> <li>▪ Belief System and Meanings of Colors in Religions</li> </ul>
		Cultural and Historical Variables <ul style="list-style-type: none"> <li>▪ Cross-Cultural Color Interaction</li> <li>▪ Cultural Partnership</li> <li>▪ Political and Historical Partnerships</li> </ul>
		Linguistic Variables <ul style="list-style-type: none"> <li>▪ Linguistic Relationship</li> <li>▪ Where Colors Are Used in Language</li> </ul>
	Period Effects	Fashion Period Styles
SPACIAL VARIABLES	Use of Color in the Interior	Functional Variables <ul style="list-style-type: none"> <li>▪ Suitability to the Function of the Space</li> <li>▪ Spatial Psychology</li> <li>▪ Space Usage Time</li> <li>▪ Where Color Will Be Used in Space</li> <li>▪ Characteristics of Action in Space</li> </ul>
		Physical Characteristics of the Space <ul style="list-style-type: none"> <li>▪ Area size of the Space</li> <li>▪ Space Element where Color will be Used</li> <li>▪ Features of the Lighting System</li> <li>▪ The Volume of the Space and the size of the Area</li> <li>▪ The Level of Luminance Required by the Space</li> <li>▪ Equipment of the venue</li> </ul>
	Factors Affecting Facade Color Selection	Architectural Function Architectural Style of the Building Structure Function Environment of the Building Climate and Topographic Conditions of the Building
PSYCHOLOGICAL EFFECTS	Symbolic and Functional Meanings of Colors	Sectoral Meanings of Colors Color Codes Shapes of Colors Color Messages in Social Life
	Effects of Colors on Human Psychology by Type	Color Types and Effects <ul style="list-style-type: none"> <li>▪ Primary Colors</li> <li>▪ Mid-tones</li> <li>▪ Neutral Colors</li> </ul> Effects of Using Warm - Cool Colors The Effect of Color Associations on Human Psychology <ul style="list-style-type: none"> <li>▪ Complementary Colors</li> <li>▪ Harmonious Colors</li> <li>▪ Contrasting colors</li> </ul>

### 3.1.1. Criteria based on individual differences of users

Colors do not have exactly the same effect on every person. Personal differences such as cultural level, age, gender, educational status, lifestyle, personality, individual health conditions come into play in the change of this effect. With the differentiation of all these variables, information and reactions to colors become personal (Özdemir, 2005). These variables basically constitute the user ID. Although it is not possible to use precise expressions in color preference according to genders, it can be said that colors such as pink and magenta are mostly preferred by women, and colors in brown and gray tones are preferred more by men. Similarly, as the age changes, one's perception of colors changes. As a result of the experiments conducted in the form of comparing the color perception questionnaires conducted on the same people at different ages, it has been proven that the color tastes of the people change as they get older (Alakuş, 2009).

In terms of color liking, besides the identity of the user, the influences and memories of the person's past are also variables. Even if the color covers a small area, the person immediately notices the color associated with an important memory (Özdemir, 2005). Thus, this color reminds him of the emotions he felt while experiencing that event in the past, and his psychological state during the time he uses that place is also affected by this. For example, someone who has experienced a fire disaster before and barely survived may feel bad when they encounter

colors in orange and red tones (Alakuş, 2009). Similarly, the immediate psychological state of the user also affects the color liking. While the same user feels overwhelmed, cold and dark colors trigger these negative feelings, while in a positive psychological mood, they can sympathize with these colors.

The perception of an event occurs by establishing a relationship with previous events and experiences (Alakuş, 2009). The situation is similar as color taste is also a perception. The colors that the users like or that make them feel various emotions are also different from each other because their approach to colors has been shaped as a result of their past color experiences, the emotions they felt during these experiences, and their psychological activities. A color that is beautiful and impressive to one user may be bad and repulsive to another. This situation is the result of the psychological activities of the person rather than the effect of colors (Alici, 2019).

### **3.1.2. Social variables**

The differences that separate societies from each other in various aspects lead to differences in color psychology.

The distinctive features of societies such as language, religion, cultural structure differences, geographical structure, fashion, social value judgments and social symbols can be given as examples of these differences. As all these parameters change, the meanings of colors and users' perspectives on color and the way they are psychologically

affected by colors also change from society to society. For example; Societies living in cold climates are more sympathetic to cold colors (such as blue, green, purple), while societies living in warm climates prefer warm colors (such as yellow, red, orange) (Alici, 2019).

It has color and shape meanings and symbols that change from society to society, from age to age. For example; While the color yellow evokes success in India, elegance and nobility in Egypt and Arab countries, it means warning and cowardice in the USA and European countries. While red color evokes feelings of happiness and celebration in China, it symbolizes feelings of anger and danger in Japan (Özdemir, 2005).

In daily life, colors act as a guide in our lives with the social codes they have settled in our minds until today. There is an unwritten communication between us and colors. For example; when we see the red color on the faucets, hot water will flow from that faucet and cold water will flow from the blue-marked faucet; When the phone rings, we know that if we touch the red part, we will reject the phone, and when we touch the green part, we will open it, without the need for an explanation.

The use of colors in language also affects the perception of color, and in the same way, social color perception shapes the use of colors in language. For example, many idioms include colors. The French idiom “etre dans le noir” (to be in black: to be in an incomprehensible, inextricable situation) expression, the expression “n'y voir que du bleu”

(to see nothing but blue: to see nothing, not to understand, to be deceived); The phrase "seeing the world as rosy", the adjective "disgraceful" and the expression "black love" in Turkish can be given as examples (Topçu, 2001).

In different eras, there is a wide variety of symbolic links between religion and color. In the Middle Ages, purple symbolizes nobility. In the early Middle Ages, archbishops used purple color appropriate to their position. In the Catholic church, the higher a clergyman rises in the hierarchy, the more purple hues and speckles appear on his robes. According to the Catholic belief, purple is the color of mourning (Alici, 2019)

### **3.1.3. Spacial variables**

The spatial features and the colors applied in the space are in communication with each other. The story that will happen in the place and the physical characteristics of the place and the color selection cannot be considered separately. With the right color selection, the perception of the sections with different functions in the space and the orientation of the user's emotions and performance as required by the function of the space can be ensured. The definition of the circulation area in the space can be realized with different colors and materials. According to the characteristics of each color, its effects on the user serve various purposes in spaces with different functions. Color serves many purposes related to aesthetics such as influencing the proportions

in the space, specifying the scale, creating an atmosphere, revealing the characteristics of the material, defining the form and strengthening or weakening its perception (Yamaner, 2001). Hospital, dental clinic etc. Colors that have a relaxing effect on users are used in places where people may feel nervous, such as Colors are used in small spaces that will change the perception of size and make users feel like they are inside a larger space.

It is also important which color is used in which part of the space in creating this perception, because as the element of the space where the color is applied changes, the effect it creates on the user also changes. In addition, the duration of use of the space is one of the parameters related to the space that should be considered in color selection. Depending on the function of the space, the duration of the user's use of the space also changes and the perception of the time spent that is desired to be given to the users also differs. Similarly, the temperature perception desired to be perceived by the user differs according to the location, climate and function of the place. Therefore, the desired temperature perception is one of the criteria in color selection. For example; warm colors; It makes the dimensions of the space smaller, the temperature of the space is higher, the sound level in the space is higher, the texture of the applied surface is softer, the actions to be performed in the space are more active and extroverted, the physical force to be spent while performing these actions is less, and the time



spent in the space is perceived as shorter. colors have the opposite effect on the user (Alici, 2019).

The level of illumination of the space is also one of the effective variables in color selection. With the right use of color, different illuminance levels can be created using the same lighting system. When the color is chosen according to the lighting level that the space needs, it is possible to reduce the energy spent on lighting and to reach the desired illuminance level.

The features of the surfaces on which colors are applied in the space change the color quality and the way the color is perceived. The reason for this is that as these properties change, the reflection of the light and the reflection factor of the surface also change (Pehlivanoğlu, 2008). These surface features that change the reflection type and reflecting factor of the light are texture, material and form. The type and angle of the incident light is also one of the parameters that affect them (Çekerci et al., 2016).

#### **3.1.4. Psychological variables**

Colors are one of the most important components that have the power to change our environmental perception and how we feel, by affecting us from many different angles in every aspect of life. As the various features and usage patterns of colors change, their perceptual effects on users also change.

Each color has its own symbolic meanings, and these symbolic meanings are constantly encountered in every aspect of our daily lives. Although there may be situations where the perceptual effect of each color is different on people from different societies, there are some universal meanings that colors symbolize in general. As a common 'color language' has been formed by gaining symbolic meanings from history to the present, the messages of this color language are used in daily life. Therefore, many features of colors such as organizing, distinctiveness and distinctiveness are utilized. For example, yellow color is preferred in road lines due to the striking feature of yellow that evokes the sun. Green; Since it is a reassuring and calming color, green is used in areas such as fire escapes, exits and signs. Warning signs are colored red, as red is an energizing and exciting color (Köseoğlu & Çelikkayalar, 2016).

The universal symbolic meanings of colors are categorized in Table 2 (Özdemir, 2005).

Each color has a wide variety of psychological effects on individuals. Human beings, who have completed their development process in terms of emotion, not only see the wavelengths of light emitted by lights or objects, but also transform the colors they perceive into various emotional reactions. Colors affect the subconscious, the resulting emotions are transferred to the consciousness and cause various reactions (Alici, 2019).

**Table 2.** The universal symbolic meanings of colors

COLOR SYMBOLIC MEANINGS	COLOR SYMBOLIC MEANINGS
RED	Love, struggle, blood, fire, danger, poisoning, hot water, shutdown
BLUE	Business layout, technological, organization, cold water
GREEN	Calmness, safety, satisfaction, first aid, free passage, opening
YELLOW	Caution, movement, slipping, bumping
ORANGE	Wealth, productivity, joy
PURPLE	Restlessness, depth, mysticism, preciousness
BROWN	Indecision, seriousness, reticence, firmness
PINK	Kindness, conservatism, obligation, timidity
WHITE	Purity, cleanliness, luminosity
BLACK	Seriousness, fear, darkness
GRAY	Neutrality

Symbolic meanings of colors have also been used in daily life as a result of the detailed awareness of the aspects of these psychological effects and the effects of which colors on individuals for centuries, and these uses have progressed towards universality. When examining the psychological effects of colors, categorizing colors according to their types, color saturation, temperature, etc. It is also necessary to examine the difference in perception caused by the change of color characteristics and at the same time to emphasize the perceptual effects of color combinations.

Colors are divided into 3 according to their types: primary colors, intermediate colors and neutral colors. Primary colors: red, yellow and blue; intermediate colors: purple, orange and green; neutral colors are black, white and gray.

If we summarize the effects of primary colors on human psychology; Red, a warm color, has a stimulating, stimulating and exciting effect. Yellow color, which is one of the symbols of volatile emotions, creates stimulating, joyful and happy, remarkable effects and makes users more open to communication. Blue color has a calming effect on people, directing thinking and focusing, giving a feeling of cleanliness (Alici, 2019). When we look at the intermediate colors; While purple color directs individuals to artistic and creativity, if it is not used in the right tone and amount, it can create a melancholic and depressive effect and reveal feelings of hopelessness and pessimism in people (Yılmaz, 1991). Orange; It is a color that brings joy to people, directs them to come together, increases productivity and appetite. Green; It has an effect that neutralizes the emotions of the users, calms them and makes them feel safe. When we look at neutral colors; black creates feelings of fear, obscurity, seriousness and dignity on people (Alici, 2019). White color evokes feelings of spaciousness, composure, sincerity and light (Yılmaz, 1991). Gray, on the other hand, has a conciliatory and neutral feeling effect. The effect of all these colors on the perceptions of the users changes as the parameters such as the tone of the color, the

location and size of the area where it is used change. A color that has a calming and peaceful effect when used with appropriate accompanying colors in a small space; When used in a different tone and area with a different color, the opposite effect can be achieved. For example, green color, which has a neutralizing and calming effect, can create a feeling of boredom and impatience when used in a very large area and in dark tones. Therefore, in cases where the green color is preferred to be used in large areas, colors that stimulate emotions such as red and orange can be preferred as accompaniments for other components in the space.

### **3.1.5. The effects of color on environmental perception**

Colors affect people's emotions as well as their senses and change their environmental perceptions in various ways. With the use of color suitable for the perception to be given, changes can be created in the thermal, mass, temporal, auditory and spatial perception of the users.

#### **- Thermal Effect**

Colors are divided into warm and cool colors according to the spectrum color. In places where warm colors are used intensely, users feel warmer than they are, and in places where cold colors are used, users feel colder than they are. In an experiment, in a place painted in blue-green colors, users described the place as cold when the ambient temperature is 15 C, and when the place is painted in red-orange color, the same place is warm when it is 11 C (Alakuş, 2009).

#### **- Mass Effect**

In the spectrum color dimension of colors, some colors are heavy and some colors are light. We can sort the colors from heavy to light red, blue, green, orange, yellow in the spectrum color dimension. It has been proven by experiments that as the spectral weight of the color of the space increases, the objects in that space feel heavier and larger (Çabuk, 2006).

#### - Temporal Effect

The colors used in the space can cause changes in the sense of time passing. Thus, the designer has the opportunity to set the time he wants the users to spend in that place by choosing the right color. It has been determined that the time spent in a place dominated by warm colors is estimated more than normal, but the estimated time in a place colored with cold colors is below the actual time (Alakuş, 2009).

#### - Auditory Effect

The colors used in the space also change the intensity of the sound perceived by the users in the space. According to researches, when cold colors are preferred in the space, users perceive the sounds in the space at a lower intensity than they are, and when warm colors are preferred, they perceive the sounds at a higher intensity (Ural, 1995).

#### - Spatial Effect

It is possible to create a different dimension perception by changing the colors of a space without changing its dimensions. The lightness-darkness of the colors can create optical illusions and give the

opportunity to change the physical character of the space. Accordingly, light colors cause objects to be perceived as closer and larger than they are, and spaces to be perceived as large, while dark colors cause them to be perceived as small (Yamaner, 2001).

### **3.1.6. Factors affecting the perception of color**

The way the colors are perceived by the user changes according to the area and equipment used in the space. As can be seen in the table below, when the same color is used in a different area or equipment, the effect it creates on the user is very different.

There are some factors that change the color quality in the space and therefore affect the perception of color. The texture of the surfaces, material, form and light are the factors that affect the color quality in the space. Color is perceived as a result of the reflection of the light coming to the surface and reaching our eyes. Therefore, when the properties of the light coming to a surface change or the textural and stylistic properties of the surface itself change, the quality of the color perceived by our eyes also changes, as the way of reflection and the amount of light absorption change. Therefore; The texture of the surfaces in the space, the materials used in the space, the form of the space components and the lighting features are among the factors affecting the user perception as they change the perceived color quality.

#### 4. Conclusion and Suggestions

Color is one of the indispensable components of life, which has one of the most important roles in design elements and affects our perceptual world in various ways, directly and indirectly. In all areas of design, when designers make color choices successfully, they have the power to direct users' perceptions as they wish. The phenomenon of color affects the perception of users in many ways. Categorizing these angles and considering each one separately is important in making a successful color selection, but before that, it is necessary to examine the concept we are talking about when we say "user". The user is first and foremost an individual; an individual with a certain age, a gender, cultural level, education level, lifestyle, a unique health condition, psychological condition, character and memories if he does not define himself as genderless. Apart from these individual characteristics, they are also part of a society. When we say society, the concept we are talking about is; It is a phenomenon that has value judgments, culture, belief systems, language, fashion approach and periodical styles, a geography where it is settled, and the climate and topographic characteristics of this geography. Although individuals have their own individual characteristics, they cannot be evaluated completely apart from these characteristics of the society in which they live. When it comes to color selection, after the concept of "user", it is necessary to examine the concept of "space" where these users perform their actions and spend



their time. The place is; a unique architectural style, concept, function, volume, dimensions, equipment, lighting system, a certain level of illumination that it needs, its elements; It is a phenomenon that has variables such as the texture, material, form characteristics of its surfaces and the climate of the environment it is in. In order for designers to make successful color selection decisions, they need to take into account all of these parameters, which belong to the concepts of individual, society and space, in detail. In addition to these parameters, how and how the concept of color affects users is an important issue that designers should consider in color selection. When the ways in which colors affect the user are examined, the concepts reached will also be sub-headings that constitute the criteria to be considered in color selection. These sub-headings are how color affects user psychology, how it affects environmental perception, and spatial factors that affect how color is perceived. Colors have symbolic and functional meanings; At the same time, there are some universally accepted feelings that it evokes in users according to their types. These meanings and the emotions they evoke are the way colors affect human psychology. With a successful color selection, the designer can direct the thermal, mass, auditory, temporal, volumetric and spatial atmosphere perceptions of the users towards the space as they wish. Therefore, these features that it wants to be perceived are among the criteria that should be considered in the color selection decision. In addition to these, spatial factors such

as the place where the color is used in the space, the equipment, the size of the area; Parameters that affect color quality such as texture, material, form and light of the surfaces that make up the space, and the characteristics of colors such as type and saturation are also factors that affect the perception of color, so they are included in the criteria to be considered in color selection. In the design process of the space, all these criteria should be taken into account in detail, the fact of creating an atmosphere that fits the purpose and the type of expression, and the harmony, unity and integrity of the selected colors should be ensured by taking into account the relationships in the color wheel, their use in quality and quantity (Özdemir, 2005). Thus, a successful space design is made in accordance with its purpose, in which the users are guided emotionally and physically as required by the space.

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## The Impact of Consumption Culture on Spatial Organization of Museum Store

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## 1. Introduction

The Fordist accumulation model, which left its mark on the 20<sup>th</sup> century, ensured the centralization and concentration of capital. In this period, especially in developed economies, a large public sector and an intense mass production/consumption process has been entered. However, in this accumulation model, the crisis that started due to the decreasing trend of profit rates since the second half of the 1960s brought along the restructuring of the capitalist production system (Tekin, 2012: 71). In the 1960s, a period of developing new strategies against the crisis, the museum was declared dead, but the museum explosion, which started only twenty years later and continued until today, has proven that this is a temporary process and a baseless claim. The spatial, cultural approach and the increase in the tendency to consumption culture encountered in these transition periods are criticized and evaluated in many ways (Huyssen, 1999: 30). This study discusses the relationship between economic/cultural/symbolic capital within the framework of the culture industry. The structure of the museum, which is affected by social judgments and can manipulate various lifestyles and worldviews in the context of status/taste/value, is discussed within the scope of concepts of consumption and change. Although the theoretical background that forms the structure of the study has an important place in the holistic design of the museum, it is used to draw attention to the museum stores, which are the least focused

on the location of the building in its spatial organization. Spatial organization which has changed as a reflection of the relationship between the culture industry and consumption, is exemplified by a contemporary case. The aim of the study is to present the concrete indicators of culture industry-museum-consumption-museum store interaction as a field to be studied.

## **2. Material and Method**

The socio-cultural effects of museums, educational programs, how and in what ways the experience will be lived, the construction of the circulation axis of the exhibition spaces, the movement patterns in the whole building when viewed from an upper scale, etc. are the topics discussed, researched and analyzed with applications within the scope of creating a commercial and marketing-based visitor behavior. However, descriptive studies that reveal the spatial reflections of a visitor's tastes, socialization expectations, consumption habits and methods of forming social identity during the period in which he/she lived -contrary to the importance of their content- are not often encountered. For this reason, the study aims to reveal the concrete responses of change and expectations through structural change, and in order to do this, it explains the conceptual framework that needs to be emphasized in depth through literature reviews. In scope of this comprehensive subject, which can be studied by developing different analysis methods on thousands of museums around the world, discussion is held with a descriptive research method, focusing on the



transformation of Barcelona Museum of Contemporary Art (Museu D'Art Contemporani De Barcelona/MACBA) in parallel with the culture industry and lifestyle theories. The museum, which has the mission of bringing contemporary art to life by focusing on Catalan production, encouraging social transformations by encouraging visitors to engage in intense, democratic, cultural and educational behaviors, has an organization that stands out within the scope of reading the cultural contributions made directly to the economy and the consumption of art/space.

### **3. Findings and Discussion**

#### **3.1. Culture Industry**

*“Culture now impresses the same stamp on everything.”*

*Theodor W. Adorno*

The change in production techniques with the Industrial Revolution in Europe, which is considered a turning point in world history, has redefined the needs that people see as necessary to reach prosperity. Starting from this period, the production of goods depending on the needs, the supply of raw materials and mechanical power for production, well-organized trade processes for the delivery of the goods to the consumer, and successful advertising-marketing services for more sales have come to the fore. Economic growth has led to an increase in the number of large-capital companies that will produce fast and high quality, and a new class (working class) has emerged,

consisting of people working in the factories established by these companies.

As a result of the need for new markets and raw materials for regularly increasing production in the 19<sup>th</sup> century, international exhibitions began to be organized with the aim of promoting industrial products and production tools. These exhibitions started an interaction between the culture and local arts of European and non-European countries (Kösemen, 2019: 207). In the 1960s, however, the emergence of previously non-existent or marginal production areas in industrial capitalism and the fact that the brokering and service business became the engine of the economy brought along a structural transformation. Industrial capitalism has become a finance-based order of activities, the source of capitalist profit has passed from concrete commodity production to abstract values. Simultaneous advances in communication and information processing technologies have created a global integrated market (Ergur, 2014: 17).

In the process of globalization of the world economy, companies have focused on art, which is perceived as an element of elite culture, and intensified their activities within the scope of art collection and sponsorship in order to maintain their strong and effective position in the global economy as dominant actors and to gain competitive advantage. According to Wu (2005: 25); companies that are very sensitive to their symbolic position in the minds of people (consumers) use art, with all its social implications, as a form of advertising and

public relations strategy, or to capture a '*slice of the market*'. Thus, by sending the signal that they adopt the tastes peculiar to a refined social group, they appeal to this group and acquire cultural capital as a way to achieve their economic goals.

The most popular of the art activities that companies have concentrated on since the 1980s, is exhibiting their collections, which they created by using their economic power, inland and abroad. Thus, they entered into competition with public museums and galleries, took over the function of cultural institutions in society and benefited from the social status of these institutions. Activities such as opening art galleries within companies, opening branches of public museums, organizing traveling art exhibitions, and handing out art awards aim to attract the attention of the public and raise themselves to the position of taste experts of contemporary culture by creating the impression that art has become an integral part of their daily business practices. On the other hand, due to the regulations in federal tax revenues in the United States of America (USA) during this period, expenditures and donations made to arts and cultural institutions actually had to be paid as taxes. For this reason, sponsorships of artistic events and arts by companies (and the rich) can be interpreted as indirect government subsidies, tax relief, and tax avoidance strategies (Wu, 2005: 16-17, 46). With art sponsorship and investments, companies basically make use of the prestige of art in their promotion, dissemination and marketing strategies, creating a "*philanthropic, modern, enlightened, progressive*" corporate identity

which is a kind of "*bourgeois*" under the concept of "*art friendly*". Because raising the profit target for capital is not limited to commercial actions. In this process until today, '*reputation*' has been one of the important rules of getting ahead in the competition (Kösemen, 2019: 215, Bozdağ, 2009: 350). In other words, companies invested in art, protected their capital, and turned their tax expenditures into symbolic capital within the framework of their own well-known and popular values. According to Bozdağ (2009: 350); '*capital*' which wants to expand unconditionally; commodifies values and relations by marketizing social areas, and makes art an object of capital in the same process.

The spread of art in the global environment through sponsorship and advertising has brought with it the commercial exploitation of art. In the book called '*Dialectic of Enlightenment*' published by the Frankfurt School thinker, sociologist, musicologist and philosopher Theodor Ludwig Wiesengrund-Adorno, together with Max Horkheimer, who is also a member of the same community, this exploitation is explained by the phenomenon of the culture industry, which is an extension of the industrial production logic. Cultural industries can be defined as industries that deal with the production, distribution and consumption of symbolic products which derive their economic value from their cultural values, such as media, film, music, design, architecture, new media, traditional arts. The cultural industries, like many other fields that make up the new economy, are made up of a mass of small

producers and (fewer) large producers who complement them (Töre, 2014: 166). According to Adorno, culture becomes a part of production modes by the culture industry. Unlike the values that come out of the layers of the people and carry the people's own internal values, the culture industry reaches the masses with products that were created as a result of industrial processes in that society and produced as standard in a way that is imposed from above, and paves the way for the emergence of a new cultural process. The culture industry, which is a profit seeking structure, should be able to generate profit by serving the interests of this industry. For this reason, the masses are encouraged to consume by presenting wants as '*necessary needs*'. As the culture industry consolidates its position, it generates needs for consumers; it directs, disciplines and satisfies this need (Çelik, 2012: 113-115). Adorno (2016: 53-56, 107-110); bases the power of the culture industry on these needs that it has created for the consumer and emphasizes that the '*customer*' is the object of the culture industry, not the subject, as the culture industry would like to convince. The culture industry is forcing the high and low cultural areas that have been separated for thousands of years to merge, integrating their customers deliberately and from above. Thus, customers in the position of consumers have to adapt themselves to the unity of production even in their spare times. Because the culture industry will have paralyzed the imagination and spontaneity of the consumer with the products it has designed in a way that will not allow intellectual activity, and will enable them to consume these

products alive even if people are miserable. Advertising, which is the elixir of life of the culture industry triumphs by ensuring that the consumer continues to buy and use cultural commodities with an overwhelming desire, even though he/she sees them as fakes. At this point, the important thing is not that people see/know the insights and purposes of the culture industry, but that people do not stop demanding these products as long as they provide them with '*temporary satisfaction*'.

The culture industry, which transforms people into consumers, transforms art into a commodity that has lost its autonomy, popularizes it and markets it. For this reason, researching the consumption habits and behaviors of various culture/art consumers, consuming the familiar/familiar, and understanding the feeling of envy towards the experiences in the upper layers of the masses will be necessary for a holistic approach to the change that occurs in the spaces where art is represented.

### **3.2. Consumption Culture and Consumption of Art**

*"The product or brand image is a symbol of the buyer's personality."*

*Pierre Martineau*

Due to the radical changes in social, economic, political, cultural and technological structures after the Industrial Revolution, freedom and individualism were seen in the understanding of competition. Fordism, which was introduced by Henry Ford in the 1920s, brought the competition relations in industry to a new dimension as a form of mass

production specific to the capitalist system that determined the nature and limits of globalization. In this production form, a sliding belt system is created and the mass production of a product is enabled. Tekin (2012: 73-74) explains the manifestation of Fordism and post-Fordist policies applied with the crisis of Fordism in the production-consumption balances as follows; "...Since the Fordist mode of production accepts individuals as producers and soldiers, social norms are shaped to fulfill these two roles. However, today, post-Fordist policies need consumers more and norms are shaped according to the consumption phenomenon. Essentially, production and consumption coexisted at every social stage. But today, the reference point of social relations has shifted from production to consumption axis. In other words, working and saving together with the 20<sup>th</sup> century is replaced by an increasing consumption." The fact that the structure of the consumption economy supports individualization in socio-cultural dimensions is also reflected in the perception of the individual to take place in the social environment, for this reason, cultural spaces and the experiences they offer have been reshaped. In the 1980s, museums, which were increasingly in number and at a dominant point in terms of cultural content, became places that can be easily consumed by individuals who want to reflect their own identity and highlight their difference, have a hedonic aspect, change the quality of their products and services, thus, culture has become privatized. According to Huyssen (1999: 37-38) the speed at which the artwork presented by these spaces reaches the

workshop-collector-gallery-museum-exhibition has increased significantly and this acceleration has inevitably affected the speed of the bodies passing in front of the exhibited objects. However, the acceleration brought with it the discipline of visitors and the introduction of tactics that would prevent them from seeing what they came to see if they refused such discipline. This new invisibility of art as the ultimate form of sublimity has caused exhibitions to surrender to the world of show business; and in the expansion of reputable old museums, establishment of new museums etc. marketing of t-shirts, posters, cards and reproductions of the relevant exhibition emerged. In other words; original artwork has become an instrument of selling its own reproduced derivatives.

Production with reproduction techniques eliminates the uniqueness of the work of art, and has caused art to gain a political function by getting ahead of the '*cult value*' of '*display value*' (Foster, 2017: 101). Benjamin and Adorno consider art to be produced for the market from two different perspectives (as cited in Artan, 2007: 90-91); according to Benjamin, reaching more people with the reproduction technique is a kind of democratization movement, whereas, according to Adorno, it is the loss of the work's '*here-ness*' and the massification that causes everyone to consume the same thing; that is, it is the result of the cultural relationship between the capital owners/capitalist and worker/consumer identities based on creating a commodity to be consumed in the market. While the prestige addiction that emerges with



the purchase of cultural commodities is defined as the ideology of the entertainment industry, the existence of art becomes a fetish in the eyes of the consumer. Art has become a kind of commodity; it has become a product prepared for consumption, recorded, adapted for industrial production, marketable and exchangeable. At this point, it can be focused on the content of the consumption act and the tendencies of the consumer.

Consumption can basically be explained as using a useful service and/or product for a need. Turkan states that; in the processes of continuous change, renewal and liberation, the individual begins to express himself/herself through consumption and embody his/her life through consumption. Consumption takes place in line with the coexistence of many everyday features such as; use (comfort, security), enjoyment (satisfaction, hedonistic consumption), meaning (lifestyle, differentiation, symbols of belonging to a group) (Turkan, 2012: 90-93). The process of acquiring identity and constructing meaning from consumption becomes evident in the concept of lifestyle. The individual, in the previous periods, adhered to ethical and political identity, but in the consumption culture, sees each lifestyle component that will differentiate himself/herself from other individuals as the main starting point in his/her relationship with those around him/her, and acquires '*temporary identities*' determined around the image. A person's body, clothes, speech, leisure use, food and drink preferences, home, automobile, holiday choices, etc. are considered signs of individuality

of the taste and sense of style of the owner/consumer (Tekin, 2012: 75). Because the concept of modern consumption has shifted towards the meanings of the products they carry and reflect rather than the features and functions of the products. Through these meanings, consumers can find the opportunity to showcase their identities (Odabaşı, 1999: 14, 29).

In some cases, the individual performs the act of consumption in groups. However, these groups, which can be called '*consulting groups*', can have three important effects on an individual's purchasing decisions even when left alone, being; informative, normative, identifying. In the identifying effect, the similarity of the group members, how the society sees the individual and how the individual assumes roles in the society are at the forefront (Odabaşı, 2017: 236, 238). Since the person is constantly inclined to measure and evaluate himself/herself with the person or persons around him/her that he/she will take as a standard of comparison, these roles will determine the '*status*', which means the grading of people according to certain criteria in a social hierarchy. Because members of the same social class will enjoy approximately the same prestige, they will regularly socialize with one another (Odabaşı, 2017: 295-296). Consumption of products that are "*marked*" and strengthened with special meanings by the society will contribute to the socialization of the individual, as well as reinforcing his/her place in society and placing his/her personality in a social status (Turkan, 2012: 90-93).

The fact that owning a work of art and being in the places where the work of art is presented is seen as an element of status, admiration and high culture, thus making it easier to create an image within the sign, meaning and image brought to the fore that the act of consumption, which is the basis of socio-cultural processes, should be sustainable with various activities in museums that give importance to the policy of gaining visitors. The visitor is no longer just for visiting exhibitions and seeing unique works; it also visits museums in order to obtain the indicators of commercialized art. Referring to Belting's thoughts on the globalization of art and that museums sanctify an art production that has no geographical boundaries and no history, Artun mentions that not only art, but also what a museum is has become relative and ambiguous (Artun, 2017: 64). For these reasons, it is thought that the museological infrastructure in the next section will be useful in terms of watching the popularization process of consumption, art and entertaining experience and reading its effects on spatial organization.

### **3.3. The Relationship between Museum and Consumer**

*“The purpose of marketing is to offer museum consumers as much value as possible for the cost of visiting museums. Museums need marketing because they face substantial competition in the leisure - time marketplace.”*

*Neil G. Kotler, Philip Kotler & Wendy I. Kotler*

The intensification of national and international competition in all areas, has made it necessary for museum to strengthen their position in the market within the scope of the culture industry and to keep up with the change; thus, to maintain the "perception of the society that there is

a sacred and real '*cultural authority*' regarding the museum" (Karadeniz, 2018: 68). This competition process, which is entered not only with institutions that carry out cultural and artistic activities, but also with institutions that carry out leisure-entertainment activities, has brought along the use of brand image and marketing methods within the scope of cultural activities as a requirement for being able to come to the fore. The development of marketing methods in museums has basically revealed a visitor-oriented management and has shaped the new museum concept around the understanding of experiential marketing. In addition, the preferences of the potential visitor have been transformed through the advertisements he/she encounters in his/her daily life, and the visit-advising tendencies that the individual can see as a contribution to his/her own socialization have resulted in the museum gaining benefits.

The museumization movement of America, encountered at the end of the 19<sup>th</sup> century, opened new horizons in the methods of putting art into the service of politics. The idea of autonomy of European museums, which is described as public, developed depending on the organization of romantic culture, and which includes the purification of art from all kinds of benefits/interests, has been reciprocated, in American museology, as a popular and utilitarian wealth presented to the public thanks to the philanthropy of the owners of the museum and art. This founding patronage system has turned into a global imposition in postmodern times when culture has privatized and gradually

overshadowed the modern mind of European museums, dreams of individuality/nationality/universality (Artun, 2018: 136). Innovations in the management style and philosophies of museums have given birth to a new generation of museum managers, and the position of the museum director, which was divided between the different functions of the art director and the budget manager, has been filled by '*managers whose field of expertise is business*'. These managers are people who have an entrepreneurial spirit like their counterparts in America, but who are more conscientious and market the institution they manage with great energy (Wu, 2005: 226; Huyssen, 1999: 35). The advertisements, posters, banners and billboards they used in their marketing strategies brought the museum closer to the world of mass entertainment. At this point, museum galleries are now organized and promoted as large theatrical shows that provide considerable profit for sponsors, organizers and city budgets, and the fame of important metropolises is largely attributed to the attractiveness of museum spaces (Huyssen, 1999: 35). In this context, the debates on new museology, which spread over a long period of time and affected the whole world, resulted in a transition to a new museum architecture. Köksal (2011) mentions that Center Pompidou in Paris, designed by Renzo Piano+Richard Rogers, is the first forerunner of museums becoming a part of the culture industry, not only with its architecture but also with its display formats. Thus, while the structure makes the boundaries between entertainment and education flexible, it feeds this

with discourses such as abolishing the domination of the bourgeoisie, democratization and going public. Here, the impressive, subjective and sculptural design of the museum building is presented as the most effective formula to strengthen this blurring. Artun (2017: 173-175), on the other hand, explains that the modern representation system of 19<sup>th</sup> century museums has deteriorated through the example of the Guggenheim Museum: First of all, the museum is no longer a medium where the visual regime of the nation and state is organized, it is integrated into the global network of companies and turns into one of the main environments where the '*cultural hegemony*' under their auspices is represented. Museums themselves are managed as a global company –a corporation– and adopt the language and principles of their management discipline. Curatorial implement shifts from art history to marketing and communications specialties. The global corporate culture, in which the social and political conditions in which production is prioritized, are suppressed and consumption is imposed, also takes over the museums. In this culture the '*citizen*' becomes the '*consumer*'. Over time, museums that come under the auspices of corporations become privatized and lose their character as a public environment. Norms related to what art is, developed since the Renaissance, are erased. Museums gradually turn into '*spectacles*' that are articulated to the popular media, daily life, entertainment, tourism and fashion industries. The most important element of this show is no longer art but '*architecture*'.

The transformation of the user of the museum space into the '*customer*' with the influence of the culture industry and the focus on marketing has led to the consideration of curatorial policies through experience design in order to reach high visitor numbers in museums. According to Huyssen (1999: 25-27); cultural knowledge is acquired through exaggerated experiences, momentary enlightenments, brilliant events, striking shows instead of being acquired with seriousness and meticulousness, and the museum itself continues to exist as a hybrid space between the public fair and the shopping mall. The planned obsolescence<sup>1</sup> of the consumer society has found its way into a relentless obsession with the museum, the museum has now become a mass media tool. In more concrete terms; service to the customer is designed as pleasure and satisfaction-oriented applications within the scope of interactive and technological exhibition practices. The phrase '*offering varied experiences for enjoyment*' taking place in the museum definition proposal<sup>2</sup> prepared by the Advisory Council to be presented for voting at the Extraordinary General Assembly of International Council of Museums /ICOM in Prague on August 24, 2022, can be

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<sup>1</sup> Planned Obsolescence; The effect of producing goods that will soon become obsolete in order to compel people to buy new products.

<sup>2</sup> International Council of Museums' Proposal of Museum Definition; "*A museum is a not-for-profit, permanent institution in the service of society that researches, collects, conserves, interprets and exhibits tangible and intangible heritage. Open to the public, accessible and inclusive, museums foster diversity and sustainability. They operate and communicate ethically, professionally and with the participation of communities, offering varied experiences for education, enjoyment, reflection and knowledge sharing.*"

assessed as the reflection of the consumer society on the functions and programs of museums (ICOM, 2022).

Bourdieu states that admiration is acquired in the environment that is cultivated from birth. For this reason, culture, which is an artificial phenomenon acquired at the end of a long, continuous and laborious process, becomes naturalized. Making aesthetic judgments for an aesthete or cultural elite, evaluating a work of art is so spontaneous and natural that it cannot be considered a result of its culture. However, in order to appropriate a cultural wealth, it is necessary to have the equipment and tools to appropriate it; these, too, are manufactured by education, whether institutional or not. In other words, symbolic capital is needed to master the symbolic language of art and it is necessary to have cultural capital in order to enjoy the products of cultural production. Symbolic capital refers to a certain accumulation of reputation, reputation, respect and honor and is based on the dialectic between this knowledge (*connaissance*) and the acknowledgement (*reconnaissance*) of this knowledge. Cultural capital concerns the forms of cultural knowledge, specializations, attitudes and behaviors. Taste, which seems as natural as a *habitus*, as a habit or instinct, a cultural capital in Bourdieu's sociology. And the museum creates an environment in which this cultural capital is both spent and accumulated. While those with favorable tastes can enjoy removing the codes of art in the museum thanks to their knowledge, it is not possible for those who do not have the same level of competence and education



to have this experience. Thus, the museum leads to a '*distinction*' between those who have taste and those who do not, or those who have the ability to consume meanings and those who do not. It excludes those whose cultural capital does not fit, distances the elite from others. Despite being glorified as fully democratic institutions open to all without any conditions, art museums reinforce the cultural divide between classes (as cited in Artun, 2018: 185-188). On the other hand, the increase in education level with individualization increases the demand for culture. Because as the society gets richer, as vital needs are met and satisfied, consumption increases and becomes a cultural discourse. With the transformation of culture into a consumer good, the consumer tries to differentiate himself/herself by using the values and signs of these goods (Çelik, 2012: 272). In parallel with this, museums produce various spaces to reinforce the differences they legitimize under their own roof. Because the individual, who is a social being, invests time and financial resources in line with his/her habits and preferences, establishes bonds with businesses and brands, and shapes the space. Facilities such as education workshops, cafes and restaurants, temporary exhibition spaces that will be visited more frequently with the permanent exhibition that differentiates in certain periods, guidance services, film-video-hologram screenings and applications combined with interactive exhibition methods, fashion/luxury brand exhibitions organized within the scope of sponsorship, healthy life events, library/study areas, auditorium, museum stores etc., help the museum

achieve its goal of presenting the values it creates as a quality experience – by attracting the attention of the consumer and making the image memorable. Especially with its effect on the structuring of the process after the exhibition visit experience, the museum store can be customized as a social acceptance place where the visit is prioritized for the individual. The store, where objects related to the exhibition visited and/or the cult works seen, are offered for sale with the potential of a 'complementary' economic tool, is increasingly centralized within the spatial organization of the museum. The consumption of art and the museum has been so internalized that the identity and brand image of the museum, its facilities and services, its efficiency and effectiveness are symbolized by the existence of museum stores by the consumer who wants to be accepted in the society.

### **3.4. The Museum Experience and Its Effects on Museum Merchandising**

*“Someday, all department stores will become museums, and all museums will become department stores.”*

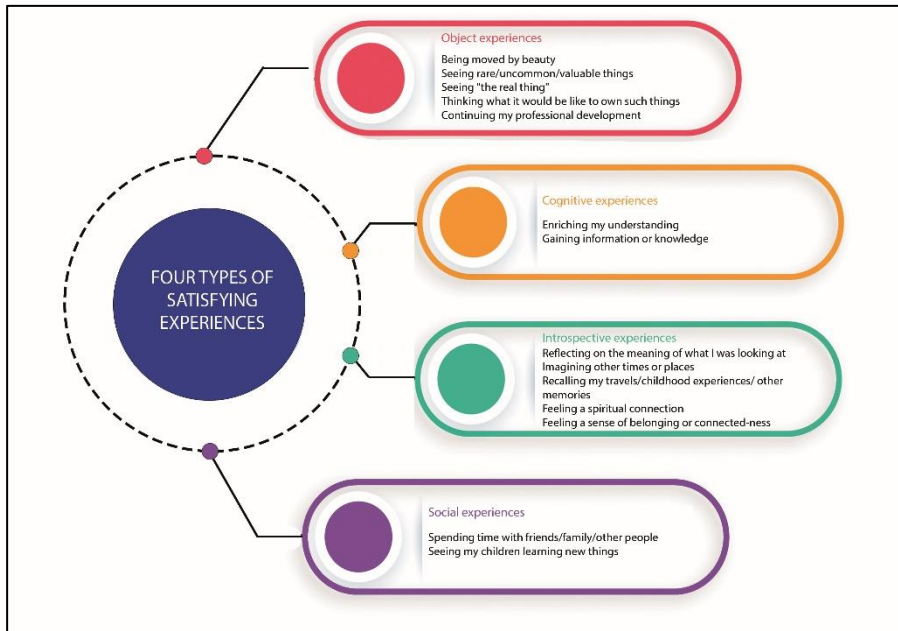
*Andy Warhol*

According to the hedonic consumption view, products are not defined as objective entities, but rather as subjective symbols. Because what the product represents (the image it carries and creates) is more important than what it is (its reality). For this reason, emotional reactions that emerge as a result of experience can be considered a key criterion for the success of the product (Odabaşı, 1999: 86). Experience, according

to the definition in the Merriam-Webster Dictionary (Merriam-Webster, n.d.) is: “practical knowledge, skill, or practice derived from direct observation of or participation in events or in a particular activity”. Dimensions of experience have been discussed and classified from various perspectives by different researchers. Two dimensions of experience are mentioned in the study of Pine and Gilmore (1998). The first of these is ‘*customer participation*’ and represents the whole of the passive participation of the customer that does not affect the performance at all, and the active participation of the customer in which the customer plays a key role in the performance. The second dimension is the dimension called the ‘*environmental relationship*’ that defines the connection that connects customers with efficiency or performance through the absorption-immersion spectrum. In this dimension classification, the results of the experience for the consumer can be interpreted through value and the source of value. Another classification focuses only on the experience itself as a product and is divided into ‘*core product/experience*’ and ‘*extended product/experience*’. When evaluated specifically for the museum, these dimensions can be exemplified as follows; while the core product (the benefit desired to be obtained from the museum) is objects, collections, exhibitions; the expanded product is the museum building, decoration, information brochures, museum maps, location/directive signs, cloakroom, informational electronic tools, training given in the museum, souvenir shop, cafe/restaurant, toilets, special services for

disabled visitors, payment of ticket options and courtesy of staff etc. (as cited in Akyol and Aksatan, 2018: 72).

The collection/artifact/object and exhibition-oriented approach of modern museology places the museum visitor in a passive position trained by a cultural authority. However, the increasing importance of versatile experiences and impressions with the changing understanding of museology necessitated keeping the visitor in an active relationship with the space/object at the focal point. In this context, the dimensions that make up the experience should be handled in the context of a mixed and holistic experience process. On the other hand, Doering (1999: 82-83) in his research on the experiences of visitors to museums, revealed four types of experiences that make the process satisfactory (Figure 1). Categories called object experiences, cognitive experiences, introspective experiences and social experiences can form a basis for the diversified interests of visitors and different functional spaces that can be designed to enhance the experience.



**Figure 1.** Four Types of Satisfying Experiences (Doering, 1999: 83). Positive emotional reactions desired by the visitor in the museum require a holistic construction of the experience. Considering the relationship of individuals with different social statuses and social perceptions with the museum, it is important that the programs to be developed have a high level of feasibility and intelligibility, and that the potential to enrich social relations and entertain the visitor meets expectations. Today, museums evaluate their solutions for these expectations within the framework of the shopping/leisure time content of other culture-arts-entertainment circles they compete with. The main reason for this can be shown as '*visitor behavior*' - which changes with the marketing strategies caused by the culture industry and

consumption. Rachman (2016) specifically explains the behavior in which change is most easily readable, based on scientific research; the museum visitor stays in front of an artifact for only 28 seconds and now many people come to the museum not only to see the artifact but also to take a selfie. Because a selfie can offer the visitor the opportunity to consume without participating. This situation has brought with it many shopping opportunities along with the construction of event and meeting places. The relationship between museum-space construction-consumption -as in Turkan's (2012: 86) analysis on shopping malls- can be summarized as: “consumption moves away from '*consumption of needs*' in the classical sense and transforms into '*consumption of comfort, pleasure and space*', while museums transform people's socialization and embodied as '*organic*' spaces that serve diversity of tastes”.

Although shopping and consumption in a socio-cultural space is a factor of '*guilt*' for visitors and '*shallowness*' in intellectual perspective, the situation is different for museum stores. Incorporating the purchase of high-cultural consumption objects from museum stores into the experience of museums as a romantic escape from the concerns of daily life, was described by Larkin (2016: 109-112) as the manifestation of the actions of purchasing specially produced products like in the medieval pilgrimage practice of pilgrims visiting holy shrines to establish a spiritual relationship with relics and to provide material connection. In both cases, it is remarkable that the visitor's desires such

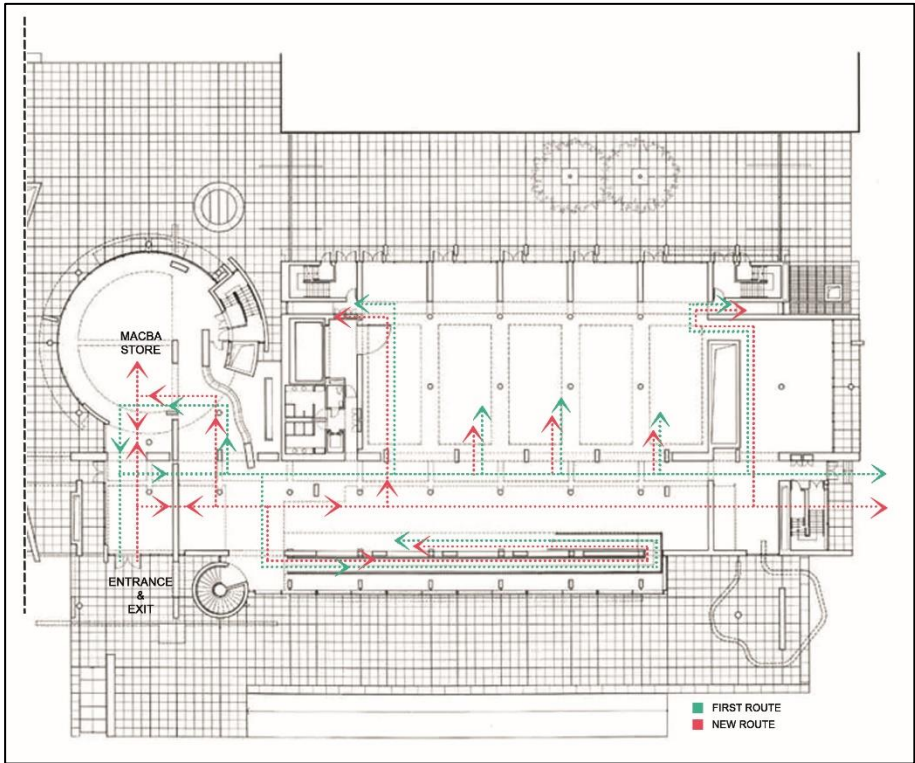
as linking and commemoration are sustained through objects. From this point of view, shopping that is perceived as a negative phenomenon and wanted to be hidden can turn into a status indicator when it is made from museum stores.

According to McIntyre (2010: 184); a significant portion of 20 minutes of a museum visit, which takes a total of 162 minutes, is the time spent in the store. In the researches, it is seen that the museum stores are defined by the participants as a '*souvenir shop*', a desired '*upper class book and/or art reproduction store*' in terms of the lower market/upper market. For this reason, the multifaceted '*quality*' elements (spatial quality, service quality, product quality, etc.) that an average visitor will encounter here are highly effective in grading the museum experience. However, the fact that the store becomes a part of the holistic experience when read from the upper scale (architecture) depends on the quality of the structural organization of the museum.

The '*flow*', which is prepared according to the movements of the visitor in the museum and can also be called the circulation setup refers to a behavior-based planning that reveals which places to see in the building as priority, which direction to go, how to reach the secondary and tertiary action areas (toilet, elevator, cloakroom, etc.) more easily, the time will to be spent for these actions etc. When the movement patterns exhibited by the individual depending on the flow in the museum are examined, it can be observed how close the success of the museum is in general or the failure rate of the experience to be presented to the

visitor. A chronological itinerary mainly encountered in exhibition spaces or a ready-made route drawn by the curators, independent of the content is seen as important in terms of directing the flow, determining the order of information, making the visitor feel comfortable and happy in psychological and physiological. In this context, even if the fiction within the building is not created on the basis of flow, the exhibition space still has a settlement concept within itself. When evaluated from the point of view of the flow model, which is especially emphasized and almost indispensable in the exhibition spaces, it is revealed that the point where the museum stores will sell should also be carefully considered. The store space, which is also perceived as the "grand finale of the show, its last exhibition (Chernick, 2017)", is usually resolved in a location close to the entrance-exit within the spatial organization of the building, depending on the tendency to purchase objects related to the contents seen in the exhibition at the end of the museum visit. But in museums that are architecturally exceptional, content-intensive, outstanding in quality, and eerily crowded by popularity, the accessibility of these locations becomes questionable. For this reason, sales areas can be arranged in front of each exhibition hall of the museum, as well as more than one store in the museum.





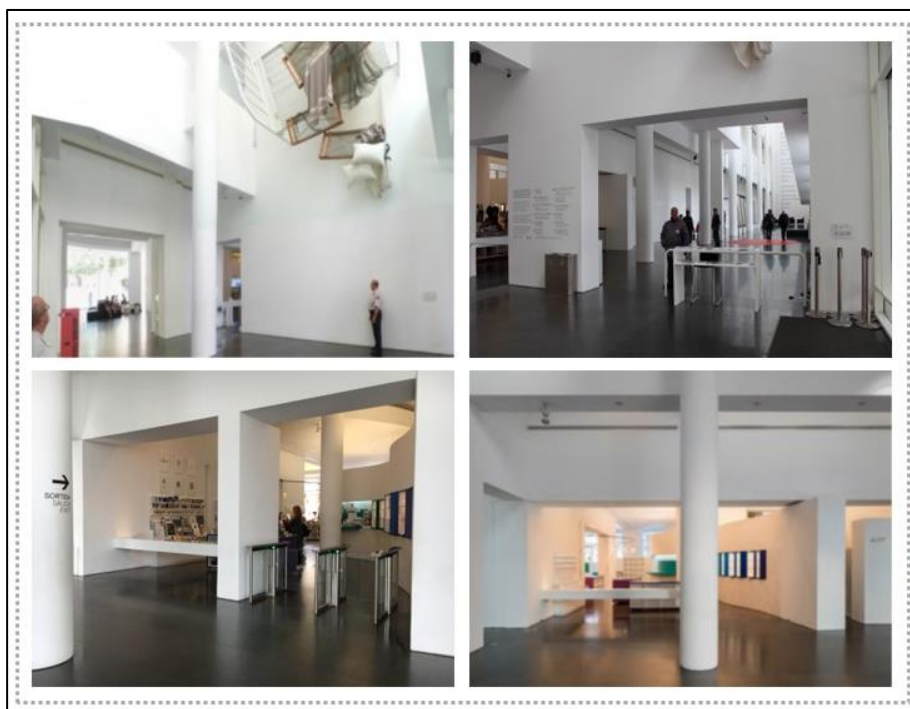
**Figure 2.** MACBA Ground Floor Plan (Reproduced by the Author, 2022).

Barcelona Museum of Contemporary Art (Museu D'Art Contemporani De Barcelona/MACBA) which needed to renew its spatial organization according to the cultural industry, consumption habits and changes in visitor behavior is a striking example that can be evaluated in the context of this study. MACBA is located in Barcelona's El Raval area, which is described as bohemian, close to famous Gaudi works such as Casa Batlló and Casa Milà, bordered by the tourist attraction La Rambla street. The museum whose structure was designed by North American

architect Richard Meier was opened to the public on November, 1995. Today, MACBA organizes sharing and entertainment activities by centering itself through the square it surrounds.

During the project phase of the design (which corresponds to 1990), a route that can be considered ideal has been drawn, and spaces that seem to be a continuation of each other in an organizational sense, and therefore integrated, have been obtained by transforming the structural elements into directing elements. The main façade of the building, which overlooks the square, provides a reinterpretation of the interior-exterior relationship, disciplines the time-space scheme with different angles at different times of the day, draws the boundaries of the atrium in the interior. The ramp, which spans the entire atrium, starts from the ground floor and continues along three floors, arranging the exhibition spaces, which are independent units around a longitudinal axis. While this setup adds excitement to the visitor's experience with its physical environment and general atmosphere, it also helps to shape movement patterns. There is a wall designed by Richard Meier between the entrance volume, which also has a three-story gallery space and the reception desk, and this atrium. This wall, which has been in its original form until 2018, is the starting point of the idea of creating a route seen in the interior. While it is not possible to enter the atrium and exhibition spaces from any other place, it is not possible to get an idea about the interior without going through the doorway left. Contrary to its open-plan appearance, the building dictates a solid and sequential experience

on the whole. It is seen that this easy to analyze, but impossible for the visitor to deduce multiple meanings based on his own experience, the authoritarian order, which is far from the effect of surprise, serves the strategy of compulsory directing all visitors to the store/exiting only from the store (Figure 2).



**Figure 3.** Alteration of MACBA's Entrance and Exit Route (Images from Author's Personal Archive, 2018; Url-1, 2022).

On the other hand, the primary target audience of museums is museum visitors, while the secondary target audience is shoppers without visiting exhibitions and collections. Therefore, such an orientation and the strategy of forcing people to walk out of the store creates a negative

perception in individuals who visit but do not want to shop or who '*stop by*' to buy souvenirs at the museum they visit regularly. On the contrary, the fact that people who enter the store with the tendency to shop are not disturbed by the visitors who enter the store forcibly can accelerate the sales (Eram, 2018). While MACBA describes its 2022 plans as: "Now, after more than twenty years, the museum is facing a new era in which, far from wishing to break with the recent past, it envisages a process of development and progress aligned with a new vision and new opportunities of great importance to its future (Url-2).", the response to these views was to widen the space in the aforementioned wall and to remove the turnstiles that obligatory exits to the store (Figure 3).

It is seen that MACBA, which associates the museum store with the entrance-exit volume and severs its compulsory visit ties, is trying to increase its effectiveness on digital platforms. With the slogan "Complete your MACBA experience by taking art home with you! (Url-3)", it is underlined that the museum stands out as a place/institution that is the subject of a context affected by the social tensions caused by globalization.

#### **4. Conclusion and Suggestions**

The visitor sends messages about his intellectual level to those around him with the products he buys from the museum; because the appreciation and interest in cultural products is seen as a reflection of innate cultural capital, status and quality of life. Museums have diversified the reproduction objects of their collections by taking this

perception and the tendency towards consumption as a reference; and have expanded their product range, which was limited in the past with only postcards, guides and catalogues, with everyday gratification tools that can be highly visible in the use such as notebooks, scarves, pens, erasers, key chains, mugs, towels, toys, food etc. Every object that is considered a prestige element is structured and distributed by the cultural industries as part of the experience.

At the point reached today, having products loaded with culture-based symbolic meanings is as natural as instinct and positively affects the potential of personalizing the experience, shaping memories, and developing a dialogue with the institution visited. From this point of view, the important role of the museum store in a holistic visitor experience necessitates researching its place in the spatial organization, analyzing it within the scope of the opportunities it offers, and re-evaluating it within the framework of the consumer behavior patterns it has changed. The organizational transformation of Barcelona Museum of Contemporary Art (Museu D'Art Contemporani De Barcelona/MACBA), designed by a famous architect such as Richard Meier, who received the The Pritzker Architecture Prize, is the summary of the whole conceptual framework and the active relationship with the visitor, whose importance is increasing today.

While the museum exists with its architecture, it evaluates and organizes the wider political/economic/cultural data in order to organize the visitor's experience. The socialization needs of individuals,

their desire to create/strengthen their identity, and their expectations to prove their existence by consuming more and to show that they are popular also transform the museum space into a consumption space. The dynamism of this interactive cycle/balance relationship can be used to build a quality visit experience. In future scientific studies, -in a way that will contribute to this approach-, data on flow can be revealed by observing visitor behaviors, and these data can be made available for the purpose of creating models that can be integrated into structural planning. Thus, it will be easier to produce spaces that will meet the new meanings and values emerging in the developing and changing order.

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The article complies with national and international research and publication ethics.

Ethics Committee approval was not required for the study.

#### **Author Contribution and Conflict of Interest Disclosure Information**

The whole process of the research was carried out by the only declared author of the article. There is no conflict of interest.

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## Biophilic Design and Individuals on Autism Spectrum Disorder

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## 1. Introduction

Autism Spectrum Disorder (ASD) is founded thanks to various scientific research in 1967 by Neil O'Connor and Beate Hermelin (Yılmaz,2019). According to the scientific research, it is found that ASD sources from neurology. Children on spectrum don't orient to visual and auditory skills as much as their sense of touch. To understand ASD broadly, it expresses impaired social behaviors, differences on communication and application of language, obsessive behaviors up to the individual's interest. ASD is commonly diagnosed around the world. One child in every fourty four children is diagnosed with ASD (CDC,2021). ASD, starts in early childhood and it continues throughout life. There is nothing found yet to disappear ASD.

In Turkey, definite number of individual with ASD isn't known. Depending on a research, "Only 42.461 children and teenager reach education among the 574.963 children and teenager who are between the ages of 0 to 19 on spectrum". When this numbers are projected to total population, it is understood that there is approximately 1.900.326 individuals on spectrum. ASD does not only affect individual, but it also affects families of these individuals on spectrum. To include number of families, in total 7.601.304 people are affected by ASD (Cumhuriyet Gazetesi).

## 1.1. ASD and Architecture

ASD has great prevalence in the world. Therefore, awareness about ASD must be increased to understand the features of these individuals and to adapt life for them. Applications on built environment is one way to ease life of individuals on spectrum. There are many studies conducted to understand how to do these applications and to design for individuals with ASD. ASD and architecture is recent topic especially in Turkey. There are numerous of research done about autism architecture. The most significant research is ASPECTSS which is done by Dr. Magda Mostafa. It is the first terminology about autism architecture and it includes set of design criteria. ASPECTSS stands for initials of criteria such as Acoustics, Spatial Sequencing, Escape Space, Compartmentalization, Transitions, Sensory Zoning and Safety. These titles describe the formula of design elements for individuals on spectrum. ASPECTSS, is the first set of criteria in the world about ASD which based on the experimental design method. This research was prepared for the education of children with special needs and it received the UNESCO/ Emir of Kuwait award. The explanation of the criteria is as follows (Mostafa, 2014):

1. Acoustic: It is one of the most effective design criteria on individuals with autism. In accord with the empirical studies, attention time and behaviors of individuals with ASD has been developed positively by minimizing the noise and echo in educational places. This improvement has reached a tripling of attention span, a 60% reduction in response

time, and a 60% reduction in self-stimulating behavior patterns in some cases.

2. **Spatial Sequencing:** This criterion was designed by focusing on the relationships of individuals with ASD to routines and predictability. It aims to sequence places up to their functional usage and logical order. Spaces should flow as seamlessly as possible from one activity to the next through one-way circulation whenever possible, with minimal disruption and distraction, using Transition Zones which are discussed below.

3. **Escape Space:** These places help individuals on spectrum to neutralize their senses and isolate from over-stimulation in environment. By this way, individual have a chance to calm in escape space when in need. Escape space could be defined as quite area in a room or crawling area. It should be designed as a neutral sensory environment which has minimum stimulus.

4. **Compartmentalization:** Thanks to this criterion, sensory environments in interiors of classrooms and buildings are well defined. Each compartment should include one defined activity. The separation of compartments doesn't need to be sharp. Compartmentalization can be applied by furniture arrangement or just difference on the level of floor.

5. **Transitions:** Transitions help individuals on spectrum to calibrate their senses while switching one place to another. Therefore, adaptation to place and rearranging senses will be easier. This criterion facilitates

the correct functioning of the spatial arrangement and sensory zoning criteria. Space transitions can be designed in a variety of ways to rearrange sensations for transition from low or high stimulus levels.

6. **Sensory Zoning:** The criterion which is related to sensory perception of those with ASD, does not only aim to zone typical functions but it also aims to zone places depending on their sensory qualities. Places are grouped according to their stimulus level such as high stimulus and low stimulus. For instance, the first section that is grouped may be the attention-demanding section, where physical therapy and activities that will improve motor skills are defined. The next part may be the part where speech therapy is done and computer skills are developed. Transitions are used to circulate between the grouped sections.

7. **Safety:** It is a criterion that should not be overlooked, especially in the design of educational places. Safety is very important for children with ASD who have an altered perception of the environment. This criterion is the design consideration that includes various safety measures such as avoiding sharp corners and edges, using hot water safety fittings.

Other researcher, who has various research about autism architecture is Dr. Shireen Kanakri. Dr. Shireen Kanakri, established Health and Environmental lab in Muncie, Indiana, USA. She generally focuses on lighting, acoustic and color in her lab research. In many projects her participation groups are generally children and teenagers. In researches; observation of participants recorded according to behavioral reactions.

These behaviors can be physiological and psychological based behaviors such as repetitive behaviors. According to the nature of research, researcher makes use of equipment that measures heartbeats in order to evaluate physiological reactions. In the lab research, various data collected to contribute literature.

One of these researches, focuses on correlation between acoustic and behavior of children with ASD. Dr. Kanakri worked on repetitive behaviors in children with ASD and acoustical design of the classrooms based on observational study in four different schools which called as “An Observational Study Of Classroom Acoustical Design And Repetitive Behaviors In Children With Autism”. These schools divided according to the sounds that are higher than 35 db and lower sounds which is below 35 db called silent and these two differentiations defined according to WHO (World Health Organization) and ANSI (American National Standards Institute). By 12 hours pilot study, some of behavioral models are specified (Kanakri ve diğerleri, 2017). Behaviors that observed by researcher correlated with voice levels. Commonly, behaviors which includes complaining, repetitive conversations and making noisy sounds are seen above 70db (Kanakri, 2017). In this research, correlation between sound levels and repetitive behaviors were seen frankly. It is seemed that repetitive behaviors increased in noisy places where the sound level is more high (Kanakri, 2017).

When literature in world is reviewed, it is seemed that there are various research done about ASD and architecture. However, in Turkey



research about ASD and architecture is very limited. ASD is researched from various viewpoints and it is aimed to take attention to ASD, inform reader in the book called as *Autism and Education, Art, Place* by Prof. Dr. Meltem Yılmaz (2019). In book's section about place, it is indicated that designing places and environments depending on peoples' needs is more appropriate than focusing on cost and hardship of design application (Gürdağ, 2019). Individuals on spectrum can achieve their independence and live in comfort if they are in a place where it is designed appropriately for them. Various design guidelines on this subject are produced and the subject is tried to be disciplined. In the British government building bulletin, various data were shared related to the space design for individuals with ASD (McAllister & Maguire, 2012): "Simple order: calm, in-line, low stimulus places, avoidance of complexity; indirect lighting, prevention of confusion, good acoustics, prevention of noise, usage of maintainable materials, evaluation of potential risks about security and health, providing safe escape space to withdraw and relax".

## **1.2. Biophilic Design**

In the book that is called as "Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life", biophilia is described as 'the inherent human affinity to affiliate with natural systems and processes' (Kellert, S. and others, 2013). In fact, biophilic innate biological connection between people and nature. In 1964 social psychologist Erich Fromm derived the term biophilia, which comes

from bio (life) and philia (to love). Since the development of technology, humans were separated from nature. This separation and rapid, busy way of living caused to stress, so physical and mental illnesses. During the Covid-19 pandemic period, it is hugely noticed that how nature and connection is hugely important for our well-being. Nowadays, it is obvious that some work places apply biophilic design elements to overcome this big threat of illnesses. Over the numerous studies it is observed that by improving the connection to nature, test results, concentration levels and attendance of children with ADHD are improved by 20-25 % (Oliver Heath, 2021).

In order to perceive biophilic design, the patterns of biophilic design must be understood. These patterns are categorized as nature in space, natural analogues and nature of the space. Themes and their patterns are shown as in below (Ghaziani and others, 2021).

Theme	No.	Pattern
Nature in the Space (Direct Experience)	1	Visual Connection with Nature
	2	Non-Visual Connection with Nature
	3	Non-Rhythmic Sensory Stimuli
	4	Thermal and Airflow Variability
	5	Presence of Water
	6	Dynamic and Diffuse Light
	7	Connection with Natural Systems
Natural Analogues (Indirect Experience)	8	Biomorphic Forms and Patterns
	9	Material Connection with Nature
	10	Complexity and Order
Nature of the Space (Indirect Experience)	11	Prospect
	12	Refuge
	13	Mystery
	14	Risk/Peril

**Figure 1.** Biophilic Design Themes (Ghaziani, 2021)

By dividing biophilic design strategies into themes, it becomes more easy to perceive. Every strategy has its design idea behind it. In order to apply it truly, it is needed to be understood well. Each number of strategies are explained as in below (Browning):

**Table 1. Biophilic Patterns: Nature In Space**

	<b>Biophilic Patterns: Nature In Space (Browning,2014)</b>	<b>Browning, et. al. 2014</b>
<b>1</b>	Visual Connection with Nature	a view to an element of nature, living systems and natural processes.
<b>2</b>	Non Visual Connection with Nature	auditory, haptic, olfactory or other stimuli that engender a deliberate and positive reference to nature, living systems and/or natural processes.
<b>3</b>	Non- Rhythmic Sensory Stimuli	stochastic and ephemeral connection with nature that may be analyzed statistically but may not be predicted precisely
<b>4</b>	Thermal and Airflow Variability	changes in air temperature, relative humidity, airflow and/or surface temperatures that mimic natural environments
<b>5</b>	Presence of Water	a condition that enhances the experience of a place through seeing, hearing or touching water.
<b>6</b>	Dynamic and Diffuse Light	varying intensities and color of light and shadow that change over time to create conditions similar to those that occur in nature.
<b>7</b>	Connection with Natural Systems	awareness of natural processes, especially seasonal and temporal changes characteristic of healthy ecosystems.

**Table 2. Biophilic Patterns: Natural Analogues**

	<b>Biophilic Patterns: Natural Analogues</b>	<b>Browning, et. al. 2014</b>
<b>8</b>	Biomorphic Forms and Patterns	symbolic references to contoured, patterned, textured or numerical arrangements that persist in nature
<b>9</b>	Material Connection with Nature	materials and elements from nature that, through minimal processing, reflect the local ecology or geology and create a distinct sense of place.
<b>10</b>	Complexity and Order	rich sensory information that adheres to spatial hierarchies similar to those encountered in nature

**Table 3. Biophilic Patterns: Nature of the Space**

	<b>Biophilic Patterns: Nature of the Space</b>	<b>Browning, et. al. 2014</b>
<b>11</b>	Prospect	an unimpeded view over a distance for surveillance and decision making
<b>12</b>	Refuge	a place for withdrawal, from environmental conditions or the main flow of activity, in which the individual is protected from behind and overhead.
<b>13</b>	Mystery	the promise of more information, achieve through partially obscured views or other sensory devices that entice the individual to venture deeper into physical environment.
<b>14</b>	Risk/Peril	and identifiable threat coupled with a reliable safeguard.

### 1.3. Biophilic Design and ASD

Designing for ASD needs comprehensive design ideas and application. As it is discussed previously, designing for ASD has various aspects. It worths to research and recommend new approach to the issue. Integrating biophilic design strategies to autism architecture could benefit environment for individuals on spectrum. Also, it may provide comfort both in their physical and psychological health. As it is known, ASD brings lot of challenges to individuals' and their families. It causes anxiety, stress and tantrum. Design plays important role to cope with indications of ASD and to support individuals' mental health. Every person on spectrum is different than each other. Some of individuals could diagnosed with hyposensitive ASD, another might be diagnosed with hypersensitive ASD. Hypersensitivity and hyposensitivity have some effects on senses as mentioned in below (Bogdashina,2014):

Hypersensitivity:

- Individuals with ASD may have hyper-vision which they dislike bright lights and sharp flashes
- They may have hyper-hearing which make them light sleepers, frightened by sudden sounds. They often cover their ears when there is disturbing noise.
- Some individuals with ASD are hyper-tactile. They can be over react to heat and cold, avoid wearing shoes and dislike certain textures of food.

### Hyposensitivity:

- Individuals with ASD may have hypo-vision that make them trouble figuring out where objects are, as they see just outlines.
- They may have hypo-hearing that make them seek noisy sounds such as banging doors, tapping things and loud rhythmic sounds.
- Some individuals with ASD are hypo-tactile which make them not feel pain or temperature.

It is found that people in biophilic indoor environments had consistently better recovery responses after stressor compare to those in the non-biophilic environment, in terms of reduction on stress and anxiety (Yuan and others, 2020). Biophilic design strategies can particularly affect those who have hyposensitive ASD. Depending on research it is known that exposing to nature to some extent, help person on spectrum reduce their stress and improve their mental health. Architect Merilee Meacock states that “Visual connection to nature provides a positive impact on cognitive, psychological and physiological responses. It influences an individual’s mental health, performance and well-being. A wide range of health studies support that connection to nature has a profound impact on human fitness and quality of life. “Exposure to nature can reduce stress, lower blood pressure, provide pain relief, improve illness and recovery, accelerate healing, enhance staff morale and performance, and lead to fewer conflicts between individuals and caregivers” (2018). Therefore, biophilic design principles can be

applied when designing individuals on spectrum. There are several examples that biophilic strategies were applied on design for people on spectrum.

One of these examples is The Bancroft School. The Bancroft School is in Mount Laurel, New Jersey. It is designed by KSS Architecture. It is a pioneer for breaking down boundaries for individuals with neurological difficulties, ASD and developmental disabilities. On the existing campus, programs take place in 136,000 square feet of space. It provides early education and intervention. It has classrooms, common areas, sensory space/therapy rooms, recreational space, housing, nursing, consultation center, maintenance area. The design of school has strong link to biophilic design. “It’s proven that biophilic design principles reduce your heart rate and allow you to focus--it even enhances creativity because you feel safe and your mind is permitted to wander” (Chenoweth, 2018). Firstly, the glass façade of the school has visual connection to nature. By this way direct light enters to interiors. As it is known light is significantly essential for circadian rhythm. Therefore, it benefits students’ in terms of cognitive, physiological and psychological aspects. The use of natural materials, like wood is another significant design feature of school. Natural materials don’t emanate hazardous chemicals, so it is healthy and durable. Risk and peril principle of biophilic design is achieved by the application of playgrounds by its different heights. Playground can offer different challenges to student with ASD. By overcoming the challenges in

game, they can witness how they overcame these challenges and it can boost their self-confidence. Multi-sensory design is important in autism design. Therefore, in Bancroft multi-sensory environment is achieved by a sensory trail, water feature, views to athletics fields, music, art and retail areas (Chenoweth, 2018). Furthermore, free and open spaces offer safety and comfort to users. The design of Bancroft school provides broaden view of campus from many viewpoints such as main lobby. By this way students can enjoy seeing nature, sun rise or moon and people enjoying their break time. This sense of connection creates security and confidence as well as refuge and prospect feature of biophilic design.



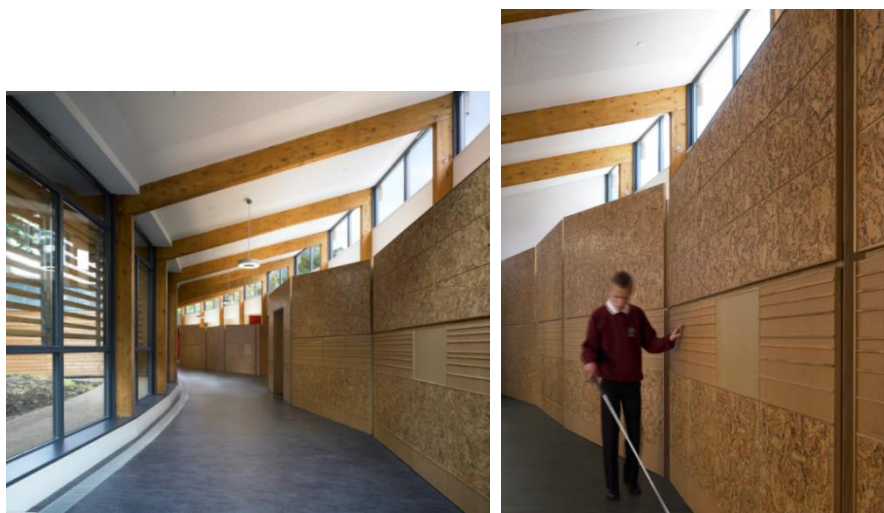
**Figure 2.** The Bancroft School. Chenoweth, 2018



**Figure 3.** The Bancroft School. Chenoweth, 2018



Second example is Hazelwood School. Hazelwood school is an elementary school where young people get their education who are blind, deaf, dual sensory impaired, impairment on cognition and aged between 2 to 18. It is located in Glasgow and designed by Alan Dunlop Architect. The design of school meets need of children with disabilities by stimulating and providing safe environment for them. It has apparent biophilic design features such as direct experience of nature in space. Theme of nature in space emphasized by the high level clerestory window that penetrates daylight to interior and provides homogenous distribution of light. Tactility feature of school is dominant that students can use wooden wayfinding tool to circulate. Also, mature trees around the site help students to connect nature visually. Hazelwood School allows to ventilate interior naturally which is one of the strategies of biophilic design. It is also designed to maximize the use of natural and durable materials, which are local based. School design has variety of classrooms that set both in indoor and outdoor. The outside environment is considered as an external classroom. Areas have been left unplanted to allow the school's involvement in the design and development of future sensory gardens (Universal Design Case Studies, 2022)



**Figure 4.** Hazelwood School (Architzer, 2022)



**Figure 5.** Hazelwood School. Architzer, 2022

## **2. Material and Method**

In this study, quantitative method was applied to collect data. It is descriptive research that examine the existing parameters within school environment. According to this examination, hypothesis is developed. Data collection tool is interview. Due to the pandemic, these interviews were realized both in person and online. The form of question was open

ended type. School safety, acoustics, sensory design, spatial design, escape spaces were questioned. Also in the end of interview additional opinion to develop the design of schools were asked.

There are 30 participants who were joined the interview. These participants have children with ASD who are between 5 to 11. This age group was chosen because of the fact that it represents the primary level of education. Early education is really essential for all children however it is vital mainly for special children. Interview approximately takes 25 minutes. Participants recruited by the help of elementary school principal of a public elementary school in Ankara, Turkey. Participation to the research study depends on the basis of volunteering. Related consent form, and information is given prior to interview. Participants are mainly women. % 85,7 of participants are women and % 14.3 of participants are men. Age of participants varies. % 25.9 of participants are 42 years old. Approximately, % 10 of participants are at their twenties, % 17 of participants at their thirties, and % 83 of participants are at their forties.

### **3. Findings and Discussion**

In the first part of interview some questions asked to evaluate the design aspects of school. Firstly, it is asked ‘Do you think is the school design ensure safety of children with ASD?’. To this question 30 participants shared their view as it can seem in Table 1. It seems %60 of participant think that existing school design doesn’t provide safety to students with ASD. % 40 of participants think it does provide safety. Second question

is ‘Is there any acoustical problems such as noise, echo that affects quality of education?’ % 63 of participants think acoustical design is unsuccessful in schools that they agreed that there are some acoustical problems in school. The rest of participants indicated that there is no acoustical problem in schools.

Third question is about sensory design which is important to consider in school design for individuals with ASD. Third question is ‘Do you think existing school design bring calmness to students with ASD?’. According to replies, %66 of participants think it doesn’t bring any calmness to students. Therefore, for this aspect it is evaluated as unsuccessful. % 34 participants think that it does bring calmness. Another questions that is asked was about spatial design of school. ‘How do you evaluate the general spatial design of school for students with ASD?’ is the fourth question. % 53 participants expressed that general school design is unsuccessful for student with ASD. The rest of participants find it successful for them. The last question is about escape spaces that is required for children with ASD. ‘Is there any adequate escape space for students with ASD?’ is the question was asked. %63 of participants think that escape spaces are inadequate, which is evaluated as unsuccessful. % 33 participants agreed that escape spaces are adequate for children with ASD which is successful.

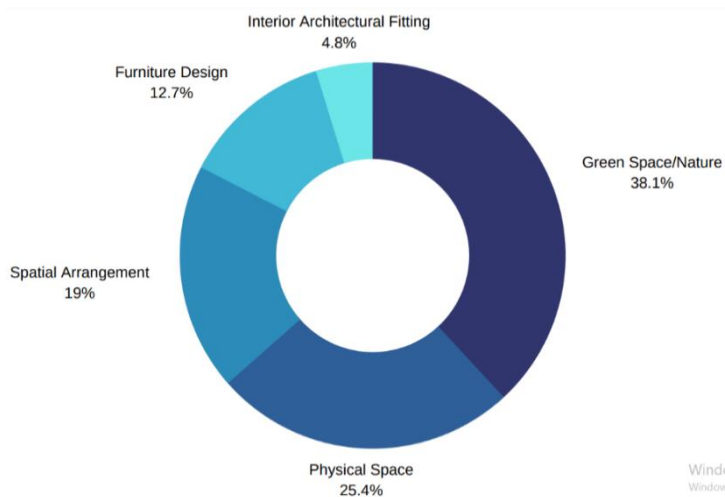
**Table 4.** Evaluation of School Design Parameters

Parameters	Successful/ Number of Participants	Unsuccessful/ Number of Participants	Total Participants
Safety	12	18	30
Acoustics	11	19	30
Sensory Design (Calmness)	10	20	30
Spatial Design	14	16	30
Escape Space	11	19	30

After completion of first part of interview, second part of interview is done. Second part of interview depends on the opinion of participants. It is necessary to take opinion of parents, caregivers of children with ASD. Since, they are active observers who have real life experience about ASD. Therefore, in the second part of interview, questions designed in open-ended form. First question was ‘What do children with ASD need in school in terms of spatial requirements? Second question was ‘What should be physically present in schools in order to contribute to the education of individual with ASD?’

1. Depending on replies for the first question, escape space, natural environment as garden, gym or place for sport and art activities, less stimulation, safe space were required.
2. According to answers for the second question, lighting control, no mirror, equipment for physical activities, socially distanced seating

arrangement to not harm each other, personal space, tools for relaxation, technological materials to support education (smart board, pc), soft and no slippery floor material (floortime), circular seating design, soft barriers on wall, escape space in classroom, position of windows for safety, visual access via window, fixed furnitures were the things that are needed.



**Figure 6.** Recomendation by Parents of Children with ASD

According to all answers which can be seen on Graph 1, % 38.1 of participants think main problem is on having less green space and nature in schools. % 25.4 of participants agreed that there are some problems about physical space which are missing for students. For instance, technological equipments for education and assigned places for sport and art activities.

Another evaluation is about spatial arrangement. % 19 participants think that spatial design does not appeal to individuals on spectrum. There is no personal space and seating is not arranged according to social distance. Safety in interior is not well thought. Therefore, wall and floor materials needed to be more soft to take precaution. % 12.7 participants think that furniture design needed to be reconsidered. Furnitures can be fixed and their arrangement can be done depending on activities in class and for social concerns. Lastly, interior architectural fittings such as window fixtures can be well designed in consideration of safety.

#### **4. Conclusion and Suggestions**

According to the data that is collected by parents of ASD, it is observed that safety, acoustic, sensory design, spatial design and escape spaces are needed to improved. Also, it is noticed that having educational environment which decrease the stress level and help students with ASD to calm down is essential and required. There is a big gap in terms of having green areas in school surrounding. Therefore, green spaces can be integrated to school environment in order to improve school design.

In the interview, it is discussed that students with ASD need their own space, where they can be in the natural environment where the light is controlled, ventilation is adequate, have enough green area. It is noticed that children with ASD have aggressive and self-harm behavior when the built environment can not appeal to them.

Therefore, while designing places for individuals with ASD, going back to nature is crucial. Going back to nature in design not only mean to add green areas to places but also it is to think nature holistically. While thinking design in a holistic way, some design approaches can be helpful such as biophilic design.

### **Thanks and Information Note**

This study is made by the participation of teachers of children on spectrum. Also, elementary school principals allow researcher to collect data. I would like to thank all volunteers who supported this research. Before applying the questionnaire, participants are informed and their consent was gained. Ethics Committee approval was not required for the study.



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## An Evaluation on Spatial Configuration in Emergency Department Design in Hospitals

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## 1. Introduction

From past to present, human beings have had to deal with their environment, which has a dynamic and ever-changing structure, and to keep up with this change. The environment in question can be a natural environment with no clear boundaries in the human-space relationship, or it can be a structural environment whose boundaries are drawn by the architectural space. These environments can have positive and negative effects on the users of the space. Living a quality life and meeting the needs of the person in these environments without any discomfort is also related to what the place provides (Güç, 2010; Bekar et al, 2022). The richness of the architectural form, in parallel with the understanding of mass changing in the architectural sense, has brought with it experiences that have not been experienced before in the interior. As a result of this, human beings have tried to develop and change their physical and social behavior standards. From this point of view, a building should not only protect the functional benefits it provides to the user, but also direct the social and psychological health of the individual. The human-space relationship has been a focus in recent years, especially in public buildings that are used by all segments of society and contain many different functions (Bekar, 2021). The space, which presents perceptual and formal differences from the past to the present, has revealed its role in maintaining a healthy and happy life, and when complex structures such as hospitals come to the fore, the importance of lived experience has increased even more.

In addition to its technological structure and architectural complexity, health buildings are meaningful and important structures with the diversity of the user group. What makes the building useful and aesthetically pleasing is not only its form and exterior appearance, but also the fact that the corridors with entrance and transition areas are wide, the rooms are large and spacious, and the interior architectural solutions are qualified. On the other hand, the fact that these areas are too large will create problems such as increasing distances, disconnection in operation, slowing down of service delivery, and decrease in service quality, leading to a decrease in employee and patient satisfaction. In addition, the increase in the cost of construction and repair to eliminate these problems also creates economic problems. For this reason, it is important to draw attention to the minimum standards of health facilities in terms of spatial dimensions (Ministry of Health, 2010).

When the issue is considered on the scale of emergency services, which for hospitals are considered as one of the most important doors to the outside, it can be said that the existing architectural structure is very important in shaping the view of the users towards the hospital, as well as the service quality applied in these units. It should not be forgotten that emergency services have to provide most of the services provided by hospitals uninterruptedly at night, on weekends, and holidays. The duty of the emergency service is to control the situation of multi-cause emergency or non-emergency patients and to give the best care to the patient 24 hours a day, 7 days a week. In addition, emergency services are units that

evaluate non-emergency cases as well as emergency cases for reasons such as direct and easy accessibility. For this reason, planning should be done by calculating that the hospital emergency department will also serve the non-emergency patient population (Saba, 2004).

Despite the necessity of providing uninterrupted and fast service in today's emergency service units, it is observed that due to insufficient planning and changes in needs over time, they are sometimes modified during the process and sometimes before they are put into service. It is known that these modifications are repeated from time to time for the same reasons. On the other hand, the continuity of the renovations increases the costs and often exceeds the cost of the existing building; yet, the desired maximum service quality can never be achieved. It is known that hospital buildings, which are in the form of unfinished constructions, are difficult to understand in terms of orientation within the user. From this point of view, while designing the hospitals of the future, the most accurate settlement planning issue comes to the fore in order to adapt the user group (health personnel, patients, patient relatives) to the space. As a result, the poor syntax planning of the hospital emergency services is seen as a problem in terms of user satisfaction. In fact, user satisfaction is directly related to service quality in terms of service and service users. If the subject is handled in terms of the user group, it can be said that when user satisfaction increases, this situation will increase the quality of service. As a result, one of the ways to increase user satisfaction is to have a well-planned interior space in terms of circulation and equipment placement in the emergency

service units. At this point, it will be useful to create a theoretical framework about the hospital concept, the emergency service unit and the service structure, in order to understand the importance and content of the subject.

### **1.1.Theoretical Framework**

The World Health Organization (WHO) defines hospitals as "inpatient institutions that provide health services that can be grouped as observation, diagnosis, treatment and rehabilitation, where patients receive long or short-term treatment". Hospitals are public or private health institutions with their building, equipment, doctors, nurses, it relieves people's pain, treats diseases, prevents the spread of infectious diseases, takes measures to protect the health of the surrounding people, takes measures to protect the health of the surrounding people and carries out education (Coates and Siepl-Coates, 1992).

Hospitals are classified under different headings such as the number of patients, plan types, building system, disease type and service they provide. Newly built hospitals are designed taking into account the number of people living in the area where they are located. According to the number of beds, hospitals are classified into four groups in the book of Health Structures and Hospitals published by Mutlu A. in 1973. These groups are hospitals with less than 300 beds, hospitals with 300 to 600 beds, hospitals with 600 to 1000 beds and hospitals with more than 1000 beds. Depending on the plan types, Hospital Buildings are divided into five: “Ash on the Base”, Independent open and high blocks”, “Curtain



block”, “Tower with a low-rise block or curtain block” and “Finger plan” (Altan, 2003).

The complexity of the design process of hospitals requires that design factors such as functionality, hygiene, order and aesthetics should be considered together when designing these buildings. Each hospital consists of wide service corridors and functional units. Hospital structures consist of units that perform diagnosis and treatment tasks such as clinical laboratories, emergency services and surgical units, general services such as food service and cleaning, and most importantly, the care and recovery process of patients receiving treatment in the hospital and inpatients. The most basic factor that increases the quality of service is that the units in the hospital where these duties are fulfilled are designed according to their priorities and needs.

Hospitals, which are at the focal point of the health system, have to respond to the health needs of the society with appropriate regulations according to the new data created by social changes. Hospital planning approaches, which are the act of deciding the future of hospitals in the health system, are initiated within the scope of possibility studies with needs determination, financing and operating decisions in line with planning decisions, and form the process with programming, design, implementation and use phases (Morhayim & Batırbaygil, 2004).

According to the World Health Organization, a country's health system should be designed in such a way as to provide high quality health care to everyone. This service should be effective, affordable and socially

acceptable. It is recommended that each country develops its own unique health systems, taking these factors into account. In a health facility design process, some information is required for the location of the project, the purpose and scope of the project, as well as the appropriate functional program. This information should include the size and function of the action areas, estimated occupancy and vacancy rates, patient load, diversity of staff, patients, visitors, density, descriptions and numbers of operations envisaged for the work areas (MDCH, 2007). All the standards explained in the minimum design standards guide for health buildings prepared by the Turkish Ministry of Health in 2010 are compulsory for hospitals in general. In terms of user profile, function and operation in a hospital structure, one of the most special units are the emergency services.

## **1.2. Emergency Department**

Emergency services are inpatient services for the evaluation, diagnosis, medical intervention and treatment of the patient by the health personnel in the emergency service with the support of medical tools and equipment in order to protect the patient from disability or death in the event of sudden illness, accident, injury and similar unexpected health problems. In cases where emergency medical intervention is required, it is a human and at the same time a legal duty to transport the patient to the health institution where the treatment can be done as quickly as possible and to make the necessary intervention in a timely manner. Health institutions, which are obliged to provide emergency health services, are required to accept emergency cases regardless of whether they have health insurance or

whether they have the ability to pay, and perform the necessary medical intervention unconditionally and without delay. (T.C. official gazette 2)

Every hospital should have a service that provides emergency treatment for emergency patients. Minimum emergency service consists of basic life support, advanced life support, basic cardiac life support, outpatient care and follow-up of patients who do not require intensive care in the observation environment (Official Gazette of the Republic of Turkey 3).

In Turkey, there is no legislative regulation that determines the minimum standards in terms of physical conditions, transportation, personnel, equipment and medical technological opportunities of emergency services. Restructuring the existing emergency services should be done in accordance with the requirements of age and patient expectations, setting certain standards and criteria for the newly established emergency services, thus ensuring unity throughout the country in terms of establishment and registration procedures and the implementation of the procedures and principles in order to carry out and conclude these procedures in accordance with written rules. In this direction, the communiqué on the "Principles and Procedures of Implementation of Emergency Services in Inpatient Health Facilities" was published in the Official Gazette dated 16 October 2009 and numbered 27378 and was put into effect in all emergency services, emergency polyclinics and units serving within public and private inpatient health facilities (Official Gazette of the Republic of Turkey 3).

Emergency services are at three different levels, taking into account criteria such as the capacity of emergency patients, the characteristics of emergency cases and the weighted ratio of the case according to the branches, the physical conditions, the materials it has, the medical equipment and the quality of the personnel, the characteristics of the region it serves, its location, and the status of the health facility in which it operates (Official Gazette of the Republic of Turkey 3).

**First Level Emergency Service:** High-level care, where emergency services are carried out under the supervision of specialist doctors on duty, on the basis of 24-hour uninterrupted service by general practitioners, and these needs of patients who require specialist doctor service in related branches are met by on-call (home watch) method. These are the services where the patients who require stabilization are transferred to the health facilities with advanced emergency services where examination and treatment of mostly stable outpatients can be performed, and short-term observation can be provided when necessary.

**Second Level Emergency Service:** Emergency patients are met by general practitioners, under the responsibility of at least one specialist from internal or surgical branches. Emergency health service can be provided on the basis of 24-hour uninterrupted service, and other branch specialists can provide emergency services with on-call (home watch) method according to need.

**Third Level Emergency Service:** In internal medicine, General surgery, Obstetrics and Gynecology, Pediatric health and diseases, Orthopedics and

traumatology, Neurosurgery, Cardiology, Neurology, Anesthesia and reanimation branches, and in addition to these branches, 24 hours a day in other branches depending on the patient density. These are emergency services that can provide emergency health services at expert level on the basis of uninterrupted service.

The emergency service design process, which is one of the most important steps in the organization of the general emergency health service system, starts from the architectural structure. In the second step, there is the organization of medical technological equipment and manpower, and finally the organization within the hospital and the connection of the emergency service with other units. The financial and operating costs of the emergency department, price efficiency analysis, and the location of the hospital, which includes the emergency department, are other factors taken into account during the planning phase (Miller, 2016).

The minimum standards for the planning of emergency services have been determined by the Ministry of Health. Accordingly, Emergency Service Entrances should be arranged as ambulance and pedestrian entrances. According to the size of the emergency department, ambulance entrances should allow more than one ambulance to unload patients. The ambulance entrance should be close to the resuscitation section. There should be wheelchair and stretcher parking areas at the emergency entrance. In this area, there should be separate places for the hospital security unit and the police. In addition, there should be areas where the application, cashier and reception team will be deployed. There should be waiting areas at the

"Emergency Service Entrances" for patient relatives (Ministry of Health, 2010). The minimum area of an emergency service that can perform all its functions is 700m<sup>2</sup>. The total number of interior space and emergency rooms can be determined by data on the number of patients, planned development, expected development in technology, and change in treatment methods (ACEM, 2007). The issues of "Flexibility", "Privacy" and "Patient and Personnel Circulation", which should be considered during the hospital interior organization stage, are also valid for the emergency department, which is the dominant unit of the hospital structure.

**Flexibility:** The convenience that flexible planning will bring to the use of spaces should also be considered. It can be beneficial by allowing the use of a smaller part of the unit in low density situations (Miller and Swensson, 1995). A design can be flexible in two ways. The first of these is that it easily allows for growth, change and renewal; and the other is that it can allow various uses depending on the demands. Counter and storage units should be kept to a minimum so that each room is as flexible as possible. Alternatively, mobile storage systems and trolleys can be used in the rooms. To maximize flexibility, specialized treatment rooms and separate specific care modules should be avoided. The most flexible emergency department is one that allows observation of any patient in any treatment area. The emergency department should be able to grow or shrink towards various treatment areas according to the increase and decrease in the number of patients.

Privacy, an important issue in indoor organizations, patient privacy and confidentiality can be achieved in the following ways (Miller and Swensson, 1995). Ensuring the confidentiality of patient interviews and records, providing separate sub-waiting areas for patient relatives who want and need separation, for example allowing the privacy of the patient through the use of general examination rooms. This is especially important for mental health, sexual health, drug and alcohol treatment and similar services. Planning by separating quiet areas from noisy areas, choosing sound absorbing materials and finishing elements, using sound insulating construction are among the measures that support privacy and confidentiality.

Patient and Personnel Circulation is important because hospital emergency services are not only busy due to the richness of activity and diversity of people, but also because they are places where scheduling disruptions threaten life. Naturally, designs that allow fast access with minimum traffic between functional areas gain importance. At the same time, while the necessity of observing the patient is accepted, it is important to protect the visual, auditory and olfactory privacy of the patient.

### **1.3. Service Structures in the Emergency Department**

While the care in the emergency department basically includes the processes of admission, evaluation, stabilization and treatment, there are also various models that contain the necessary service elements for different patient groups. These models are (Candar et al. 2008):

- Rapid Monitoring of Certain Patient Groups: The operating policy of the ED may be to identify special patient groups early and to accept and treat them in a separate way from other emergency patients. This can be done at the triage point or just after the triage but in a separate area. Examples of conditions these patients have are infectious diseases, minor injuries, mental health conditions, child-related conditions, and fractures. Admission and treatment may be completed by general emergency personnel or by a dedicated team.
- Grouping According to Urgency: This grouping is done for the co-treatment of patients with similar urgency or because of the staff sufficiency. In this case, the Resuscitation area, acute monitor bed areas, acute unmonitored bed areas and outpatient treatment areas can take place. Separate entry points (or triage points) can be provided to different areas. The health staff may be placed separately in these different areas, and in this case, staff may need separate staffing stations and workspaces.
- Grouping by Function: When patients need acute treatment and complex examination, they can receive these services in areas separated according to the quality of the service. Patients are directed to the allocated area from a central destination or separate ambulance entry points. Within each functional area, patients are given priority according to the degree of urgency. In this model, separate personnel are needed for each area and a separate working area is provided for the staff.
- Other Special Functions: Observation unit/ Short Term Treatment units may be adjacent to or within the emergency department. If these areas will



be managed by emergency service personnel, additional administration and personnel areas can be created.

- Special Sub-Units: The toxicology and hyperbolic drug therapy unit has its own unique design features.

In this context in the current study, we aim to show that it is possible to prevent possible functional problems in the design process by determining the strong and weak points of the hospital emergency room interior organization, based on the spatial analyzes performed on the sample hospital emergency services using the space syntax technique.

## **2. Material and Method**

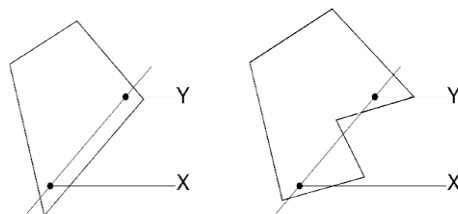
Recently, as stated by the Trabzon governorship, 23 health centers are actively providing services in Trabzon, which has become a health center. The fact that health services are intense in the city plays a major role in the development of health tourism. It has been observed that the basic systematics are not sufficiently established in the design of complex health structures such as hospitals. As a result, it was decided to demonstrate this relationship in practice in the emergency service unit, where the relationship between circulation and action areas is very important, by using the space syntax technique, which has a strong theoretical background and is mentioned in the literature as a whole. First of all, promotional charts were created for the "Fatih State Hospital" and "Kanuni Training and Research Hospital", which were chosen as the application area. Then, the data obtained from the analysis made in the emergency departments of both hospitals using space syntax theory and technique also

offered the opportunity to compare between two different emergency departments.

Space syntax is simply a data collection technique developed by a research group led by Prof. Bill Hillier at Barlett School, University College London. The basic idea on which this technique is based is that the social structure that constitutes the space can be understood by examining the physical structure of the space. The spatial setup has a structure that affects the social structure and the components that make it up. Therefore, there is a reciprocal relationship between social structure and space (Hiller, 1996, Hiller, 1987). Space Syntax is a set of techniques developed for defining, measuring and interpreting the properties of space configuration in buildings and residential areas. Space configuration, in its simplest form, examines the relationship between two spaces when considering the third space. When considered comprehensively, considering all the spaces in a complex structure, space syntax provides the opportunity to examine the relationships between these spaces (Hillier, 1969). The "Space Syntax" Theory explains its social structure by analyzing the space both in the building and in the urban area. As stated in the aim of the study, while designing the hospitals of the future, the most accurate settlement planning issue comes to the fore in order to adapt the user group (health personnel, patients, patient relatives) to the space. As a result, the space syntax technique was chosen to reveal the reflection of the emergency service unit in the user's mind and to compare it with the interviews.

Every point in the system has both a one- and two-dimensional shape. These dimensions are two-dimensional convex space and one-dimensional linear structures. Convex space is the area defined by straight lines that can be drawn from a point within the space to any point within the boundaries of the space. Convex spaces are two-dimensional extensions of the largest and most convex spaces for the analysis of a whole plan. There are spaces where all points in space can be seen from all other points. Convex areas are shown with convex maps (Peponis & Wineman, 2002).

Visibility analyses are about the accessibility and visibility of a space and the openness of the space. They are analyses that give information about how the spatial setup works. These analyses help us understand the user's visual perception and spatial experiences. How we perceive the space visually and how much we can see is important because we can direct ourselves to the extent we can see (Hanson, 1998). According to Hillier and Hanson (1984), convex areas are formed as a geometric result of the division of spaces into parts. Convex maps are used to determine two-dimensional spaces. Hillier (1983) defines the convex map as “the minimum and largest areas covering the system” and proposes a specific algorithm for creating the map (Figure 1).



**Figure 1.** Convex spaces

Seamon defined linear and convex spaces as analytical interpretations of the dialectic of movement and rest: These spaces guide how lived events of movement and rest contribute to physical-spatial properties. Convex spaces are the two-dimensional feature of space associated with rest. It's like a neighborhood where kids play football. Axial space, on the other hand, is the one-dimensional extension of the space, showing the level of movement in the open space (Seamon, 2007).

Visibility, According to Hillier and Hanson (1984), who argue that physical space shapes human behaviors, the field of view is related to human movement. Space syntax, based on this view, describes the movement of people based on visibility arising from the physical structure of space. Based on the definitions, the current situation study was carried out on the plans of the hospitals determined as the sample group in the study. In order to prepare the plans during the analysis process, equipped and non-equipped plans were prepared for both emergency services. Graphics and integrity values obtained as a result of “visual connectivity” and “visual integration” and “visual mean depth” analyses performed using the “Depthmap” program are presented in the findings section.

### **3. Findings**

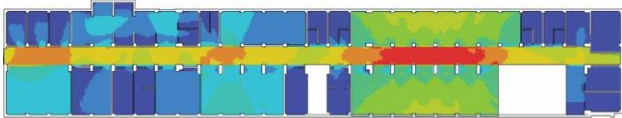
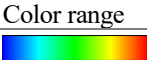
Visibility graph analyses were applied to investigate and evaluate the user contribution to the legibility of the space by testing the visual accessibility of the space. These analyses mostly generate data on the privacy and visual communication of the user. Visibility graph analyses were only handled on a global scale, with and without reinforcement, due to the consideration

of emergency service circulation within the scope of the study. The data obtained from the application will reveal the strong and weak points in the relationship of the action areas, show the effect of the interior equipment organization on the results and give an idea about how the emergency service architectural design affects the service quality.



**Fatih State Hospital Emergency Service furnished and unfurnished**

**Visibility Graph Analysis:** Global (R=n) visual analyzes were carried out on the furnished and unfurnished plans of Fatih state hospital. Visual connectivity maps and minimum, maximum, mean and standard deviation values obtained from these analyzes are explained in Table 1 and Table 2.

**Table 1.** Unfurnished visual connectivity analysis of Fatih State Hospital

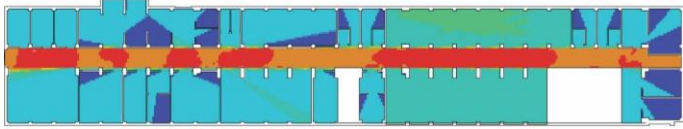

				
Minimum	Color range	Maximum	Average	Std. Deflection
87		6705	2450.66	1511.28

**Table 2.** Furnished visual connectivity analysis for Fatih State Hospital

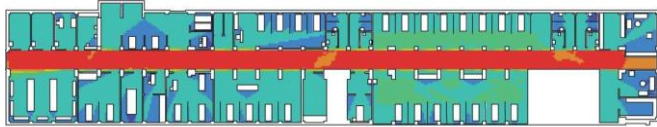

				
Minimum	Color range	Maximum	Average	Std. Deflection
5		5517	1681.06	1729.62

As previously explained, visibility analyzes were performed only as global analyses. In Table 3 and Table 4, global (R=n) visual integration maps and their minimum, maximum, mean and standard deviation values are explained.

**Table 3.** Unfurnished global visual integration analysis of Fatih State Hospital

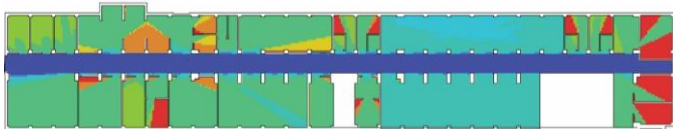

					
	Minimum	Color range	Maximum	Average	Std. Deflection
R=n	4.298		15.03	8.449	2.895

**Table 4.** Furnished global visual integration analysis of Fatih State Hospital

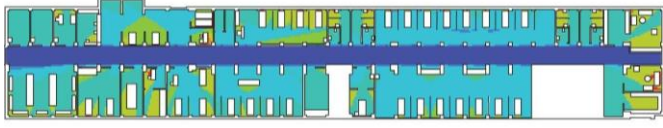

					
	Minimum	Color range	Maximum	Average	Std. Deflection
R=n	3.051		13.882	7.902	2.911

In Table 5 and Table 6, global (R=n) visual mean depth maps and their minimum, maximum, mean and standard deviation values are explained.

**Table 5.** Fatih State Hospital unfurnished global visual mean depth analysis

					
	Minimum	Color range	Maximum	Average	Std. Deflection
R=n	1.785		3.747	2.541	0.454

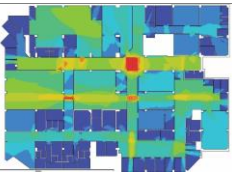

**Table 6.** Fatih State Hospital furnished global visual mean depth analysis

					
	Minimum	Color range	Maximum	Average	Std. Deflection
R=n	1.838		4.815	2.665	0.538

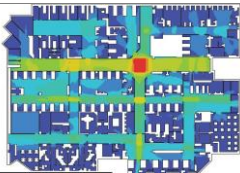

**Kanuni Training and Research Hospital Emergency Service furnished and unfurnished Visibility Graph Analysis**

Global (R=n) visibility analyzes were carried out on the furnished and unfurnished plans of Kanuni training and research hospital. Visual connectivity maps and minimum, maximum, mean and standard deviation values obtained from these analyzes are explained in Table 7 and Table 8.

**Table 7.** Unfurnished visual connectivity analysis of Kanuni Training and Research Hospital

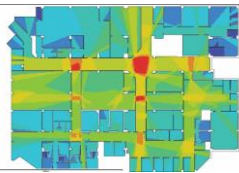

	Minimum	38
	Color range	
	Maximum	8134
	Average	2479.53
	Std. Deflection	1694.96

**Table 8.** Furnished Visual connectivity analysis of Kanun training and Research Hospital



	Minimum	4
	Color range	
	Maximum	7680
	Average	1657.94
	Std. Deflection	1515.09

Global (R=n) axial integration maps and the minimum, maximum, mean and standard deviation values associated with them are explained in Table 9 and Table 10.

**Table 9.** Unfurnished global visual integration analysis of Kanuni Training and Research Hospital

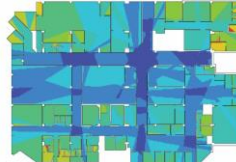

 R=n	Minimum	2.676
	Color range	
	Maximum	10.651
	Average	6.156
	Std. Deflection	1.48

**Table 10.** Furnished global visual integration analysis of Kanuni Training and Research Hospital

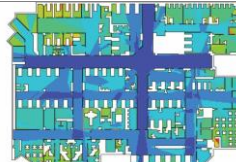

	Minimum	2.166
	Color range	
	Maximum	9.492
	Average	5.39
	Std. Deflection	1.432

Visual mean depth maps and data obtained from global (R=n) visibility analyzes are given in Table 11 and Table 12.

**Table 11.** Kanuni Training and Research Hospital unfurnished global visual mean depth analysis

	Minimum	2.231
	Color range	
	Maximum	5.9
	Average	3.262
	Std. Deflection	0.569

**Table 12.** Kanuni Training and Research Hospital furnished global visual mean depth analysis

	Minimum	2.357
	Color range	
	Maximum	6.947
	Average	3.575
	Std. Deflection	0.731

#### 4. Evaluation and conclusion

Examination of Fatih State Hospital Emergency Service Visibility Analysis: Since the visibility graph analyses are built on a grid system, the connectivity data may vary according to the selected grid number. Here, too, numerical comparison may not yield realistic results since less grid selection is made in the reinforced plan analysis. However, when we look



at the visual graph maps, we can see that the areas with the strongest commitment are on the main corridor and the observation area covers a large percentage of this commitment.

Looking at the visual integration data, it is seen that the average visual integration value decreased in the reinforced plan analysis. This means that the emergency room is more visually integrated in unequipped analysis. However, when we look at visual graph maps, it is possible to see the main corridor as the most integrated area.

As explained before, visual mean depth data describes the visual depth in the field. When we compare the reinforced and non-reinforced plan analyses, we can see that the data does not differ and the reinforcement arrangement does not increase the average depth effect in the emergency room. As a result of the examination of the visual mean depth maps, it is understood that the main corridor has the least depth and the staff rest area and the hospital entrance are the areas with the highest average depth.

Examination of Kanuni Training and Research Hospital Emergency Service Visibility Analysis: As understood in the previous visual connectivity maps review, since visibility graph analyses are based on a grid system, connectivity data may vary depending on the number of grids selected. Here, too, numerical comparison may not yield realistic results since less grid selection is made in the reinforced plan analysis. However, when we look at the visual connectivity maps, it is seen that the reinforcement plane reduces the connectivity in the observation and internal examination areas. In addition, we can see that the number of

reinforced plan analysis increases in the areas with the least commitment value indicated by the dark blue color.

When we look at the visual integration data, we can see that the average visual integration value has decreased in the equipped plan analysis, no different from the emergency service of Fatih state hospital. This means that the emergency service has a more visually integrated structure in the non-reinforced analysis. When we compare the visual mean depth data obtained from the reinforced and unreinforced plan analyzes, it is seen that the data does not differ and the reinforcement arrangement does not increase the mean depth effect in the emergency room. As a result of the examination of the visual mean depth maps, it can be said that the reinforcement arrangement does not affect the depth in the emergency department much. Another remarkable aspect of this analysis is that the main corridors in the floor plan depth map graph has a single continuous color.

Considering the data obtained from the analysis of the emergency service units of the two hospitals, it was determined that the average values were higher in Kanuni training and research hospital and the situation was more appropriate in terms of spatial connectivity of this emergency service unit. In addition, when the equipped and non-equipped global visual integration values are evaluated between two emergency service units, the reinforcement effect is not seen much due to the linear structure of Fatih state hospital. As a result of the comparison of the same values, it shows

that the linear structure increases the average commitment value in the place in Fatih state hospital.

Emergency services are one of the most sensitive and important units of hospitals. Remarkable results have been obtained with the work carried out to support the provision of better quality service in these units. In this context, according to the data obtained from the global and local visibility analyses performed with the Space syntax technique for two public hospitals in Trabzon, it has been revealed that it is possible to calculate the problems of the users related to the internal circulation of the emergency room with the space syntax technique at the design stage.

It has been determined through space syntax analysis that the equipment disrupts the circulation due to the narrowness of the corridors and the small areas in the emergency service unit of Fatih State Hospital. This situation has been confirmed by the data obtained from space syntax analyses, where the location and size of the emergency service action areas of Kanuni Training and Research Hospital and the physical conditions of the corridors connecting them are suitable. Considering these, it was concluded that the width of the corridors connecting the action areas and the arrangement of the equipment affect the circulation of the emergency service. In this case, it can be said that the arrangement of the reinforcement may become a factor that will ease or complicate the circulation depending on the action area where it is located.

It can be said that the hypothesis of the study that the emergency room interior organization is not handled in a way that supports the priorities of

the health personnel, that the action areas do not establish a correct relationship with each other, that the equipment placement does not adequately support the basic functioning of the space, negatively affects the service quality both in the circulation areas and in the action areas (Nayeb and Aydintan, 2019).

In the study, only two plan types were considered and as a result of the investigations, it was determined that the plan arrangement of Kanuni Training and Research Hospital was more useful functionally. From this point of view, it is possible to determine the most suitable plan type for this unit in the examinations to be carried out by considering more emergency service plan types in the next stage. In addition, the method developed within the scope of the study can be used not only in the hospital emergency department, but also throughout the hospital or in areas that affect the quality of planning such as inpatient units, which can guide the design process. As a final word at this point, in addition to complying with the minimum standards in the design of the newly built or remodeled hospital emergency services, controlling the designed area with space syntax may be an appropriate approach for emergency department design.

### **Thanks and Information Note**

This article, have been produced from a master's thesis done by authors at Graduate School of Interior Architecture in Karadeniz Technical University. Ethics Committee approval was not required for the study.

### **Author Contribution and Conflict of Interest Disclosure Information**

All authors contributed equally to the article.

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## Reuse of Waste Wood Material in Interior Design

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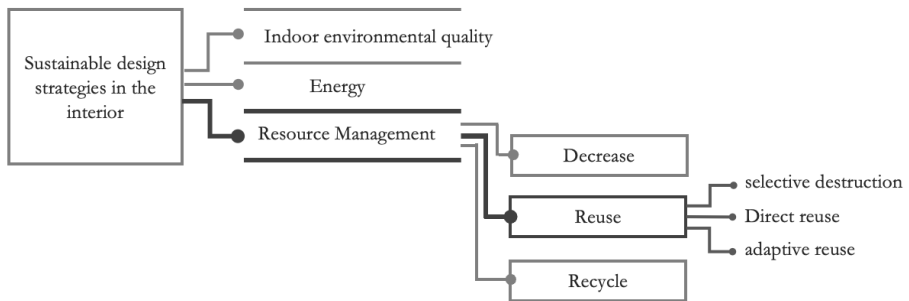


## 1. Introduction

In today's world, where resources are rapidly depleting, the changing needs and damages caused by excessive consumption to the environment have increased the importance for sustainability and ecology in the construction sector (Tuğluer & Çakır, 2021; Çakır, 2021). One of the most basic requirements for achieving a sustainable and ecological structure is to ensure the use of natural resources without consuming the environment (Türkeri, 2021). The fact that the material can be reused or easily disposed of is at the heart of creating a sustainable product. Aktaş (2013) draws attention to the importance of the role of interior space in the building sector in his research discussing sustainable and ecological design approaches. While designing buildings that are respectful to the environment and increase ecological efficiency, the interior design, in which the user interacts with directly, should be considered together with the building, since it creates the immediate environment inside the building, and sustainability should be addressed with a holistic approach (Celadyn, 2019, p.3).

Showing a sustainable approach in interior design is possible with the management of the conservation and efficient use of resources. For this reason, reuse of waste materials emerges as a necessity of a sustainable life in order to minimize the resource use caused during the construction and demolition phase (Ringdon and Kim 1998). Today, various applications and methods are being developed to work on the use value of waste materials and to reuse them. One of the accepted approaches

to the management of waste materials is the 3R (reduce, reuse, recycle) principle, which focuses on “reducing, reusing and recycling”. This principle supports the creation of a sensitive environment for waste materials to be seen as a resource rather than a loss and to be reused. The use of waste materials and resource management, which has the potential to be utilized in many areas of design, is considered as a sustainable design strategy. Celadyn (2019) discussed resource management with the principle of “reduce, reuse, transform” among the sustainable design strategies in interiors (Figure 1). In the most general sense, reduce is expressed as measures to reduce waste production, reuse, repairing the parts that are still usable after they become unusable, as they are, or by applying simple processes, and recycling, transforming the material into raw materials to serve a different use.



**Figure 1.** Sustainable design strategies and resource management in the interior (Compiled from Celadyn, 2019)

Reuse is an approach that should be preferred more than recycling because less energy is consumed in production (kendir Beraha, 2019). For this reason, within the scope of the study, the focus is on the evaluation of waste material through “reuse”. The reuse approach is discussed under three headings: selective destruction, direct reuse and adaptive reuse (Celadyn, 2019). Selective demolition is the evaluation of the demolition in a controlled manner and according to the quality of the material in order to ensure the reuse and recycling of the materials produced during the construction and demolition stages (ÇOB, 2004). Direct reuse is the reuse of an inactive product for a similar purpose. Adaptive reuse is the evaluation of materials recovered from a dismantled or deconstructed product to serve different purposes and functions (Celadyn, 2019).

Waste materials can find a place in the design with many different types of materials, from plastic to metal, from wood to paper. The use of wood waste materials in interior design is discussed in this study, since wood has a wide range of uses such as walls, ceilings, flooring, furniture, stairs, windows, doors, offers a variety of uses and is a frequently preferred material. Thus, we aimed to explain the reuse of waste wood materials in interior design and their application through examples. For this purpose, 10 venues that serve different functions and were designed by different designers, where various types of waste wood materials were reused, were determined. Then, where, how and for what purpose the waste wood material was used in the space was

examined and based on the data obtained, the type of waste material used, the type of reuse and the purpose of use (functional and visual/aesthetic) were evaluated by making a summary table. We believe that researching and analyzing this subject will contribute to the widespread use of waste material in design, as well as revealing how the use of waste material can be evaluated as a design input.

### **1.1. Wood Waste and Wood Reuse**

Wood material, which has been used in various fields from past to present, is the only natural raw material that does not harm the environment and is renewable (Bozkurt, 1986). In addition to being an economical and aesthetic material, the physical and mechanical properties of wood, which allow it to be used in very different products, are the main reasons why wood is often preferred as a building material (Keskin and Bülbül, 2019; Kutlu and Ergün, 2020). Developed countries encourage the use of wood materials in the construction sector since wood is an economical, practical, light, natural edible and environmentally friendly material. The fact that the energy consumed during the production of wooden construction elements is less than other construction elements is another feature that causes wood to be preferred in construction production (Türkeri, 2021). In addition, easy production, practical installation, easy storage and transportation of wood materials are other factors that provide savings (Somer, 2010). After the industrial revolution, technological development increased rapidly (Tuğluer & Çakır 2019). These developments have also

increased the construction techniques and expanded the usage areas of wood products. The use of wood in buildings can be described in a wide range, including the carrier system, roof, walls, ceilings, surface coatings, doors, windows, floor coverings, stairs, furniture and other accessories. This intensive use of wood in the construction sector has led to a significant increase in wood waste over time, and these wastes have become an important environmental problem over time. The pursuit of decrease environmental problems has been on the agenda of contemporary architecture based on the idea of "obtaining a sustainable and ecological structure", which includes energy saving, conservation of resources and reduction of waste. In this context, "wood" gains a special importance in spreading the use of natural materials in design and production (Türkeri, 2021).

The fact that wooden material can be reused in the design without undergoing major processes after its use and that it can be easily disposed of provides a sustainable and ecological environment. Wood, which is a natural material, has the potential to be reused and reused in order to obtain a structure or product, no matter what purpose it was used for before, since it can be articulated and processed (Türkeri, 2021). Wooden materials, which are desired to be evaluated through reuse, can be used in architecture, facade design or interior design. An example of this is the Jellyfish Theatre, which was designed using waste wood materials in England (Figure 2).



**Figure 2.** Facade and interior surface designed by reusing waste wood material, “Jellyfish Theater” (URL 1)

The use of waste wood materials finds its place in design from large scales such as architectural building elements to smaller scales such as furniture and product design. In this regard, some designers and companies have adopted the principle of producing furniture and products by reusing waste materials. Furniture Magpies is one of these companies which has designed various products such as coffee tables, coat racks and lighting elements by reusing waste wood material (Figure 3).



**Figure 3.** Re-designed products by Furniture Magpies, respectively “Hang onto your Drawers”, “Come Walk With Me” and “Lovely Legs Table Lamp” (URL 2)

Hang onto "your Drawers" is a coffee table designed using old drawers, Come Walk With Me is a coat rack designed using old chair backs, and Lovely Legs Table Lamp is a lighting element designed using old furniture pieces.

## **2. Material and Method**

This research consists of four stages. In the first stage, a theoretical background was created by conducting a literature search on sustainable strategies in interior design, waste material management, reuse and the use of wood waste materials in design. The second stage was the stage in which the places to be examined within the scope of the study were determined. sufficient information like year of construction, location, designer/company and visual data, variety of wood waste materials used, functional diversity of the spaces, use of various properties of the materials, and the waste at least in two parts of the space are some of the factors that determined in study. Attention was paid to the use of wooden material. Thus, it was aimed to provide diversity in the samples to be examined. In this direction, similar samples were eliminated and 10 different samples were determined to be examined within the scope of the study. The name, year, location, designer/company and venue information of the venues are given in Table 1.

**Table 1.** The venues examined within the scope of the study

<b>Project Title</b>	<b>Year</b>	<b>Location</b>	<b>Designer/Campony</b>	<b>Function</b>
Nishi Hotel Residence	2014	Austria	March Studio	Lobby
Bon Restaurant	2012	Romania	Corvin Cristian	Restaurant
Brandbase	2010	Netherlands	Most Architecture	Office
New Hotel	2011	Greece	e-Studio Campana	Restaurant
Casa Conceptos	2014	Mexico	Alejandro Preciado	Gallery
Ella Dining Room and Bar	2007	USA	UXUS	Restaurant
Shustov Brandy Bar	2014	Ukrain	Studio Belenko	Bar
Slowpoke Cafe	2011	Australia	Sasufi	cafe
Kamikatz Public House	2015	Japan	Hiroshi Nakamura ve NAP	Public Center
Step By Step	2013	Spain	Dom Arquitectura ve Asa Studio	Retil

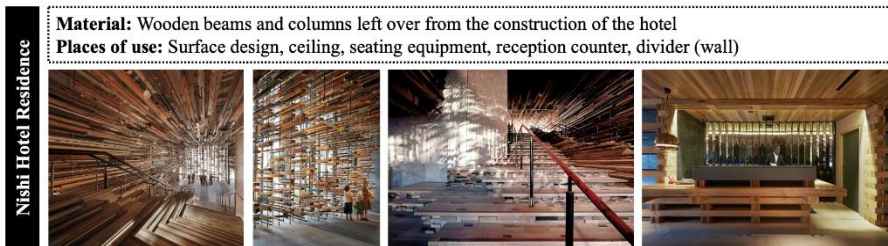
In the third stage of the study, the types of wood waste materials used in the interior designs of the determined spaces were determined, where, how and for what purpose they were used in the space, and the visual and functional effects of the material on the interior design were examined. The fourth stage of the study was the stage in which the type of waste material used, the type of reuse and the purpose of use (functional and visual / aesthetic) were presented and evaluated with a summary table based on all the data obtained.

### 3. Findings

In this part of the study, the use of waste wood material in interior design is examined by analyzing the Nishi Hotel Residence, Bon Restaurant, Brandbase, New Hotel, Casa Conceptos, Ella Dining Room and Bar, Shustov Brandy Bar, Slowpoke Cafe, Kamikatz Public House and Step by Step projects, respectively.



**Nishi Hotel Residence:** Located in the city of Canberra in Australia, Nishi Hotel Residence is a building with various functions such as residence, hotel, office, restaurant and social areas. In the lobby of the hotel designed by March Studio, wood carriers and timber left over from the building's construction were used. In the lobby, thousands of lumber were used in ceilings and walls, either fixed with steel rods or suspended from the ceiling. With this system, a visual effect was created that blurs the spatial boundaries and even creates a sense of movement. Thus, the space takes on an identity and character, encouraging curiosity and staying indoors. The staircase and reception counter are designed by placing the timbers on top of each other in an orderly or irregular manner. In addition to its visual effect, the timbers, which are also used functionally, serve as a filter in the lobby to let sunlight in. Thus, the light reflects inside in beams, creating an aesthetic appearance in the interior. Utilizing the natural texture of wood in space design, designers have created a warm environment by using the intrinsic character of wood. March Studio won an Interior Design Award for this sustainable design in the hotel lobby (Figure 4).



**Figure 4.** Nishi Hotel Residence lobby design (URL 3)

**Bon Restaurant:** Located in Bucharest, Romania, the restaurant was designed by Corvin Cristian in 2012. In the space, old and colorful wooden doors, windows and shutters are used as dividers or are displayed on the walls and used in surface designs. Despite the demolition of the old buildings in the country and the construction of new ones, designer Corvin Cristian, with the idea of keeping the memories of the lost past, brought together the old and the new, and combined the wooden pieces with the modern elements of other fittings in the space that add comfort and luxury. Using more than 200 old doors and windows for this, Corvin generally used the materials with their original colors, while some of them were colored. The abrasions and graffiti on the doors visually contributed to the interior atmosphere as elements that Corvin used in the design. In addition, old windows and doors are also used as exhibition elements or cabinets by making use of their collapsible features in some areas. The use of some of the doors with the same door function in the space is an example of direct reuse (Figure 5).



**Figure 5.** Bon Restaurant interior design (URL 4)

**Brandbase:** BrandBase in Amsterdam is an advertising office designed by Most Architecture in 2010. He used wooden shipping pallets to design work surfaces, desks, seating areas and stairs in the office. Using pallets provides an advantage in terms of creating multi-storey reinforcements suitable for sitting, working, lying and walking. For a creative advertising office, the creative and innovative use of such a material has helped the advertising office gain a different character by supporting fun and new ideas. The huge stack of pallets in the middle of the meeting table creates an unexpected and fun image and adds a visual richness to the space. Pallets stacked on top of each other with different movements give the space a creative and dynamic look. While the gradations of different lengths are a floor to walk on at some points, they transform into sitting units or work surfaces at some points, adding a functional richness to the space as well as a visual effect. In addition to pursuing a sustainable design approach by re-evaluating wood, the designers created an intimate environment by making use of the natural texture of wood in the space (Figure 6).



**Figure 6.** Brandbase advertising office interior design (URL 5)

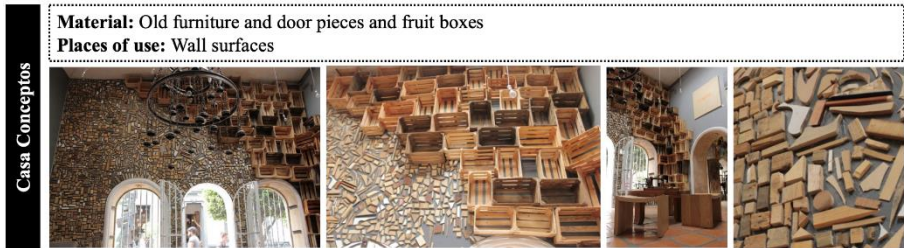
**New Hotel:** Located in Athens, Greece, the hotel interiors were designed by e-Studio Campana in 2011. The walls of the reception and restaurant sections of the New Hotel were designed through the reuse of old drawer doors, furniture pieces and mixed wood pieces. While the surfaces with a dynamic and fun appearance add visual movement to the space, they provide the user with an authentic atmosphere created by old materials. Located on the ground floor, the “New Taste” restaurant is inspired by Campana's iconic “Favela” chair, whose columns are covered with long narrow wooden strips, reminiscent of Brazilian favelas. Favela is the name given to the slums in Brazil where irregularly settled houses are located, and it has found its counterpart in the design as the surfaces on which furniture pieces are formed by coming together in an irregular way. The design received the “New Hotel” award (Figure 7).



**Figure 7.** New Hotel reception and restaurant interior designs (URL 6)

**Casa Conceptos:** Alejandro Preciado designed the interior walls of his gallery, Casa Conceptos, in Mexico, using waste and obsolete pieces of wood and fruit boxes. Setting out with an environmentally friendly design idea, the designer obtained wooden pieces from old furniture,

shelves and doors and combined them with fruit boxes to design a wall surface. Thus, it has created a textural effect created by the combination of various wood wastes on the wall surface. The masterfully arranged pieces have become a sculptural composition of ancient materials, each with a history. Waste fruit boxes can also be used as shelves and display elements (Figure 8).



**Figure 8.** Casa Conceptos gallery interior design (URL 7)

**Ella Dining Room and Bar:** Located in the United States, the restaurant was designed by UXUS in 2007. It was designed with the principles of “Rustic Luxury” in mind, an understanding that synchronizes simplicity and complexity, traditional and contemporary, to define an elegant, comfortable lifestyle and the taste and sensuality of real materials. In accordance with these principles, UXUS has combined the old and the new. Designed using around 500 old Hungarian shutters, the wall and ceiling surfaces are surrounded by rustic textures and colours. The combination of these old and wooden materials with plush, luxurious ottomans and light and renewed wooden stools adds a visual richness to the space by combining the old and rustic look with a contemporary look. While the wooden materials are

used by preserving their own colors, there are also those that are used by changing the tones (Figure 9).



**Figure 9.** Ella Dining Room and Bar interior design (URL 8)

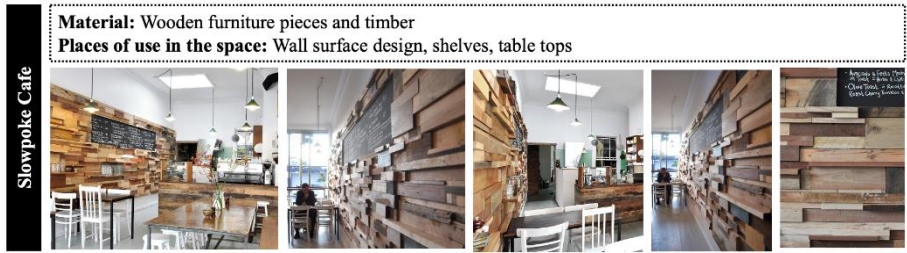
**Shustov Brandy Bar:** 19th century cellar in Odessa, Ukraine, was designed by Studio Belenko as a brandy museum and bar. Wall and ceiling surfaces were designed by positioning wooden barrel lids side by side and on top of each other. The wooden texture of the covers used, while harmonizing with the place with a dark and warm atmosphere, also highlights the character and history of the place. An environmentally friendly and sustainable approach was followed in the design, with wooden barrel lids that harmonize with the function and spirit of the space. In addition, the ceiling design made of thousands of brandy bottles supports the sustainability understanding of space design as another example of reuse (Figure 10).





**Figure 10.** Shustov Brandy Bar interior design (URL 9)

**Slowpoke Cafe:** A small cafe located in Fitzroy, Melbourne's oldest suburb, Slowpoke Espresso was designed by French designer Sasufi in 2011. In the project, it was aimed to gain a unique identity, a simple and warm atmosphere with a very limited budget. For this reason, waste wood materials were used in the space. A surface design was created using waste lumber scraps collected from local furniture manufacturers along the wall of the space. The designer created a texture on the wall by combining different types and colors of wood. The variety of wood species increases the depth and warmth of the wall, giving the user a lively feeling in a plain and simple space. Some of the pieces expand and turn into shelves. The tops of the tables used in the space are made from old floorboards. Thus, the designer demonstrated a sustainable design approach by reusing waste wood materials, as well as an economical and low-cost interior design (Figure 11). This place, which was created with a low budget, respects the environment and has a unique character. It received the Shortlist Australian Interior Design award in 2012.



**Figure 11.** Slowpoke Cafe interior design (URL 10)

**Kamikatz Public House:** Located in Japan's Tokushima prefecture, Kamikatz Public House is a public house designed by Hiroshi Nakamura and NAP in 2015. The designers aimed to design the space with a sustainable approach, choosing mostly recycled or obsolete materials. Sourcing the materials from town waste, the designers used the windows of old and abandoned houses. To provide heat and sound insulation in the interior, the windows were used as double layers. With the creative combination of windows of different sizes made of various wood species and colors, a striking visual effect has been achieved both on the façade and the interior. The use of windows with the same functionality is an example of direct reuse. The tables and shelves in the space are produced using waste wood pieces and timber. The building, which was designed and built with a reuse approach, uses an economical and sustainable design approach and raises awareness among the residents of the town with its zero waste approach (Figure 12).





**Figure 12.** Kamikatz Public House interior design (URL 11)

**Step By Step:** Designed by Dom Arquitectura and Asa Studio, is a shoe store in Barcelona, Spain. While waste materials such as wheels and ropes are reused, the transformation of wooden pallets into shoe exhibition elements is remarkable. Wooden pallet pieces were also used as a backdrop behind the shelves on which the shoes were displayed. Another use of wooden pallets is the seating elements designed by stacking pallets on top of each other. Palettes were not painted to reveal the diversity of the products, but rather raw and neutral colors were used (Figure 13).



**Figure 13.** Step by Step interior design (URL 12)

#### 4. Evaluation

Nishi Hotel Residence, Bon Restaurant, Brandbase, New Hotel, Casa Conceptos, Ella Dining Room and Bar, Shustov Brandy Bar, Slowpoke Cafe, Kamikatz Public House and Step by Step examined within the scope of the study are summarized in Table 2 by evaluating the type of waste wood material, the functional use of the material in the space and the visual/aesthetic effect it creates.

**Table 2.** The use of wood waste material in the interiors of the examined projects

Project	Used wood material type	Reuse type	Purpose of usage	
			Function	Visual/Aesthetics
<b>Nishi Hotel Residence</b>	Wooden beams and columns remaining from the construction of the hotel	Selective demolition, adaptive reuse	Stairs, counters, breaking the light of day, divider, limiter, hanging lighting elements	Surface designs with a dynamic visual effect with the way materials are brought together, making use of the natural texture of wood
<b>Bon Restaurant</b>	Old, doors, windows and shutters	Direct reuse, adaptive reuse	Hanging of cabinet, limiter, divider, door, lighting elements between sitting areas	Surface design by utilizing the formal features of doors and windows
<b>Brandbase</b>	shipping pallets	adaptive reuse	Serving different functions such as flooring, seating equipment, tables and stairs with gradations	Creating a dynamic visual effect with the way the materials are combined
<b>New Hotel</b>	Drawers, doors, furniture and wooden parts	adaptive reuse	Closing the columns, hanging the lighting elements	Wall and surface designs create a dynamic and moving visual effect.

<b>Casa Conceptos</b>	Old furniture and door pieces coupled with used fruit boxes	adaptive reuse	Use as a shelf and display unit	The surface design creates a dynamic and dynamic visual effect by combining different types of wood.
<b>Ella Dining Room and Bar</b>	old doors and shutters	adaptive reuse	Hanging lighting elements, positioning above the bar, defining the bar table space	Wall surface and ceiling design
<b>Shustov Brandy Bar</b>	keg caps	adaptive reuse	-	A striking surface design with the way the barrel lids come together, making use of the natural texture of wood
<b>Slowpoke Cafe</b>	Wooden furniture pieces and lumber	adaptive reuse	Shelves, tabletops	Texture effect with the combination of different wood types and colors
<b>Kamikatz Public House</b>	windows, wooden parts	Direct reuse, adaptive reuse	Insulation with the use of double windows, table tops, shelves	A creative and striking visual effect with the combination of different windows
<b>Step By Step</b>	wooden pallets	adaptive reuse	Display surface, seating element	A simple and neutral visual effect by making use of the natural color and texture of wood.

In the light of the data obtained with ten different examples examined in the study, the evaluations regarding the use of wood materials in interior design and their effects on design are listed below:

-When evaluated in terms of the type of waste materials used in interior design, we see that various materials such as old doors, windows and furniture pieces, shipping pallets, blinds, fruit boxes, timber pieces and barrel lids are reused. We can see that the texture, colors and wear of items such as windows and doors, which have been

salvaged from old and unused buildings, can be features used in the design. In addition, there are examples where the space is used by applying simple processes such as painting, polishing, and repair according to the concept and setup of the space. The characteristics of the material used, such as color, shape and form, often direct the design and create an environment for creative solutions. Examples of the guiding effect of the material on interior design have created different combinations by placing shipping pallets on top of each other, creating a texture effect in which colors are at the forefront with the combination of various colors of wood, or functional solutions by making use of the openable and closable features of windows and doors.

- When evaluated in terms of reuse type, we observed that waste wood materials were generally used with adaptive reuse, that is, in new functions or forms apart from their old function. Direct reuse was encountered in the use of doors and windows with their original functions, as in the examples of Bon Restaurant and Kamikatz Public House. Selective demolition, which means separating the parts that can be used while building or washing a place, was only seen in the wooden beams used in Nishi Hotel Residence among the examples examined.

- When waste wood materials are evaluated in terms of the purpose of use in the space, it was generally seen that the material is used both functionally and visually/aesthetically in space design. The easy-to-cut, repairable, paintable and mountable features of wood can be used indoors as a furniture, staircase, wall, etc. It enables it to be

used for functional purposes, as well as by making use of the natural texture and color of various types of wood materials, different visual effects can be created in the design. We could also see that a natural and warm atmosphere was created in the space by utilizing the natural properties of various types of wood materials.

- Based on the data obtained in the study, we saw that waste wood materials were also benefited from a semantic point of view in addition to their functional and visual/aesthetic effects in interior design. In the case of Bon Restaurant, keeping some memories of the lost past; In the Ella Dining Room and Bar example, the idea of creating a synthesis by using the old and the new together, or raising awareness by showing that materials that seem to be lost can be considered as a resource, as in all examples, or messages the designer wants to convey in the space. At this point, it is possible to say that the waste material affects the meaning and perception of the space.

- Wood material can be used in various scales in interior design, from structure to furniture, from products to surface designs. At this point, making use of waste wood materials provides economic benefits in addition to the benefits described above; while doing this, it also displays an environmentally friendly and sustainable approach.

- It was seen that the function of the space can also be a guide in the selection of the waste material to be used. In the example of Shustov Brandy Bar, the use of wooden barrel lids on the surfaces in relation to the cellar and bar function and the use of Brandy bottles in the ceiling

design are indications that the function affects the choice of material to be used. Similarly, the region where the space is located can affect the type of waste material to be used and its use in design. An example of this is the reference to the favelas in the region, as seen in the New Hotel surface designs.

- Old wood has a history and character. For this reason, the inclusion of old and out-of-use wooden materials in the design is effective in giving the place an authentic and rustic appearance. At this point, it can be said that wood is a determining factor in giving character and identity to the space. So much as that the rustic appearance of Ella Dining Room and Bar, the neutral and plain appearance of Step by Step, the lobby design of Nishi Hotel Residence and the warm atmosphere of Shustov Brandy Bar seem to benefit from the naturalness and antiquity of wooden materials.

## **5. Conclusion**

As a result of changing and increasing consumption habits and rapid production, the increase in the amount of waste all over the world causes economic and psychological destruction as well as creating negative effects on the environment, human health and all living things. The reuse of products that have completed their useful life as a resource rather than being treated as waste is a necessity of sustainable life. Reuse method in the recovery of wastes is seen as a more appropriate solution in the evaluation of waste materials since it requires less time, energy and cost than recycling.

In this study, which deals with the reuse of waste materials in interior design, on wooden wastes, we found that that sustainable and environmentally friendly spaces are created by allowing various uses in design with the economical, easily obtainable, portable, storable, workable, cut, repairable, paintable and mountable properties of wood. These spaces also raise awareness of their users and society about environmental approaches and the reuse of waste. While emphasizing how wood materials that are often overlooked, neglected and seem like waste can create new stories in space design with the right applications by using their own essence, it also shows what kind of contributions they can make both functionally and aesthetically. Despite the limitations created by waste materials, both creative and environmentally friendly spaces can be obtained by recognizing the material properties well and producing solutions in this direction. In addition, wood, which is a suitable material for heat and sound insulation, can also be used in terms of environmental quality. The reuse of wood material, which looks like waste in the design, ensures efficient use of resources, reducing waste and harm to the environment, and saving energy. It can be seen as an important and guiding design input in the process of designing sustainable spaces. For this reason, encouraging designers and users to reduce and reuse waste materials is an important step in reducing damage to nature and providing a sustainable environment.

This study, which focuses on the use of waste wood material in interior design, is thought to be a guide for studies to be carried out in different areas and with different types of waste materials. Raising awareness of designers about the use, dissemination and adoption of waste materials in design and paving the way for further research on the subject are among the most important benefits of this study

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All authors contributed equally to the article. There is no conflict of interest.



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## Technological Infrastructure in Smart Space Design

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## 1. Introduction

The information revolution and the rapid development of technology have led to significant developments in all research fields, including the building sector. These developments have contributed to advances in sensor and actuator technologies and developments in the field of materials. With these developments today, the expectations of people for a more modern, flexible and comfortable lifestyle have increased. As a result of all developments and needs, the concept of smart space design has come to the fore.

Smart space design has the ability to increase space comfort and flexibility according to the needs and preferences of users, optimize dynamic processes, provide energy efficiency and contribute to a more sustainable interior design. Therefore, smart space design supports the creation of a space that meets the current needs while preserving the needs of future generations. Designers with the necessary technological tools will significantly contribute to sustainable interior design by integrating smart solutions into interior design (Rashdan, 2016).

When the literature is reviewed, it has been observed that smart materials are confused with the technologies used in smart space design. For this reason, in this study, the difference of smart materials from the technologies used in smart space design will be revealed and their place in the smart space design concept will be determined.

## 2. Material and Method

In this study, which aims to question the place of smart materials within the scope of the concept of smart space design, the concept of smart in design in general and space subjectively will be questioned, and the technologies and smart materials used in the concept of smart space design will be examined. Thus, the difference of smart materials from the technologies used in the smart design concept will be determined and the complexity seen in the literature will be tried to be clarified. In addition, the features of the smart space concept will be determined and these features will be examined through smart materials.

### 2.1. The Concept of ‘Smart’ in Design

Smart design; It includes sustainable design strategies such as optimizing the thermal comfort of the space and providing energy efficiency by adapting to climatic change, which expresses adaptation to dynamic processes such as climate change, providing user needs by making the space flexible, and thus reducing costs by reducing the construction site. This concept enables the creation of new multifunctional spaces that meet current needs without compromising user comfort and the needs of future generations. Therefore, it can be thought that intelligent design is related to sustainable design. This design approach provides energy efficiency and user comfort by controlling dynamic processes such as climate change with passive and active methods. (Senagala, 2006). The concept of ‘smart’ refers to the adaptation of structures and materials according to the changing needs

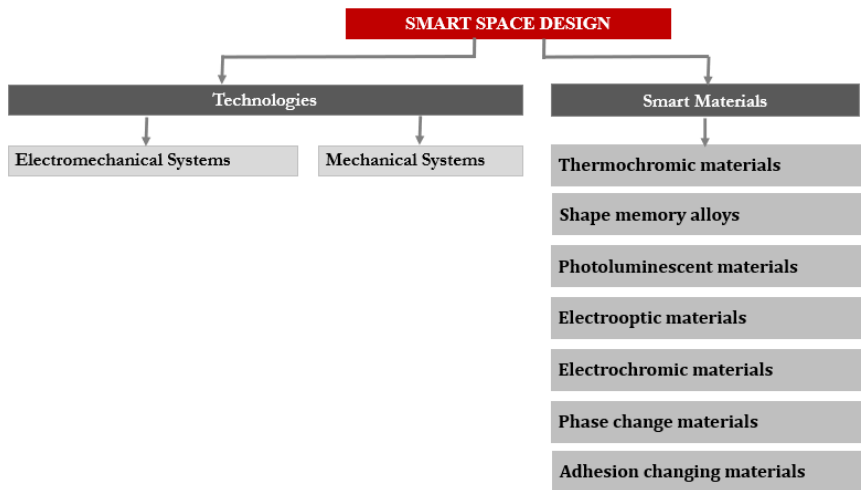
and preferences of the user and the changing conditions of the environment. This adaptability is due to the perception, memory and multiple functions of materials or structures (Addington & Schodek, 2005; Tarfiei, 2015). Being active, dynamic, environmentally compatible, sensitive or reactive refers to the basic features of smart design (Tarfiei, 2015).

## **2.2. Smart Space Design**

Smart space design is the use of techniques that provide space flexibility such as multifunctional and adaptable furniture, movable and interactive walls, floors, ceilings in order to reduce the amount of construction sites. The application of these techniques also protects the needs of the users as it increases the number of possible uses, flexibility and adaptability of the space. These techniques include practices that encourage sustainability by reducing the amount of construction site as well as reducing the production of waste, the energy consumption required for building air conditioning, and the need for construction materials. (Barbosa et al., 2016).

In the concept of smart space design, there are a number of technologies applied to move architectural components or elements. These technologies are electromechanical and mechanical systems. With the development of material science, smart materials have also been seen to be used within the concept of smart space (Figure 1), (Heidari Matin and Eydgahi, 2019).





**Figure 1.** Technologies and Smart Materials Used in Smart Space Design Concept (Author, 2022)

In the study, the technologies used in the concept of smart space design will be examined and the place of smart materials in this design concept will be questioned. In addition, the difference of smart materials from the technologies used in the smart design concept will be determined.

### 3. Technologies Used in Smart Space Design

Smart space design can be interactive, dynamic or flexible as it can change and transform depending on need, demand, changing environmental factors or design setup. In order to realize these features, there is a need to use smart materials, sensors, processors, actuators and/or mechanical systems (Akgün, 2020).

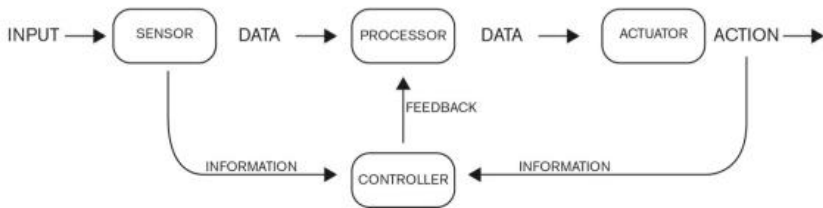
#### 3.1. Electromechanical Systems

In the concept of smart space design, some technological infrastructure is needed for the interaction of the user with the space, for the space to

be re-adapted according to the needs, for the space to be dynamic as a result of its flexible structure. One of these infrastructure systems is the relationship established between the sensor, processor and actuator, which represents the electromechanical system. This relationship takes place in two ways: open loop system and closed loop system. The difference between a closed loop system and an open loop system is that the closed loop system also has a controller that can measure the output action. The control unit, on the other hand, allows users to intervene in the system (Figure 2-3) (Modin, 2014; Heidari Matin and Eydgahi, 2019).



**Figure 2.** Open Loop System Diagram (Modin, 2014).



**Figure 3.** Closed Loop System Diagram (Modin, 2014).

Sensors detect information from user activities and environmental stimuli. They can detect various environmental conditions such as wind speed, temperature, light, air pressure, air quality and sound levels (Schnädelbach, 2010). Sensors convert an external stimulus into

electrical signals that can be processed and measured. There are various sensors such as mechanical, humidity, chemical, pressure, touch, speed, temperature (Işık, 2013). There are processors responsible for reading data, both triggered by direct human intervention and caused by sensor output, processing this data and then transmitting it to the respective actuators. (Modin, 2014). In addition, non-manual adaptations in buildings require various actuators to achieve the intended effects. Actuators basically respond to create desired effects in adaptive architecture. These are engines, hydraulic and pneumatic systems (Schnädelbach, 2010). Hydraulic systems are generally used to move architectural components or elements (Üçüncü, 2016).

The relationship established between these sensors, processors and actuators is used in smart space designs to support sustainable design and/or create interactive surfaces. For example, in the wall surface design named 'Nature Trail', animal depictions in forest abstraction were digitally applied to the wall surface in the hospital corridor at different heights. LED panels and motion sensors are placed behind this interactive wallpaper (Figure 4) (Bezci and Gürbulak, 2015; Akgün, 2020).



**Figure 4.** Wall surface design named ‘Nature Trail’ (Jason Bruges Studio, 2022).

Another example is the 25 m<sup>2</sup> space named Optibo, although small, spaces with different functions have been solved in a single volume thanks to the transformable and concealable furniture. With the use of electrohydraulic systems, tables and chairs can be adjusted in height and hidden according to different functions such as working and eating. In addition, thanks to this system, furniture such as beds, tables, chairs, armchairs that are not used in a certain time are buried on the floor (Figure 5), (Savaş, 2011).



**Figure 5.** The space named Optibo (Akgün, 2020; Savaş, 2011)

Another example, the Floirac House designed by architect Koolhaas, includes a central room or platform that can be raised to allow the

wheelchair-bound user full access to all levels. (Figure 6), (Schnädelbach, 2010).



**Figure 6.** Maison à Bordeaux (Archdaily, 2011).

In addition to the electromechanical systems used in the smart space design concept, mechanical systems that enable the architectural components to move are also used.

### **3.2. Mechanical Systems**

Another technology that moves architectural components is mechanical systems. Here, the change and transformation feature in the design is realized by mechanical techniques such as hinges, bearings and rails. For example, in the Schröder house designed by architect Gerrit Rietveld, a flexible space was created thanks to the sliding walls by using rails (Figure 7), (Akgün, 2020).



**Figure 7.** Gerrit Rietveld – Schröder house (Archilovers, 2018; My Architectural Moleskine, 2013).

In another example, the project named 'All I Own House', each of the components and elements of the space is arranged according to the needs of the user. The compartments can be combined or separated, each on a simple industrial rail system, depending on user needs. At the end of each is a bookcase for extra storage. Three separate compartments have allowed many different space functions to be combined (Figure 8), (Designmilk, 2014).



**Figure 8.** 'All I Own House' Project (Designmilk, 2014)

Along with electromechanical and mechanical systems, smart materials that react to the stimuli around them thanks to their natural properties are also used within the concept of smart space design.

#### **4. Smart Materials**

Smart materials are materials that perceive certain stimuli around them and change their properties or exchange energy due to their natural structure. These changes occur continuously depending on whether the stimulus is present or not. Smart materials used in interior design are phase changing, adhesion changing, electrochromic, electrooptic, thermochromic, photoluminance and shape memory alloy materials (Akgün, 2020). Electrooptic materials, which are among these materials, are generally integrated into the glass material and applied (Oltean, 2006). Electrooptic glass technology, which is used as a dividing glass wall, transitions to two different states, transparent and translucent. Therefore, it does not have the ability to control the degree of transparency (Dam & Daniel, 2015). It can be used in matt form without electrical stimulation to provide privacy and confidentiality within the space. However, in order to allow more daylight to enter the space, the transparent glass constantly needs electricity (Figure 9), (Addington and Schodek, 2005; Akgün, 2020).



**Figure 9.** Transparent and translucent phase status of electrooptic glass (Smartglass Vip, 2021).

Adhesion changing materials are materials that reversibly change the absorption or adsorption state of an atom, or molecule of solid, liquid, gaseous compounds in response to a stimulus. Generally, titanium dioxide, which is from this material group and reacts to light stimulus, is used in the design discipline (Ritter, 2007). The adhesion power of unwanted organics such as microbes, bacteria, odors and harmful organic chemicals to the titanium dioxide surface is weakened by the effect of sunlight. These harmful substances decompose and form harmless species such as water and carbon dioxide (Ritter, 2007; Yilmaz, 2014). This feature of the material cleans the air as it makes it possible to separate chemically harmless components by eliminating unwanted odors and substances (Leydecker, 2008). This process is called the photocatalytic effect. As a result of the photocatalytic effect, decomposed substances are removed from the surface of material with the help of rainwater. This process indicates that the material performs self-cleaning (Yilmaz, 2014). Therefore, adhesion changing materials,



which are integrated into the window glass, exhibit self-cleaning properties due to the fact that they can come into contact with rain water, as well as cleaning the air (Akgün, 2020).

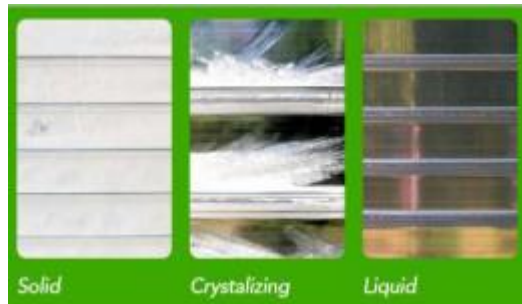
Electrochromic materials are materials that can darken their color depending on the amount of electricity applied. Due to this feature of the material, it is generally used to provide daylight control on window glass. Depending on the degree of darkening of the electrochromic glass, the level of daylight transmitted to the space changes. (Gavrilović and Stojić, 2011; Tarfiei, 2015). Color control of electrochromic glass is carried out manually by the users of the space or by sensors that detect light (Figure 10), (Akgün, 2020).



**Figure 10.** Electrochromic glass in different color shades depending on the applied electric current (Urbanland, 2016; Sageglass, 2017)

Phase-change materials (PCM) control the indoor temperature by taking the heat into the material structure with the increase in the temperature around it and storing the heat, while leaving the heat within its body to around with the decrease in the temperature (Addington ve

Schodek, 2005). PCMs are used as composite materials by integrating into gypsum plaster, gypsum board and glass materials by microencapsulation method (Ritter, 2007). Generally, phase change materials are sandwiched between two glasses or between two aluminum in sample applications. Aluminums, in which phase change materials are compressed, are used by placing them behind the gypsum board (Tokuç ve Taşçı, 2014; Parthenopoulou ve Malindretos, 2016; Harland vd., 2010; Vavan Vuceljic, 2009). In the glass system containing phase change material; since the glass facade becomes transparent when the material passes from solid to liquid, this effect also appears on the glass facade of the building (Figure 11), (Parthenopoulou and Malindretos, 2016).



**Figure 11.** Phase change effect in glass containing PCM (Parthenopou and Malindretos, 2016)

Apart from those applied for functional purposes, some smart materials are used as installation art by designers today in order to create user-sensitive and interactive designs. Photoluminescent, thermochromic

and shape memory alloy smart materials used for this purpose have been applied on a small scale in public spaces such as exhibitions and biennials (Akgün, 2020).

Thermochromic materials are materials that can sense the surrounding temperature and react by changing their color. Generally, in sample applications, depending on the purpose of the design, the key temperature point in thermochromic materials is determined according to the indoor temperature and/or human body temperature (Addington and Schodek, 2005; Ritter, 2007). Thermochromic materials, which are generally used on wall surfaces and furniture, are used as pigments by integrating them into latex paint (Ritter, 2007).



**Figure 12.** Application of thermochromic materials in space and furniture surface design (Ritter, 2007; Techno Crazy, 2014).

Photoluminescent materials are materials that absorb the energy from natural and artificial light stimuli and then emit the absorbed light (Ritter, 2007). These materials have been applied on interior wall surfaces by integrating with traditional materials such as glass and wallpaper in the form of paint usage (Akgün, 2020). These materials, which emit light without electric current, have also been applied by

architects and artists as installation art. For example, the canopy named ‘Lumen’, designed by Jenny Sabin in 2017, is an installation art consisting of threads made of photoluminescent material. The installation art is made of more than one million threads of digitally woven fibers (Jenny Sabin Studio, 2017; Fabric Architecture, 2017)



**Figure 13.** Canopy named ‘Lumen’ (Fabric Architecture, 2017)

Shape memory alloys are materials that change shape as a result of excitation with temperature. The key temperature causing the change and how the change will occur depend on the properties of each alloy (Modin, 2014). Shape memory alloys refer to returning or remembering a predetermined shape. This feature is due to the phase change of the alloy with the effect of temperature. The material that transitions to the austenite phase at high temperature is strong and hard, while the material that transitions to the martensite phase at low temperature is soft. For this reason, while alloys can be easily deformed at low

temperatures, they return to their original shape as a result of excitation at high temperature (Addington and Schodek, 2005).

It has been observed that shape memory alloy materials are used in various example applications within the design discipline. For example, in the design named ‘Lotus Dome’, in which shape memory alloys produced in the form of foil are used, a lighting input is triggered to the lamps thanks to motion detection sensors that detect the presence of the user. Thus, the heat emerging from the lamps in the Lotus Dome causes the foils to change shape. This change takes place continuously depending on the flashing of the light (Martini, 2013; Studioroosegaarde, 2019).



**Figure 14.** Foils used in the design named ‘Lotus Dome’ (Dezeen, 2012)

Hylozoic Ground, designed by architect Philip Beesley, consists of tens of thousands of lightweight, digitally produced components equipped with sensors, microprocessors and mechanical arms (Beesley, 2010). Proximity sensors that detect the movement of a spectator stimulate Arduino <sup>TM</sup> microprocessors to activate shape memory alloy arm mechanisms. In addition, mechanical arms were used to increase the

contraction, since shape memory alloy wires contract by up to 5% of their length when heated (Kanaani and Kopec, 2016; Yates, 2012).



**Figure 15.** Project named 'Hylozoic Ground' (Yates, 2012)

Smart materials are preferred by designers for people to experience interactive environments and furniture designs in public spaces. In addition to interactive space experiences, smart materials are used to improve the comfort conditions of users and to provide energy efficiency (Akgün, 2020).

### 3. Findings and Discussion

Within the scope of smart space design concept, spaces where smart materials are used; interactive, dynamic, adaptable space features. However, not all of these features exhibited by some smart materials can be perceived by our sense organs. In addition, the examples used by all smart materials are not for sustainable design purposes (Figure 15).

SMART MATERIALS	FEATURES OF SMART SPACE DESIGN			
	INTERACTIVE	SUSTAINABLE	ADAPTABLE	DYNAMIC
Thermochromic mat.	●		●	●
Shape memory alloys	●		●	●
Photoluminescence mat.	●		●	●
Electrooptic mat.	●		●	●
Electrochromic	●	●	●	●
Phase changing mat.	●	●	●	●
Adhesion changing mat.				

**Figure 15.** Smart materials properties that can be detected by our sense organs

Smart materials used to create an interactive interior, provide energy efficiency or/and user comfort interact with the environment or the people with the effect of temperature, light and electrical stimulus. Smart materials exhibit dynamic and adaptive space characteristics by providing visual and thermal comfort depending on the changing conditions of the environment or by changing their properties alternately depending on the temperature and light stimulus in the environment to appeal to our visual sense. It has been observed that only adhesion-changing, phase-changing and electrochromic materials are used in sustainable designs. We cannot perceive the properties of the adhesion changing materials with our sense organs. In addition, Phase changing materials are applied to a matte surface such as gypsum board, the phase change is not noticed, but when applied to a transparent surface such as glass, the phase change is visually noticeable.

#### 4. Conclusion

Today's social, technological and economic changes have affected many fields, including architecture. Increasing population, irreversible destruction of the natural environment by human activities, and limited natural resources have brought the concept of sustainability to the agenda in space design. The concept of smart space design has come to the fore as a result of the change in the expectations and needs of the user, the developments in technology and materials, and the growth of the economy, together with the importance of the concept of sustainability. Smart space design: It can support sustainable design in terms of reducing construction site, increasing the comfort of the user, providing energy efficiency and reducing the use of materials. These spaces can have adaptable space features by adapting to the changing needs of the user, thanks to the smart materials, various technologies and techniques used. Smart spaces can be dynamic as a result of meeting the changing needs and expectations of users with its feature of change and transformation. It can also show an interactive space feature by interacting with the user or its environment. The concept of smart space design shows one or more of the features of sustainable, adaptable, dynamic and interactive space. Although smart materials show all the features of being interactive, adaptable and dynamic, not all properties of materials are perceived by our sense organs. In addition, it has been observed that some of the smart materials groups are used for sustainable design.



When the technologies applied in the concept of smart space design are examined; there is an interaction, dynamism and adaptability between the architectural components and the user by using electromechanical systems or mechanical systems such as hinges, bearings and rails. In smart materials, these properties are realized thanks to the natural abilities of the material. Smart materials have the ability to sense, control and react. It realizes this ability not thanks to sensors, processors and actuators, but because of its natural features. However, when we examine the examples where shape memory alloy materials are applied; sensors, processors and actuators may also be needed depending on the design fiction or the power of the smart materials' ability to respond. The reason for the need to make strong the response capability is because some of the smart materials realize their react on a small scale rather than on a large scale.

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All authors contributed equally to the article. There is no conflict of interest.

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## Universal Design Principles in Boats Interior for Wheelchair Users

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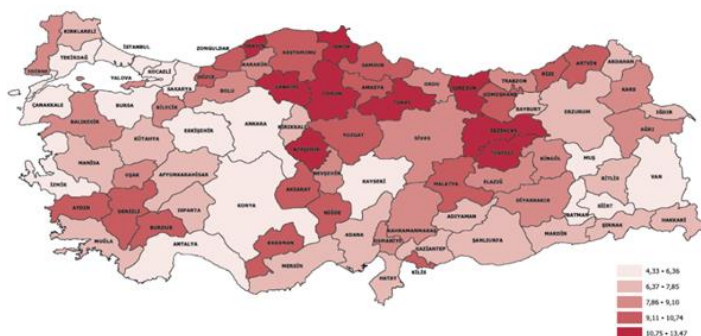
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*“If you are sincerely attached to the sea, it will not hesitate to open the door of heaven on earth for you. You realize that you live like a real human being, apart from billions of people who live like ants, by taking advantage of the blessings of nature. I can't imagine that there can be a lifestyle as effective and satisfying as traveling, seeing, and living with a small sailboat...”*  
 (Sadun Boro)

## **1. Introduction**

When we look at the human environment we live in today, it is seen that the disabled are still ignored, and even physically healthy people face difficulties and consist of non-inclusive designs. As in the world population, the number of physically disabled and wheelchair users in our country is quite high. There are 2.511.950 people registered in the national disability data system in Türkiye (Ministry of Family and Social Services, 2022). On the other hand, 15% of the world's population experiences some form of disability and the disability rate seems to be higher in developing countries (McClain-Nhlapo, 2022). When we look at the disability research data published by TURKSTAT in 2011, it is seen that 2.923.000 people have difficulty carrying things, 2.313.000 people have difficulty in walking, 1.039.000 people have difficulty seeing, and 836.000 people have difficulty in hearing (Ministry of Family and Social Services, 2022). The map, which is colored depending on the number of populations with at least 1 disability in Figure 1, shows that the population suffering from a physical disability is higher in the coastal areas.





**Figure 1.** Percentage of People with Physical Illness in Turkey (General Directorate of Disability and Elderly Services, 2021)

It is a well-known fact that every person lives as a disabled candidate. People must live differently and continue their life with a disability, as some of their organs cannot fulfill their functions in normal people due to reasons such as accidents and diseases, as well as being congenital (Dostoğlu, Şahin, & Taneli, 2009). In retrospect, land vehicles and BC were the oldest means of transportation for the disabled. It is known to have been found in China in 525 BC. During the Romans, the disabled were transported with chairs, and the modern wheelchair, the Bath Chair, was invented by John Dawson in 18th century England. With the industrial revolution, numerous manufacturers have designed electric, and gasoline-powered versions, and over time, they have left their place to the normal cars used today. It is seen that such an accessible design is not sought in water vehicles as in land vehicles. Today, it is seen that traditional yachts are generally designed for the middle-aged male population, and most of them are not suitable even for women, young and old (Cerveira, Fonseca, & Sutherland, 2012). Yachting is an activity that enables the disabled and the elderly to explore the world,

interact with other people, and realize their plans and wishes (Branowski, Zabłocki, Kurczewski & Walczak, 2021). Turkey is a country that has a total of 512 small and medium-sized yacht ateliers that produce even its furniture and ranks 3rd among the mega yacht manufacturer in European countries (Ulay, Çakıcıer & Koç, 2016). It is seen that investments and research for functionality, aesthetics, and economic concerns have increased with the acceptance of yacht design as a specialty in the world since the 20th century (Göksel, 2011). In the beginning part of the introduction, the feelings of Sadun and Oda Boro, the first Turkish sailors who made a world tour with their boats in 1965-1968, are included in the feelings of sailing with a boat at sea.

In this study, the current situation of accessible yacht designs is questioned by emphasizing why this feeling, which is quite human and enjoyable, is not accessible to all people, and those equal opportunities are not provided for people with a passion and curiosity for the sea. The interior features of yacht designs that can be used comfortably, safely, and independently by the disabled are mentioned. Since universal design grasps the concept of accessible design, it was deemed appropriate to examine the study in the context of "wheelchair" users, while examining it in line with the 7 basic principles of inclusive design. As a result of the literature readings, it is seen that yacht design for wheelchair users is not directly mentioned, and such analyzes are included in sailing-type boats in the foreign literature. In order for the reader to understand the subject better, marine vehicles, yacht interior design, and universal design standards are mentioned.

### **1.1. The Aim of the Study**









The study aims to determine the status of 'accessible' boats and to read the universal yacht interior criteria through existing projects. It is aimed to emphasize the importance of this type of marine vehicle to maintain and standardize yacht designs that meet universal criteria. Yacht designs, it is aimed to determine the spatial needs of wheelchair users with physical disabilities through existing projects. The research questions are as follows: "Are there national and international projects for the disabled in yacht design?", "What are the design criteria of yacht interiors with a universal design concept?", "How do yacht interiors with the accessible yacht design label meet these criteria?". Theses, articles, periodicals, indefinite tourism magazines, promotional brochures, and sample projects were used as materials. The yacht interiors examined in the project analysis were accessed from national and international yacht companies.


### **1.2. Limitation of the Study**

Only projects designed for physically disabled and wheelchair users were analyzed in the study. Boats designed for other disabled users are excluded from the scope. However, since suggestions are made on the relationship between boats' interior design criteria and universal design principles, inferences covering all power losses are included. In the literature, single-hull, and double-hull yacht designs between 14-20 meters in length have been reached. Since the main purpose of the study is to reveal the accessibility of private yacht designs, large passenger ships, water tanks, warships, lifeboats, and all other vehicles are

excluded from the scope of the study. Since other boats have diplomatic and commercial functions, it is seen that tailor-made yacht designs have interiors that are more user-oriented, ergonomic, and aesthetic concerns. It has been seen that there are also accessibility concerns in large cruise ships used for tourism purposes, and space adequacy is appropriate in these ships, but it is thought that it would be more appropriate to read the design criteria over personalized marine vehicles in terms of a large number of users and the diversity of the user profile. It has been seen that single-hull and double-hulled yachts between 14-20m in length are preferred in terms of easy applicability during construction, allowing the most accessibility in the interior. Limited data were obtained when yachts were designed directly for wheelchair users or designed considering universal standards through different materials such as magazines, books, articles, and the internet.<sup>16</sup> different yacht projects suitable for wheelchair users worldwide have been reached. Visual and content analysis has been included in only 7 projects in which the interior visuals, physical characteristics, project information, and information about the user being a wheelchair user of the marine vehicle in the sample were obtained. The yacht projects that make up the sample are listed in alphabetical order (Table 1).

**Table 1.** Yacht design projects examined within the scope of the study

Name of Boat	Type of Boat	Interior	Project Information	Physical Properties	Suitable for Wheelchair Use
Artemis	Catamaran	✓	✓	✓	
Blue Boar	Boat	✓	⊗	⊗	General Use
Dolphin III	Yacht	⊗	✓	⊗	
DP15	Yacht	✓	✓	✓	
Dragonfly	Boat	✓	⊗	⊗	General Use
Handi 48	Catamaran	⊗	⊗	✓	
HH44 Open	Catamaran	✓	✓	✓	
Impossible Dream	Catamaran	✓	✓	✓	
Lagoon 620	Catamaran	✓	✓	✓	
River time	Boat	⊗	✓	⊗	
Silver River	Boat	✓	✓	⊗	
The Wish4Fish	Catamaran	⊗	⊗	✓	
Uri	Sailboat	✓	✓	✓	
Wetwheels	Catamaran	⊗	✓	⊗	
Wheelyboat	Boat	⊗	⊗	✓	
Wellabled	Yacht	✓	✓	✓	

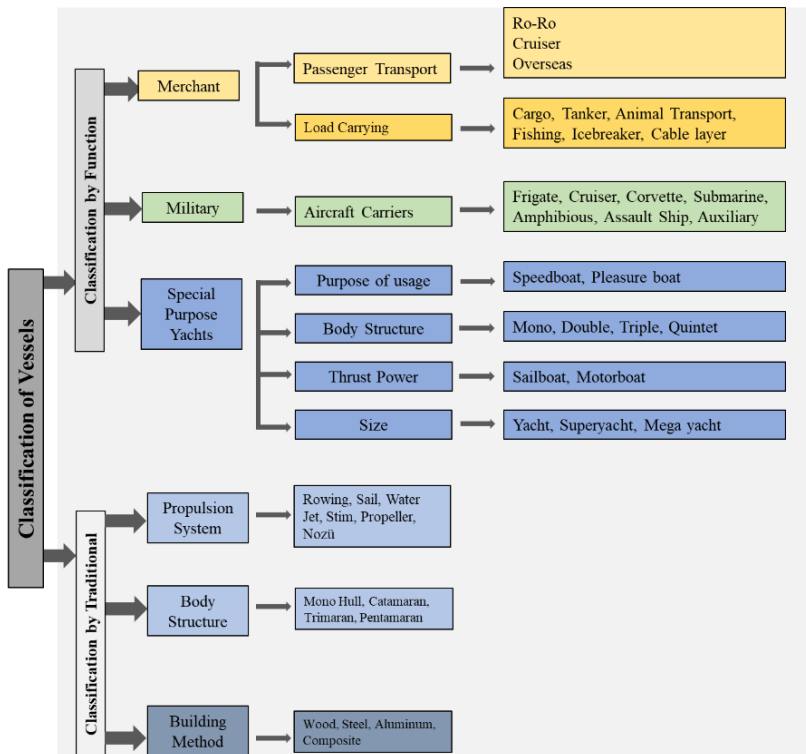
SYMBOLS: ✓ accessed      ⊗ not accessed       wheelchair accessible

## 2. Material and Method

The "linear model path" was followed in the scientific research process. Working on the linear model path includes determining the problem, questioning, separating important concepts, collecting data, evaluating data, explaining, and concluding (Karmasin & Ribing, 2014; Friedrichs,1990). The type of research is included in the qualitative information gathering action research title. Qualitative content analysis was carried out through scientific research on the current project and yacht interior. In the conclusion part, the current and possible problem situations of wheelchair users in the yacht interior were questioned and their solutions were evaluated. The method of the study consists of 4 stages. Initially, the literature on yacht design and universal design principles was reviewed. Secondly, domestic, and international accessible yacht designs were researched, and interior analysis was made. In addition, an unstructured interview method was conducted with the interior architect Şefika Şamlıoğlu, who specializes in yacht design, on "accessible yacht design approaches" in the sector. After the visual and content analysis, the findings and analysis tables are given in the third part. The rate of meeting the physical requirements determined under the universal design principles of the yachts was transferred into numerical data in percentage values in the excel program. Finally, expectations and suggestions about the current situation are mentioned.

## **2.1. Definition and Classification of Boats**

When questioning how the first boats were produced and used, the traces found are based on primitive times (Tokol, 2020). It is known that boats were initially moved by physical force (oar and sail) for military, commercial, and transportation purposes. Over time, it began to be used for different activities such as resting, having fun, and taking a vacation (Larsson and Eliasson, 2000). With the industrial revolution, structural developments such as the use of metal and composite materials instead of wood have been experienced in marine vehicles by making use of machine power (Göksel, 2006). Today, concrete and fiberglass materials are used together with metal materials (Beydoğan, 2021). It is seen that marine vehicles are classified and examined under different headings in the literature. It is classified by parameters such as size, body structure, material, number of bodies, the purpose of use, thrust, longitudinal, production type, etc. (Tokol, 2020; Göksel, 2006; Yıldırım, 2020).

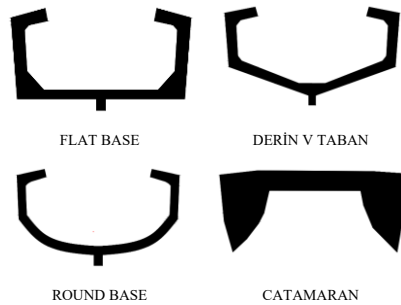


**Figure 2.** Classification of Boats (Yıldırım, 2020)

Yachts, which have a large market among the sub-branches of marine vehicles, are generally used for special purposes and are classified as sailing and motor yachts (Tokol, 2020). Today, yacht design has been accepted as a different discipline since industrial designer Jon Bannenberg started yacht design (Özkuşaksız, 2007). The design limits (dimensions, speed, comfort needs, and materials) of yachts are usually determined by the customer's budget (Yıldırım, 2020). During the physical analysis, it is necessary to correctly place the functional distribution, crew, service areas, entrance and exit, circulation areas, emergency exits, rudder, and engine relationship for the actions to be



taken. When such physical analyzes are done correctly, spatial satisfaction and psychological comfort will be provided correctly (Koçoğlu & Helvacıoğlu, 2016). Although the lengths of the yachts vary between 8m and 49m, their classification is called super beyond 20-24m, mega and giga beyond 35m (Yıldırım, 2020). One of the parameters affecting the yacht interior is the hull form. Body types are examined in 3 groups sliding, displacement, and semi-displacement. One of these types, the sliding hull increases the mobility and maneuverability of the yachts and enables the user to have larger multifunctional spaces in a limited area (Bilal, 2019). The body types are given in the figure.



**Figure 3.** The Body Types of Boats

The catamarans (twin boats) seen in Figure 3 consist of 2 boats connected by a connection and a deck at a certain distance (Çiçek, 2007). When comparing single hull and double hull boats with each other, Tokol (2020) determined that catamarans can enter shallower waters, more space can be gained indoors, and the comfort of life increases further (Tokol, 2020). For example, living areas such as saloons, cockpit areas, and cabins are larger and more numerous in

catamarans. Since catamarans are more stable and easier to balance in the interior, there is less need for handles. Monohull yachts have less stability. For this reason, there are sets on the edges of the horizontal tables to prevent the objects on the interior furniture from slipping and falling and the users from being hit and injured. The corners of the furniture are designed with radius instead of right angles. Furniture designed with light, water-resistant sheet materials that are fixed with glue or different fasteners are preferred against the risks of overloading the balance center and injury during movement (Güler and Ulay, 2010).

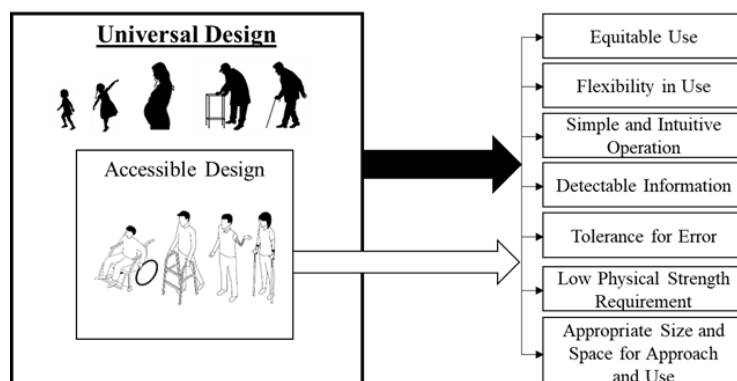
## **2.2. Universal Design Principles and Yacht Interior**

Interiors are living spaces where we spend almost all our time and interact. All living things should have the right to access and experience equal conditions in these habitats. People with physical, mental, or spiritual deficiencies are among the groups that have the most difficulty in being involved in social life. In the literature, the concept of disability is defined as the limitation or complete loss of physical or mental ability due to the deficiency caused by the deterioration of health (Türkmen, 2018). Physically disabled people are examined in 3 groups those with a walking disability, wheelchair dependents, and those with inadequate arms or hands (Iskender, 2015). Wheelchair users discussed within the scope of the study can only move with the help of arm power or with the help of a wheelchair that moves electrically. The types of wheelchairs used are classified as standard type, large wheels in front, small wheels in front, used for sports, arm-wheeled coke, travel seats, electric seats, wheelchairs used for toilet needs, wheelchairs used for

travel, wheelchairs with different functions (Iskender, 2015). The most widely used “Standard Wheeled Seat” is carried by hand turning from the handle attached to the big wheel. The big wheel (61-66 cm) is at the back, and the small wheel (10-30 cm) is at the front. Its dimensions are 40-50 (depth) x 40-62.5 (width) x 81-99 (height) cm (Çağlayan, 2007). The physical environment should also be designed in a way that does not restrict wheelchair users. Universal design is a design concept that provides equality to the users covering the whole scale from the mentioned products to the physical environment. In the literature, universal design is defined as a design approach that makes it possible for everyone to use it regardless of age, gender, skill, culture, or situation (Aközer, 2007). The approach was initially put forward by Ronald L. Mace in the 1980s with some principles and summarized to ensure that the built environment can be easily used by all people without the need for adaptation (Dostoğlu et al, 2009). The normal appearance and feel of the features of the designed physical environment or product, thanks to its user-oriented features, includes all people and ensures the formation of social integrity (Prieser and Smith, 2011). Universal design appeals to all people, not just people with disabilities. At this point, it is the social equality element and performance-based feature that distinguishes universal design from accessible design (Ergenoğlu, 2013). In the universal design approach, “accessibility or accessibility” is integrated into the entire design process, allowing for a better design to be avoided and features that

emphasize the “disabled” adjective that emphasizes the flaw (Ergenoğlu, 2013).

Universal design and accessible design concepts are graphed in figure 4 (Figure 4). 7 principles have been determined so that universal design can be understood and applied more easily in different disciplines (Zeyrek & Güler, 2020). These are equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical strength requirements, and appropriate size and space for approach and use (Burgstahler, 2002).



**Figure 4.** Universal Design and Accessible Design Relationship

To ensure the principle of equitable use, the design must comply with the rules of security and privacy under equal conditions by everyone. For flexibility in use, your design should suit a wide range of individual preferences and abilities (Erten and Aktel, 2020). For simple and intuitive use, it can be used intuitively, and feedback should be provided with minimal effort, without language, knowledge, or experience requirements. For perceptible information, the readability of the basic information for use should be at the highest level, regardless of the

ambient conditions or the sensory abilities of the user. The principle of tolerance for error aims to minimize dangerous and detrimental consequences and to be organized in a sheltered way. It should be used efficiently and comfortably for low physical power requirements and with minimum fatigue (Olguntürk, 2007). Appropriate size and space should be provided, regardless of body size, posture, and mobility standards, to ensure the principle of appropriate size and space for approach and use. Users should be able to access any place they want while sitting or standing, and an unobstructed viewpoint should be provided. Adequate space should be provided for wheelchair users and assistants, considering different hand sizes and strengths (Dostoğlu et al, 2009; Preiser & Smith, 2011).

Structural requirements and certain standards set by Türk Loydu limit the yacht interiors. One of the limitations imposed by the standards is the testing of materials and products in accordance with the International Code of Fire Test Procedures accepted by the Maritime Safety Committee (Yıldırım, 2020; Beydoğan, 2021). The criteria required for the design of yacht interiors are "quality of use, suitability for climate, number of passengers, customer requests, distribution of open and closed spaces, distribution depending on the center of gravity, compliance with ergonomic qualities, dimensional adequacy (area-volume), functionality, thermal comfort, heat, sound, fire insulation, vibration, psychological comfort adequacy, technical security needs, social needs, visual comfort adequacy, lighting decisions"(Arslan, 2010). One of the structural limitations is that the interior spaces of

marine vehicles consist of convex, inclined surfaces. Curved surfaces directly affect the forms, dimensions, and functions of indoor furniture. Yacht interior furniture should be aesthetic, ergonomic, suitable for the anthropometry of all people, and functional. Since yacht interior furniture and materials make up 20% of the total cost, longevity should also be taken into consideration (Ulay et al, 2016: SGM, 2013). The units in the yacht interior can be divided into groups such as working, living, navigation, and service areas (Bilal, 2019). Working areas are engine rooms and technical rooms; living areas consist of social areas such as cabins, offices, wet areas, and living rooms; navigation areas consist of radar and radio rooms, and service areas consist of spaces such as kitchens, warehouses, and cellars (Yıldırım, 2020). Since yachts are a living environment that offers comfort to people, these spaces should be arranged in a way that embraces all people with a universal design approach (Ruddiman, Moody & McCartan, 2014). In this part of the study, standards such as TS 12576, TS 9111, and ADA, the data obtained from the literature review on national and international articles, and the universal requirements for wheelchair users in the yacht interior will be discussed. Within the scope of the study, the spaces are examined as kitchen, living area, WC-bathroom, deck, cabin, technical room, and circulation areas.

### **3. Findings and Discussion**

In this study, single-hull, and double-hull private yacht designs between 14-20m in length, created with international universal design criteria, are examined. Looking at the international projects, it is seen

that the first yacht designed for accessibility and wheelchair users is in our country. 4 different catamaran projects, 1 sailboat and 2 yacht designs have been specially produced for wheelchair users.

### 3.1. Impossible Dream

It is a fully wheelchair-accessible sailing cabin. It was designed in 2002 by yacht designer Nic Bailey for wheelchair user Mike Browne. Structural integrity, safety, and security come to the fore during the construction phase of the cabin. There are numerous controllable automation systems inside the boat and accessible buttons to control these systems (Figure 5). It is approximately 18.3 meters (60 ft) long, has a carbon fiber body type, a displacement of 15 tons, 4 cabins, and is powered by a string engine (Impossible Dream, n.d.).



**Figure 5.** Impossible Dream's Deck and Body Type (Impossible Dream, n.d.)

The catamaran can be controlled by the wheelchair user on the deck and has access to all spaces. The wheelchair user can sit on one of the two specially designed modern helmsman's seats on the deck. These seats are made of carbon fiber and move easily from port to starboard along a curved track, allowing for sail lift, trim, navigation, and steering access (Figure 6).



**Figure 6.** Impossible Dream's Rudder (Impossible Dream, n.d.)

The catamaran has a single-level deck and a handrail around the side that continues between the spaces, which also adds to the aesthetic qualities. While the handrail adds an aesthetic value to the deck, it also ensures that the wheelchair user can maneuver comfortably and stay in balance by holding on throughout the circulation (Figure 6).



**Figure 7.** Impossible Dream's Circulation Area (Impossible Dream, n.d)

Both cabins of the catamaran are designed for wheelchair access and can be accessed when needed. Modern metallic drum sliding doors of appropriate width separate each cabin from the other. Each body has a hood accessible via a sliding door, and even the toilet seats are made of carbon fiber. There is an external rudder position on both sides of the boat and these cabins are also wheelchair accessible. All control functions are duplicated so that every station is the same. The deckhouse is glass-enclosed and provides 360-degree visibility (Figure 8).





**Figure 8.** Impossible Dream's Control Functions (Impossible Dream, n.d.)

Surrounding the deckhouse, a bridge-like 'racetrack' was created, rising towards the bow, and providing shelter for the fenders. Due to this space, a sailor in a wheelchair can move freely around the boat from the bow to the back. The seats at the helm are mounted on a travel rail that can be locked in place. This gives the helmsman access to all tools and both main winches while preventing uncontrolled movement while cruising in bad weather conditions (Figure 9).



**Figure 9.** Impossible Dream's Rail and Handrail (Impossible Dream, n.d.)

The bedrooms in the cabins are located below the deck area. An elevator in each hull provides full wheelchair access to the cabins and below-deck areas. The two cabins at the rear have very low roofs. The floor material has been chosen as suitable for wheelchair use for maneuvers and transitions (Figure 10).



**Figure 10.** Impossible Dream's Cabins and Living Room (Impossible Dream, n.d.)

Below deck, there are two internal lifts providing wheelchair access and two external lifts providing access to the harbor. A hydraulic roller crane mechanism was used to lift the wheelchair. Lift platforms outside the boat are located behind hinged hull panels that can swivel when docked or manually lock into place while underway (Figure 11).



**Figure 11.** Impossible Dream's Hydraulic Roller (Impossible Dream, n.d.)

The design purpose of the catamaran is stated as increasing the awareness of barrier-free design and improving the quality of life of people with disabilities through sailing. It not only provides the wheelchair user with cruising pleasure but also allows them to experience all the activities related to yachtings such as controlling the catamaran, sailing, berthing, mooring, and maintenance.

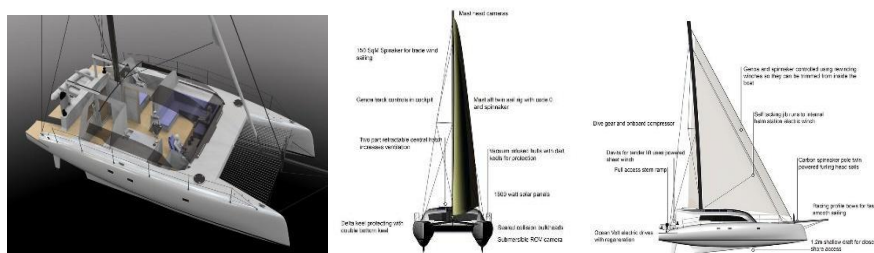
### 3.2. Artemis

Built by Multimarine for wheelchair user Tom Hughes, 'Artemis' is a sailboat with a fully wheelchair-accessible diving platform. It is a fully wheelchair-accessible high-performance catamaran with a state-of-the-art sail configuration (Figure 12).



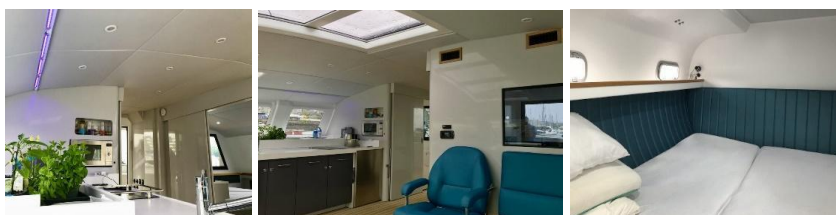
**Figure 12.** Artemis Deck (Multihull Centre, n.d.)

It can also work as a diving platform, as Tom Hughes gives scuba diving lessons to other wheelchair users on board. There is room for 8 crew on board. It is approximately 16m long and the sail can be controlled with one hand (Figure 13).



**Figure 13.** Artemis Body Type (Multihull Centre, n.d.)

Suitable openings are left for wheelchair maneuvers in the living areas indoors. A small kitchen has been created just behind the helm. Living areas are also associated with the small kitchen (Figure 14).



**Figure 14.** Artemis Living Area and Kitchen (Multihull Centre, n.d.)

A detachable seat is designed for use with wheelchairs in the helm area. If necessary, the wheelchair user can control the boat (Figure 15).



**Figure 15.** Artemis's Wheelchair Accessible Deck (Multihull Centre, n.d.)

### 3.3. DP15 Desiderata

It is a 15 meters long yacht with a displacement of 15 tons, built with a composite foam sandwich. Designed and manufactured by Derrick Reynolds for wheelchair users Paul and Pauline Scholey. It has a length of 14.95 meters. All doors in the interior of the boat are sliding and the widths are determined by considering ergonomic dimensions (Figure 16).



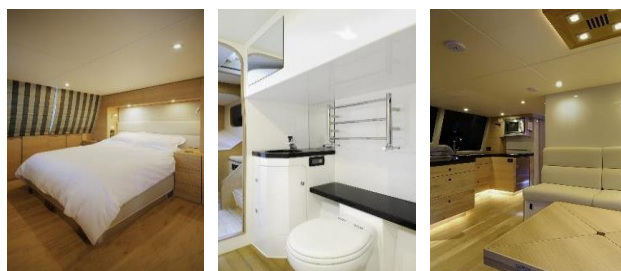
**Figure 16.** DP15's Body Type (Multihull Centre, n.d.)

There is a sitting and dining table in the living area, which is surrounded by glass, which provides a 180-degree panoramic view, which is designated as the living room. There is a hydraulic gangway for wheelchairs on the back deck of the boat. In this way, the user can go down to the water level with a chair and swim. The kitchen is level with the deck and in a spacious area. Only electric stoves and grill are used here, gas stoves are not preferred for safety reasons. The sitting area has also been solved together with the deck, thus creating a more social and intimate environment (Figure 17).



**Figure 17.** DP15's Deck and Living Area (Multihull Centre, n.d.)

There is no information that the furniture used in living areas and cabins is specially produced for wheelchair users. In wet areas, door sills and support handles are not included on the surfaces. It can be read from the visuals that the cabinet doors are used with a lock system against opening and sharp corners are not included (Figure 18).



**Figure 18.** DP15's Cabins and Bathroom (Multihull Centre, n.d.)



### 3.4. Well-abled

Wellabled is the first yacht specially built for wheelchair users in the world. Built by the Montana yacht design office for businessperson Tunç Tonger, the yacht is 19 m long and 5.5 m wide. The lower and upper hulls of the boat are made of steel. There are 1 VIP, 2 guest cabins, and 2 crew cabins in the interior of the yacht. The boat has a fuel capacity of 4 tons, a clean water capacity of 4 tons, and a gray and dirty water capacity of 2.5 tons. A person in a wheelchair can easily reach every place except the kitchen, from the beginning of the yacht to the very back, from the top floor to the bottom deck (Figure 19).



**Figure 19.** Well-abled Body Type and Rail System (Cohh Yacht, n.d.)

All systems inside the yacht (seating, sleeping units, toilets, and bathrooms) can be managed via a tablet. It has also been considered that the system can operate manually in case the automation system fails. There is a jacuzzi working with seawater on the yacht. In addition, the boat is environmentally friendly because it uses solar and winds energy. Since the yacht is intended for people with disabilities, it is aimed to ensure that its speed is not too high, so that it can cruise with torque, slow speed, and stability, and accelerate to a maximum of 8 miles. All doors and cabins in the interior are designed to be at least 90 cm so that they can be passed by wheelchairs. Hydraulic systems that allow the

wheelchair user to reach the boat deck from the pier and descend one meter below the water when desired and elevator systems that can reach the top deck from the lowest deck are used. All cabins and main doors are designed to be fully wheelchair accessible. All industrial products (furniture, lighting, electronic equipment, etc.) in the interior are designed for the disabled (Figure 20).



**Figure 20.** Well-abled Deck and Interior (Akasia Yachting, n.d.)

On the ground floor of the yacht, there are 3 bedrooms for the disabled (one VIP and 2 guest rooms). All rooms can be controlled by an autonomous system. It is equipped with touchpads to control lighting, sound, HVAC system, and even doors. Each floor has a portable karaoke machine and a sound system. There are a total of 5 beds in the master bedroom and crew rest areas, all of which are mobile hospital beds. Beds are 50 cm high from the floor to the top of the mattress (Figure 21).



**Figure 21.** Well-abled Cabin and Interior (Akasia Yachting, n.d.)

Hydraulic systems are integrated into the living areas for comfortable sitting and standing on the seats. Accessible products are also used in wet areas. All rooms have grab bars, roll-up washbasin, and a shower cabin in the bathroom for disabled guests. The height of the mirror can be adjusted according to the guest. Upholstery, floor, and wall coverings are selected from Lloyd-approved fire-resistant, antibacterial materials. There are types of equipment such as a manual elevator system, alarm buttons, and fire extinguishing system for crisis moments in the bathroom and cabins. For security and peace of mind, panic buttons are placed in every room of the yacht in case guests need any help. There is a seating area for six people in the main hall and the height of the table can be adjusted electronically. All other tables can be adjusted manually. Since there is an electronic rudder on the deck, there are 2 cockpits designed for disabled guests to drive. Not only is the kitchen accessible, but an auxiliary element is also considered here. Therefore, bench heights, bases, and safety measures suitable for wheelchair users are not only seen in the kitchen (Figure 22).



**Figure 22.** Well-abled Bathroom and Kitchen (Cohh Yacht, n.d.)

It is stated that the Well-abled yacht project aims to reveal all the needs of people with disabilities, related to marine life, and to realize socially responsible designs and productions by feeding them.



### 3.5. HH Catamaran 44

She was built by Mike Wood, who has also been physically disabled since 1978, at the HH Catamaran Company, considering the physically disabled people between the ages of 5-25, who use wheelchairs as part of a social responsibility project. She has been designed so that people with any physical disabilities can enter all spaces as both passengers and captains and experience maritime fully. She is a fiberglass multi-hull yacht with a total length of 15.15 meters (Figure 22).



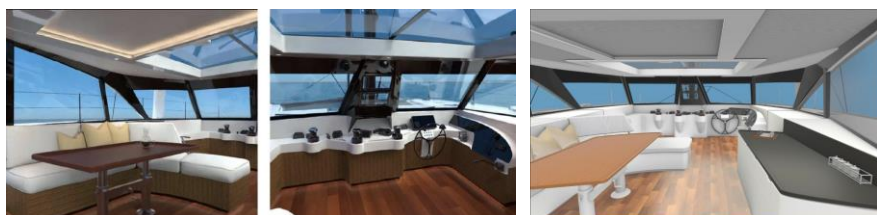
**Figure 23.** HH Catamaran 44's Body Type (HH Catamarans, 2022)

While sitting at the helm, 360-degree visibility is provided, and all controls are within arm's reach of the person sitting at the helm. Movement restriction is prevented in all places. It is aimed to reach everywhere by wheelchair, disabled people with limited use of their limbs, smaller hands than normal and short stature are also taken into consideration. Lift systems and elevators were preferred to ensure the circulation of wheelchair users between the spaces and to transfer them to another seating element (Figure 24).



**Figure 24.** HH Catamaran 44's Deck and Rudder (HH Catamarans, 2022)

It has access to all control keys where 10 people can easily fit on the yacht and 4 wheelchair users can control the yacht side by side at the helm. The living area, kitchen, and rudder are solved in the same space. The living area includes a dining table and sitting corner. There is no fixed captain's seat at the helm, but proper knee room for the wheelchair user has not been considered. The edges of the cabinets in the kitchen area are no sharp corners, folding sinks are used. It is stated that providing full access to all parts of the yacht increases the number of members of the Disabled Yachting Association group, a social organization in the USA. These activities, which are carried out within the scope of the social responsibility project, lead people who cope with enough restrictions in their lives to feel freer to discover their talents, potential, and their place in the world (Figure 25).



**Figure 25.** HH Catamaran 44's Interior (HH Catamarans, 2022)

### 3.6. URI Sailboat

The Uri is a motor sailboat designed by Itay Simhony in 1992 for the use of a wheelchair-bound paraplegic. The yacht has two bedrooms, a glazed deck, a kitchen dissolved together, a lounge, and sun terraces. The yacht can be used comfortably for 4-6 people in total. The yacht is 16.43 m long, and her hull is aluminum. The living area, the helm, and the kitchen are resolved together. All places, including the technical room, can be entered with a wheelchair (Figure 26).



**Figure 26.** URI's Technical Room and Living Area (Wheelchair Sailing, n.d.)

Considering the access from the pier to the yacht, hydraulic crane systems that can be used easily while getting on and off are included. The controls for controlling the crane are located at a height within the reach of a seated person. A hydraulic winch system is also included in the interior to provide access to the cabins from the deck. Modular solutions are provided in the bathroom, threshold differences and quota are not included, and support bars are placed at appropriate heights. Fire extinguishing, panic buttons, and both regional and general lighting are included in the bathroom. Different storage rooms have been designed for wheelchairs, bicycles, and diving equipment. Structural analyzes were also carried out to provide extra stability and the low heel angle at sea (Figure 27).



**Figure 27.** URI's Lift Systems and Bathroom (Wheelchair Sailing, n.d.)

In the cabins, access to the bed is provided from at least 2 ends for easy maneuvering. The wheelchair user can easily reach the bed by using the support rope on the ceiling. There is a foot space on the captain's table at the helm, all electronic equipment is fixed to the furniture and the furniture is fixed to the floor. For the kitchen, there is a small counter and a mini-oven, refrigerator. Although there is no access to the back of the counter, the oven and refrigerator can be used easily from the front surface (Figure 28).



**Figure 28.** URI's Cabin, Rudder, and Kitchen (Wheelchair Sailing, n.d.)

### 3.7. LAGOON 620

The catamaran built- in 2011 is 18.90 m in length and waterproof, polyester resin balsa sandwich panels are used as the deck material. The catamaran is adapted for the physically disabled owner. She has a total

of 5 cabins, an electric ramp, and a private stair lift. Thus, wheelchair access can be provided to the entire boat, including the pier (Figure 29).



**Figure 29.** Lagoon 620's Deck and Lift System (Bahamas Catamaran, n.d.)

In the interior living area, the kitchen, the dining area, and the rudder are designed together. The hull area of the yacht is 50.67 m<sup>2</sup>, the living area and kitchen are 17.3 m<sup>2</sup> in total, and the deck area is 20 m<sup>2</sup>. Fixed furniture has been placed in consideration of the maneuver dimensions required for circulation. Adequate door widths were taken into account for the passage to the deck, and threshold differences were tried to be avoided. The bathroom and toilet are solved in a very small square meter. Here, the toilet bowl and the shower head are fixed together, and the toilet chair and grab bars are included (Figure 30).



**Figure 30.** Lagoon 620's Kitchen, Bathroom and Deck (Bahamas Catamaran, n.d.)

There are seated stair lifts that provide access from the deck to the cabins. Beds in guest cabins are accessible from a single surface.

Thanks to the support ropes suspended from the ceiling, the user can get out of the bed and access his wheelchair without an assistant. In the main cabin, there are autonomous systems and panic buttons for emergencies. Access to the bed is provided from 2 different surfaces (Figure 31).



**Figure 31.** Lagoon 620's Lift System in Interior (Bahamas Catamaran, n.d.)

The physical requirements associated with the universal design principles of 7 different yachts were determined as samples were determined and analyzed (Figure 32).

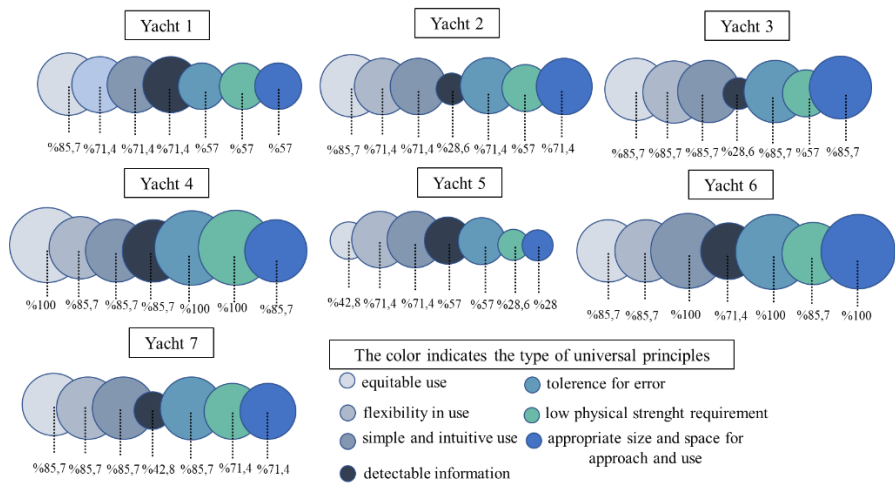


Universal Design Principles				Yacht 1	Yacht 2	Yacht 3	Yacht 4	Yacht 5	Yacht 6	Yacht 7
<b>1. EQUITABLE USE</b>										
a. Kitchen is wheelchair accessible and usable										
b. Living room is wheelchair accessible and usable										
c. WC is wheelchair accessible and usable										
d. Deck is wheelchair accessible and usable										
e. Cabin is wheelchair accessible and usable										
f. Technical room is wheelchair accessible and usable										
g. Circulation areas is wheelchair accessible and usable										
<b>2. FLEXIBILITY IN USE</b>										
a. There are solutions that reduce the loss of space in the kitchen.										
b. There are modular and flexible seating units in the living room.										
c. There are flexible modular units in the WC and bathroom area.										
d. There are adjustable seats and rudder systems on the deck.										
e. There are beds and wardrobes suitable for flexible use in the cabins.										
f. There are solutions to prevent mistakes in the technical room.										
g. There are solutions that enable movement in circulation areas.										
<b>3. SIMPLE AND INTUITIVE OPERATION</b>										
a. Electronic systems in the kitchen can be used simply.										
b. Unnecessary complexity and obstacles in the living space are avoided.										
c. Electronic and plumbing systems in the WC can be used simply.										
d. All kind of systems in the deck can be used simply.										
e. All kind of systems in the cabins can be used simply.										
f. All kind of systems in the technical room can be used simply.										
g. All kind of systems in the circulation areas can be used simply.										
<b>4. DETECTABLE INFORMATION</b>										
a. There are necessary warning and guidance information in the kitchen.										
b. There is routing information in the living areas.										
c. There are panic buttons and warning signs in the WC and bathroom areas.										
d. There are information about detectable systems on the deck.										
e. There are panic buttons and telephones on the cabins.										
f. There are information about warning and fire systems on the tech. room.										
g. There are two different senses perceptible warning and direction in circulation areas.										
<b>5. TOLERANCE FOR ERROR</b>										
a. Kitchen cabinets have lock systems and electric stoves.										
b. In living areas, furniture is placed in such a way that it does not create obstacles.										
c. In bathrooms and WC precautions were taken against falling.										
d. Precautions have been taken against physical injuries on the deck.										
e. There are fasteners and holders on the cabinet doors in the cabins.										
f. Precautions have been taken to prevent injuries in the technical room.										
g. Threshold differences in circulation areas are prevented.										
<b>6. LOW PHYSICAL STRENGTH REQUIREMENT</b>										
a. Autonomous systems are included in the kitchen										
b. It is possible to move around with minimum effort in the living area.										
c. Wheelchair users can meet and access their own needs without assistance in WC.										
d. All the other equipment on the deck are moved with a maximum force of 22N.										
e. There are solutions that make it easier to get out of bed or lie down in the cabins.										
f. The technical room can be accessed and intervened by the lift system.										
g. Lift systems were used in the circulation area and non-slip floor material was chosen.										
<b>7. APPROPRIATE SIZE AND SPACE FOR APPROACH AND USE</b>										
a. Knee space is provided on kitchen counters and adjustable counter height is considered.										
b. The seating in the living area are designed in such a way that the wheelchair can be adapted.										
c. The maneuvering diameter required for the wheelchair is taken into account in WC and bathroom										
d. There is knee space on the captain's table on the deck.										
e. At least 2 corners of the beds are wheelchair accessible.										
f. The technical room is spatially suitable for wheelchair users.										
g. Sufficient passage distances have been established in the circulation area.										

Figure 32. Analysis Table

In Figure 32, the conditions for meeting the physical requirements determined under the universal design principles for each space of the 7 yachts that make up the sample are given. Under each of the 7 universal design principles, design criteria for 7 different spaces were determined and marked on the analysis table. When all the examples are examined, it is seen that the solutions that enable the wheelchair user to be present in the space with optimum facilities are presented. For the principle of "equitable use", all spaces are accessible by wheelchair, for the principle of "flexibility in use", reducing space loss in the spaces and producing solutions for this, for the principle of "simple and intuitive use", easy use of all spaces and equipment, for the principle of "detectable information" presence of necessary warnings and panic buttons in the space, taking all kinds of precautions against injury and accidents for the "tolerance for error", autonomous systems for the "low physical strength requirement" principle, physical power requirement below 22N if manual systems are to be used, approach and necessary spatial analyzes should be made by taking into account the maneuvering diameter of the wheelchair in order to ensure the principle of "appropriate size and space for approach and use". The frequency of meeting the universal design principles of each yacht constituting the sample is plotted in Figure 33 (Figure 33).





**Figure 33.** Frequency Plot

Impossible Dream (yacht 1) meets 85.7% of the principle of “equitable use”, “flexibility in use” and 71.4% of the principles of “simple and intuitive use”. And also meets 57% of the principles of “detectable information”, “tolerance for error”, “low physical strength requirement”, and “appropriate size and space for approach and use”. Artemis (yacht 2) adopted the principle of “equitable use” at a rate of 85.7%, “flexibility in use”, “simple and intuitive use”, “tolerance for error”, the principles of “appropriate size and space for approach and use”, “detectable information” criteria at 71%, and “low physical strength requirement” meets at 57% rate. Artemis (yacht 2) meets the principle of “equitable use” by 85.7%. It meets the principles of “flexibility in use”, “simple and intuitive use”, “tolerance for error”, “appropriate size and space for approach and use” by 71%. It meets the “detectable information” criterion by 28% and the “low physical strength requirement” by 57%. The DP 15 (yacht 3) meets the

“detectable information” criterion by 28%, “the low physical strength requirement” by 57%, and all the remaining principles by 85%. Wellabled (yacht 4) only meets the criteria of “flexibility in use”, “detectable information”, “appropriate size and space for approach and use” 85%, while it meets 100% of the other criteria. The HH Catamaran (yacht 5) meets the principles of “equitable use” 43%, “flexible use” and “simple and intuitive use” 71%, “detectable information”, “tolerance for error” 57%, “low physical strength and appropriate size and space” principles 28%. The URI (yacht 6) meets all the requirements of “simple and intuitive use”, “tolerance for error”, and “appropriate size and space” principles. Lagoon (yacht 7) meets the criteria of “equitable use”, “flexibility in use”, “simple and intuitive use”, “tolerance for error” 85%, “low physical strength requirement”, “appropriate size and space” criteria 71%, “detectable information” 43% criteria.

While wheelchair accessibility to the living area and deck is provided on all yachts under the title of equitable use, only 2 yachts meet the technical room accessibility criterion. The fact that the structural and economic limitations in the living area and deck areas are less than in the technical room, ensures that the physical requirements are met more easily than other spaces. The frequency of meeting the physical requirements determined under the universal design principles is graphed in Figure 34 (Figure 34).

Universal Design Principles									
<b>1. EQUITABLE USE</b>									
a.	Kitchen is wheelchair accessible and usable								% Percentile
									71.4%
b.	Living room is wheelchair accessible and usable								42.80%
									100,00%
c.	Wc is wheelchair accessible and usable								85.7%
									100,00%
d.	Deck is wheelchair accessible and usable								100,00%
e.	Cabin is wheelchair accessible and usable								85.7%
									28.5%
f.	Technical room is wheelchair accessible and usable								100,00%
g.	Circulation area is wheelchair accessible and usable								100,00%
<b>2. FLEXIBILITY IN USE</b>									
a.	There are solutions that reduce the loss of space in the kitchen.								% Percentile
									42.80%
b.	There are modular and flexible seating units in the living room.								100,00%
c.	There are flexible modular units in the WC and bathroom area.								71.40%
d.	There are adjustable seats and rudder systems on the deck.								100,00%
e.	There are beds and wardrobes suitable for flexible use in the cabins.								100,00%
f.	There are solutions to prevent mistakes in the technical room.								42.80%
g.	There are solutions that enable movement in circulation areas.								100,00%
<b>3. SIMPLE AND INTUITIVE OPERATION</b>									
a.	Electronic systems in the kitchen can be used simply.								% Percentile
									71.40%
b.	Unnecessary complexity and obstacles in the living space are avoided.								100,00%
c.	Electronic and plumbing systems in the WC can be used simply.								71.40%
d.	All kind of systems in the deck can be used simply.								100,00%
e.	All kind of systems in the cabins can be used simply.								100,00%
f.	All kind of systems in the technical room can be used simply.								28.50%
g.	All kind of systems in the circulation areas can be used simply.								100,00%
<b>4. DETECTABLE INFORMATION</b>									
a.	There are necessary warning and guidance information in the kitchen.								% Percentile
									42.80%
b.	There is routing information in the living areas.								57.10%
c.	There are panic buttons and warning signs in the WC and bathroom areas.								71.40%
d.	There are information about detectable systems on the deck.								85.70%
e.	There are panic buttons and telephones on the cabins.								71.40%
f.	There are information about warning and fire systems on the tech. room.								28.50%
g.	There are two different senses perceptible warning and direction in circulation areas.								28.50%
<b>5. TOLERANCE FOR ERROR</b>									
a.	Kitchen cabinets have lock systems and electric stoves.								% Percentile
									85.70%
b.	In living areas, furniture is placed in such a way that it does not create obstacles.								71.40%
c.	In bathrooms and WC precautions were taken against falling.								57.10%
d.	Precautions have been taken against physical injuries on the deck.								100,00%
e.	There are fasteners and holders on the cabinet doors in the cabins.								85.70%
f.	Precautions have been taken to prevent injuries in the technical room.								28.50%
g.	Threshold differences in circulation areas are prevented.								100,00%
<b>6. LOW PHYSICAL STRENGTH REQUIREMENT</b>									
a.	Autonomous systems are included in the kitchen								% Percentile
									14.20%
b.	It is possible to move around with minimum effort in the living area.								100,00%
c.	Wheelchair users can meet and access their own needs without assistance in WC.								85.70%
d.	All the other equipment on the deck are moved with a maximum force of 22N.								100,00%
e.	There are solutions that make it easier to get out of bed or lie down in the cabins.								57.10%
f.	The technical room can be accessed and intervened by the lift system.								28.50%
g.	Lift systems were used in the circulation area and non-slip floor material was chosen.								71.40%
<b>7. APPROPRIATE SIZE AND SPACE FOR APPROACH AND USE</b>									
a.	Knee space is provided on kitchen counters and adjustable counter height is considered.								% Percentile
									57.10%
b.	The seating in the living area are designed in such a way that the wheelchair can be adapted.								100,00%
c.	The maneuvering diameter required for the wheelchair is taken into account in Wc and bathroom								57.10%
d.	There is knee space on the captain's table on the deck.								85.70%
e.	At least 2 corners of the beds are wheelchair accessible.								71.40%
f.	The technical room is spatially suitable for wheelchair users.								28.50%
g.	Sufficient passage distances have been established in the circulation area.								100,00%

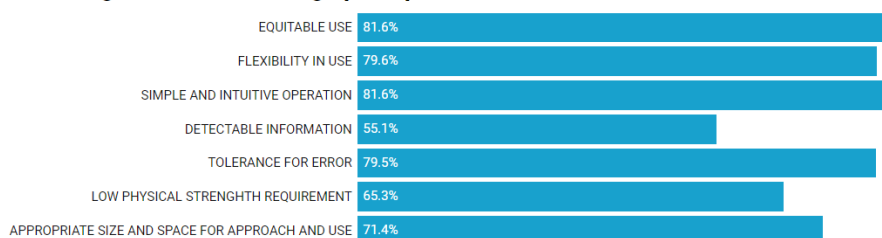
**Figure 34.** Frequency of Meeting Physical Requirements

It is seen that the main reason for the wheelchair user's inability to access the technical room is due to the lack of hydraulic, lift systems and the insufficient size of the space. All yachts in the sample meet physical requirements such as the use of flexible modular units in living areas, adaptable seating and rail system on the deck, beds and cabinets for flexible use in cabins, and solutions that facilitate movement in

circulation areas, under the principle of “flexibility in use”. Under the principle of “simple and intuitive use”, the criteria of avoiding unnecessary complexity and obstacles in the living area, easy use of all systems in the deck, cabin and circulation areas are met on all yachts. None of the items covered by the “detectable information” principle were met by all yachts. The requirements of the “detectable information” principle include measures that require technical and knowledge, such as warnings and notifications that appeal to at least 2 senses. The main reason why these needs are not met is the ignorance of the disabled people who have lost other abilities such as seeing and hearing, and the insufficient level of awareness on the subject. Requirements such as placing the furniture in the living area in a way that does not create obstacles, taking precautions against physical injuries on the deck, and absence of threshold differences in the circulation areas are met by all yachts within the scope of the principle of “tolerance for error”. Within the scope of the principle of “low physical strength requirement”, physical requirements such as being able to move in living spaces with minimum effort, meeting the needs of wheelchair users in wet areas without assistance, carrying the equipment on the deck easily, requiring a maximum force of 22 N are also met on all yachts. All yachts meet the requirements that the seating elements in the living area are designed in such a way that the wheelchair user can adapt, and that there are sufficient passage areas in the circulation area, within the scope of the principle of “appropriate size and space for approach and use”. When examined according to the

physical requirements determined under all principles, it is seen that the principles of "equitable use" and "simple and intuitive use" are provided with a maximum rate of 81.6% (Figure 35). "Flexibility in use" and "tolerance for error" principles 79.5%; "appropriate size and space for approach and use" criterion 71.4%; "low physical strength requirement" criterion was 65.3%; The "detectable information" criterion is met at a rate of 48.9%.

#### Percentage of universal design principles



**Figure 35.** Percentage of Universal Design Principles

Detectable information requires the highest level of readable information to be provided, regardless of the user's sensory abilities. It is thought that the main reason why this criterion is at least met is due to the fact that information is transmitted in at least 2 different sensory ways in the yacht interiors, and that warning and guide documents, panic buttons and warning signs are ignored in the spaces. It is seen that these systems are provided in large-scale tourist ships that are not dependent on economic and systemic limitations.

## 4. Conclusion and Suggestions

Yacht design emerges as a new discipline that requires expertise. Having designers and production capacity specialized in yacht design has a positive impact on the country's economy. Although most healthy

people are taken into consideration during the design process, there is not much financial necessity to design under universal design criteria. Designing the yachts with a universal design approach in the first process provides savings in terms of both time and cost; this will ensure that major changes are not required. It is thought that yacht designs mostly appeal to the upper economic level and are made for healthy individuals. There are very limited examples that are accessible at the international level and designed with a universal design approach. When it is thought that everyone struggles with physical disability at a certain period of their life, it is more clearly understood that universal design is not an option but a fundamental right and a necessary practice. Within the scope of the study, the 7 principles of universal design were analyzed within the scope of physical requirements in the kitchen, living area, wet area, deck, cabin, technical room, and circulation areas in the yacht interiors. When these requirements are examined through the 7 different yacht projects that make up the sample, it is seen that certain universal design principles are met at a higher rate, while some of them are less met and ignored.

It has been observed that the physical requirements of the principles of "equitable use" and "simple and intuitive use" are mostly met in the yacht interiors that make up the sample. Since these countries are not very dependent on economic and structural constraints, applicability is thought to be easier. The selection of the right furniture in the yacht interiors and the functional organization provided in the space easily ensure that the "equitable" and "simple and intuitive" usage principles

are met. The principles of "flexibility in use", "tolerance for error", "appropriate size and space for approach and use", "low physical strength requirement" are met on average, respectively. In the data obtained as a result of the analysis, "detectable information" was the least met principle.

Due to economic and systemic limitations, it is insufficient to meet the requirements of this criterion. It seems that it is easier to provide principles related to physical needs that are not dependent on structural limitations. These principles are, respectively, equitable use, simple and intuitive, flexibility in use and tolerance for error. It is seen that the yacht design is done differently from the current ergonomic and anthropometric standards due to certain structural constraints.

However, it should be expected that these places, which are relatively called "luxury", have, and offer the most comfortable, convenient, sustainable, and timeless amenities for all people.

A yacht designed with a universal design approach will provide maximum efficiency and comfort not only for a user with a physical disability, but also for a healthy yacht user. The original aspect of this study is the determination of yacht design criteria with universal criteria and the analysis of these criteria over existing projects. It is thought that it is necessary to create new standards by integrating universal design principles with yacht design standards, and to work by considering these new standards created both in academic studies and in the yacht production sector, and to raise awareness on the subject.

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All authors contributed equally to the article.



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## Spatial Analysis of The Change in A Public Housing in Isparta

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## 1. Introduction

The changes in communities converted housing phenomena into a problem from time to time, while they also brought the subject to a solution producing activity both for the user and the supplier. Technological, social, cultural and economic transformations in history till today affected the communities and also changed the presentation of the houses. House with its surrounding environment is a crucial study area, which should be studied in a multidisciplinary perspective for making appropriate interpretations about the history of the communities.

Özüekren (1996) analysed the housing cooperatives in Turkey regarding the differences in the spatial organisation of the house and its enclosure and classified them into three periods. The first period contains detached houses with gardens, the second one has housing blocks that replaced the houses with gardens, which had been built according to garden-city concept once, while the third one has mass housing projects built with housing cooperatives (Özüekren, 1996). On the other hand, Keleş (1967) classified housing cooperatives into three main categories in terms of economic, technical and social benefits both to the members of the cooperative and to the rest of the community. The common property of these three main categories is to create a healthy environment in cities with balancing different income groups, ensuring sustainability with a collective understanding.

Housing cooperatives constitute the second type of house-supplying practice except for personal housing activities in the history of housing in Turkey (Tekeli, 2012). The earliest example is “Bahçeli Evler Konut Kooperatifi (Housing cooperative for housings with gardens)” which was established in 1935 in Ankara and submitted housings to 169 members in 1938. Although the housing cooperatives were realised for solving the housing needs of low-income people in European context, Bahçeli Evler case consisted of members with high-income bureaucrats (Tekeli, 2012). It was a practice to produce solutions for the shortage of housing appeared in Ankara and to ensure housings especially to the civil servants working for the government. It was not able to sustain its existence since the ownership of houses and plots could not stay belonging to the cooperative (Keleş, 1983). The presentation style that was produced with Bahçeli Evler cooperation belonging to civil servant groups gave its place to the organisations composed of insured workers in the following years. The cooperative system emerged in Ankara as a project for civil servants i.e. upper class of the society, in contrast to the practice in Western context, lead cooperative housings gain luxurious characteristics beyond being tools for supporting house-ownerships rather than social housings (Özüekren, 1996).

The solution proposed for solving the housing need of the middle class of the community after the 2nd World War was the flat ownership and construction of apartment blocks. Legalising the flat ownership was realised in 1954 with the alteration of the 26th article in the deed law



and it gained success. Loan opportunities presented by the Social Insurance Institution (SSK) and the Emlak Bank (Bank for real-estate) were combined under the control of the flat ownership institution with the help of modifications in the related regulations and resulted in constructing apartment blocks for middle class of the community. Two different organisational bodies ensured the construction process of apartment blocks. The initial one is the build and sell model, which is processed by the practitioner (Tekeli, 2009). The build and sell model started to replace the individual building practice especially in large cities owing to diverse reasons, while the individual ones remained active in small settlements in this period (Tekeli, 2012). The other one led to the emergence of housing cooperatives, which are based on a different loan system and organisation chart resulting from the progress of the country i.e. Turkey with new economic program in 1963; which eventually put into practice of constructing apartment blocks for middle and even lower middle classes (Tekeli, 2009). Additionally, the period with an economic plan after 1960s contained the second phase of the house-supplying practice with cooperatives. When the Social Insurance Institution started to offer housing loans independent from the Emlak Bank and started to convey them only to housing cooperatives, institution of cooperation started to be the primary requirement for benefitting from the Social Insurance Institution. This also ensured people to own flats as soon as they set the cooperative with the number of members equal to the number of flats in an apartment block, in the

regions of the city with the urban plan (Tekeli, 2009). Cooperatives gather the people by organising the demand, obtain the finance, construct the building and eventually disappearing after conveying the ownership of house or flat to the individuals. Hence, housing cooperatives were not organised under cooperative associations in this period (Tekeli, 2012). These cooperatives cause an increase in the population density and decrease the quality of life. Moreover, the projects do not contain social spaces, which can sustain communication facilities for inhabitants of the cooperative housing blocks (Özüekren, 1996).

Perception of problems related to housing qualitatively changed with the impacts of industrialisation and the connections between housing-urbanisation between 1950 and 1965. The solution found for meeting the need of increasing house demand caused by rapid urbanisation was decreasing the standards and the size of the houses. Determining the standards of social houses became the discussion topic of housing problem in this period in Turkey (Tekeli, 2012). Standards for Public Housing (Halk Konut Standartları) were constituted in 1964 to promote housings using loan and tax, where the lowest property limit was determined as 63 m<sup>2</sup> (Özüekren, 1996). Thus, the presentation of cooperative housing limit had stayed above the mean value presented by the licensed housings in all municipalities until 1965 and then fell below 100m<sup>2</sup> after the application of social housing standards (Tekeli, 2012). By the end of 1960s, cooperatives were organised by

professional individuals who were specialised for either presentation and/or construction in large cities such as Istanbul (Özüekren, 1987). A rapid increase in the number of cooperatives was recorded in Turkey in 1964, which was emphasised and associated with the idea of regarding them as a solution to housing shortage in large cities. Majority of the cooperatives belonged to worker communities in large cities of Turkey, which was also associated with the impacts of industrialisation in those cities. Two types of housing cooperatives with two different partners were recorded for Turkey in literature. The first type of cooperatives was financed by insured workers according to the legislation of the Social Insurance Institution, while the second type contained the rest (Keleş, 1967).

The growth of cities by densely attached buildings without free spaces in between negatively affected the quality of urban life and triggered the discourse about the need of mass housing projects in Turkey in the early 1970s. Cooperatives are regarded as the force for meeting the need for housing. Cooperatives that are affiliated to the local authorities served as crucial functions during the application of mass housing projects in Turkey (Özüekren, 1996). Economic crisis in real estate market in the early 1980s negatively affected the projects that were guided by the local authorities as well as other presentation types. Intentions about making policies that regard the housing as a tool to improve the quality of urban life beyond being a shelter resulted in putting the related law in action i.e. The Mass Housing Law, No. 2985

in 17th of March 1994, and started a new period for Turkey. This law resulted in transfer of resources to cooperatives initially, hence opened way for setting up cooperatives as well as associations of cooperatives (Özüekren, 1996).

## **2. Material and Method**

### **2.1. The City of Isparta And Housing Cooperatives in Isparta**

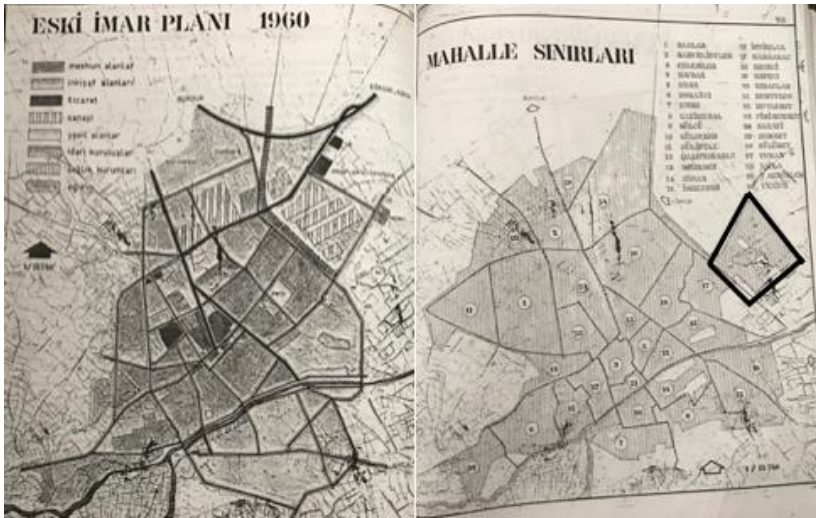
The city of Isparta is located in the inner western part of the Mediterranean, in Lakes Region. The primary urban plan of Isparta, one of the significant settlements of the Psidia region in history, was made by Kemal Aru between 1938 and 1944 with the consultancy of German Prof. Oelsner (Çetin, 2011). The following urban plan of the city is a revision plan in 1967. Studies on the city's urban plan continued in 1976, 1985 and 1990 and were approved. The last urban plan studies, which are valid today, were authorised in 2007 after two years of work. The requirement for housing in the city was attempted to be addressed in the 1945 plan, in addition to compact building, and the unplanned population was attempted to be planned in 1967. With the opening of the ring road connecting the city to the city of Antalya, its development in the north and northeast direction with the influence of industry and the university, and the developments seen depending on natural thresholds (Aydın and Polat, 2021), practices with housing cooperatives have been seen in the neighbourhoods established in these areas.

When we look at the cooperative practices in Isparta, there are applications consisting of detached or terraced houses built in

accordance with the concept of garden city concept, which started in Ankara in 1935, as well as applications in the type of multi-storey mass housing. The Davraz neighbourhood building cooperative was built in accordance with the Ministry of Construction and Settlement's "Public Housing" standards as well as Law No. 775 on "Illegal Housing" (Isparta Municipality Archive, 07.03.2021), aiming to create housing for people with limited income and stop the creation of possible illegal housing in the area (Eski Başkan Fuat Uyar ile Tarihe Geçecek Röportaj, (Accessed: 15.08.2021)). Initially, 999 units of cooperative houses were planned to be built, but then 1070 units were built as 37m<sup>2</sup> ground floor and 40m<sup>2</sup> first floor. This neighbourhood is similar to the institutionalised adaptations of the "garden city model" that was observed in housing cooperatives and workers' housing practices that started after the 1930s in Turkey. These applications have been accepted as a continuation of modern life with an understanding of shared infrastructure and integrated neighbourhoods (Akcan, 2009).

As of the 1950s, with the increase in migration from the village to the city, the housing and land problem reached serious dimensions, causing slum areas in the city. One of the important suggestions developed to prevent this situation is to declare slum prevention zones (Tekeli, 2009; Tekeli 2012). The Davraz Neighbourhood Cooperative, the research case study, was similarly built in an area declared as a "Number 2 Slum Prevention Zone" in the 1968 Revision Urban Plan. This area, which was not included in the 1960 Urban Plan, was included following the

construction of the 30-meter Antalya highway. The area is located in the northeast of the city; It is surrounded to the industrial zone in the east, the Antalya-Isparta highway in the northwest-southeast direction, and the residential development areas in the west. South of the highway seen in the Urban Plan of 1960, *Gülevler and Mutlu Evler Neighbourhoods* cooperatives were built on the other planned slum prevention areas (Figure1).



**Figure 1.** 1960 Development Plan and Neighborhood Boundaries (Isparta Municipality Archive, 07.03.2021)

## 2.2. Case Study and Data Collection Method

Within the scope of the study, the position and importance of housing cooperatives in the history of housing in Turkey were emphasised, and its periodic characteristics were mentioned. However, the main aim is to examine the change in the selected sample neighbourhood by emphasising the spatial characteristics of the cooperatives, which

define the social and cultural subsystem, rather than addressing their economic and political aspects (Bilgin, 1992). Moreover, it is to try to understand the position of cooperative housing neighbourhood, which offers solutions by bringing together a user group with a specific socio-cultural structure, in the context of housing, with numerical measurements in the through floor plans.

There are studies in the literature that focused on the period of housing cooperatives before the law on cooperatives was put into an application (Keleş, 1967), and carried out in various cities with the demand of the International Labour Organization (ILO; Geneva) (Özüekren, 1987), and studies that examined the principles of cooperatives, number of members, the socio-cultural properties and gathering ways of members as well as their share in urbanisation and spatial properties (Koç, 2018). This study aims to analyse the change and transformation in the place of *Davraz Neighbourhood Building Cooperative*, which is one of the examples of social housing in Isparta, one of the Anatolian cities, of the process experienced in big cities such as Ankara, Istanbul and Izmir. While researching this, it re-examines the current situation and reveals how and in what way we adapted this housing culture that came to us from Europe to our own culture.

For this purpose, configurational analysis with visibility graph analysis (Turner and Penn, 1999) and geometric analysis with m2 analysis (França, Sales and Fogaça, 2017) were calculated to understand the change in the study. Aguiar (2010) expresses the concept of spatiality

as the inclusion of the body in the space, and this includes the concept of topographic space, which describes the interaction of the user with space, as well as the concept of physical space, called geometry (França, Sales, & Fogaça, 2017). Therefore, it is valuable to make sense of the value that the user adds to the space in the context of the space-user relationship and to use square meter analysis while doing this. It is important to analyse the existence of spatial rules that govern the behaviour of the users rather than the spatial order in the houses. Therefore, visibility graphs are measurements that clearly reveal some special characteristics of houses (Güney, 2007). In this study, the visibility analysis used to determine such features have been performed using the DepthmapX software (It was created by Turner. It was later developed further by Tasos Varoudis in Space Syntax Lab.) (UCL Space Syntax, 15.10.2022).

Two different plan types belonging to *Davraz Building Neighbourhood Cooperative* were examined. As a result of the on-site investigations, 15 houses of A-type and six houses of B-type were included in the study in order to make a difference from these houses. The houses, which are built as a terraced house type, have front and back gardens. Gardens, which are used for different purposes depending on user preferences, have become significant spatial parts in adapting the house to culture. In parallel with the change in the family structure, there has been a change in the use of housing in the outdoor space as well as in the indoor

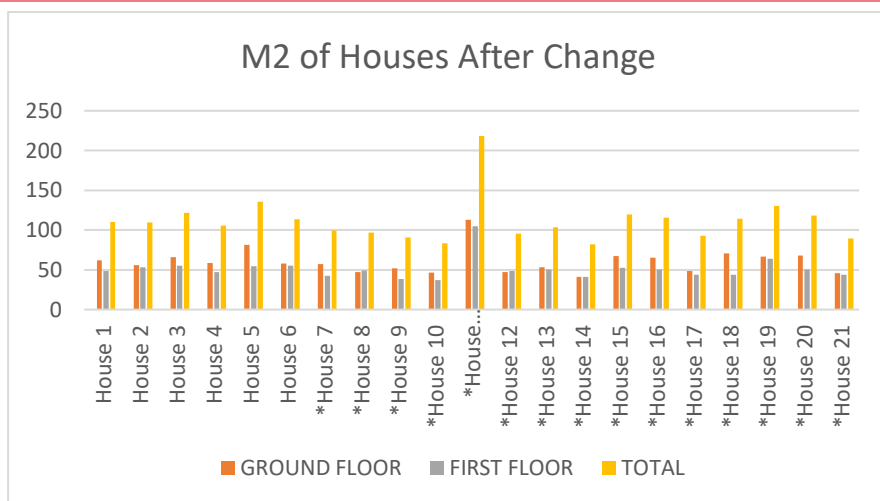


space. At the same time, interviews were held with the owners of the houses to understand the user profile and the usage status of the house.

### 3. Findings and Discussion

In this research, 15 houses of A-type and 6 houses of B-type were visited with the homeowners' permission. In the measurements made on site, it has been seen that the A-type houses are 81.47 m<sup>2</sup>, and the B-type houses are 77.62 m<sup>2</sup>. Both house types are terraced houses, consisting of the ground floor and first floor, with front and back gardens. When the floor plans are examined, there are entrance hall, guest room (*salon-salomanje*)/living area, circulation (stairs), toilet, kitchen on the ground floor and there are two bedrooms, one of which has a connected balcony and a bathroom on the first floor.

These houses, which were built according to the standards of public housing, have changed over time depending on the changing living conditions and requirements. As a result of the evaluation of the spaces for different purposes, the change in both types mentioned is analysed and summarised below (Figure 2). When the square meters are calculated on average, it is seen that Type A houses space increase to 120.55 m<sup>2</sup>, while Type B houses space increase to 126.32 m<sup>2</sup>.



**Figure 2.** The m<sup>2</sup> of the houses after the change.

Overall, the living area in the houses was expanded towards the front garden parallel to the entrance hall and the kitchen towards the back garden, and the usage area was tried to be increased. In both types of houses examined, it was observed that additional storage, terrace, garage and bread-making place were built in the backyard. In the three A-type houses plans, the kitchen was relocated, and an additional children's bedroom or bedroom was built. In the three B-type houses plans, the area on the border of the backyard between the living room and the kitchen has been turned into a living room surrounded by sliding doors. A significant increase in square meters was observed in the kitchen of 19 houses of type A and B (excluding two houses of type B). In both plan types, extensions were made, especially in the bedroom on the first floors, depending on the enlarges made on the ground floor. In addition, the balcony connecting with the room was also enlarged to

follow the ground floor line and either turned into a glass balcony or used as an open balcony.

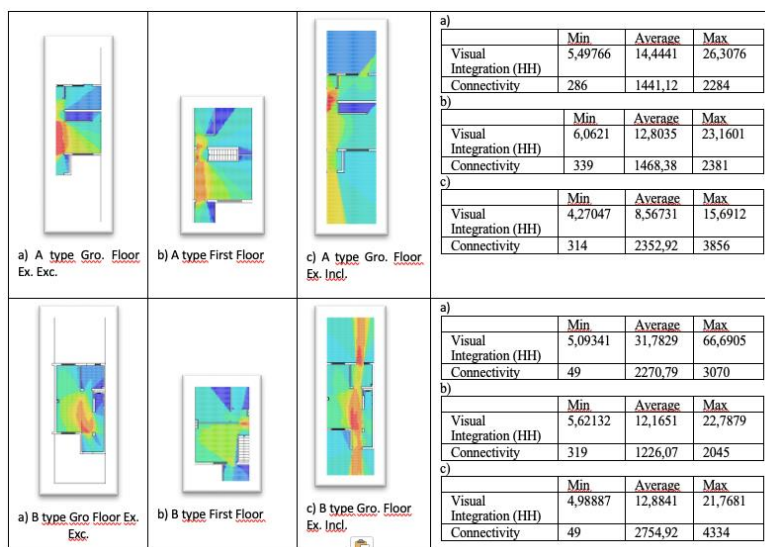
In one of the A-type houses, the first floor was modified to be a completely separated flat. The two existing bedrooms on the first-floor plan were preserved, and an additional new kitchen was built. Access to this floor is via a steel staircase from the front garden. Therefore, the house is arranged in a way that the ground and first floors will be used independently two houses. Moreover, one of the A-type houses (House 11) was converted into a single house by removing the separating walls between two separate houses. This change made in this house, which is seen to be used in different ways depending on the crowdedness of the house, did not cause a significant differentiation in terms of spatial configuration.

According to the interviews with the users in the 21 selected houses, it was seen that only two of all users were tenants and the others were landlords. The least resident tenant has lived for two years, and the landlord has lived for six years. Moreover, 16 landlords have been using the house for more than 20 years. All houses except two are used continuously in summer and winter, while one of the other two is used only in summer and the other is used only in winter.

As a result of the interviews and examinations, it was seen that different interventions were made by the users of the houses. Therefore, visual integration analyses were made and compared in order to decide to what extent the interventions affected the spatial configuration.

### 3.1. Visibility Analysis

The buildings constructed as A and B types were first analysed in their original plans, and then the changes on 21 examples were examined. The houses consist of main spaces such as a front and back garden, entrance, living area, kitchen, wc/bathroom and bedrooms. First of all, the ground floor layout was evaluated separately just the interior plan and with together the exterior space, and it was observed that the integration value decreased in both plan types when the exterior space was included. Although the integration values of all types decreased in the analyses including the ground floor exterior space, an increase was observed in the connectivity values. In particular, it has been observed that the B type house strengthens the connectivity by providing a linear relationship between the front and the back garden. Depending on the location of the staircase in type A, the spaces have gained a distinctive feature and especially by isolating the kitchen and the backyard, it has moved the core of integration to the entrance and living room intersection. Thus, the kitchen and the backyard gained privacy. In type B, although the staircase is placed parallel to the space and the integration core remains at the intersection of the entrance and living room, the privacy of the kitchen and backyard is reduced compared to type A. Especially in the analyses that included the garden, it was observed that the integration shifted towards the back garden and the kitchen (Figure 3)


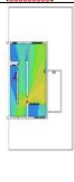

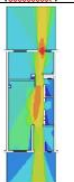
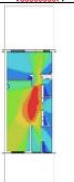
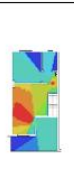
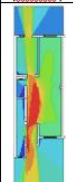
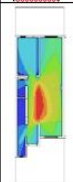

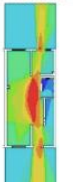
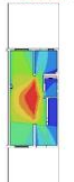
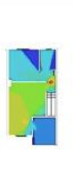
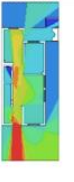
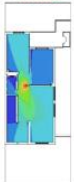
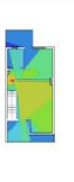
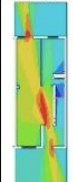
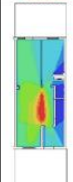



**Figure 3** Analysis and numerical values of the original plans of type A and type B

When the houses were analysed separately, the spaces that underwent the most changes in visual integration analyses were the kitchen, living area, circulation, and the master bedroom. These areas have become more private with the two-storey dissolution of the houses and the placement of the bedrooms on the upper floors. Since the houses are adjacent, they could only grow along the front and back gardens. However, places such as underground and above-ground warehouses, poultry houses, bakeries and garages added to the gardens according to the lifestyles of the residents were able to create different forms of use. When the Hall is examined in terms of integration values (House 3=31.7273, House 4=33.7101 and House 6=29.2762); It was seen that House 3 enlarged the living room along the entrance line of the house

and used it in accordance with the original, while House 4 and House 6 formed a living room within the living area with the enlargements made to the front and back garden. Although it was seen that the integration core was not adversely affected in the analyses made only in the interior space for all three houses, the integration value of the hall in the original plan of type B could not have a value above (39,2005) (Table 1).







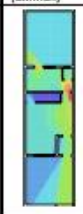





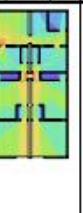
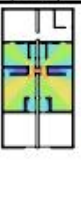

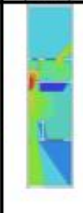


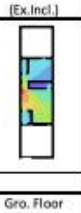


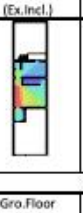
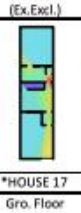

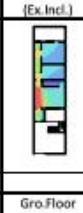
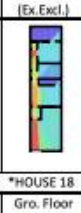





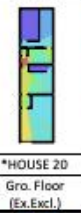


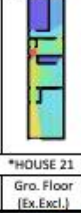


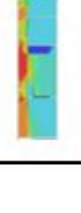

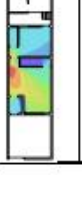
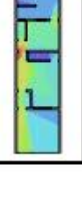


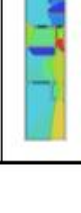

**Table 1.** B type houses

HOUSE 1			HOUSE 2			HOUSE 3		
Gro. Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor	Ground Floor (Ex.Incl.)	Ground Floor (Ex.Excl.)	First Floor	Gro.Floor (Ex.Incl.)	Gro.Floor (Ex.Excl.)	First Floor
								
HOUSE 4			HOUSE 5			HOUSE 6		
Gro.Floor (Ex.Incl.)	Gro.Floor (Ex.Excl.)	First Floor	Gro. Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor	Gro.Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor
								

A-type Houses 8(21,2989), 9(21,2989), 12(21,2989), 13(19,4864) and 20(19,4864) showed a value above the living room integration value of the original type house. The intervention in the living room towards the front garden has led to an increase in integration in this section. Considering the public nature of living spaces, it can be seen as a positive attitude (Table 2).

When the change of kitchens is examined, it is observed that House 2(11,9886), 3(14,1326), 4(13,9328), 5(14,8008), 6(13,9933) have the highest integration values, House 16( 7,68187) and 19(7,36464) were found to have the lowest integration values. Despite the additions made in the B-type houses (except for the house no. 1), the integration value of the kitchen is higher than the original situation (13,9221). Because it is seen that the interventions do not affect the integration core negatively. The integration values of the kitchens, with the space added to the kitchen side, decreased (9,9271) compared to the original state, in the interventions made in the houses numbered 16 (7,691) and 19 (7,364) in A type with the lowest integration value. Although the integration does not change its core, the depth has increased due to the newly added space and the integration of the kitchen has also decreased. It can be said that this intervention, which differentiates the relationship of the front garden and the backyard according to the original plan, negatively affects the relationship of the two spaces House 11, on the other hand, has the lowest integration value in the living area as the type that combines two houses. (Table 2)

Table 2. A type houses

*HOUSE 7			*HOUSE 8			*HOUSE 9		
Gro. Floor (Ex.Incl.)	Gro.Floor (Ex.Excl.)	First Floor	Gro.Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor	Gro.Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor
								
*HOUSE 10			*HOUSE 11			*HOUSE 12		
Gro. Floor (Ex.Incl.)	Gro.Floor (Ex.Excl.)	First Floor	Gro.Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor	Gro.Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor
								
*HOUSE 13			*HOUSE 14			*HOUSE 15		
Gro. Floor (Ex.Incl.)	Gro.Floor (Ex.Excl.)	First Floor	Gro.Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor	Gro.Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor
								
*HOUSE 16			*HOUSE 17			*HOUSE 18		
Gro. Floor (Ex.Incl.)	Gro.Floor (Ex.Excl.)	First Floor	Gro.Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor	Gro.Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor
								
*HOUSE 19			*HOUSE 20			*HOUSE 21		
Gro. Floor (Ex.Incl.)	Gro.Floor (Ex.Excl.)	First Floor	Gro.Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor	Gro.Floor (Ex.Incl.)	Gro. Floor (Ex.Excl.)	First Floor
								



Among the bedrooms on the 1st floor, the master bedrooms were the most integrated spaces in both types. Depending on the use of balconies, it was observed that the integration core of some houses in type A (House 8,9) and type B (House 1,2) shifted to the interior of the room. Spatial separation has been achieved by clearly defining the circulation in House 1, which differs from the original type with the interventions made. The living spaces on the ground floor have gained privacy by separating them from the integrated spaces. When the B type houses are evaluated, including the exterior space, they define an integrated axis between the entrance door from the front garden and the exit door to the backyard. In the analysis made without including the ground floor exterior in House 5 of type B, it is seen that it is the house with the most unintegrated area. It is seen that the additions made reduce the integration in the functional spaces of the house (Table 1-2).

#### **4. Conclusion and Suggestions**

Housing, as a cultural element, presents an extremely dynamic interdisciplinary study that reflects the changes and transformations experienced in society with its different dimensions. In this study, a sample area reflecting the housing concept of a period was examined, and 21 samples of different types were selected that best reflect the spatial change there. The fact that the houses are still used by the first users even today is an indication that these examples, which reflect a period, can be adapted to the present day. The interventions made showed an increase of approximately 45% in square meters, and it was

understood that the users (except three users) used active gardens. In particular, interventions were made in the form of spatial growth, adding new space, spatial separation in horizontal and vertical directions, and adding a balcony despite the use of the garden, and it was seen that the production space, which is used especially for winter preparation and called bread-making, was preferred in the garden.

Space syntax analysis used in the study provides numerical values that provide comparison and evaluation in houses as well as in many buildings (Güney, 2007; Hillier, Hanson, & Graham, 1987; Hanson, 1998). The relationship between the original types and the configuration of the new spaces undergoing changes was evaluated by visual integration analysis.

It is thought that the study will provide input for new designs to be produced from now on. In both types, it is possible to say that there is no privacy for the outside user, considering the location of the core of the integration and the integration of the living space in the general configuration of the space. In the original state of the house, it can be said that the circulation in the house, especially in the transition to the 1st floor, has also negatively affected the privacy of the living space. In the original state of the houses, the kitchen space was less integrated in the general configuration, thus creating a more private space. However, access to the backyard where guests are hosted is also provided from this place. Homeowners did not change this usage (except for house 6) with their interventions. The users in House 6 separated the living room

from within the living area and provided the backyard passage from here and prevented the use of the kitchen, especially for the user coming from outside. Therefore, it can be said that the houses have different schemes in terms of privacy, depending on the areas added later.

Following the traces of the integrated areas in the analyses of the original plans in the interventions supports the use of integration maps for this study. Integration analyses are analyses that will also support providing inputs to new designs by evaluating the inter-space relations in the use of these houses.

#### **Thanks and Information Note**

The article complies with national and international research and publication ethics.

Ethics Committee approval in the study, Ethics Committee of the University of Suleyman Demirel dated 09.11.2021 and decision no.158700 that it was taken.

#### **Author Contribution and Conflict of Interest Disclosure Information**

All authors contributed equally to the article. There is no conflict of interest.

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## Isparta University of Applied Sciences Rectorate Campus Landscape Design and Application Process

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## 1. Introduction

Urban green spaces, It increases the quality of life and air of the city, creates a habitat for the fauna in the city, contributes to the protection of biodiversity, provides active and passive recreation opportunities to the communities, as well as has positive effects on the aesthetics and image of the city. Green areas in cities that reflect the natural landscape character of the region are areas that provide information about the past of the city, increase the quality of urban life with their ecological, aesthetic and economic contributions, and add value to the city in terms of tourism.

There is a strong link between people's environment and their quality of life. The criteria that determine the quality of life also affect the quality of the physical space in which it is located. Limanond et al. (2011), they state their opinion that the strengthening and settlement of sustainable approaches within the university will not only affect the university itself, but may also affect and transform the society and the city in the same way.

Higher education institutions are one of the most important institutions in both national and international platforms in terms of raising awareness of societies, educating them and integrating individuals into society. Universities aim to provide professional skills through academic education and practices, to produce knowledge by conducting scientific, social and economic-based practices and research to prepare young people for social life by giving them duties and responsibilities, and to contribute to the education, awareness and



cultural level of the society. For this reason, the design of university campuses, which include open and green areas at a significant size for the city, is very important in addition to educational activities (Yılmaz & Irmak, 2012).

University campuses significantly affect the ecology of the city in terms of the area they cover and are of great importance in terms of creating a microclimate. Open-green areas use natural landscape elements in city centers to break the negative effects of building density and provide human-nature unity. At the same time, it allows city users to use and perceive nature and to perform their recreational activities (Akten & Gül, 2007).

University campuses have undertaken the task of creating a model on a universal, national and regional scale with their land use, structural and plant designs all over the world. Rectorate buildings, which are the administrative structures that make up the dynamic structure of universities, hold an important place in university campuses in the physical context, while at the same time, they are the showcase of the university in social terms. Therefore, campuses are areas that provide aesthetic, ecological, economic and recreational contributions as well as their socio-economic and cultural contributions to the cities they are located in with their open and green space planning.

In campus planning, open green space planning is as important as structural plan decisions. Universities are not only places where students acquire a profession through academic education, but also institutions where they develop themselves socially and culturally.

The open and green spaces in the campus contribute to the integrity of the buildings, to enable recreational activities, to establish the relationship between people and their environment, to provide the necessary space for the circulation system and to add aesthetic value (Karakaş, 1999).

Universities, beyond providing specialist training in certain fields, are also responsible for providing contemporary lifestyle examples and environments for their employees, users, people in their immediate surroundings and in the city where they are located. The use of campus areas and the decisions made and/or to be made by the university administrations about these areas are very important in terms of the quality of life of the users and their commitment to the university (Yalçın and Yılmaz, 2020). McFarland et al. (2008), it is seen that young people who use campus green areas frequently perceive their quality of life higher than those who use these areas less. Lau et al. (2009) emphasize that natural areas on university campuses are physical environments that have positive effects on people's mental health. Many researchers define landscapes that contain natural elements as distinctly healing spaces as they provide emotional relief on individuals. In addition, raising awareness of individuals about the environment will increase the sense of belonging to the university and improve the awareness of environmental protection.

Design of university campuses; It should be in a way that will relieve the physical and psychological distress and anxiety of the people in it,

and allow socialization and physical activities by providing calmness. Considering these factors, there will be a significant increase in the education and training quality of universities (Yılmaz, 2019). Planning and designing these areas in line with the landscape design criteria will enable the users to live in a safe and high quality environment (Ertekin and Chorbaci, 2010).

In the design of outdoor spaces; Data such as preservation of environmental character, indoor-outdoor relationship between spaces, continuity of urban texture, ensuring accessibility, creating symbols, formality, perceptibility, visuality and aesthetics should be taken into consideration (Atabeyoğlu, 2014). Open and green spaces on university campuses; perimeter of the campus, campus entrances, active recreation areas, passive recreation areas, vehicle circulation system, pedestrian circulation system, plastic objects (fountain, sculpture, monument), intersections, outdoor furniture (pergola, bench, gazebo), lighting, planting, special applications can be classified as (Dober, 1992).

In this study, in line with the request of the Rectorate of Isparta University of Applied Sciences, the landscape project of the open and green areas around the administration building and administrative buildings of the University Rectorate Campus was carried out. Before starting the design, the spatial, functional and natural landscape data of the existing area were analyzed, and the positive-negative qualities and user needs of the area were revealed. In this context, the current situation in the design of the campus within the scope of the landscape

design process, considering the principles of landscape planning, has been revealed and suggestions have been made.

## 2. Material and Method

### 2.1. Material

The material of the study consists of a campus area of approximately 8900 m<sup>2</sup>, located on 102nd Street in Bahçelievler District, within the borders of Isparta province, where the Isparta University of Applied Sciences Rectorate and administrative buildings are located (Figure 1). 3000 m<sup>2</sup> of the campus area is the building residence area. It has an open and green area of approximately 5900 m<sup>2</sup> in total.



**Figure 1.** Location of ISUBU campus (Google Earth, 2022)

### 2.2. Method

The method of the study consists of defining the problems of the Rectorate campus area, determining the current situation of the area, collecting-evaluating the data for the demands, analyzing it, landscape design and application stages.

The steps followed during the study are given below:

- ✓ Determining the boundaries of the study area on the maps of the area,
- ✓ Transferring the site plan to the computer environment,
- ✓ Determination of the topographic structure,
- ✓ Spatial and visual analysis of the study area and its surroundings,
- ✓ Determining the locations, numbers and landscape values of existing plants,
- ✓ Determination of goals and problems,
- ✓ Creation of the needs program of the area,
- ✓ Preparation of alternatives for design,
- ✓ Design and implementation process

The landscape design project for the Rectorate campus was prepared between February and March 2021, and was delivered and implemented in May 2021. During the project construction period, the preliminary project, the final project, the plantation project were prepared and the application of the prepared project was made.

It creates a design approach that provides recreational opportunities for the design process and also takes into account the quality of urban life. As a result of the examinations and observations made in the campus area during the design, data about the area were collected, surveys and evaluations were carried out.

The data obtained, visual and written sources and photographs taken were also evaluated as auxiliary material in the study.

The project phase was carried out by evaluating the functions of the structural and plant designs envisaged in the design, their relations with each other and with the environment. The landscape design project was created by considering the design principles in line with the needs and requirements determined in the campus area. During the study, proposal projects were prepared, 2 draft projects were created in line with the identified needs and presented to the rectorate unit. As a result of the meetings held with the Isparta University of Applied Sciences Rector's Office, information about the area was obtained and the current situation was evaluated in terms of area users, and the project was finalized and detailed by considering the criteria to be considered in campus design.

At the last stage, the detailed project has been handled in two separate sections as vegetative and structural. The activity areas, areas of use, equipment and plants to be used were determined within the scope of the design, and the final stage was completed and the application of the designed project to the area was carried out. In addition, photographs of the area were taken before the application, and the change was revealed in comparison with the photographs taken after the application. After the application, the use of the area, user satisfaction, maintenance and management were controlled and interventions were made to the failing aspects.

### 3. Findings and Discussion

#### 3.1. Analysis of the Field Data

##### 3.1.1. Isparta University of Applied Sciences Rectorate Building and Its Surroundings

Isparta University of Applied Sciences was established in Isparta with the "Law No. 7141 Amending the Higher Education Law and Some Laws and Decrees", which was published in the Official Gazette dated May 18, 2018 and numbered 30425 (Figure 2).



**Figure 2.** ISUBU rectorate campus

The Rectorate building is in the city center and is in a position to facilitate both pedestrian and vehicle transportation. The connection of the land with the city is provided by the Isparta-Ankara intercity road. The entrance part of the campus area; It is on Süleyman Demirel Street in the east of the area and is limited to Isparta Regional

Directorate of Forestry, PTT Central Directorate, Mustafa Gürkan Anatolian High School.

In the study area, which is the first representative building of Isparta University of Applied Sciences, there is a two-storey Rectorate building (A Block) and a two-storey administrative building consisting of two separate blocks (B-C Block). B Block and C Block are symmetrical. In Block A, which is used as the Rectorate building, the office of the Rector, Vice-Rectors, Secretary General, Deputy Secretaries and Advisors to the Rector, and Personnel Department, in Block B, Department of Health, Culture and Sports, Department of Information Processing, Department of Administrative and Financial Affairs, Library Department Presidency and Strategy Department. In the C block, in the administrative structure of the rectorate affiliated to the Rectorate, there are the Senate Meeting Hall, the Registrar's Office and the Academic/Administrative Staff Cafeteria.

There are busts, pedestals and flagpoles positioned on a rectangular ground in the south of the area, aligning to the left of the entrance of the rectorate building, which has an area of approximately 1100 m<sup>2</sup>. There is also a security building next to the main gate entrance. There are a few benches and camellias used by the staff in the area. There is no specific parking lot in the area, roadsides and existing hard floors are used as parking lots. The area is surrounded by a stone wall with iron bars. The area outside the administrative buildings on the campus is one of the important open and green areas in the city center reserved for outdoor use.



### 3.2. Landscape Design Process

The landscape design process consists of determining the problems, analysis-synthesis of the current situation, creating alternative landscape design projects, and deciding on the final project.

After obtaining the data and survey of the area, the area was examined in detail, photographs were taken, needs, deficiencies, necessities and available possibilities were evaluated. In the design of the area, the principle of transforming existing structural materials and adding new functional elements, and developing the plantation, by considering minimum resource consumption and economic requirements.

In the landscape design process of the campus, literature study on the subject, analysis of natural and cultural data, existing plant species, land structure, environmental analyzes and user requests and demands were taken into consideration. As a matter of fact, according to Kılıçaslan et al. (2015), it is recommended to include designs that serve the user population, that are environmentally and financially applicable, that can be integrated and that can be developed in campus design studies.

The analysis of natural data is effective on plant species selection and spatial organization decisions, as well as determining the existing plant species in the project area and revealing the plants to be protected. This affects the design decisions regarding planting and determining the activity areas.

In this context, the analyzes carried out on the field can be summarized as follows:

The climate structure of the area, especially temperature/insolation, prevailing wind direction, precipitation and humidity, soil structure, slope of the land were analyzed.

The campus area is in a location and size where academic and administrative staff can spend their free time. The area is flat and has a microclimatic climate, partially protected from the wind, in the form of a courtyard surrounded by buildings of varying heights.

When the climatic data are evaluated, it is seen that there is a high probability of frost in the project area and there is a temperature change between the seasons and day and night. The prevailing wind direction is southeast. Our second-degree prevailing wind direction is northwest.

When the topographic data is evaluated, the slope of the project area is below 5%. This ratio is too small to affect design decisions.

When soil data is evaluated, the project area has clay soil type.

When evaluating the vegetation cover, there are plant species that are valuable in terms of landscape in the project area.

In the light of these data;

- ✓ Selection of plant species suitable for soil structure,
- ✓ Use of conscientious species in terms of water demand,
- ✓ Selection of plant species resistant to climatic changes,
- ✓ Selection of plant species and equipment that will provide shade on sunny days,

- ✓ Ensuring protection with wind-resistant plants in order to reduce the negative effect of the wind has been effective in the decisions regarding the plant design.

In addition, it is aimed to create continuity in use both functionally and visually by ensuring that the landscape remains colorful for all four seasons.

### **3.3. Landscape Design Project**

A preliminary project prepared as a result of the analysis, problem identification and evaluation carried out in the field was developed and a landscape project was prepared.

The main objective of the prepared landscape project; is to transform the university campus into an area where academic and administrative staff and visitors can use their academic, social, artistic, cultural and aesthetic needs comfortably every term. With the work carried out in this direction, it was given importance to allow social and cultural activities to be realized, as well as to have an approach that allows daily use.

The landscape project increases the interaction between the open and green space between the buildings in the campus and the user, and positively affects the accessibility. Thus, it was ensured that the structures were interconnected and their holistic perceptibility was supported. The spaces where individuals can communicate with each other and meet their rest, work, recreation and food needs are designed to be integrated with each other. In the campus design; The pedestrian priority circulation system, the continuity and integrity of

the green fabric in open social areas, the mass vacancy rate in construction play an active role in the accessibility and efficient use of the open social spaces of the campus. In addition to the effective use of interior spaces, the importance of comfort, transportation and efficiency of public spaces, which are important in university designs, is emphasized.

### **3.3.1.Structural Design**

In the campus design studies, care was taken to have design studies that serve the user group, and have a holistic and developable structure. In addition, in the design area within the boundaries of the campus, structural designs that are suitable for the region and environmental landscape, which can be economical, ecological, sustainable and manageable, are included.

With the definition of the first place that welcomes the visitors at the entrance of the Rectorate building, care has been taken to leave a positive impact on the visitors. In the study carried out for this purpose, it was aimed to have a functional, aesthetic and at the same time a space design with a certain style.

In the structural design, activity areas were determined in line with the current map of the area, and making an arrangement suitable for active use and preferred was determined as the primary target. In the design, since the area is rectangular and surrounded by buildings, it has been acted on a space setup that is divided by radial paths in harmony with it. While the system was being built, the center was taken to the focal point. Radial paths originating from the center are connected to

structures and uses. Thus, users entering the space from any building can easily reach the rectangular central area in the center. In addition, the integrity of the circulation system is preserved and effective use is aimed in the entire area. Resting and waiting areas are defined on the main axis in circulation and supported by landscape elements.

While the campus area, which was designed to provide spatial integrity, was designed, the central area was created as the focal point in order to organize social activities for the determined user needs and was inspired by Turkish motifs. The open and green area of this area has a rectangular floor area, and the pool, inspired by the Seljuk geometric motifs in the center, is planned to be used as a moving and still in order to add dimension, depth and attractiveness to the campus area (Figure 3).



**Figure 3.** Ornamental pool in the campus

Apart from its social-cultural use, the area is designed as a functional space that also serves for sitting purposes. The pool and the hard floors around it are planned to have the highest user density during the academic opening periods and more concerts, bazaars, etc. In addition

to this, care was taken to ensure that it is suitable for daily use (Figure 4).



**Figure 4.** Social activity area in the campus

The areas determined as sitting areas were created on the radial roads and the walking paths that intersect at different distances from the center. The axis of the walkway is supported by plant areas to create an emphasis and at the same time it is designed to create a shadow. The seating units in these areas are made of wood due to its harmony with the environment and its natural appearance (Figure 5).



**Figure 5.** Pergolas in the campus

Sitting units supported by plant crates were created in front of the B Block and C Block building entrances in a way that surrounds the

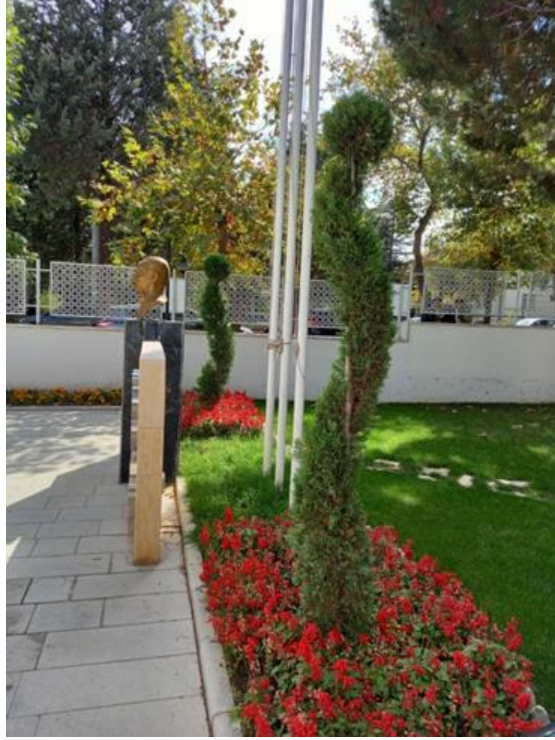
vegetative area in the center, and this both contributed to the formation of space and reduced the effect of hard floors, providing mobility in the design. It has been taken special care to place plant boxes in front of the building entrances in the campus in order to eliminate the heavy impact of the hard floor, to limit the seating areas, to direct the users of the area, and to add mobility to the area in areas where hard floors are densely located. In addition, plant crates surrounding the space and plant materials were included up to the people sitting in the space, and the green texture effect at eye level was increased. The material of the plant crates was chosen as wood, and it was aimed to have an alternative feature so that it can be used indoors during the winter months.

There are two different transportation networks in the campus of the Rectorate. The first is transportation to the administrative unit area and the second one is transportation to the administrative area, the most important principle taken into consideration while creating the circulation system has been to provide comfortable and effective circulation within the campus and to reach the desired point as soon as possible.

There are busts, pedestals and flag poles positioned on a rectangular ground in the south of the area, aligning to the left of the entrance of the rectorate building, which has an area of approximately 1100 m<sup>2</sup> (Figure 6). Behind this area, a walking path was built with stepping stones. With this road, it is aimed to ensure the continuity of



circulation in the area by integrating the C Block with the road behind the building.



**Figure 6.** Rectorate building entrance

There are three sitting areas with camellias on the main circulation road located in the continuation of the entrance door of the Rectorate building. Since this road will also serve for the transportation of the senate meeting room to be built in B Block, a rock garden design has been made in two stages on an area of 70 m<sup>2</sup> at the entrance (Figure 7).





**Figure 7.** The rock garden in the campus

On the same road, a structural area with the university logo, which symbolizes and reflects the corporate and hierarchical identity, was also created (Figure 8).



**Figure 8.** University logo

The axis running in front of the Rectorate building was considered as the protocol road and three pergolas were designed on this road, and the passage was supported with a herbal composition. In order to distinguish this area from other places, it has been transformed into a special place by using the scented wrapping plant (*Jasminum officinale L.*) (Figure 9).



**Figure 9.** Pergolas on the protocol road

There are two different parking areas around the administration building. 100 m<sup>2</sup> area is reserved as parking lot. In addition, there is a parking lot with a capacity of 3 disabled vehicles in the common areas. The first area is located next to the security building. The second car park behind Block B and C block is located on the west of the building, with a capacity of 4 vehicles, and has been arranged by preferring locked cobblestone pavement. Plant areas for shade are also included in the parking areas (Figure 10).



**Figure 10.** B-C Block parking lot

**Accessories:** In the landscaping of the campus area, it is necessary to include reinforcement elements such as benches, pergolas, camellias, plant boxes, garbage cans, water element, plastic objects, lighting units, flooring material, irrigation systems and retaining walls that can meet the needs of the users in the campus.

Reinforcements (fixed and movable seating elements) have been placed in the open and green areas designed, taking into account the needs of the users. With the help of movable equipment, some places' function changes from time to time (such as turning the sitting area in the center into a ceremony area) are provided.

There are wooden benches, trash cans and plant boxes in the area. In order to partially solve the parking problem in this area within the campus, the area previously used as a parking lot was enlarged and it was aimed to prevent vehicles parked on the roads.

**Lighting:** Day and night changes are very important for the security of their settlements in the campus. Altunkasa (2011), defines lighting as the application of light that determines the perception of a certain environment or objects in this environment.

Project work and luminaire selections regarding area lighting were carried out together with the electrical technicians and personnel of the Technical Department of Construction Affairs of our university. In the landscape design study, the lighting was created in accordance with the general system determined. It has been designed considering the day and night changes of the spaces in the area in lighting. High, low and spot lighting fixtures are used as lighting elements. Low lighting elements are used to emphasize the radial paths reaching the central area. The lightings that support the entrances, walkways and seating units create high lightings to make them more prominent. In addition, the university logo and spot lighting were used in the pool.

**Upholstery material:** By choosing flooring materials suitable for Isparta city character and climatic characteristics, flooring material has been used in order to create a pleasant effect on the users with the help of the patterns used in the design, to guide them, and to provide a relaxing, calming and relaxing effect with color tones.

Variety was created in flooring by using marble at the edges of the pool, andesite stone in the university logo, cliff stones in the rock garden and on the side of the walking paths as flooring material.

### 3.3.2. Plant Design

After the finalization of the structural landscape project, the existing plant species in the area were determined for the plant design study and the plant species that could be used were determined. In the preparation of the herbal design project, it was aimed to design a sustainable herbal landscape compatible with the natural vegetation as well as the natural and ecological structure of the area. Design criteria such as having the chance to be watched continuously from inside the building in the campus texture and having the feature of a green corridor that will connect with the green texture in the surrounding and main transportation axes were taken into consideration.

The plants determined in accordance with the size, shape, color and texture characteristics will emphasize the design and provide the functions such as limitation and orientation needed in the square. In particular, with the arrival of spring, priority was given to the selection of species that create emphasis with a floral effect, provide color transitions, have a shadow effect, and have features such as yellowing and reddening. Shade trees are placed on the walkways and seating units in order to protect them from the heat in summer and the snow cover in winter from excess light caused by reflections (Figure 11). In addition, the existing natural vegetation in the area has been preserved and improved.



**Figure 11.** Examples of plant design

The fact that the campus is located in the city center and is the common courtyard of the administrative buildings causes it to have a partially more favorable climate compared to the open areas. In the plant design, depending on the seasonal changes, taking into account the sunshine duration and intensity of the area, the amount of precipitation, and the number of clear days, plant designs were made in accordance with these changes. In the design, the functional properties of plants to increase the comfort of life, especially by taking advantage of the effects of microclimate, preventing noise and air pollution, were applied. At the same time, the aesthetic and functional properties of the plants used in the area were also prioritized. Since the existing plant species in the campus area are coniferous plantations, particular emphasis was placed on the selection of leafy and colorful plant species in this area.

The front garden, where the main entrance of the Rectorate building is located, was designed as a welcoming area and emphasized with flowering plants. At the entrances, the hard-looking light-colored travertine floors are softened by the green areas in front of the wall,



shrubs (*Euonymus japonicus* Thunb.) and perennial groundcovers are included as borders (Figure 12). With the wooden pots used at the entrance and the seasonal flowers used inside, a green texture has been tried to be given to the environment.



**Figure 12.** Rectorate main entrance roadside planting

Considering the principle of repetition, rhythm, unity and balance, plants (*Euonymus japonicus* Thunb., *Buxus sempervirens* L.) that are the same in terms of form, size and texture are included in the shortcut connections within the area. It has been separated from open and green areas in order to define, indicate and visually contribute to the walking axes (Figure 13).



### Figure 13. Planting examples on walking axes

The entrance to the rear garden of the Rectorate building was considered as the venues for the main events. Mass-space balance is preserved with turf surfaces, and this area is protected by *Photinia serratifolia* (Desf.) Kalkman, *Gaura lindheimerii* L., *Rosa* sp. and *Syringa vulgaris* L. species present in the area were preserved. In addition, it is aimed to provide plant diversity and to use endemic plants in a way that does not create confusion.

*Robinia pseudoacacia* L. 'Umbraculifera' was used symmetrically around the ceremony area and supported by bushes to create a color effect with its flowers. *Paeonia turcica* L. and *Pelargonium inquinans* (L.) L'Hér., *Ruellia tuberosa* L. flower were used in the plant boxes around the ceremony area because of their color effect. *Pittosporum tobira* (Thunb.) W.T.Aiton, *Viburnum tinus* L., *Spirea vanhouttei* L., *Nandina domestica* Thunb. were used around the garden, *Buxus sempervirens* L. and *Lagerstroemia indica* L. was used to meet the garden entrance to form a background for the pool. In addition, many color effects (*Lavandula officinalis* Chaix ex Vill.), flowers (*Rosa* sp.) and densely textured shrubs and spreading junipers (*Juniperus horizontalis*) have been used because of the effect they provide on the grass surface.

Evergreen plants (*Pittosporum tobira* (Thunb.) W.T.Aiton etc.) and calligraphic plants (*Lagerstroemia indica* L. etc.) were used in the planting design so that the campus environment is not deprived of the green and aesthetic provided by the plants during the winter months.



In addition, privacy and continuity are provided by using *Hedera helix* L. on the campus walls. In order to protect from noise and dust, bushes were mostly used at the borders of the area.

In order not to disturb the legibility of the space, a design approach has been adopted in which the main axes will be emphasized with the same plants. A stepped rock garden was created at the entrance of Block B in order to enjoy the scenery with the created vistas, and an arrangement was made taking into account the viewing angles in the dining hall and sitting areas (Figure 14).



**Figure 14.** Rock garden planting

Species such as *Magnolia × soulangeana* Soul.-Bod., *Santolina chamaecyparissus* L., *Gaura lindheimerii* L., *Ruellia tuberosa* L., *Pittosporum tobira* (Thunb.) W.T. Aiton "Nana", *Viburnum tinus* L., *Photinia × fraseri* Dress, *Nandina domestica* Thunb., *Jasminum nudiflorum* Lindl., which are not used much in the province but are thought to adapt to the region, are included with the thought that they will contribute in this sense. The trees and shrubs, shrubs, ground

cover and seasonal and wrapper plant species used in this plant design project are listed below.

In order to protect from noise and dust, bushes were mostly used at the borders of the area. Large collections of roses (*Rosa hybrida*) and wooden plant crates were used to soften some hard floors.

The trees used in the Isparta University of Applied Sciences campus landscape project are given in Table 1.

**Table 1.** Plants used in the campus

PLANT NAME
Cupressus macrocarpa L. "Goldcrest Spiral"
Magnolia grandiflora L.
Magnolia × soulangeana Soul.-Bod.
Robinia pseudoacacia L. "Umbraculifera"
Prunus cerasifera Ehrh."Nigra"
Lagerstromia indica L.
Syringa vulgaris L.
Laurus nobilis L.
Thuja occidentalis L.
Pittosporum tobira (Thunb.) W.T.Aiton
Berberis thunbergii DC.
Buxus sempervirens L.
Euonymus japonicus Thunb.
Nandina domestica Thunb.

Spirea vanhouttei L.
Viburnum tinus L.
Juniperus sabina L.
Juniperus horizontalis L.
Pyracantha coccinea M.Roem.
Jasminum officinale L.
Jasminum nudiflorum Lindl.
Weigela florida (Bunge) A. DC.
Photinia serratifolia (Desf.) Kalkman
Photinia × fraseri Dress
Lavandula officinalis Chaix ex Vill.
Gaura lindheimerii L.
Ruellia tuberosa L.
Santolina chamaecyparissus L.
Salvia rosmarinus Spenn.
Rosa sp.
Hedera helix L.
Lonicera caprifolium L.
Wisteria sinensis (Sims) DC.
Paeonia turcica L.
Pelargonium inquinans (L.) L'Hér.
Phormium tenax J.R.Forst. & G.Forst. "Variegata"

In the final product of the design, the relations between concept, function and aesthetics were clearly revealed and an aesthetic, legible and living campus open space was planned.

### **3.4. Application Phase**

After the end of the design phase, the implementation studies started in February 2021 in the study area and concluded in May 2021. The hard ground application of the project designed for the Rectorate campus was made by the contractor company / practitioners as a result of the tender, the pool, rock garden, university logo and planting application is within the possibilities of the university and under the control of the Landscape and Ornamental Plants Growth Department academic staff. Project implementation was carried out by the Department.

The creation of the university logo in the area, the application of locked cobblestones on the walkways, the creation of irrigation systems, the lighting systems and application were made by the relevant technical unit of the university, taking into account the designer's opinions. However, during the implementation phase, Landscape Architects of the department participated in all structural and plant applications, and the project application was carried out together with the control engineers and contractor company/applicators.

After the leveling work was carried out in the Rectorate campus, the pool and other construction activities were completed. In addition, in line with the design project, the pergola, seating units and plant boxes

were placed on the walking paths. At the end of the completed structural work, plants were placed in line with the vegetative design and the planting process was completed. The grass field facility of the area was also realized and its application was terminated.



**Figure 15.** Landscape design applications

#### **4. Conclusion and Suggestions**

Universities are not just educational and research institutions. In addition, they are responsible for presenting examples and environments required by contemporary life to their students, employees, users and people in their immediate surroundings. For this

reason, the planning of university campuses and their harmony with the environment gains great importance.

This study, which was prepared within the scope of the landscape design and application process, was carried out for the open and green areas in the Rectorate campus of Isparta Applied Sciences University, which was established in 2018. The needs of visitors, academic and administrative staff were taken into consideration during the design process. In this context, the process was carried out with analysis, design and implementation phases. In the analysis phase; spatial, functional and natural landscape data were evaluated. The design phase, on the other hand, started with the determination of user needs and was concluded by establishing the determined concept and form relationship. The implementation phase, on the other hand, was carried out under the control of the relevant units affiliated to the rectorate over the existing design.

The open and green areas in the Rectorate campus have a function to allow social activities, as well as a space setup that combines aesthetic and functional features.

Due to the fact that it is a place belonging to the university, the study, which has paid attention to include exemplary applications, aimed to create a point of attraction for the users. Both structural and herbal preferences were made in this direction. In structural and plant designs, attention was paid to create designs that are economical, ecological and functional, resistant to climatic conditions, do not impose much structural load on the area, contribute to the identity and

prestige of the university, and are compatible with the environmental texture.

Plant arrangements;

- ✓ Compatible with the built environment,
- ✓ Suitable for use in all periods with different usage areas,
- ✓ Care has been taken to ensure that it is compatible with the natural environment and climatic conditions.

In the design, care was taken to use a green area that is compatible with the hard floor arrangement. Since the place is located among the buildings, it can give a feeling of being surrounded, so it has been tried to create a feeling of spaciousness and comfort in the field of view with ground cover and shrub species as much as possible. Since open and green areas are more organized and have plant species diversity, it has become effective and exemplary for its environment.

Although vegetative applications are made with large saplings in the vegetative arrangement of the area, it takes time for the area to establish its own ecosystem. As the plants develop and begin to reveal all their aesthetic and functional characteristics, landscape design will begin to show its effect more.

In this study, successful results were obtained from this design and implementation study carried out under the supervision of university decision makers and related units, accompanied by the landscape design process. A similar process should be followed in all open green space planning and designs in the campus texture of the university.

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## Installation Art as a Landscape Element in Public Open Spaces

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## 1. Introduction

With the Industrial Revolution started in England in 1760 and continued until 1840, developments occurred in the social and economic structure of societies, a new impulse was given to art movements, and the way to the development of contemporary art design was paved by means of the mass communication era. The moods brought by capitalism at the beginning of the 20th century effected on artists and led to the emergence of modern art movements. Futurism in Italy, cubism in France, constructivism in Russia, the dada movement in Europe and the surrealism that developed afterward, influenced art design and established the formation of installation (Kınam, 2010 from Bektaş, 1999).

Installation is a concept that includes many different disciplines and applications, which is derived from the verb "install", which means to set up, arrange, and place in English. The Turkish equivalent of "Installation" is "Enstalasyon". The best-known definition of the concept of the installation is made in the Eczacıbaşı Art Encyclopedia as "exhibition of objects related to each other and the space they are in together at the level of meaning and perception." (Birol, 2021 from Özyayten, 1997).

New movements such as photography, land art, and installation were added to the branches of art such as painting and sculpture which were accepted to be the mainstream until the beginning of the 20th century, thus, it laid the ground for artists to Express their art by means of a richer language (Emmungil, 2007). The concept of installation, rooted

in Kurt Schwitters, shaped in the 1970s (Okumuş, 2016). The art of installation has an interdisciplinary relationship with other fields such as sculpture, performance, video and architecture and offered unlimited application areas (Özaltun, 2020 from Yücel, 2012). In this way, it provides the opportunity to work indoors and outdoors without spatial limitations (Emmungil, 2007). In the 1970s, in the U.S. some artists went out of their interior spaces and turned to nature, and they created a wide variety of application areas by using stone, soil, and many natural materials (Okumuş, 2016). Thus, by using real-world materials in installations, art has become something that one can go in and out, walk through, and sit, and it is open to perceptual experiences, integrated with its environment, realizing itself in the "real space" rather than just being "viewed" (Süzen, 2010). At this point, what makes the art of installation complex is why and in what ways the objects are placed in the space, that is, the conceptual dimension of the relationship between the space and the placed object (Ayözcan Atalar, 2006).

The focal point in the perception of space and its experience by people in the installation art is public spaces, allowing everyone to benefit from these spaces. Public spaces can be indoor or outdoor. The fact that artists moved from indoors to outdoors has also increased the demand to open spaces as public spaces, in this way, open spaces have gained not only recreational value but also aesthetic value in the living area.

In social life, it is possible to define public spaces as social spaces where thoughts, forms of expression, and experiences are formed, shared, and discussed (Parlakalay, 2020). When it comes to public spaces, starting

from the Greek agora, it is seen that these areas have turned into more functional areas and are defined by uses such as strolling, resting, recreation, consumption, and art. Between the years 1950-60, many theorists focused on the visual perception of public space. Cullen (1961) defines public space elements as an artistic, architectural composition composed of open space and buildings (Gökgür, 2017). Jacobs (1961) and Madanipour (1999) define public open spaces as open spaces that people can access for free. In this respect, parks and open spaces not only provide a pleasant and natural environment, but also improve the quality of life in the urban area and take on the necessary environmental functions. The fact that public open spaces bring individuals together and that this space is open to the whole community requires it to provide certain physical conditions for the interaction and activities that will take place there. The spatial quality of these public open spaces also plays an important role in the survival of the city as a “living organism” (Uzgören & Erdönmez, 2017).

Installation art in public spaces is used as landscape elements such as a border element, seating element, ground element, playground (Kalin, 2018), and focal point. All over the world, there are installation art examples in public open spaces, which are put into practice using all kinds of living and non-living materials.

In this study, the focal point applications by installation art in public spaces are discussed and their contributions to the landscape are mentioned.

## **2. Urban Open Space Installation Practices in the World**

### **2.1. Pool Balls**

The work called “Pool Balls”, which was carried out by Oldenburg and Van Bruggen in 1976 for the installation art defined in the urban landscape, has been an important project affecting the value of the urban space. The idea to place these cannons came from a cannonball that Coosje saw embedded in the Munster city walls. Spheres of different colors were thought to move in random patterns and routes. These balls would change place every day and this change could only be viewed from a bird's-eye view or from an apartment across the park. In this way, it is planned to create a super slow-motion billiard game. These balls have been experienced by park users and used as public notice boards and have become a part of the public space and the city (Figure 1) (Ayözcan Atalar, 2006 from Oldenburg and Van Bruggen, 1994).



**Figure 1.** Oldenburg, Van Bruggen-Pool Balls (Ayözcan Atalar, 2006 from Oldenburg and Van Bruggen, 1994).

## 2.2. Cloud Gate

The giant sculpture called "Cloud Gate" located in the urban space in Chicago has an important place among the examples of installation (Figure 2). The sculpture by Indian-born artist Anish Kapoor that connects people with clouds has become a major symbol of Millennium Park in Chicago. The sculpture is exhibited in the event area, in the center of the city and in a way that everyone can see. For this reason, it contributes to the experience of the place by drawing the audience in it (Parklakkalay, 2020).





**Figure 2.** The “Cloud Gate” Installation by Anish Kapoor (Anonymous, 2021)

The Cloud Gate not only reflects the space within, but also gives the audience the illusion of a space. By creating a cave effect with its form, it draws the attention of the viewer. The abstract image formed on the surface reflects the world as a living painting, expressing endless other spaces that are not noticed in daily life and are in a constant rush (Ateş et al., 2020).

### **2.3. Mirror Labyrinth NY,**

It is a public outdoor installation by Jeppe Hein made of polished stainless steel and evenly spaced vertical lamellae (Anonymous, 2016). The uneven heights of the lamellae refer to the skyline of Manhattan across the park (Figure 3). The mirrored surfaces reflect the viewers and their surroundings, as well as adjacent mirrors. This multifaceted reflection gives the viewer the feeling of being part of a surrounding space with an unfamiliar and disorienting environment like a labyrinth. Mirror Labyrinth New York is also a visual bridge between Manhattan and Brooklyn Bridge Park, reflecting the city view (Anonymous, 2015).



**Figure 3.** Mirror Labyrinth NY (Anonymous, 2015)

## **2.4. Urban Bloom**

Urban Bloom is an experiment created in urban space. It was originally built in a parking lot, but it aimed to add innovation and vitality to the understanding of urbanism. The parking lot has been transformed into an ideal urban garden, and has become a city project that was built with completely artificial methods and brought people to the forefront. A platform consisting of modules was set up, and a courtyard was created by placing various flowers and vegetation between the modules. Balloon-like elements are placed on the courtyard to look like colorful tree leaves and provide shade to the space (Figure 4). In this way, an inviting garden was created (Anonymous, 2018a).



**Figure 4.** Urban Bloom Installation Art (Anonymous, 2018a)

## 2.5. Sprouts

Sprouts is India's largest and first site-specific art installation designed by Vibhor Sogani. Sprouts standing 40 feet tall and spreads over 6 acres of greens surrounding in Delhi (Figure 5). The project was initiated with the idea 'when the seeds begin to sprout'. The objective was to create a landmark through a series of installations signifying growth, development and progress. 'Sprouts' is symbolic of the feeling that India is rising after 60 years of independence (Anonymous, 2018b).



**Figure 5.** Sprouts in India (Anonymous, 2018b)

### 3. Conclusion

The developments that started in societies with the Industrial Revolution led to the beginning of many variations in the field of art, which affected the way art was applied. In addition to the usual art movements, living spaces have begun to take shape with new understandings.

The installation art, which is the subject of this study, has a field of application in many disciplines. The art of installation, which can be experienced indoors and outdoors, lays the groundwork for the space to not only be watched but also lived. Installation experiences in open spaces, which are public living spaces, contribute to the urban landscape and significantly affect the urban life and the perspective of the inhabitants. Kevin Lynch explained the images of a city with 5 elements. These are landmarks, borders, paths, districts, and intersections/nodes (Lynch, 1960). Installation applications carried out in public spaces are almost the landmarks of the city. This contributes positively to the image of the city. The application areas of installation art in the world are quite extensive. The installation applications discussed in this study are the landmarks of the cities in which they are located. They have become an important landscape element with their recreational and touristic values, influencing the socio-cultural use of the spaces.

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## Systematic Analysis of Urban Wildscapes in Urban Space and Design Process Suggestions

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## 1. Introduction

Today, more than half of the world's population lives in urban areas. This rate reaches up to 80% in Turkey (Tuğluer & Çakır, 2019; 2021). Many cities around the world are struggling to cope with the pressure of a rapidly growing population and the lack of available space. These crowded cities deal with limited urban space and resources, and it becomes very difficult and complex to increase public space.

Urban space is made up of dynamic urban parts that are designed according to physical needs, socio-cultural structure, and perceptual characteristics and is in constant change and transformation in practice. Also, its function and form have evolved with the changing needs of society (Dinç & Gül, 2022). One of the reasons for the change in urban space is rapid and unplanned urbanization. Because of the rapid development of technology and industry in the 19th century, urbanization has undergone a great and rapid change (Dinç et al., 2020). Urbanization is driven by economic, technological, political, and socio-psychological factors, which lead to the physical change of existing urban space (Dinç & Gül, 2021). As a result, forms of intervention and spatial/structural problems arise in many types and scales of spatial pressure and developments in urban space.

In order for the urban space to be perceived or comprehended by its users, there are various urban space elements according to the size of the city and urban settlements. Because the emotional needs of the user are one of the determining factors of the space arrangement. Although the design concept of the urban space has changed over time, it is seen

that there are still many functional, structural, and socio-economic deteriorations (deformation/ aging) that disrupt the integrity and meaning of the space. In addition, the change in urban space over time causes different spatial problems. Negative factors such as over-construction, heavy vehicle traffic, environmental pollution, insufficient open and green areas have caused more CO<sub>2</sub> emissions to the atmosphere and created the heat island effect in cities (Gül, Dinç, Akın & Koçak, 2020). Within the scope of the research that is the subject of this study, which is carried out for the urban space problems and solutions within the specified scope, it has been determined that there are subjects such as urban voids, lost spaces, leftover spaces, etc., regarding the physical structure at different scales, and shrinking cities, city crevices, etc., regarding the socio-economic structure. Similar deterioration, disappearance, and obsolescence in space are result of the environment, socio-economic structure, changes in spatial structure, technological developments, and most importantly, the constantly changing perception of planning and design.

The subject dealt with within the scope of the study is urban wildscapes areas, which are not used in the cities or where the user profile changes and the natural features of the space come to the forefront over time, as distinct from the integrity of the urban space. Urban wildscapes are areas where ecological or environmental characteristics emerge and where ecological structure fights, as well as changes in functional, structural, and socio-economic structures. In addition, the issue that emerged with the concept of ecological infrastructure includes an

approach that covers the nature and use of urban space from different perspectives. These areas can be evaluated from the smallest spatial unit to the planning scale.

Urban wildscapes are spaces that are unplanned, unpredictable, and exposed to natural and artificial factors compared to other urban problems. Therefore, it is ignored in the practice of the design and planning discipline.

## **2. Material and Method**

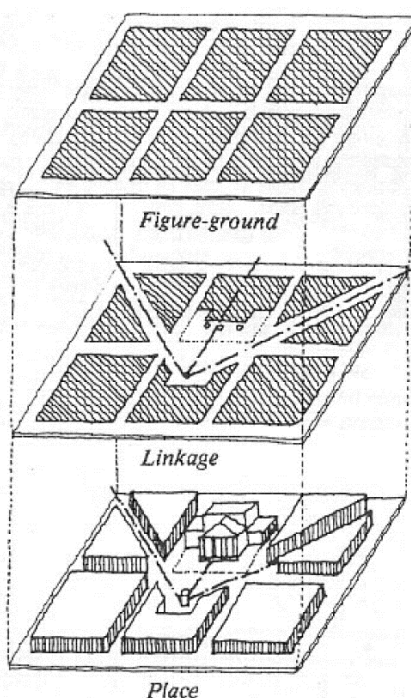
This chapter is based on the questions of how the concept of urban wildscapes is handled in the literature, its place and importance in current urban problems. In this study, primary and secondary sources were used by making a literature review, in which theoretical knowledge was obtained in the first stage. The study, which focuses on the change/transformation of urban space, focuses on urban problems and solution proposals that arise in cities in a fragmented way. In this context, as the second stage, a theoretical comparison of urban wildscapes and other urban problems (shrinking cities, lost spaces etc.,) that emerged in the historical process was made. Spatial features, resolution processes of urban space problems, and interdisciplinary application areas have been determined. In addition, systematic evaluations were made between concepts that are close to each other. In the next stage, a proposal was developed for the integration of urban wildscapes areas into the design processes of the urban space. The design process of the urban space, which differs according to the application area and needs, is open to development with case studies.

### 3. Findings and Discussion

#### 3.1. Urban Space

Space can be defined as a reality dependent on people, under the influence of the socio-cultural and socio-economic environment, apart from the need for shelter. It is the place where the traces of social history are seen, in short, physical/spatial development are provided and, at the same time, social events are experienced. This space, which is formed by the relationships and proximity of the buildings with each other and with other elements, is also called "urban space".

Rob Krier (1991) stated that while defining urban space, all outdoor spaces can be called urban spaces if they are not evaluated aesthetically. Urban spaces are dynamic areas that are designed according to the physical needs, socio-cultural structures, and perceptual characteristics of the users and are in constant change and transformation in practice. While cities maintain their dynamic structures, there are 3 elements that connect all of them. These are the figure and ground system, linkage, place and its relationship to other nearby places (As cited in Mowla, 2013, Krier, 1991) (Figure 3.1).



**Figure 3.1.** Connecting Elements of Urban Space (Mowla, 2013)

The spatial formation can be considered as a result of the changes in space over time according to the economic and socio-cultural characteristics of the decisions taken in the planning processes, practices, and users. In this context, cities with different spatial characteristics and formations are important. Theorists divided urban space into its components with different approaches and examined its natural, structural, and cultural characteristics (Birik, 2011). The aim of these approaches is to reveal the functioning mechanisms of the urban whole by determining their roles in the formation of spatial identity rather than the independent evaluation of the parts. Due to the dynamic

nature of the city, certain urban qualities are not sufficient to define the space alone.

In theoretical and practical applications, urban space structure is evaluated in different ways according to its development and the way it is defined over time. In this process, the perception and use of space in urban areas are very important. It is important to consider the spatial, social, economic, ecological, and perceptual/experiential in the planning or design of urban spaces.

### **3.2. Urban Wildscapes**

Urban development directly affects natural ecological environments through habitat loss (As cited in Aurora & Simpson, 2009, McIntyre & Hobbs 1999), habitat fragmentation, increased vegetative degradation, erosion, and soil compaction (As cited in Aurora & Simpson, 2009, Bradley 1995). The development of residential areas often changes the vegetative composition by introducing non-native species for ornamental purposes (Aurora & Simpson, 2009). Urbanization has led to the establishment of green spaces that are improperly managed or the planting of exotic ornamental plants in these urban spaces. However, traditional landscaping and maintenance practices made with short-term aesthetic concerns can be harmful to human health and the environment (Çakır, 2021).

Urban wildscapes are areas that are unused in cities or where the user profile changes and where the physical, ecological, and socio-cultural characteristics of the place come to the fore and are separated from the integrity of the urban space. ‘Urban wildscape’ is one of many ‘scapes’

that are currently being used to highlight and promote particular landscape qualities, functions and experiences (Jorgensen & Keenan, 2012).

In addition to changes in functional, structural, and socio-economic structures, they are the struggle areas of urban spaces and ecological structures, where ecological or environmental characteristics appear. The issue, which emerged with the concept of ecological infrastructure, includes an approach that covers the nature and use of urban space from different perspectives.

Urban areas that are natural for human action seem to shape the terrain, especially where there is spontaneous growth of vegetation through natural succession. Such wild landscapes can exist at different scales, from cracks in pavements to much broader urban landscapes, including woodland, unused land, river corridors, and abandoned areas (Jorgensen & Keenan, 2012).

With the increase in the number of urban population on a global scale, the issue of urban ecosystems is gaining importance all over the world (As cited in Nerlekal, Kulkarni, 2014; Savard et al., 2000). Increased urbanization can lead to habitat changes such as degradation of native vegetation, increase in regional temperature, deterioration of air and water quality, and soil erosion, all of which affect species composition and the proportion of exotic species (As cited in Nerlekal et al., 2014, Moore & Palmer, 2005; Tratalos et al., 2007).

Just as the abandonment of urban areas creates opportunities for pioneer vegetation to move and colonize unused areas, it creates a vacuum that

attracts human pioneers to occupy and use them in ways that are not possible in more organized and regular sections. The basic starting point of the concept; urban voids, urban residual areas, aging urban fabric, and urban parts/areas/regions that have lost their function and been invaded by ethnic or social groups have revealed their own ecology without any intervention (Jorgensen & Keenan, 2012).

It covers the determination of problems such as emerging vegetation, ecological infrastructures such as lost rivers, streams, etc. that cause floods in the built-up area, sudden changes in socio-cultural structure with planning interventions and environmental effects of decisions in planning policies and practice (Jorgensen et al., 2012). Urban Wildscapes are places that are unplanned, unpredictable, and exposed to natural and artificial factors compared to other urban problems (Figure 3.2., Figure 3.3., Figure 3.4.). For this reason, it is ignored in the practises of design/planning discipline.





**Figure 3.2.** An example of Urban Wildscapes in the Periphery (Author's Personal Archive, Çünür, Isparta, 2017)



**Figure 3.3.** An example of Urban Wildscapes Nearby Urban Transportation (Author's Personal Archive, Çünür, Isparta, 2019)



**Figure 3.4.** An example of Urban Wildscapes at Ruin Housing  
(Author's Personal Archive, Volos, Greece, 2019)

Urban wildscapes allow an unmediated experience of the physical traces of the past that they often contain. These traces or fragments, including structures, surfaces, industrial artifacts, landforms, and vegetation, are not maintained in a fixed condition, either physically or representationally, or interpreted from a fixed perspective. Urban wildscapes are in a state of growing, weathering, transforming, etc., as are the forms of human appropriation they host, and these changes and processes of transformation are by their nature clearly legible (Sheridan, 2012).

As a result of the literature review and the studies carried out to define the concept, Table 3.1 was created. Urban/rural intervention forms and interdisciplinary interactions of the concept of urban wildscapes towards spatial quality, ecological structure, formal structure, socio-cultural structure and socio-economic structure were evaluated.

**Table 3.1.** Theoretical Explanation of Urban Wildscapes

	Spatial (Urban/Rural)	Forms of Intervention	Interdisciplinary Interaction
Effects on Spatial Quality	Public Semi-Public Semi-Private Private	Participatory processes	Urban Design, City and Regional Planning, Landscape Architecture, Architecture
Effects on the ecological structure	Topographic structure, Hydrogeological structure (availability of water) Special Environmental Conditions Climate structure	Holistic approach in planning processes, Observing sustainable environmental values,	Landscape Architecture, Urban Design, City and Regional Planning

<b>Effects in form</b>	Space in urban space, Aging structures and urban systems, Unused Structures, Space created by bridges, Areas created by large area uses such as railways and airports, Lack of infrastructure	Urban Renewal, Urban Transformation, Urban Design (Creation of urban design guides) Restoration Reconstruction	City and Regional Planning, Architecture,
<b>Effects on socio-cultural</b>	The divisions formed by ethnic groups, Regions formed by communities of different income levels, Unsafe places,	Urban re-functioning, Establishment of the urban system in accordance with the socio-cultural structure	City and Regional Planning
<b>Effects on socio-economic</b>	Functional deformation, Urban rent		City and Regional Planning, Landscape Architecture

### 3.3. Differentiating Situations in Urban Space

Urban space, which has a dynamic structure, is exposed to changes and transformations in spatial, social, and economic structures over time, and urban problems occur. One of these problems is considered an urban problem that is evaluated ecologically as well as spatial, socio-economic, and social problems. Conceptually similar formations in urban space, which are similar to "Urban Wildscapes", have been determined. These can be defined as near-urban problems in urban areas that have been out of use, lost their functionality, or socio-culturally

unsafe urban areas, etc. Concepts are discussed in two groups as physical use and socio-economic structure.

### **Physical Use;**

#### ***Lost Spaces***

General Features: *No Identity, No Definite Boundary, Disconnected from the Integrity of Urban Space, Unsafe, Public Spaces, Intervention with Filling and Recycling*

It can be said that space is not the determinant of the structures and relations established by societies, but a product of them (Özbek, 2012). When social relations are considered as determining factors in spatial differentiation, features such as regional differences, diversity, and resistance to time; on the other hand, considering the city as a system and the space as a system within itself and as a subsystem of the city emerges as an effective model in explaining the concept of Lost Spaces (Trancik, 1986). According to Trancik (1986), Lost spaces define “social meaning” and “use values/functionality” lost by unpreferred and abandoned spaces that lose their use, do not contribute positively to their users, and lead their environment to transform into problematic spaces.

#### ***Urban Voids***

General Features: *Result of Neglected Development Practices, Undefined, Dysfunctional Gaps in Urban Space, (Planning Gaps, Gaps in Urban Fabric, Dysfunctional Gaps), Unsafe, Public Spaces, Partial Interventions*



Spaces have been fundamental to improving the quality of the city around us and are of prime importance in our lives. Urban voids are places that are often neglected or forgotten in the eyes of the people. Often, these result from isolating planning areas, and poor design or voids under the structure. Urban gaps arise after interventions by decision makers and designers, such as inefficient decision making, poor land management and poor coordination (Marfani, Smit, Nirav, Savan, 2019). According to Hamelin (2016), the formation of gaps in urban areas is the result of many factors, such as topography, neglect, and development practices. Urban spaces can be divided into three main categories: planning, functional and geographical (As cited in Hamelin, 2016, Nipesh Palat Narayanan, 2012). According to Marfani et al. (2019), urban spaces can be considered in two categories: These are planning gaps that arise with incorrect and inadequate planning processes and functional gaps that appear as empty or dead spaces in the city that are not used for the design of urban areas.

### ***Leftover Spaces***

General Features: *Dysfunctional, Unplanned/Undesigned, Part of Urban Uses, Generally Use of Green Spaces, Public or Nobody Owned, Uncertain*

It can occur in cities next to a planned development or along transportation axes, often green space but undeveloped or abandoned, in yards and shipyards of old buildings set aside but unnoticed, on public or private land. Leftover spaces have been defined in many different ways, such as “zones of uncertainty”, and “urban spaces

forgotten, unnoticed or considered meaningless by a large segment of the community” (Quamaraz-Zaman, Samadi, Azhari, 2012).

### **For Socio-economic Structure;**

#### ***Shrinking Cities***

General Features: *Population Decline, Destroyed and Unsafe Housing Areas, Empty Lands, Private and Semi-Private Areas, (Integral) Unsafe Zones, Disruption in Infrastructure and Services, Socio-Economic Problems*

Shrinking cities are often caused by reductions in population and in the local workforce. There are economic and socio-cultural changes in cities, and gaps, idle areas, and unused areas appear in urban areas. There are always cities in the world that lose their population permanently (Oswalt & Reiniets, 2006). There are several different effects of shrinkage transforming cities. This, of course, results in different patterns of shrinkage and demographic change. In addition to the spatial emptiness in shrinking cities, social, political, economic, etc., transformations occur with the effect of population loss (Hannemami. 2003). Shrinking cities are considered an important international political, economic and planning problem (As cited in Martinez-Fernandez, Audirac, Cunningham-Sabot, 2012, Reckien ve Martinez-Fernandez, 2011). In the most general terms, Shrinking city can be defined as a metropolitan area, a city, a region within the city, or a rural settlement experiencing population loss, economic decline, employment decline, and social problems (Martinez-Fernandez et al., 2012).

### ***City Crevices***

General Features: *Breakdowns in Urban Space, Unnoticed Guiding Gaps in the Planned Area, Public Spaces Restricted by Socio-Cultural Structure, Unsafe Artistic Interventions as a Result of Transportation Systems*

Cities have many leftover spaces that are inactive. These residual spaces can be defined as urban vacant areas that are not used for the construction of remnant buildings. These areas are areas under overpasses and subway bridges, traffic islands and stops, abandoned buildings, etc. It is possible to come across such areas many times a day when walking down a street or crossing an intersection. On the other hand, these areas have the potential to be transformed into a new urban experience (Singh, 2016).

### **3.3. Urban Space Intervention Forms and Urban Wildscapes**

Spatial pressure and developments in urban space reveal many types and scales of interventions and spatial or structural formations. Intervention forms are determined as solution-oriented for the identified problems. Some forms of intervention are urban transformation, urban renewal, urban reuse, urban design projects, competitions, central and local administration planning, etc. Urban design can be considered the most important intervention tool against fragmented problems in urban areas. Urban design not only physically organizes the relevant environment but also examines the ecological, economic, social, and political aspects and seeks solutions. In the context of ensuring urban



continuity, it ensures the integration of this area with its environment and increases its effectiveness in its environment. Urban design has an important role in terms of covering all planned interventions for different purposes in urban wildscapes areas. In his book *The Image of the City*, Lynch (1960) defines urban design as the ability to create suggestions for spatial expansion and the management and form of the existing environment, and he lists the values required for the realization of an urban design as follows:

- Livability,
- Suitability for its function,
- Easy to read and learn,
- The satisfaction it provides,
- Being meaningful through associative perception,
- The balance of spaces under private and public control,
- Feasibility

When evaluated from a spatial point of view, it has been seen that urban wildscapes have a structure that covers the other concepts mentioned in section 3.1.2. In addition, unlike other concepts, it becomes important in terms of including the ecological structure. In Table 3.2, their spatial qualities and their effects on urban space are systematized comparatively.

**Table 3.2.** Systematization of Theoretical Knowledge in the Framework of the Concept of Urban Wildscapes

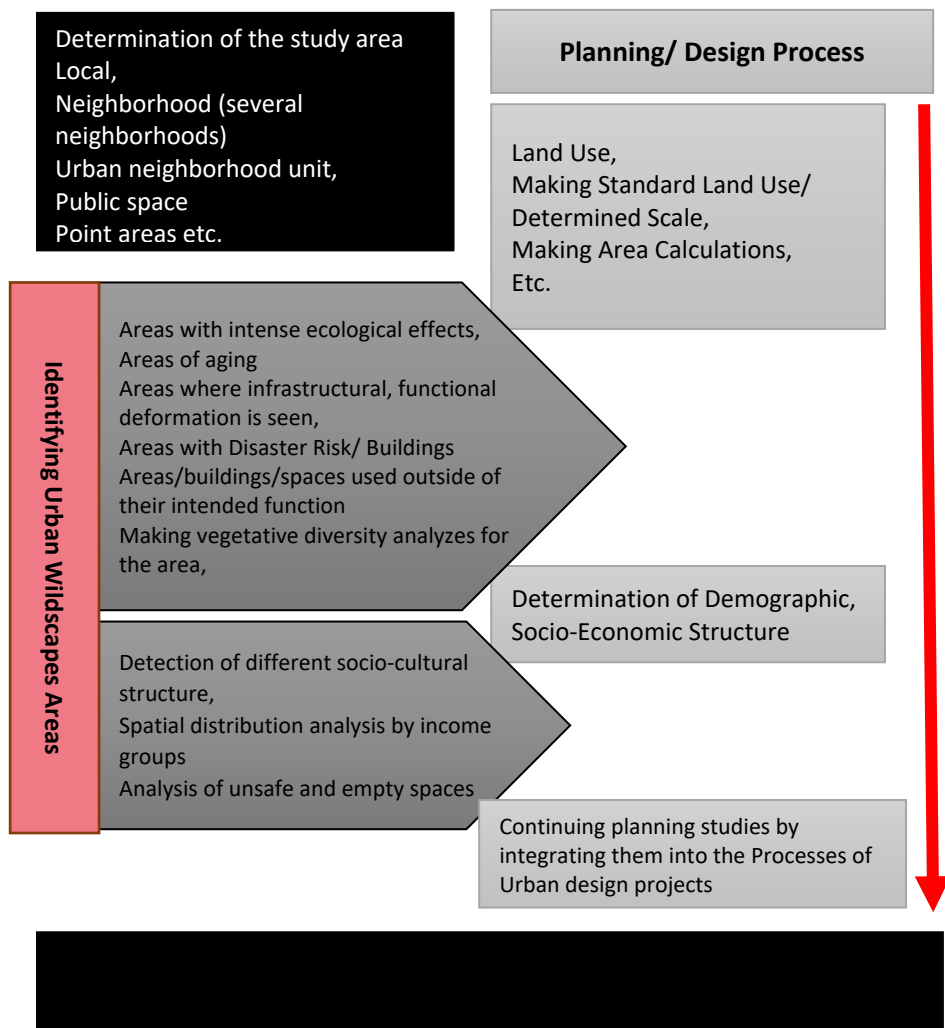
	Quality of Space	Effects on Urban Space	Scale
Lost Spaces	Public	No definite borders, unidentified places, Areas detached from their urban space, Unsafe areas, Functionally and physically empty places,	Urban
Urban Voids	Public Private	Ignored places in spatial development,	Urban, Part of urban space
Leftover Spaces	Places that don't belong to anyone	Secluded and unsafe spaces,	Part of urban space
Shrinking Cities	Public Semi-public	Empty buildings in the city, Unconnected urban functions, Spread to the city periphery and unplanned development,	Urban, Regional
City Crevices	Public Places that don't belong to anyone	Socio-cultural and economic divisions, Point gaps in the city, Infrastructural problems,	Part of urban space
Urban Wildscapes	Public Semi-Public Semi-Private Private	Gaps in space, Unsafe areas, Aging, Re-emergence of ecological structure in space and possible environmental problems	Regional, Urban, Rural, Part of urban space

### 3.4. Analysis/Research Process Design for Urban Space

Designers and planners will play pivotal roles in a new vision of urban space. Instead of designing for users, new thinking, feeling and working spaces are not only a method, but a process where the individual can contribute to self-expression and creative thinking in the design process (Kaya Köse & Akbulut, 2019). Their artistic tradition—finding unique and esthetically pleasing solutions to design problems—has always been shaped by functional and economic constraints. Now they must add a third dimension to their thinking and learning: ecological thinking, both its constraints and its inspiration. Although their relative importance varies between projects, the three factors of esthetics, economics, and ecology are critical in all planning and design (Karr, 2009).

Ecological design should focus on correct spatial and temporal scales, simplicity, efficient use of resources, close harmony between means and ends, durability, redundancy, and flexibility. The design should also be specific to the space. Design should focus on multiple issues at once to avoid undesirable effects. Good design requires ecological thinking—that is, a conscious effort to avoid unexpected results (Karr, 2009). Key concepts in ecologically based design processes (Karr, 2009); Integrity and health, System and scale, Landscape and context, Parts and Processes, Natural History and Life Cycle, Resilience and Resistance, Disturbance and Equilibrium, Change and Transformation, Trajectory and cycles, Connections, Limits and Collapse, Root Causes and Patterns, Effect and Consequence, Simplification, Complexity and

Diversity, Uncertainty and Surprise Situations. Integrity and health, system and scale, landscape and context, parts and processes, natural history and life cycle, resilience and resistance, disturbance and equilibrium, change and transformation, trajectory and cycles, connections, limits and collapse, root causes and patterns, effect and consequence, simplification, complexity and diversity, uncertainty and surprise situations are key concepts in ecologically based design processes (Karr, 2009). It is very important to integrate ecologically based design into planning and urban design processes. It is clear that ecological design and spatial design, which are considered holistically, will contribute to sustainable urban development. In this context, it is important to deal with urban wildscapes and the change/transformation processes of urban space in a holistic way and to manage the process together. The process is described in general in figure 3.5. for this purpose. An approach that can be developed in detail by carrying out field studies has been adopted.



**Figure 3.5.** Integrating Urban Wildscape areas into the Planning/Design Process of the Urban Space

As a result, urban design; processes that primarily affect the city and its inhabitants, such as economic conditions, shared memory, behaviors and habits, functional needs, and political processes, should also play an active role in the projects (Banerjee, 2001). Urban design is not just a means of creating space physically; it is also an effective means of

organizing urban life and social activities. In addition to the development of spatial values, the social and economic structure there will be effective in guiding cultural developments.

#### **4. Conclusion and Suggestions**

The dynamic structure of cities, which are in continuous development, may reveal some negative consequences over time. Urban degradation is quite high, especially according to the time, technology, functional change, and user profile that occur in the physical space. Each urban degradation has its own unique structure and solution process. With the emergence of these deteriorations, it is possible for the ecological structure to become dominant and the disappearing vegetative vegetation in urban areas to begin to manifest itself. In addition, the recovery of the lost ecological structure will be important for the urban space. Urban Wildscapes areas can be defined as urban degradation precisely where this process is defined. As seen as a result of the literature review and systematic evaluation, urban wildscapes are in a structure that covers all other urban deteriorations and can contribute to sustainability. Urban wild scapes examined in this study; It does not play an important role in categorizing the short or long term deformations in cities and urban spaces, creating ecological awareness, determining possible problems other than the way urban spaces are designed from a different perspective, making urban design processes more comprehensive, and perception of the use of today's living space when integrated into legal processes.

The concept of urban wildscapes shows itself in many urban areas in the world and in Turkey as well. The lack of theoretical studies was determined as a result of the literature review. This is seen as an important shortcoming. It is thought that this study will guide future studies by contributing to the literature, and at the same time, it is open to development by being supported by application studies.

### **Thanks and Information Note**

Ethics Committee approval was not required for the study.

### **Author Contribution and Conflict of Interest Disclosure Information**

All authors contributed equally to the article. There is no conflict of interest.

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## Site Inventory and Analysis in Urban Landscape Design

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## 1. Introduction

One of the most important goals of landscape architecture studies is to identify and sustainably use the distinctive features of space, place, and landscape to improve environmental quality. People have always needed convenient spaces in order to live comfortably. Therefore, it becomes absolute to meet the biological, physiological, psychological, and social needs of the individuals (Akoğlu & Akten, 2022). Today, human population growth and actions are seen as important factors that often cause negative effects on landscape change. The world's population is estimated to increase by 2 billion people in the next 30 years, from 7.7 billion presently to 9.7 billion in 2050 (Population, 2022). Therefore, it is clear that protecting the planet's health depends on making wise decisions about how the entire landscape will change to ensure that people's needs continue to be met in the future (Stahlschmidt et al., 2017). Sustainable approaches to site design aim to improve the well-being of the community while trying to minimize development impacts both on and off the site. Vital environmental processes must be protected and degraded ecosystems restored (LaGro, 2007). To make optimal decisions, the designer needs to understand how landscape sites are structured and operated and their potential to change for the better. The designed landscape is the result of a series of natural and cultural processes. It is essential that landscape designers understand these and respond to them creatively and responsibly (Filor, 1994). A systematic approach is required to understand this spatial

change fully and to design a sustainable space that is in harmony with its surroundings. For this, an inventory and analysis process is needed in urban landscape design projects.

The inventory and analysis process allows us to recognize the elements and context of nature and culture and learn about their effects. In this way, new and original projects are produced by using the analysis results. In addition, site analysis is one of the most important and effective ways to find concepts (TIFA, 2020). The built environment also affects people's perceptions. For this reason, sites should be designed in a harmonious balance with nature while providing suitable conditions for users. In this book chapter, the necessary steps and definitions in landscape site inventory and analysis applications, which are the basic steps in the correct realization of urban landscape design projects, are explained in detail.

### **1.1. Urban Landscape Design Projects**

Design is the creative process of enabling change according to circumstances and intensifying meaning. Landscape design is the creation of responsive, meaningful sustainable, and regenerative landscapes. The European Landscape Convention defines landscape as: “An area as perceived by people, whose character is the result of the action and interaction of natural and/or human factors (Council of Europe, 2000).

Landscape architecture (a profession that integrates art and science for the management, planning, and design of the physical and cultural

landscape, including its vestal wilderness and its growing urbanization) is rapidly evolving to address ecological and human health and well-being (Motloch, 2000).

Landscape design is the process by which landscape architecture is reached; essential elements are site character, user requirements, and design vision (Flor, 1994). According to the Planned Areas Development Regulation (2017), a landscape project refers to the project for open and green areas, based on ecological, natural, and cultural data, prepared and signed by landscape architects, and requested by the relevant administration according to the characteristics of the settlement and building. Therefore, some stages need to be done before the projects are finalized and implemented. Tom Turner's (1996) SAD approach (Survey-Analysis-Design) is widely applied in landscape projects. Filor (1994), on the other hand, states that the design process consists of a succession of standard parts called research, analysis, concept, and final design. A survey means “examine and record the area and features of (an area of land) to construct a map, plan, or description” (Oxford Languages, 2022). Depending on the scale of the designed site, the data can be determined by a survey study carried out on the site and after extensive office studies and the inventory stage. This stage provides an objective context for the analysis of the cultural, social, and visual aspects of the landscape, and vital evidence for understanding landscape history, dynamics, and change. Between the analysis and design phases, there is also a concept phase, which is

effective in achieving the planned purpose. The concept is also an important step in shaping the design outputs such as human interest, identity, and integrity according to the analysis results. A concept is an abstract idea of what something is or how it works. In landscape design studies, the concept is the set of ideas that are effective in shaping the project within the framework of the findings obtained during the analysis process of the designer. The designer observes the opportunities and constraints offered by the site as a result of the analysis. Accordingly, it develops a sustainable concept that offers solutions and highlights opportunities. The analysis plans can be used as the basis to develop concepts and ideas of how to fulfill the brief and respond to the vision in plan form. As well as mapping the analysis it is important to consider what has inspired you about the site and its context (Site Context Analysis Guide, 2016). Considering all these, concepts are developed to produce sustainable, functional projects that respect local identity. Features to consider when creating a concept for a good design;

- Access
- Character
- Community Safety
- Environmental sustainability
- Movement (Site Context Analysis Guide, 2016).

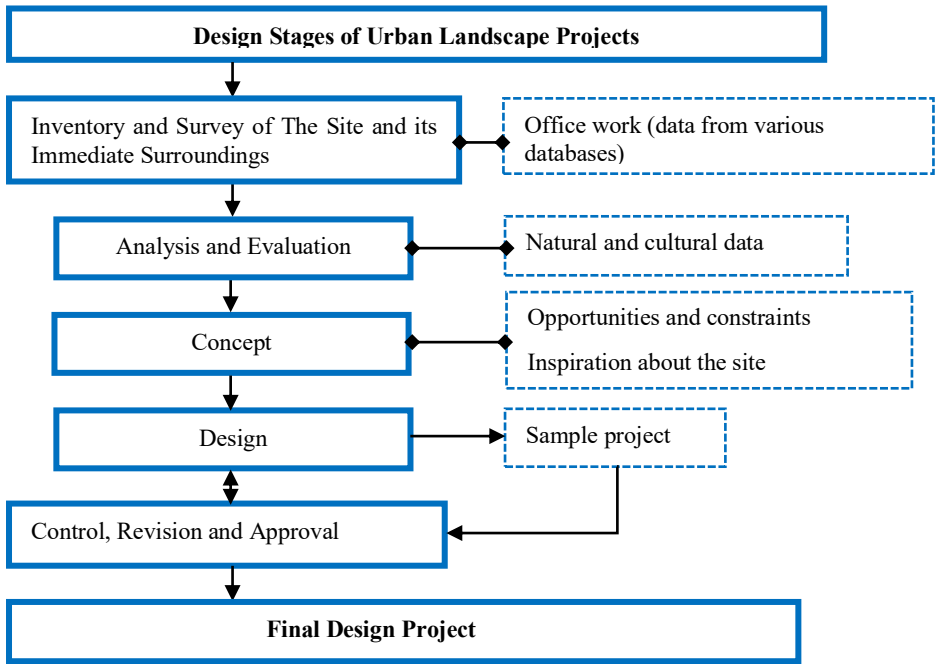
In addition, LaGro (2007) states the benefits of context-sensitive, sustainable site planning and design (Table 1).



**Table 1.** Benefits of context-sensitive, sustainable site planning and design (LaGro, 2007).

SOCIETY	Pedestrian/bicyclist safety Opportunities for active living Sense of community Attractive surroundings Safe neighborhoods Proximity to public services Minimizes negative impacts on surrounding properties Protects cultural and historic resources
ECONOMY	Attracts investment Attracts visitors and tourists Adds property value Creates marketable “experiences” Quicker real estate sales and rentals in tight markets Attracts high-skilled employees and employers Less time spent commuting Uses land efficiently
ENVIRONMENT	Conserves energy Protects biodiversity Reduces air and water pollution, and urban heat islands Protects natural processes and sensitive natural areas

In this context, the necessary work to be done before the final landscape project is put forward and implemented is expressed by the authors in the figure below (Figure 1).



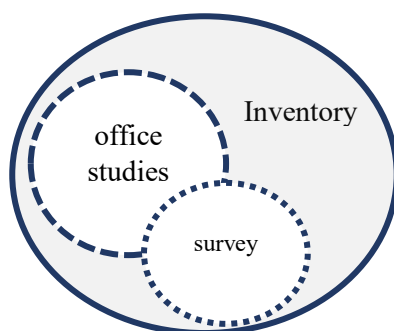
**Figure 1.** Design stages of the urban landscape projects

## 2. Site Inventory and Analysis

Collection of data of the site in landscape planning/design studies; It is a process that includes linear, textual, and figural visualization to create a database, determine the current situation, research, review, classify, associate, analyze and evaluate. It is the acquisition of complete documentation of the landscape that will allow for the description of all the elements of the landscape area and the interaction between these elements. These data are generally obtained by remote sensing and provided by various open-access databases (Copernicus, Open Street Map, Google Earth, USGS Earth Explorer, ESA's Sentinel data, NASA Earth Data, NOAA Class, NOAA Digital Coast, IPPMUS Terra, VITO,

Vision, etc.). In addition, there are various local open-access databases offered by countries. Also, researchers can obtain data from databases created by public institutions with special permissions (Urban implementation development plans, Cadastral maps, Environmental Plans, etc.).

Survey studies, on the other hand, are the data obtained by conducting research, observations, and examinations on the site. Sometimes, surveys can be made to update the data obtained in office work or to add data when the data obtained is not considered sufficient to perform the necessary analysis (Figure 2).



**Figure 2.** Representation of inventory

The data to be collected during the inventory phase of landscape design studies are often decided by the designer or a multidisciplinary team. Ecologists, hydrologists, anthropologists, arboriculturists, landscape architects, built architects, land surveyors, archaeologists, transport consultants, property market surveyors, environmental engineers, acoustic consultants (Site Context Analysis Guide, 2016), and other experts can be involved in the collection, mapping, and analysis of the site and contextual attribute data. The project's schedule or intended

uses of the site help limit the scope of these data collections (LaGro, 2007). However, to collect and organize the data systematically, the data are obtained according to the predetermined classification by the researchers. Researchers have presented different classification systems in different studies on this subject and there is no consensus (Zimmerman, 2000; LaGro, 2007; Stahlschmidt et al., 2017; Site Context Analysis Guide, 2016). Therefore, in this study, the authors presented a table that classifies the data that can be evaluated in site analysis.

The analysis is derived from the Greek analysis, *analuein* “unloose” (*ana* “up” + *luein* “to loosen”) and means “the detailed examination of the elements or structure of something by separating its constituent elements” (Oxford Dictionaries, 2011; Stahlschmidt et al., 2017).

Site analysis is a necessary step in the design process for a successful design. It includes an evaluation of an existing or potential site regarding the concept, design, environmental impact, community, project budget, and timing (Zimmerman, 2000). A careful and thorough analysis of landscape sites can lead to better project ideas and ultimately higher-quality built environments (LaGro, 2007). Before the analysis phase, the work team determines what data is needed for the project area and obtains the data from various sources. A comprehensive summary of data and analyzes that researchers can consider by type of site is provided by the following authors (Figure 3).

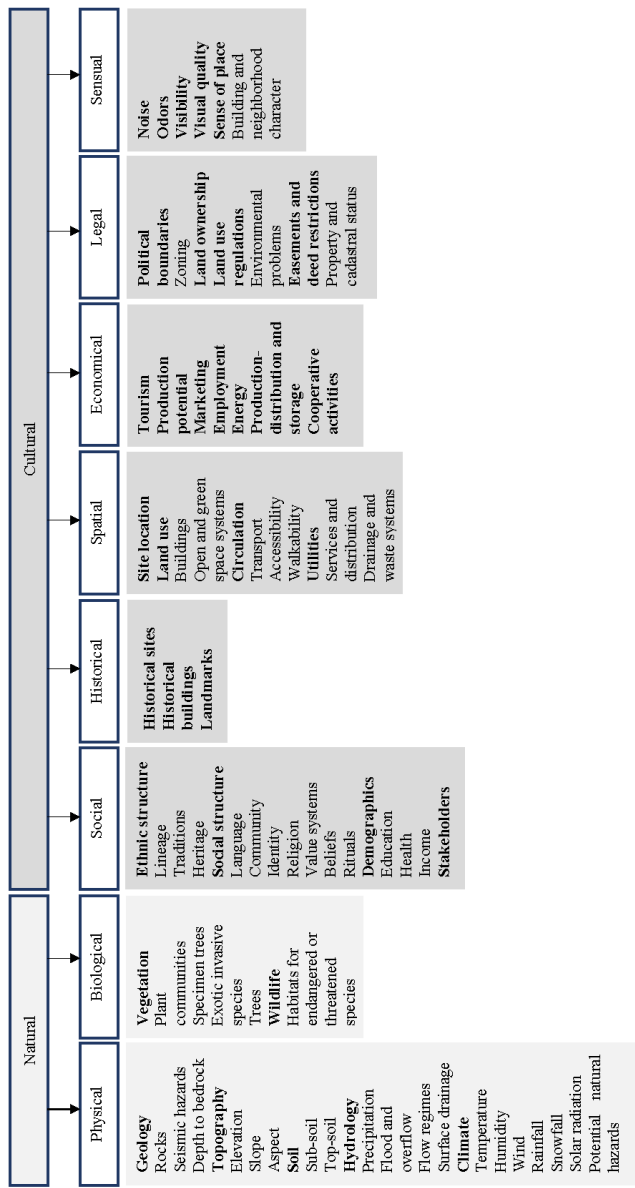


Figure 3. Natural and cultural data

## 2.1. Natural Factors and Analysis

Landscapes have long been settled, cultivated, and modified by humans (LaGro, 2007). Nowadays, researchers determine that this causes significant urban problems (land cover change, loss of ecological capacity, diversity, natural beauty, and damage to the cultural landscape with and historical value) (Bastian et al., 2006; Feranec et al., 2010; Dinç & Gül, 2021). Most of these have occurred due to the combination of small changes in the natural structure due to urban sprawl, population growth, and technological changes over the years. For this reason, researchers should closely examine the data on natural processes, minimizing the negative effects that may arise from the project, even if it is small, and ensuring its sustainable use. In this study, natural data were classified into two groups physical and biological.

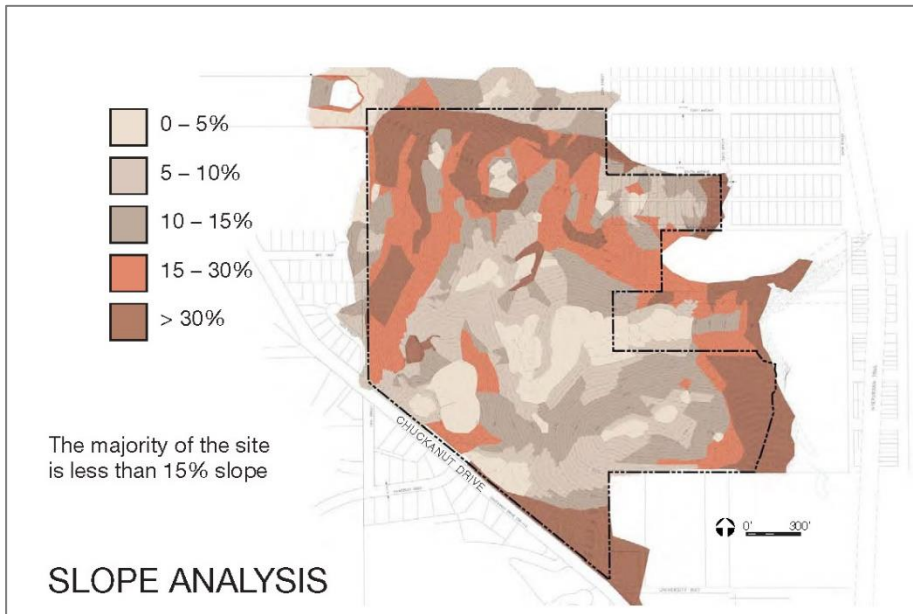
### 2.1.1. Physical

Obtaining physical data (geology, topography, soil, hydrology, and climate) systematically and performing analyzes during the inventory and analysis phase is an important step in understanding natural processes.

**Geology** refers to the basic structure of the earth. Geological maps typically show the type of rock closest to the earth's surface. In addition, data on tectonic activities are examined to observe effects such as seismic hazards and earthquakes in the field of geology. Bedrock depth can also be a critical parameter in geotechnical studies. Bedrock, especially in earthquake-prone areas, affects the stability of structures

built on it and can strongly affect initial construction costs depending on its depth, rip ability, and excavation volume (Depth to bedrock, 2020). The Richter magnitude and Mercalli intensity scale, are international units of measurements used in seismology that determines and classifies the instrumental magnitudes and intensity of earthquakes occurring around the world. Richter classifies the magnitude from 0 to 9 and its exponent. Mercalli classified the intensity values of earthquakes between I-XII. According to these classification systems, data on the site about the feeling and effects of the earthquake are obtained and analyzes are made by associating them with the design, especially in areas where dense construction is planned.

**Topography** is the study of the land surface. In particular, it lays the underlying foundation of a landscape. Topography refers to mountains, valleys, rivers, or craters on the surface. Topographic data such as (elevation, slope, and aspect) are usually obtained from USGS DEM ready-datasets. Height is an important data in the visual analysis as the presence of high areas provides a wide field of view. However, transportation to these areas is also important. For this reason, topography data is also important in studies related to transportation. In valley formations with sloping areas due to their natural structure, a slope map is an important element to understand the topography correctly. The amount of slope is an important factor to be considered in studies such as construction, drainage, sports activities, recreational activities, and planting (Figure 4).



**Figure 4.** Slope analysis (Thompson, 2013)

Aspect data is used to benefit from the sun, protect from the sun, plant, and position the structural elements (houses, sports fields, etc.) (Yılmaz, 2009). Within the scope of this study, the authors suggest grouping as 0-2, 2-6, 6-12, 12-20, 20-40, 40 and above in slope analysis according to the topographic structure of Turkey.

In site analysis, **Soil** data is important for the properties of soil and subsoils, the location of roads, railway lines, and built structures, as a building material, and the basis of buildings. Two types of analysis, subsoil, and topsoil are used to classify the soil at a particular site. Subsoil refers to soil conditions at depths of up to two meters, excluding the surface layer. Topsoil refers to the topmost layer (20 centimeters at the top), which is particularly relevant to agriculture and horticulture.



Clay content, organic matter, soil profile, and acidity are the four important characteristics of soil. That's why soil data should be taken into account in the selection of plant species. Internationally, the FAO World Reference Base for Soil Resources (IUSS Working Group WRB 2014) is the global standard intended to serve as a common denominator for communication at the international level (Stahlschmidt et al., 2017).

**Hydrology** conducts interdisciplinary studies that examine the distribution of water on the earth and its mechanical, physical, chemical, and biological properties. Hydrological studies such as precipitation, average precipitation calculation, flood and overflow, and surface drainage are used in site analysis. In urban spaces, it is vital to include an analysis of artificial networks such as storm-water drains and pipes. Mapping can include locations of natural and artificial networks, vertical relationships and relative levels, flow capacity, and flow regimes (Stahlschmidt et al., 2017). Such data allows us to determine the basin where the water source is fed and to plan according to the mobility of the water before making a design.

**The climate** that may influence site planning and design decisions includes precipitation, air temperature, solar incidence, wind direction, and wind speed. These attributes vary annually, seasonally, and daily. Local weather records can provide information about the daily weather conditions that can be expected each season. Collectively, these data include the following:

- Temperature (maximum, minimum, and day/night temperature variation)
- Humidity (high, low, and average)
- Wind (maximum, average velocity, and direction)
- Rainfall (monthly total and maximum for any one day)
- Snowfall (monthly total and maximum for any one day)
- Solar radiation (monthly average)
- Potential natural hazards (LaGro, 2007).

By obtaining the necessary physical natural data according to the characteristics of the site, various analyzes such as erosion detection, landslide risk areas, and future simulations due to climate change should be made by the researchers and the necessary precautions should be determined before the design.

In addition, terrain models are also vital tools in flood risk studies caused by heavy rainfall due to climate change. It is important to categorize the landform when predicting and modeling flooding of areas from streams and lakes, elevated groundwater levels, and stormwater systems (Stahlschmidt et al., 2017). Therefore, these data are evaluated together and various analyzes are carried out.

### **2.1.2. Biological**

Landscapes have both biotic and abiotic components, and their structure and ecological function are influenced by the complex interplay of biological, cultural, and physical factors (LaGro, 2007). Human activities such as dividing areas with long transportation systems, large

construction sites, and opening mining areas to meet energy needs can cause habitat fragmentation and damage the distribution areas of wildlife and plant communities. Within the United States, an estimated 50,000 species of exotic plants, animals, and microbes cause significant ecological changes in both managed and natural ecosystems (Myers, 1979; Pimentel et al., 2000; LaGro, 2007). Therefore, the biological features (plant communities, specimen trees, exotic invasive species, and habitats for endangered or threatened species) in the sites should be examined and the designs should be shaped accordingly.

Turkey hosts a wide variety of flora and fauna species. Turkey is located between the continents of Asia, Europe, and Africa, diversity of geographical and topographic features, altitude differences ranging from 0-5000 meters, ecological and climatic characteristics, Euro-Siberian, Mediterranean, and Iran-Turan phytogeography regions, and a wide variety of ecosystem types are among the reasons for its extraordinary biodiversity (Seven, 2020). The number of flora elements distributed in Turkey is close to the number of plant species distributed throughout the European continent. It is known that Turkey has around 12.000 plant taxa, 3000 of which are endemic (Davis, et al., 1988; Özhatay & Kültür 2006). In addition, with an endemism rate of 34.4%, it is one of the richest countries in Europe in terms of endemic species diversity. Endemic plant species are mostly common in Anatolia and especially concentrated in mountainous parts (Avcı, 2005; Özhatay, et al., 2009). The animal species that make up the fauna are biologically

classified as vertebrates and invertebrates. The total number of vertebrate species living in Turkey is around 1500. fauna of Turkey; It includes around 170 mammals, nearly 500 birds, over 130 reptiles, more than 30 frogs, and over 680 fish species (Demirsoy, 1997; Sindaco et al., 2000; Bilecenoğlu et al., 2002; Baran, 2005; Misirlioglu, 2019; Noah's Ark, 2020). Of these creatures; 16 reptiles, 37 mammals, and nearly 70 freshwater fish taxa are endemic (Noah's Ark, 2020; Seven, 2020).

These biological features can sometimes have a significant cultural and economic impact on the region. For example, a plant community in the region may have become a visually important value of the region, or these values have been preserved for generations and may cause a cultural identity effect by influencing the folklore of that region. The right planning in this site should aim to protect the biological continuity of the site, ensure the correct use of these sites, shape the opportunities correctly, and minimize the threats. In addition, endemic species help to select plant species in the newly designed area. This approach also provides economic benefits as the maintenance costs of the plants selected according to the soil and climate characteristics of the region will be low. In addition, since the need for irrigation will be met by natural means, it prevents the waste of water resources and affects the protection of nature. Exotic species also have important economic implications. Annual expenditures for the control of non-native species

are estimated to exceed \$6 billion per year in the United States alone (Pimentel et al., 2000).

Populations of most wildlife species consist of subpopulation groups called metapopulations (McCullough, 1996). For example, segregated wooded areas can host colonies of birds, mammals, and other animals. Local extinction of metapopulations is not unusual and is often a natural part of ecosystem dynamics. This is a natural process that includes local extinctions, migration and colonization, and reproduction. However, the area where a local extinction occurred should remain a habitat for future colonization and repopulation of the species. If the habitat is destroyed or degraded or made inaccessible by intervening barriers, the species' geographic range is permanently reduced.

There are many benefits to protecting wildlife habitats in our built environments. For example, many bird species are prolific consumers of insects, especially insects harmful to humans. Birds also have significant aesthetic value, bringing satisfaction to both avid birdwatchers and casual watchers. An increasing number of bird species are endangered or threatened with extinction. The most effective method of protecting endangered or threatened bird species is to protect their natural habitats (LaGro, 2007).

Trees on a site are assets that can yield multiple ecological, economic, and social benefits. Trees provide shade and can reduce the heating and cooling costs of nearby buildings. By providing a significant natural amenity, trees also can increase the value of the real estate by as much

as 15 percent (National Association of Home Builders, 1991). Trees serve multiple design functions that directly benefit people. For example, they provide shade, screen undesirable views, and serve as windbreaks. Trees also have significant aesthetic value. They may provide a focal point or visual amenity or provide spatial enclosure for an “outdoor room”. Consequently, a tree standing alone is usually worth more— from an economic perspective—than one that is growing in a group. During the construction of buildings, utilities, and other site structures, existing trees on a site require protection. Common, yet easily avoided, construction damage may kill trees outright or lead to their slow demise. Typical construction impacts include soil compaction of the root zone, scraping the bark from trunks and branches, and grading (that is, cutting or filling) within the root zone. Many species of trees have a fine-meshed mat of feeder roots within the top 30 cm of soil. Therefore, construction disturbances should not occur within the “drip line” of a tree’s canopy, at the very least (LaGro, 2007). For this reason, tree inventory, data collection, and determination of tree root protection zones would provide significant benefits in the implementation of the design.

## **2.2. Cultural Factors and Analysis**

All land use changes take place in a cultural context. In this study, the cultural context is grouped as social, historical, spatial, economic, legal, and emotional related to the site. The built environment is largely shaped as a result of the effects of cultural characteristics. Therefore, a

correct understanding of the cultural characteristics of the site creates opportunities and constraints for development.

### **2.2.1. Social**

Social data helps designers understand the character of the space and the people who use it. The characteristics of the local population will influence how places will be used. For example, the age profile, car ownership statistics, and ethnic mix of an site will influence how public space, footpaths, and public buildings are used (Site Context Analysis Guide, 2016). For this reason, obtaining inventory data on ethnicity, social structure, beliefs and demographic characteristics of the site is an important step in developing a design concept. The data on the ethnic origin of the society constitute the data of lineage, traditions, and heritage. Religious data, on the other hand, provide information about value systems, beliefs, and rituals. Language, community, values, and identity data can be obtained within the social structure. Factors such as education, health, and income status are examined within the demographic structure. Social studies include tools such as statistical evaluations, consultation, local development plans, and community strategy. In addition, studies may be carried out with stakeholders related to the field, and for a long time, there has been an emphasis on designs that involve the participation of stakeholders. It allows people who know and understand the site to contribute to the design in gaining more identity for this site.

### 2.2.2. Historical

Every site is rooted in the history of its locality and the development of a site should take account of this and, where appropriate, reflect this history. This could take many forms such as retaining historic features on the site or reflecting historic building lines. This will help to create a sense of place and identity for the development, it will continue the narrative of the site, and will add value. The site may also have archaeological importance that needs to be protected and interpreted. For this, research and studies on the following topics are carried out;

- Development of the site over time
- Presence of street patterns or structures of historical importance that need to be preserved and restored
- Historic physical or cultural features that characterize the site and can help establish an identity for the future
- Preserving and integrating historic features in the site (Site Context Analysis Guide, 2016).

### 2.2.3. Spatial

Spatial analysis is the study of the spatial relationships of a landscape. It deals with the relative location and significance of different patterns, elements, and features in the landscape. The designers examine site location, land use (buildings, open and green space systems, agricultural areas) circulation, (transport, accessibility, walkability) utilities (services, and distribution) by the spatial data. The built environment contains a complex array of private and public buildings,



open spaces, and infrastructure. The public infrastructure includes streets, other transportation systems, and vast utility networks (for example, sanitary sewerage and potable water). The location and type of utility networks present or adjacent to the site are important information in the site planning process. The locations of existing transportation and utility systems are common design determinants that often influence key site-planning decisions. The location of site entrances and the placement of new buildings, for example, are decisions that may be driven directly by the location of the existing public infrastructure (LaGro, 2007).

The location of the site is expressed on the map relative to the nearest settlements, tourist areas, and other important places. This map makes it possible to understand whether the site is a rural or urban space. It gives information on how to access other uses from the space. It provides information on the development of modes of transport in the area. For example, it is determined whether services are within walking/biking distance, whether traveling by car or public transport is necessary or if additional facilities are required within the scope of development. Allows assessments to be made of whether the site is close to important sites such as parks, cultural venues, entertainment, or workplaces, and to develop links with these uses (Site Context Analysis Guide, 2016).

The figure-ground analysis is a very long-established spatial analysis technique that simplifies the vertical dimension of a plan into two

layers. The figure layer shows the presence of the phenomenon that the analysis intends to highlight. In an urban figure-ground analysis, this is typically buildings, or in a park figure-ground analysis it may be tree canopies or dense vegetation. The ground layer is the background where the highlighted features are absent – typically this is the surface terrain. A figure-ground analysis of buildings in an urban neighborhood is therefore a spatial analysis of building footprints and the ground shows areas where there are no buildings. It is therefore also an analysis of the outside and inside, and it is widely used in the analysis of dense urban settings where buildings create much of the spatial structure (LaGro, 2007).

Reviewing the buildings around the site or the land use provides an important basis of opinion on determining appropriate uses for the site and how these uses can be arranged. Some neighboring uses may produce adverse effects such as noise or odor and appropriate buffer zones or design responses may need to be established. In some cases, it is necessary to consider what future uses are to be expected and where there may be further developed. Therefore, land use data should be well analyzed before design. The design can be developed by conducting studies on issues such as the relationship between the uses in the environment and the use determined for the site, the weaknesses or opportunities arising from the neighboring use, and the design response to the weaknesses.

Another important point in land use is green area systems and distribution because green areas have effects such as providing oxygen and balancing heat as well as aesthetic appearance. In this direction, data such as how the green areas are distributed in and around the site, existing plants, and the amount of green space should be taken into consideration in the designs (Figure 5). It should be aimed to connect the site designed with these data to the green system and to ensure the aesthetic and physical comfort of the users. In addition, researchers perform various spatial analyzes on issues such as the relationship between buildings and the distribution of green space.



**Figure 5.** Green System Plan Map (Zhang, 2021).

An inventory of circulation data is required to determine how the vehicle, pedestrian, and bicycle paths in the region will be associated with their surroundings, and to plan entrances, exits, and parking lots. In addition, these data can be used to evaluate safety factors at intersections and pedestrian-vehicle conflicts. The location of adjacent streets, driveways, drop-off zones, service areas, and parking spaces are often contextual information that influences the spatial organization of the site plan. In addition, estimation and mapping of current average daily traffic volumes on adjacent streets and highways can be beneficial to the design. Different circulation systems (pedestrians, bicycles, vehicles) and volumes can be displayed graphically by changing the color and width of the arrows (LaGro, 2007).

Infrastructure is conventionally thought of as streets, bridges, and sanitary sewer systems. But the utilities serving a site often include other networks for the distribution of energy and potable water, telecommunications, and the removal of stormwater. New utility systems often account for a significant share of a site's development costs. In the site inventory, it is important to understand where the public utility systems are located. This information is needed to determine the locations where the new development will connect to these systems. Utility systems deliver energy, water, and information to the site and remove wastes and excess stormwater.

A site utility map commonly includes, therefore, these systems:

- Potable water
- Electricity
- Natural gas
- Telecommunications
- Stormwater sewerage
- Sanitary sewerage

An inventory of existing site utilities should include the locations of utility poles, overhead power lines, fire hydrants, and utility boxes, as well as the diameters of underground pipelines (LaGro, 2007).

#### **2.2.4. Economical**

Economical data includes tourism, production potential, marketing, employment, energy production distribution and storage, and cooperative activities. These data affect the determination of the deficiencies and potential of the site. While maintaining the balance of protection within the framework of the obtained data, economic improvement studies and new employment opportunities can be planned at the same time. By planning the design of the site in a way that relates the production potential to tourism, the opportunities offered by the site are intelligently directed. In addition, technological changes, and the development of new energy sources affect the change of sites. Depending on this situation, economies and markets change. The designer should consider these changes while preserving the cultural structure of the site.

### **2.2.5. Political**

A site inventory should consider the legal context for site planning and design decisions. Political data includes political boundaries (Zoning), Land ownership, Land use regulations (Environmental problems), Easements, and deed restrictions (Property and cadastral status).

Spatial development in Turkey has been shaped according to the Spatial Plans Construction Regulation (2014) put forward by the Minister of Environment, Urbanization, and Climate Change. The purpose of the regulation; is the creation of spatial plans that bring land use and construction decisions, which are prepared to protect and develop physical, natural, historical, and cultural values, to ensure the balance of protection and use, to support sustainable development at the country, region and city level, to create healthy and safe environments with high quality of life, and to determine the procedures and principles regarding its implementation. The master plan specified in this regulation has an important role in shaping land use in cities. In addition, the Transportation master plan provides the transportation system of the city and its immediate surroundings by taking into account the transportation needs and demands and sustainable development according to the spatial, social, and economic characteristics of the city. The implementation development plan is shaped according to these plans and other upper plan stages. The implementation development plan expresses the building blocks and uses related to the construction, taking into account the conditions of

the region and the general characteristics of the planning area, the purpose of use of the building, accessibility, sustainability, and environmental impact.

The development plan enables us to obtain many components at the application scale related to the areas and sets the boundaries in terms of design. Zoning codes are a common form of land use regulation at the local level.

The site inventory documents the legal constraints that limit or, in other ways, influence the future uses of the site. Legal issues that should be investigated for each site include the following;

- Zoning classification (permitted land uses and densities)
- Easements, covenants, and other deed restrictions
- Government agencies with jurisdiction over the property
- Building placement requirements (required front-, back-, and side-yard setbacks from property boundaries)
- Allowable buildable area
- Building height, bulk, floor-area ratio, or footprint restrictions
- Parking and driveway requirements
- Minimum requirements for open space (public and private)
- On-site recreation or environmental requirements
- Stormwater management and erosion control requirements
- Landscaping requirements
- Required special permits, regulations, and planning procedures (for example, variances, design review, public hearings,

environmental tests/data) (White, 1983; Garvin, 1996; LaGro, 2007).

### **2.2.6. Sensual perception**

Our ability to see, smell, taste, touch, and hear gives us access to the extensive information about our surroundings. Human perception of land-based amenities—and disseminates — primarily involves three senses: hearing, sight, and smell.

For most people, perceptions of a site are formed primarily through the sense of sight. Visual resource assessments are concerned with both visibility and visual quality. However, sound quality and air quality are also very relevant in land planning and design. The significance of each attribute depends on the site and its context, of course, but also on the program or intended uses of the site. For this reason, the noise, odors, visibility, visual quality, and sense of place (building and neighborhood character) components in the site are the features that are important in shaping the design and should be evaluated during the inventory analysis phase (LaGro, 2007). These data allow us to identify the sensual characteristics necessary to develop the concept.

While perceiving a place, a person is also affected by the sound and odors in the place in addition to the image perceived by the eye. Noise in a site is a quality that can change momentarily or periodically. Noise or too much silence has a significant effect on the perception of the environment. For example, an environment that is too quiet can create the effect of desolation, while human voices that are not excessive can



make the space lively. Sound intensity is measured as sound pressure level (SPL) on a logarithmic decibel (dB) scale. Permanent hearing loss may result from chronic noise exposures that average 85 dB(A) or higher over eight hours (Morata et al., 1993, 245-254). However, four hours of exposure to noise at 88 dB is considered to provide the same "dose" of noise as eight hours at 85 dB (Clark & Bohne, 1999). Common noise sources and sound intensity levels measured in decibels (dB) are as follows (Rabinowitz, 2000);

- Firearm (140–170)
- Jet take-off (140)
- Rock concert, chainsaw (110–120)
- Diesel locomotive, stereo headphones (100)
- Motorcycle, lawnmower (90)

Odors can also be a problem in sites near large industrial or animal confinement processes. The direction of prevailing breezes is a particularly important feature to consider when planning land development in the vicinity of these and other odor-producing operations.

The way a site is perceived plays an important role in land planning and design. For example, the effect of the landscape in the neighboring areas creates an effect that increases the purchase and rental income in the area. For this, visibility analyzes are performed. The definition of viewports or areas visible from specific locations on the site is usually done through GIS. A visibility (or viewshed) map graphically shows

the locations that can be seen from an individual viewing point (LaGro, 2007).

It is widely stated that a site with historical or natural features attracts attention. This is due to the high visual quality in these areas and the fact that the specified features contribute to the sense of place. In addition, aesthetic considerations of landscapes are important considerations in context-sensitive site planning and design. As a result of the visual analysis, information about the existing visual characteristics and status of the site is provided. The data obtained will guide the stages of priority determination, protection, repair, reinforcement, concealment, decision-making, and monitoring development during land use planning, improvement, and resource management studies. In this way, the degree of sensitivity to possible changes and destructions that visually sensitive areas may encounter in the future can be determined (Aşur & Alphan, 2018).

Visual quality is often a function of the natural and cultural diversity of a site. Distinctive natural features include high mountains, bodies of water, woodlands, waterfalls, etc. examples are available. Distinctive cultural features include both historical and contemporary elements such as various architectural styles, pathways, churches, and parks. A visual quality map is graded into four classes as follows (Anderson, 1980);

- Very unique
- Unique

- Frequent
- Common

For example, eye level analysis is another important method for understanding sites. The purpose of the eye-level analysis is to focus on what happens in the horizontal visual field at a given level, inspired by one's vision level. Therefore, eye-level analysis can complement three-dimensional drawing forms (perspective plan, etc.) and vertical projections (cross-sections and section heights) by expanding the horizontal plane with symbols. In other words, eye-level analysis is a horizontal section that follows the movements of the terrain at eye level.

Such studies allow users to experience and understand the field.

Building and neighborhood character is also influenced by street and walkway arrangements, the mix of land uses, and the size, location, and design of outdoor open spaces. Parks and public open spaces are integral community elements that should be considered in the inventory process. Especially if part of an integrated public open space system, these open spaces may provide not only visual amenities and outdoor recreational opportunities but also vital space for stormwater management. These open spaces may also perform essential ecological functions that could be enhanced or—at the very least—protected by careful site planning and design. Other community resources that contribute to a neighborhood's character include schools, libraries, and community centers. A site context map shows the locations of these important civic institutions.

Kevin Lynch (1960), in *The Image of the City*, proposed a typology to explain how people form cognitive maps, or mental images, of the built environment. The five functional elements, with examples of each, are as follows:

- Edges (for example, shorelines, roads, and hedgerows)
- Paths (for example, streets and walkways)
- Districts (for example, neighborhoods)
- Nodes (for example, entrances, plazas, and street and walkway intersections)
- Landmarks (for example, unique buildings, structures, and natural features)

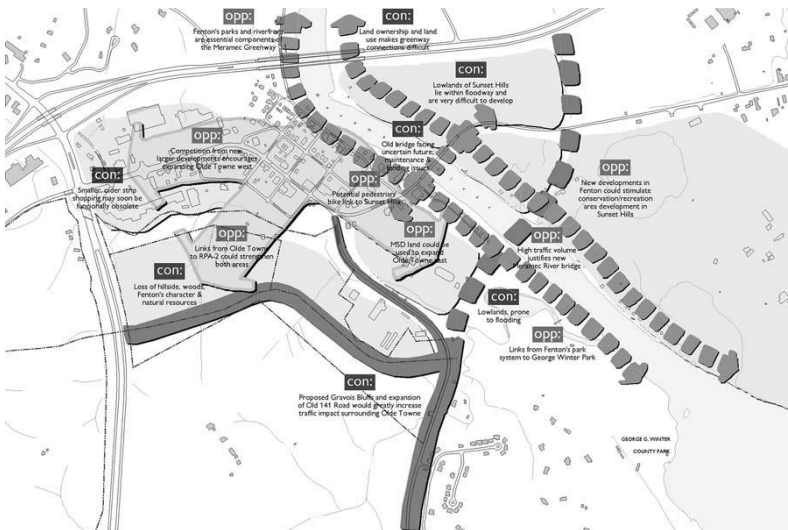
This typology is particularly useful for assessing the character and function of the built environment.

In addition, understanding the character in the space is an indispensable building block for the analysis to progress to the concept. Common building forms, architectural characters, and building materials on the site should be examined and how these data will be reflected in the design should be considered. The focus should be on the usability of local materials. Making use of these materials will contribute to the integrity and identity of the site, while also providing benefits in terms of economic and energy needs. Creating or maintaining a "sense of place" depends on understanding and responding to site context (Hough, 1990; Beatley & Manning, 1997). For example, a sense of place can be strengthened by adopting forms and materials common in

the region or society (LaGro, 2007). Sometimes an understanding of the local approach is necessary to bring a contemporary interpretation to the site (Site Context Analysis Guide, 2016).

### 2.3. Synthesis and Evaluation

An approach that preserves cultural values and natural balance is needed to achieve a sustainable design and at the same time improve the field. For this reason, after all, natural and cultural data has been obtained, the synthesis and evaluation stage, which guides the right design, is passed. This stage is necessary for the completion of the inventory and analysis and the transformation of the obtained data into a meaningful output. At this stage, the design team should synthesize and evaluate the analysis results by identifying the capacity, suitability, strengths, weaknesses, opportunities, and threats of the site with various methods.



**Figure 6.** Opportunities and constraints diagram (LaGro, 2007).

At this stage, site constraints (difficult sites, natural hazards, legal and cultural constraints) and site opportunities (sense of place, cultural significance) should be examined and discussed in depth by experts (Figure 6). As a result, comprehensive evaluations can be made to develop the site analysis plan. These may include physical testing of the site's features, improvements, and future scenarios.

### **3. Conclusion**

The designed urban spaces are evaluated as a shell to express the concept which is created in mind as functional and symbolical. The choice and application of all the features which compose the concept of the space such as color, texture, and material are the results of thinking with spatial identity (Akten & Akoğlu, 2017). Landscape site inventory and analysis performed in landscape planning, design, conservation, and development studies is a process that enables the collection of natural and cultural data, the creation of a database, the determination of the current situation, and the understanding of the context. In this process, the previous land use and the history of the site are explored in depth. The landscape is studied by considering the past, present, and future of the site and the people living in there. In addition, many operations such as research, examination, classification, association, analysis, evaluation, interpretation, and visualization are performed. The main purpose of landscape site inventory and analysis is to have information about the current natural and cultural situation of the study area, to recognize it, and to see the context. In other words, it is to obtain

complete documentation of the landscape that will allow us to describe all the elements of the landscape and the interaction between these elements. It also includes aesthetic and perceptual data to fully express the sense of space created by the landscape on people. All natural and cultural data for the site to be designed should be obtained in a way that is up-to-date, reliable, and analyzable. It is necessary to analyze, relate and interpret the data obtained for the purposes.

Therefore, the success of landscape design depends on a correct analysis (data, analysis, interpretation, generation of options, and optimal decisions) stage. Also, site analysis is the most important step in shaping the concept and creating the design idea. As a result, the development of the designer's knowledge and vision with systematic knowledge is the basis for approaching the most appropriate design.

#### **Thanks and Information Note**

The article complies with national and international research and publication ethics. Ethics Committee approval was not required for the study.

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## Evaluation of Social Performance of Urban Open Spaces and Use of Geographic Information Systems

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## 1. Introduction

Urban open spaces have always been an important part of the city and society (Dinç & Gül, 2022). Urban open spaces, which is conducive to the use of space with different characters (Gold,1980), individuals gathered outside of their work life daily and regular and home (Oldenburg,1989), in dense urban fabric is breathable and visual richness of creating environments that contain the major areas (Çubuk, 1991).

Urban open spaces, which are expressed as spaces between the building masses in cities, are classified as public, semi-public and private spaces (Krier, 1979). There are also different opinions about urban open spaces. The Danish urban designer Jan Gehl states that semi-public spaces are more accessible and social spaces than fully public or fully private open spaces (Gehl, 1987). Lynch, who defines urban open space as an area designed for human activities, easy to access and completely open to the public, does not include semi-public areas within the scope of urban open spaces (Lynch, 1984).

Urban open spaces are a vital necessity, and they are physical elements that make important contributions to a city in terms of ecological, economic, socio-cultural, psychological and aesthetic (Gül, Dinç, Akın & Koçak, 2020). Urban open spaces are defined as socialization places that bring people together, encounter people and strangers in different social groups (Ruppert, 2006), and interact socially (Ruppert, 2006; Alpak et al., 2018). Urban open spaces, which serve as an important

mechanism for social interaction, play an important role in social development (Tuğluer&Çakır, 2019). Urban open spaces play a major role in ensuring "psychological needs (identity, diversity and environmental contribution), social relations (communication, interaction, education) and economic changes (value-enhancing – income-generating characteristics and trade)" (Çubuk, 1991).

The processes in which cities are in constant change and transformation transform the social, economic, and cultural systems of the whole city by including the people living in the city (Uzgören & Erdönmez, 2017). In the process of adapting to the dynamics of urban life that directly affect human behavior and relationships, urban open spaces that give the opportunity to meet, encounter and interact with what is different occupy an important position in the social development process of individuals receives. The wishes and expectations of the interacting individuals direct the city and therefore the urban open spaces. The development of urban space quality is associated with identity, sense of belonging, access and circulation, vitality and security (Dinç, 2021). Whyte (2000) mentioned 4 main characteristics that make a public space successful.

- Public space is accessible,
- Encouraging people to participate by offering various activities,
- Having comfortable spaces where social activities are supported,

- There are spaces where social interaction is provided (Uzgören & Erdönmez, 2017).

Mehta (2014) stated that there is a growing interest in public open spaces, but there are few comprehensive studies to measure the quality of public space (Alpak et. al, 2018). It was also seen that there were not enough studies to measure the social performance associated with the quality of the space. It is thought that geographical information systems cannot be used effectively in obtaining social data, transforming social data into numerical data, recording in the database, statistical analysis, and spatial expression of data.

This study emphasizes the importance of social interaction in creating a successful public space, and the methods used to measure the social performance of public space and its effective integration with the geographic information system will be explained. With the developing technology, it is thought that geographic information systems will be used as an effective tool in the measurement and improvement of the social performance of public spaces as an interface for database, mapping, and data analysis.



## **1.1. The Role of Urban Open Spaces in Promoting Social Interactions**

Most human activities take place on the streets, in social and public spaces and in natural or artificial structures that enhance their visual and functional quality (Bekar and Çakır, 2022). Urban open spaces are spaces that serve the use of all, respond to social needs, and create the necessary opportunities for social experiences (Tuğluer & Çakır, 2021). They are places where people with different social and demographic characteristics participate and provide opportunities to share thoughts and information, offering more than a space experience (Rad and Ngah, 2013).

The increasing desire of people to participate in the public sphere leads local managers, as well as decision-makers about planning and design, to think more about the quality of public spaces. The creation of social activities is more important in social interaction than the physical characteristics of the public sphere in terms of enabling public spaces to participate in social activities and developing a sense of belonging to the space (Lennard, 1984). In this context, creating successful public spaces and improving social interaction by ensuring community participation depends on the global view of city decision-makers, planning and designers (Rad and Ngah, 2013).

The fact that users seek interestingness, diversity and rapid changes in the outdoors, the demand for visual and functional diversity in urban environments shows the desire to meet the psychological need. The fact

that urban areas have functions that can be used at various times of the day brings vitality to the space. The programming of public uses such as the square with various activity patterns transforms these areas into social purposes instead of being just a walking area (Alexander, 1977; Uzgören & Erdönmez, 2017).

## **1.2. Spatial Behavior**

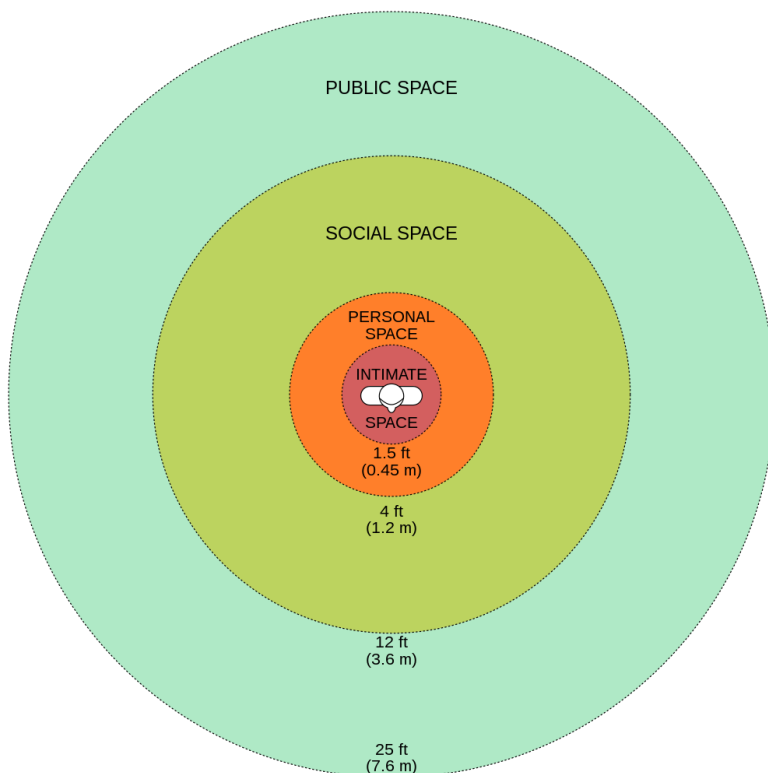
Schulz (1971) defined space as a piece of space that satisfies the physiological, psychological, and social needs of users. The ability to perceive space as concrete or abstract is related to the physical and pragmatic characteristics of the space. Concretely experienced spaces become abstract in the mind as a result of experiences (Demir Kahraman, 2014).

By meeting their needs, human beings shape their environment and reveal the behavioral characteristics related to the space by taking part in the position of user in the spaces. These characteristics, which are defined as spatial behavior, are explained by the concepts of personal space, privacy, self-belief/personalization, belonging, sovereignty space.

Personal Space theory is evaluated within the framework of human-space relations in environmental psychology. It appears as an input in the shaping of urban and architectural space.

Personal space theory, also known as proxemics, is the study of how people use the physical space that surrounds them. Stating that the distance of the person from other people in the space determines social

interaction, Hall (1974) defines distance as a means of communication and states that people use different distances according to their changing emotional bonds (Göregenli, 2021) (Figure 2).



**Figure 2.** A Chart Depicting Edward T. Hall's Interpersonal Distances of Man, Showing Radius In Feet And Meters

**Intimate distance:** It covers about 45 cm from the person's body. The feelings experienced in the closeness of the other person at this distance are characterized as strong and violent. It describes the distance at which the voice is kept quieter, where the other person's heat and smell

are clearly taken. Entering this distance, where trust, love and sincerity are prerequisites, without consent is perceived as an extremely uncomfortable act.

**Personal Distance:** covers the distance from the person's body between 45 cm and 120 cm. Compared to close range, visibility is clearer, sound is more normal, and the chance of smell is minimal. This distance is mostly used by friends and acquaintances.

**Social Distance:** covers the area between 120 cm and 360 cm from the body. It is the distance at which no one touches each other, the volume is higher. At this distance, mutual relations become more formal.

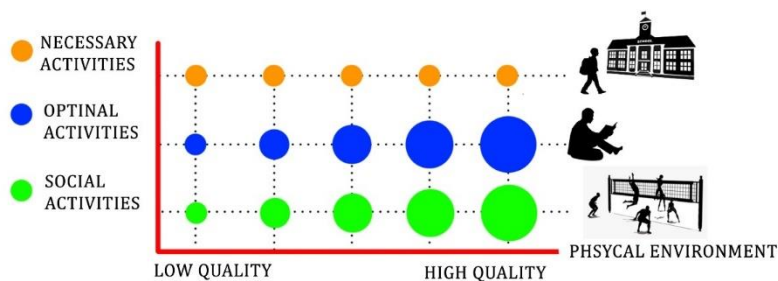
**Public distance:** covers the distance from the body at 360 cm and beyond. This distance is characterized by figures that define the relationship between speakers and those who listen to them. Sounds, gestures, gestures, and other stimuli are magnified with increasing distance and turn into exaggerated movements (Hall, 1974).

### 1.3. Factors Affecting Social Interaction in Urban Open Spaces

Urban open spaces with a lively and active use are thought to encourage and enhance users' social relationships and increase a sense of belonging (Cao & Kang, 2019; Gehl & Svarre, 2013; Thwaites & Simkins, 2005). In their study in Balducci & Checchi (2009), they said that social relationships and interactions established in the public sphere benefit individual well-being, on the contrary, social isolation increases the stress factor and causes depression.

Social and demographic characteristics are effective in people's use of public space and social interactions. Gender and age are the most prominent of these characteristics. Women are more sensitive to environmental conditions than men and tend to avoid being seen directly. While women attach importance to parameters such as comfort, convenience, and safety, it has been seen that men are more willing to participate in the publicity, social interaction and activities offered by space (Whyte, 1980; Gehl, 1987; Marcus and Francis, 1998; Cao & Kang, 2019). Regarding age differences, older people are more sensitive to the presence of others in the space and avoid especially night use. Young people and adults use public spaces in large groups and in large areas (Holland et al., 2007).

Behavior patterns in public spaces usually include walking, sitting, standing, etc. (Marcus & Francis, 1998). Sometimes, a secondary behavior may occur simultaneously with a behavior pattern such as eating while sitting, talking on the phone while standing. (Gehl, 1987) divided these behaviors, which he called activities, into three types: compulsory activities, optional activities and social activities. He argued that compulsory activities take place independently of the environmental characteristics of the space, but optional and social activities take place under certain environmental conditions (Figure 3).



**Figure 3.** The Relationship between 3 Types of Urban Space Activities and Space Quality

**Necessary activities:** Going to school, waiting for a bus, and going to work are the types of activities that people have to do compulsorily, regardless of the quality of the physical environment. Increasing the quality of the physical environment will create a good environment and provide positive results in mandatory activities.

**Optional activities (urban recreation):** These are activities that develop depending on the quality of the physical space when the appropriate climatic conditions are provided. Cities with high spatial quality are characterized by many optional activities. A wonderful, attractive city can always be noticed by the fact that many people choose to spend time in public spaces.

**Social activities:** Social activities were defined by Gehl as all activities that depend on the presence of other people in the public space. Activities such as interacting with other people, meeting, talking, meeting with other people can be given as examples.

There is a relationship between social activities and optional activities. Long-term optional activities also allow more people to come together and social activities to take place more.

#### **1.4. Social Performance Within the Scope of Landscape Performance Evaluation**

The Landscape Architecture Foundation (LAF) defines landscape performance as a measure of the effectiveness of landscape solutions in fulfilling their objectives and contributing to sustainability (Landscape Performance Series, 2017). Efforts to understand, manage, and improve the performance of a system based on inputs, processes, and outputs based on specific desired characteristics are among the goals of performance evaluation (Ndubisi et. al., 2014).

In order to evaluate and measure performance with the understanding of sustainability, performance targets should be determined first. Designers step into which measurements and methods will be effective in assessing and measuring the performance of the project according to the set goals. The designer collects the necessary basic data in the field analysis during the design process so that the data can be evaluated comparatively in the implementation and management of the project (Ndubisi et. al., 2014).

The concept of performance, which we can call the measurable behavior of a space, is the level of meeting the needs and requirements of the user in this sense (Karagenç, 2002).

The concept of performance in environmental design is directly related to the quality of the space. The performance and quality of the space depends on the components that make up the environment, the people who produce and use it, and the activities that take place (Esin & Özsoy, 2003). While the performance values determined based on user requirements are evaluated as data at the design stage, they are called targeted performance and point to the performance value that should be revealed by those intended in the design. At the end of the design process, the concept of performance emerges with the determination of the extent to which the applied space meets the targeted performance value (Preiser et. all, 1988).

In the interaction of user and space, performance dimensions include components that can be evaluated in every space. The evaluation of performance dimensions is useful in terms of determining and improving the qualities of the existing space. In this way, in the places where performance evaluation is made, suggestions can be made to meet the needs and requirements of the user and user satisfaction can be ensured. According to Dengiz (1998), performances are the qualitative levels of solutions that meet user requirements. From here, two types of requirements and performance relationship can be explained.

- The relationship between user requirements and design performance
  - The relationship between user requirements and space performance
- (Malkoç, 2008; Özkan, 2011).



It provides many opportunities to create more sustainable, high-performance, and durable landscapes because of applying landscape performance to the design process. Thanks to their ability to evaluate jobs, designers can learn how to improve the design and adapt it to other projects to increase their future success. Demonstrating the value of sustainable landscape solutions because of the assessment will increase awareness of sustainable landscape solutions and reduce investor risk and increase investment opportunities (Ndubisi et. al, 2014).

### **1.5. Measuring Social Performance in Urban Open Spaces**

Mark Francis, who has researched public space issues in landscape architecture, states that in addition to participation in a collective design process and critical evaluation of peer studies, it is necessary to meet the needs of the user of the "prerequisite" for effective design, especially in public space. According to Mark Francis, as well as meeting the needs of the User, it needs to be accessible to everyone and have meaning in the broader context. In a sustainable design, projects should be evaluated in the context of "needs, rights and meaning" in the transformation of social spaces into social spaces and ensuring social performance (Francis, 2003).

However, the removal of the idea of aesthetically editing from the stereotyped way of thinking in the design of public space has led to various controversies. It is thought that while aesthetic concerns are motivated, the needs and wishes of the people are ignored. Since social performance is the most subjective category of performance, it is the

designer's responsibility to recognize their own biases and perspectives when assessing how well a project balances beauty, inspiration, and functionality.

Landscape architecture is a discipline dedicated to protecting the health, safety, and well-being of all people. Therefore, designing for social performance and evaluating a space in terms of its ability to support social performance criteria is one of the most important aspects in landscape architecture. The social performance criteria specified in the book "A Landscape Performance + Metrics Primer for Landscape Architects: Measuring Landscape Performance on The Ground" published in the American Society of Landscape Architects Landscape Architecture Technical Information Series are also given in the (Table 3). These criteria play an important role in the transformation of urban open spaces into areas with high social performance (McCoy et.al, 2018).

**Table 3.** Social Performance Criteria (McCoy et. Al, 2018)

• Comfort	• Social and environmental justice
• Preference	• Spiritual enrichment
• Accessibility	• Sense of place
• Physical activity and health	• Cultural heritage, relevance, and history
• Well-being	• Freedom, choice, and democratic space
• Education and cognitive development	• Stakeholder needs, and programmatic needs
• Safety and perceptions of safety	• Education
• Community building	• Cultural resiliency
• Beauty, inspiration, and visual quality	- Multi-functionality
	- Social capital, and social diversity

Before starting social performance research, it is useful to observe the space with your intuition and instincts without any preparation. Such preliminary observations, through a detailed review of the literature, will help establish your initial study proposals for identifying goals and methods for the research area (Yin, 2003; McCoy, 2018).

For the first observations and analysis of the field before or after the application; The formation process of the space, its important qualities, who uses it, what activities are held, what users think about the space, the design process and the success of the design, post-implementation management and suggestions for creating a more successful public space can be research questions (Francis, 2001; McCoy, 2018).

Zeisel (1984), on the other hand, stated who the actors of the study are, what these actors do and how they relate to whom (visual, auditory,

tactile, olfactory, and symbolic), in what context they can be evaluated sociocultural and where they are located, spatial relations can be questioned (McCoy, 2018).

As with all performance categories, it is important to review the literature before beginning a social performance survey to identify theoretical frameworks that can serve as guidelines during research. Many theorists and experts from the field of landscape architecture have conducted research on the factors that make public spaces successful. Post-use evaluation criteria are also included in these valuable contributions. While some of the studies are more concerned with the human use of space, they have extended the criteria for social success to sustainability goals such as ecological, health, aesthetic appeal, functional forms, cultural significance, and economic growth (Czerniak et. al, 2007).

A summary of the studies specifying the elements that are important when designing and evaluating successful urban open spaces with high social performance is given in the Table 4.

**Table 4.** A Summary of the Evaluating Successful Urban Open Spaces with High Social Performance (McCoy et. al, 2018)

Urban Open Space: Designing for User Needs	Francis, 2003	<ul style="list-style-type: none"> <li>• Comfort: a place to sit, shelter, food, drink, sun exposure, and shade</li> <li>• Relaxation</li> <li>• Passive engagement: people watching, reading, sitting, and sleeping</li> <li>• Active engagement: walking, sports, gardening, and exercise</li> <li>• Discovery: public art, landforms, and learning</li> <li>• Fun</li> </ul>
How to turn a place around: A Handbook for Creating Successful Public Spaces	Project for Public Spaces, 2000	<ul style="list-style-type: none"> <li>• Accessibility</li> <li>• Activities</li> <li>• Comfort</li> <li>• Sociability</li> <li>• Triangulation</li> <li>• Indicators (e.g., people in groups, women, age groups, many activities, affection, other people)</li> </ul>
With People in Mind	Kaplan, Kaplan, and Ryan, 2008	<ul style="list-style-type: none"> <li>• <b>Understanding</b></li> <li>-Coherence</li> <li>-Legibility</li> <li>-Visual access</li> <li>-Human cues</li> <li>• <b>Restful and Enjoyable</b></li> <li>-Fascination</li> <li>-Distraction-free</li> <li>-Comfortable</li> <li>Meaningful Participation</li> <li>• <b>Start early, include many</b></li> <li>-Clear information</li> <li>-Alternatives</li> <li>- Feedback</li> <li>• <b>Exploration</b></li> <li>-Complexity</li> <li>-Mystery</li> <li>-Depth</li> <li>-Openings</li> </ul>

In the design of urban open spaces, considering the needs and wishes of users as well as aesthetic concerns is important for designing urban spaces with high social interactive performance. Questioning the situation before and after the application, making preliminary observations in the field and documenting the spatial behaviors exhibited during the social interaction of who the users are, how they use the space are the first stage in the evaluation of the social performance of the area.

### **1.6. Behavioral Mapping**

William Ittelson, Leanne Rivlin, and Harold Proshansky first introduced behavioral mapping in the environmental psychology literature in 1970 by describing it as "a technique for studying the relationships between behavior and the physical space in which it occurs."

Behavior mapping is a technique used in areas related to environmental psychology to systematically record human behavior and movements relative to space and time (Bechtel & Zeisel, 1987).

It is a recording technique that supports behavior mapping observation developed to record behaviors that occur in the design environment. As one of the post-use evaluation techniques, it allows a systematic evaluation by observing the behavior of people.

A behavior map is basically used to show the distribution of people's behaviors on a spatial-temporal dimension over a space, showing where they are and what they are doing.

Ittelson et al. (1970) identified four general uses for behavioral mapping. Accordingly, behavioral mapping:

- To define the distribution of behaviors in a particular area,
- To compare the different situations and conditions in the use of different gender groups, such as men and women,
- To identify general patterns in space use when usage reaches its peak,
- It is used in architectural programming to provide quantitative estimates of the distribution of behaviors in a new area before the space is built or used.

Behavioral mapping is considered an approach that can be useful because of its advantage in documenting and organizing the data that describe the observed phenomenon. When data are collected in a way that is suitable for observation systematics, it becomes easier to record them in the database and compare them with each other. Such a database can serve as a basis for comprehensive spatial models. Sufficient amounts of data allow the creation of behavioral simulations in spaces, while sufficient observation allows for better design practices or simulations (Marušić and Marušić, 2012).

Behavioral mapping is used as an effective method in the evaluation of the social performance of urban open spaces. Geographical information systems are used effectively in the stages of recording, analyzing, mapping and spatialization of the data collected systematically in the database.

## **1.7. The Use of Geographic Information Systems in Behavioral Maps**

The behavior mapping method, which is used effectively in studies in various fields from past to present, provides great convenience in stages such as automatic observations, data entry, data analysis and data visualization due to the advances in information processing and communication technologies. Global positioning system (GPS), the use of Geographic information system (GIS) has an increasing use in behavioral research.

GIS has a great advantage in using behavioral maps as a digital database because it can be updated with a new data entry. Behavioral maps provide the opportunity to visualize situations such as density in different time periods of the day, spatial clusters according to the activities performed, use of space according to gender variable, etc. (Marušić and Marušić, 2012).

GIS is used in the creation of thematic maps that allow map drawing and storage of spatial data and offers the opportunity to present the geographical elements on the earth separately or together in a certain visuality as symbols. In addition, GIS is a tool that examines multiple data layers together and in separate data layers and provides the opportunity to perform analyzes to create new spatial information using existing information (Decker, 2001).



### **1.8. The Use of Geographic Information Systems in The Evaluation of Social Performance**

According to many references to the widespread use of geographic information systems, the overlapping theory in Ian McHarg's *Design with Nature* book had a very important impact on the emergence of GIS. McHarg, a landscape planner, emphasized that when making a decision about geography or space in this theory, many features of that space should be evaluated together, and this process could be done by overlapping these layers. In addition, McHarg stated in his book that if the number of data to be evaluated is more than five, it is impossible to do this in a healthy way with human reasoning ability. These determinations, especially when producing a decision about space or geography, have made a technology such as GIS mandatory in order to produce healthy and accurate results.

GIS is used in the creation of thematic maps that allow map drawing and storage of spatial data and offers the opportunity to present the geographical elements of the earth separately or together in a certain visuality as symbols. In addition, GIS is a tool that examines multiple data layers together and in separate data layers and provides the opportunity to perform analyzes to create new spatial information using existing information (Decker, 2001).

The maps created with the help of GIS are designed as desired and made ready for presentation. In doing this, the skill and cartography knowledge of the person preparing the map are important. GIS obtains

the material it needs by measuring, photographic methods, remote sensing, data collection with the help of GPS, manual digitization of existing maps, transfer of ready-made databases and transfer of the data obtained by digitization through scanning to the computer environment (Yomralioğlu, 2005). Some of these materials are 2D while others are 3D. Thanks to its powerful data transfer capability, GIS can collect data in the same database and analyze this data and prepare the desired map. It enables the production of visually rich maps.

GIS, whose use has been increasing in recent years, offers tools with great potential for thinking and visual communication in the discipline of landscape architecture. With its wide and comprehensive analytical capacity, GIS plays an important role in the understanding of landscape architecture and especially in design intervention in design studies. By integrating computer-aided applications such as image processing, CAD, mapping, data modeling and database management, Geographic Information Systems become a good tool for comprehending complex geographical situations in the present, past or future. GIS can process high dimensions of data as information while carrying out analytical and graphical operations accurately and quickly. By leveraging the processing power of computers through inventive analysis, modeling and visualization techniques, researchers can develop new insights into spatial structures, processes, and uses. In this respect, GIS can be considered as a tool that supports spatial observation in landscape architecture research and design (Nijhuis, 2016).

Social performance evaluation is used in the interpretation of the human-activity relationship to determine how physical and demographic variables affect the use of space within the framework of the determined criteria of urban open space. Geographic Information systems can be used as an effective tool in data acquisition, analysis and simulation processes.

## **2. Conclusion and Suggestions**

In the evaluation of the social performance of urban open spaces, it is necessary to obtain and analyze the data of behavioral observations with appropriate techniques. Behavior mapping is a method that reveals the situation of the use of urban open spaces and allows studies to improve the situation in simulations. Geographic Information Systems are an important tool for recording data in a digital database. It allows the layers to be analyzed separately according to variables such as day, time, gender, etc. Observed activities and behaviors, analysis methods provided by geographic information systems, the use and quality of urban spaces offer the advantage of depiction and visualization with maps. The impact factor of demographic and physical variables in the evaluation of the social performance of the spaces can be revealed. Statistical interpretation of the data is important to determine the factors affecting the quality of urban spaces. GIS can be used effectively to determine the design interventions to be made to increase social performance.

As a result of the increasing importance of urban open spaces, the high quality and social performance of existing and newly designed urban spaces causes the public benefit to reach the maximum level by providing social interaction. While the behavioral observation techniques used in post-use evaluation provide information about spatial use, the digitization and analysis of these data in the GIS environment can guide the prospective studies with knowledge and experience. Understanding how and by whom urban open spaces are used is a prerequisite for planning and designing successful urban spaces. With the endless advantages it offers, the effective use of geographic information systems will be an important tool in urban open spaces to have spaces with high social performance.

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The article complies with national and international research and publication ethics.

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