CONTEMPORARY ISSUES IN ARCHITECTURE AND URBAN PLANNING Development, Memory, Environment

EDITED BY YILDIZ AKSOY EFE DUYAN



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EDITOR'S NOTE

Contemporary Issues in Architecture Development, Memory, Environment is an edited (multiauthored) book focusing on the new trends and frontiers in architecture.

Development in terms of urban and technical aspects has always been one of the frontiers of architecture. Today, it is possible to observe that technical innovation go hand in hand with urban visions. Memory has played an important role in historiography and humanities recently and architectural perception as well as historical perspectives have acquired a new edge in the form of memory. Environment continues to be one of the hot-topics in the center of global warming and sustainability.

Within that scope, the concepts of development, memory, and environment had been brought into focus.

YILDIZ AKSOY AND EFE DUYAN

EVOKING THE RURAL MEMORY THROUGH THE URBAN LANDSCAPES

ARZU GÜLER¹

ABSTRACT

The landscape is a medium that contains tangible and intangible values inside. They provide a habitat for plants, animals, and other livelihoods on earth. They shape the surface with morphology, water, vegetation, soil and change with time. Rural landscapes are basically a production space whether it is natural or designed, while its basic idea is based on ecosystem services. Urban landscapes are designed to provide more natural images in built areas, help to urban ecosystem, keep biodiversity, and create recreational spaces for humans. The enthusiasm for urban landscapes comes from the naturalness of the rural or pastoral images of the landscapes. Landscapes are also a threshold not only in the meaning of concrete borders but also unseen worlds, senses, dreams, or memories. The landscape defines the place which is a socially constructed space. It is created by personal and collective memories besides the natural phenomenon of the landscape itself. The memories in a place collect over and over as a palimpsest and become the layers of place memory. Mnemonic devices in landscapes are the reminder elements of place memory. They can be used to remembering the past, an event, a person, or more deep inside our subconscious. The main object of the research is understanding how contemporary urban landscapes can evoke the rural memories of visitors. The research is conducted on a closed and open questionnaire. The general images of urban landscapes and rural landscapes, landscape design materials, and design approaches are used to understand the power of evoking rural landscape memories. The outcomes of the survey show that there is a strong connection between the main design elements used in urban and rural landscape designs. On the other hand, the use of design materials strongly affects the power of reminding the rural landscapes. Despite the fact that naturalness becomes a strong keyword for the rural landscape memories, every urban landscape does not perceive as a pastoral image even if the natural materials inside. The participants emphasize that the places in urban landscapes give positive feelings when they have more rural landscape images.

KEYWORDS: Landscape Design, Rural Landscape, Urban Landscape, Mnemonic Devices, Landscape Perception.

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1. INTRODUCTION

Landscape first started with a painting, then became the landscape itself; It was designed by landscape gardeners with an eye of a painter as a reflection of the pastoral scenery; it became a three-dimensional representation of the painting (Jackson, 1984). However, as indicated by Jackson, landscape designers and landscape painters differs their approaches to the landscape through the evolving concepts of ecology, conservation, landscape perception and psychology, resiliency. The landscapes became written history not only the cultural history but also the ecological past on the basis of persons and communities. They are trusted archives without self-correction in the contrary of autobiographies (Lewis, 2013).

Rural landscapes are basically a production space whether it is natural or designed, while its basic idea is based on ecosystem services. The mutual benefits between human and nature is about the using natural resources wisely. According to ASLA, the rural landscapes refers the areas low populated and settled and includes pastoral images of fields, forests, lakes which are the main basis of natural resources for ecosystem (ASLA, 2007). Despite of the fact that being products of humans besides the natural existence, the rural landscapes also includes cultural traditions and codes (Lipsky, 1995). The natural scenery of rural landscape empower it against to natural disasters and changes. The balance of natural materials, hardscapes, biodiversity and habitats the key factors became more resilient than urbans. On the other hand, intense human interventions, deforestation, dense agricultural activities, mining cause to be more vulnerable of them. Urban and rural landscapes are differs from each other. Urban landscapes are designed to provide more natural images in built areas, help to urban ecosystem, keep biodiversity, create recreational spaces for humans. In other words, urban landscapes recreate the ecosystem services in cities. Urban landscapes includes different types of public and private areas as neighborhood parks, urban parks, playgrounds, coastal landscapes or roof gardens, courtyards, terraces. Urban landscapes not only help the citizens to meet their needs such as recreation, nature and physical activity, but also contribute to the improvement of the urban ecosystem. Today, the problems that urbans face such as climate change, floods, high temperatures, urban heat islands reminds us the importance of urban landscapes.

Landscapes are also a threshold between the tangible and intangible worlds. It is created by personal and collective memories besides the natural phenomenon of the landscape itself. The memories in the landscape collect over and over and become the layers of place memory. Mnemonic devices in landscapes are the reminder elements of place memory. They can be used to remembering the past, an event, a person, or more deep inside our subconscious. The main object of the research is understanding how contemporary urban landscapes can evoke the rural memories of visitors. The research is conducted on a closed and open questionnaire. The participants of the survey was from the disciplines of architecture, landscape architecture, city and regional planning and who are not involved in any design disciplines. The first part of the study proceeds with comparative questions; An image of an urban landscape of vegetative design and a visual of a rural landscape, urban examples of wooden road, wooden fence and stone walls on material use and examples in rural landscapes, and finally, a question about the water element was asked. Through these questions, the participants were asked to explain whether the given urban modern landscape design reminds of the representation in the rural landscape and how similar it is in terms of design. The second part of the questionnaire consists of open-ended questions. In this group, the participants were asked to describe the rural landscape; whether they feel as they are in a rural landscape in the city; which design elements of these types of areas remind the rural landscape image; what kind of changes are in the general mood of attendees in such areas.

2. PLACE, LANDSCAPE AND MEMORY

2.1. Place Memory through the Landscape Design

The place is a socially constructed space. It has meanings and memories individually or collectively. Sometimes, it can be create with cultural interpretation (Baldwin et al., 2018), and sometimes it create a culture. Giving a meaning by the users of the space, the place is connected with the belonging, identity, space memory and genius

loci. The place is widely researched by the cultural geographers. On the other hand, a geographical land becomes a place with visual and physical form in a landscape (Relph, 1976). The place includes unseen layers as well as the visible deposits of a ground. These layers collect over and over in time. Finally, they are becomes the layers of place memory.

The physical image of the place and the memory of it may be created with doors, rocks, trees besides the artificial or natural creatures (Gieryn, 2000). Therefore, the remembering can be tangible and intangible. It can be also used to remember the past, evoke the memories, ancient roots. The reminded image, past, or a place can be occurred through a different place, geography. The place or location can be changed completely. The traces left by a place on people are carried with them and constantly revived despite the change of location (Gagnon & Desbiens, 2018). The remembering of the past can be seen in the ballads of the poet Rafael Alberti, emigrated from Spain to South America, as researched in the article of Logan (2011). The environment of South America reminds the poet his country in both cultural and natural environment. As a matter of fact, in the first part, Argentina's landscape, rivers, the flow of water and wind reminded him of Spain. In the second part, the poet identifies the smells of the orange trees with the smell of the sea of Spain. In the third part, he says that nostalgia gives its place to orientation, place attachment and sense of place (Logan, 2011). The landscape creates intangible borders between tangible objects through the sense of nostalgia. On the other hand, while the nostalgia begins to give it's place to space attachment; intangible borders turns to tangible. The past and memories remembered by tangible objects of daily life and landscape. Remembering is also related to time; time is archived in the past and investigated through the remembering activity. The passing of time perceived by the landscape use and read by the seasonal changes, space belonging and sense of place, loss of the past environment (Rishbeth & Powell, 2013). The objects used in landscapes become a mnemonic structure to remember the past, evoke the old memories, or feel the nostalgia as well as the perception of the unseen place atmosphere.

2.2. Mnemonic Structures in Landscape

The landscape goes beyond a land with its form and design elements, and it becomes a space and then a place. Due to the fact that the physical and visual form of land by turning into a place shows itself in the landscape (Relph, 1976). The place is a socially construction process. It is enriched by the personal and collective memories. Thus, the place is created by the place attachment, place identity and belonging. After this point, the place becomes the space where these facts are remembered and rebuilt. These phenomena in the process of remembrance can be realized with mnemonic devices in which the past is remembered and reminded. Because of being a cultural palimpsest, the place has a mnemonic power (Steiner, 2002). Sometimes, an entire place can be a tangible or intangible mnemonic space, while sometimes each of its design elements can become a reminder. The mnemonic power of a place can be used for the remembrance of the past or another image.

According to Rappaport, the mnemonic elements in the landscape serve in three ways: they parallel written records, shape political boundaries, and construct a concrete and tactile link of the past that can extend into the future (Layton, 1994). While landscape structures create concrete indicators of landscape memory, they also become reminding elements (mnemonic devices) for the observer (Rappaport, 1994). Mnemonic places are specifically designed and constructed to evoke memories, trigger identities, and embody histories (Gieryn, 2000). The memories can be about the past or something below our subconscious as our ancestors' rural past. An urban landscape may remind a rural landscape image with its design and elements form the place. At this point, the place can give visitors a nostalgia; sad or happy feelings. Because the remembrance process is about senses. The reason for the connection between remembering and perception is about the senses perceived by an observer while looking at a place from a specific perspective. The landscape is related to the sensory perception of the land, and they are the creation of a mind and feeling (Tuan, 1979, as cited in Duncan & Duncan, 2010).

The longing for the rural image or the feeling of nostalgia can be a phenomenon that people in general face. The reason for this can be considered as the existence of human beings in the savanna landscapes in evolutionary and cultural chronology, learning from it and progressing with it (Riley, 1992). Our existence in these landscapes

for thousands of years may be creating some memory codes, searches, and longing in our cultural genes. In this context, the plantation design in landscapes or natural vegetation cover of an area may be an essential role to evoke the rural memories. The image of a pastoral landscape is generally powerful with its plants; colors, different species, smells, seasonal changes and spontaneous existing. They are also a homeland for the different animal species with rich biodiversity.

Remembering can also occur with a variety of tactile, used, functional materials. Telling about the light collection manufactured with brass, product designer Tom Dixon says that the popularity of the brass in product designs may be about the "nostalgic comfort" (Howart, 2014). The use of brass dates back to 1400 BC. The concept of nostalgia is related to perception and it creates a memory for the past. The popularity reason of that material can be about our subconscious. It can be same within the landscape design and mnemonic devices of its. The selection of the design materials may be instinctive for us. In this sense, remembering the rural landscape has a close relationship with the material as well as the landscape cover, which provides a living environment. A rock morphology, vernacular walls, seating elements, richness in vegetation cover, stairs, or an alone stone located in the middle of a green area give a perspective about the rural landscape image. Implementing these rural landscape elements in the urban landscapes creates positive moods and revives a sense of naturalness. They can help to feel people as they are in a pastoral landscape. It's not just about recalling a rural landscape in a particular geography or location directly; this is also related to remembering the ambiance, warmth, atmosphere, and feel of the landscape (Lauzon, 2019). Therefore, the landscapes are also an intangible threshold between the memorial worlds. Remembering with design or design elements means that people make sense of the landscape, understand it and establish a connection with it in some way. In other words, this is about the experience of activity and observation. If a planted area does not give the observer clues about wildlife, then the existence of this habitat may be questioned; but if this space is more than just a green space then it says more about exploration and curiosity (Clements & Dorminey, 2011).

3. CASE STUDY

Aiming the mnemonic role of the contemporary landscape design elements on the rural memory, a survey is made with the people belong to design disciplines (architects, landscape architects, regional planners, interior designers etc.) and unrelated to any architectural disciplines. The first part of the survey focuses on the planting design in urban landscapes and natural vegetation texture in the countryside; designed fences and randomly built fences in the countryside; gabion walls frequently used in landscape designs, and village walls made of stone; bioswales in urban areas and natural stream beds in rural (Table 1). Survey participants were asked to evaluate these images under different titles and to determine whether these landscape design elements in the city have a link between the local materials. On the other hand, they were also asked to determine whether the examples shown in the urban landscape remind their representation in the rural landscape. All the images, the Analysis of Visual Landscape Characters (Tveit et al., 2006) is used. In this analysis method, where they present an evaluation criterion over "stewardship, coherence, disturbance, historicity, visual scale, imageability, complexity, naturalness and ephemera", the landscape quality is tried to be measured on a holistic basis. "Analysis of Visual Landscape Characters" is selected in order to evaluate components of the landscape images.

Question Group	Type of Landscape Element	Representation in Urban Landscape	Representation in Rural Landscape
Group 1	Plantation Design	Wild Planting Design on an Elevated Train Road	A Natural Country Image Shaped by Different Colors of Plants
Group 2	Path Design	Wood Path Design Located in a Roof Garden	Wood Path in a Rural Landscape Formed by Perennials
Group 3	Fencing Design	Properly Cut and Varnished Wood Fencing of a Villa	Wood Fencing with Logs in a Forest
Group 4	Wall design	Gabion Walls in a Green Area	A Village Wall Made with Stones as Spontaneous
Group 5	Water Element	Bioswale with Wild Planting, Natural Materials	Natural Stream with Perennials

Table 1. Question Groups in the First Part of Questionnare

In this group, where it is tried to understand whether the landscape areas in the city give a reminder about the rural landscape, an important difference has emerged between the planting design and design materials. First of all, the landscape element that the rural landscape is least remembered is the contemporary fencing designs. The regularity and varnish of the design element that makes up the garden fence of a villa is not capable to remind the participants of the rural landscape.

This also creates a break in the meaning of "naturalness". The clean contemporary elements are not perceived as natural even though they were made from natural materials. However, in the second image, the design made with logs was evaluated as high in terms of naturalness. The naturalness of the object also increases the value of the "historicity". However, the group one and two in which the vegetative design is also evaluated, remained in a low evaluation of historicity. In these two groups of questions, "ephemera" comes out in high value compared to the other three questions. In this criterion by which change is evaluated, the historicity of an area may be equated with the change of landscape. In question groups where change is evaluated as high, it is seen that human intervention and degradation are also minimum, therefore the historicity of these places is defined as high. The informal planting design in landscape areas seems to remind the participants of the closest image to nature. In the case of "disturbance", the highest value is seen in fence designs. This leads to the idea that the materials should be used in the closest way according to their natural existence. The trimmed, grinded, cleaned wood fences are not capable to remind the vernacular wood fences in a rural area. For that reason, the degradation is perceived more. The city silhouette seen at the background in vegetative design in Group 1 seems to have a low value in terms of reminding the landscape according to the survey participants. The intense built areas seen at the background of a landscape also decrease the "naturalness" and "imageability" of the landscape. This leads to the rural landscape descriptions to be announced shortly and the answers given to the design elements in the landscape areas that make them feel as they are in the rural landscape in the city.

The second part of the questionnaire was conducted on open-ended questions. Participants were asked to describe their definitions of the rural landscape, feelings in a rural landscape, components of a rural image, existing places perceived as a rural landscape in urban, feelings in these places. The answers of the participants regarding the definitions of rural landscapes were coded through the Hyper Research software and reduced to various keywords. The participants generally define the rural landscape over "natural elements, natural, outside from urban, minimum human intervention, spontaneous and vernacular". Other codings for the definitions are indicated in Figure 1. The feelings in a rural landscape can be summarized as peace, happiness, naturalness, and serenity. It can be said that the rural landscape is not exactly natural, but the interaction with nature is strong,

the materials of the location are used, they are described away from the city, and the human intervention is minimal, they are mostly spontaneous places. It is understood from the descriptions of the feelings that being in a rural landscape creates positive effects on the mental states of the participants.



Figure 1. The Descriptions of a Rural Landscape

When human beings' relationship with the landscape is interpreted as the longing for nature in the city and the need to get closer to it, landscapes in the city come to mind. People's relationship with nature has been strong since the first time human beings began to exist in the world. Later, this relationship evolved into the need to shape nature and bring nature to the city by designing the landscape in urban areas. Rural landscape, on the other hand, offers an intersection between artifical and natural landscape. This is also perceived from the answers given to the questionnaire. In that case, how does the existence of these areas, which can be defined as "semi-nature", affect people in urban? The second part of the open-ended questions of the questionnaire aims to understand the effects of semi-nature urban landscapes on people.

The rates of the places in the city where the users feel as if they are in the rural landscape are given in Figure 2. According to that, natural areas in urban landscapes are a very small part. It is related to the decreasing urban forests, urban parks and expanding built areas.



Figure 2. Urban Landscape Areas Felt as in a Rural Landscapes (1: Never, 2: Exactly)

Participants were asked to indicate design elements or data in places in the city that made them feel as they were in a rural landscape. "Natural elements, natural landscape, informal planting design, vernacular landscape" are mostly indicated keywords by participants. In addition, the visibility of dense structuring affects this feeling positively or negatively (Figure 3).



Figure 3. Design Elements Empower the Rural Landscape Image in Urbans

Natural Elements, Natural Landscape, Informal Planting Design, Vernacular Landscape description codes are both indicated in Description of a Rural Landscape and Design Elements Empower the Rural Landscape Image in Urban. On the other hand, the areas that closed to the urban silhouette behind it also strengthen the rural landscape images. In this context, intense building settlements surround landscape areas' effects in a negative way for a rural landscape image. However, it could be in relation to the eye-level perception of the environments. For "Design Elements Empower the Rural Landscape Image in Urbans", participants emphasize the value of blocking urban image and tall plantations. Indeed, the areas outside the urban settlements are also one of the descriptions for the rural landscape. Due to the fact that seeking for rural landscapes in urban for the natural feelings, it is essential both designing the areas in a small scape and the borderlines between the space and environment.



In Figure 4, there is a high rate of positive change in the general mood of the users in places that are felt as if they are in a rural landscape in the city.

Figure 4. Urban Landscape Areas Felt as in a Rural Landscapes (1: Never, 2: Exactly)

4. DISCUSSION AND CONCLUSION

In this research, it is aimed to understand the power of urban landscapes to evoke the rural landscape images. The effects of mnemonic urban landscapes to rural image on humans is also tried to understand. For the participants it is clear that there is a relationship between these five contemporary landscape design elements and their rural forms. The reason is the main idea behind the design elements are the same in rural and contemporary representations. However, different situations arise in terms of reminding the rural forms. There are basically four different variables here: Informal, Formal, Intense Structural, Natural Design approaches. Informal and Natural Design approaches perceive as a positive situation in order to evoke the rural landscape memory. On the other hand, formality and intense structural gives a moderate perception to evoke the rural landscape memory. Moreover, in cases where designs are evaluated to include these two words, rural memory's revitalization power becomes weakest.

Heterogeneity seems to be positive in the planting design as it reflects nature itself. This also seems to be related to whether the vegetative design is formal or not. Recently preferred in planting designs, "wild vegetation" is the design approach that reminds the rural landscape the most at this stage. Regarding the material, the participants stated that the naturalness of the materials strengthens this reminder. On the other hand, whether the natural material is used in accordance with its nature or not also strengthens or weakens the reminding process. Another situation is that the relationship of landscapes in the city with its environment is considered to be extremely essential. In places where all these are pain attention to but the visitors perceive still the dense settlement texture, people still feel themselves in a city. At this point, the connection of the design with the rural landscape seems to be severed. However, when the dense housing is blocked by the tall trees, shrubs, this bond is established stronger. Participants also noted that including flora and design elements as well as fauna in the design played a role in this. This reminder also reveals its relationship with sound memory. Bird sounds, cat/dog sounds, and insect sounds bring people closer to the countryside in this sense.

In this study, which attempts to understand the effects of urban landscape areas on awakening rural memory, it is seen that people feel more positive where they feel as if they are in the rural landscape. This is also due to the healing power of nature on the participants' moods. On the other hand, this improvement does not actually work only anthropocentric. Natural materials and landscapes with high biodiversity are also extremely important for the healing and strengthening of the urban ecosystem. These types of areas make biodiversity even richer by attracting more fauna. It enables the emergence of permeable surfaces, the use of materials that are more compatible with their surroundings, thus creating landscapes that are more resistant to the environmental problems. It is important to understand the relationship between material world, nature and people. Because it

is about the understanding that what objects mean to people and what people do with these objects (Baldwin et al., 2018). At this point, the nostalgic designs are created for the emotional investment, engage the traditions of the users and evoke the meaningful memories of use (Kurlinkus, 2018). The survey shows that these elements can be used as mnemonic devices to evoke the rural image. The rurality in urban landscapes provides place attachment for the users. Place attachment and remembering become more meaningful with the ephemerality and invisibility of the daily landscapes. These designs with small touches of the mnemonic structures help to create meaningful places rather than non-places; remind participants of nature. The sensibility of the design approaches helps people to protect the environmental awareness and connection between nature and them.

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A MODERNIST ACCOMMODATION BUILDING FROM THE MEMORIES OF A SAYFIYE NEIGHBORHOOD: TAMARA MOTEL

Ö. SILA DURHAN¹, T. EMRE KIRHALLI²

ABSTRACT

The presence of "sayfiye" culture, that has been the reflection of the summertime sea and beach experience of the townsman of Istanbul since the Late Ottoman Empire Period, was felt in the seaside neighborhoods until the end of the 1970s. Tamara Motel emerges as a qualified accommodation building in such a period, when the urban fabric and urban culture were in a process of change. It is one of the rare inner-city motels that was constructed in modernist style in Bostancı, a residential neighborhood increasing in density in 1968. The building, which was designed by the architect Melih Koray - and left outside of the spotlight of architectural history- stands as an exceptional example on which the architectural approaches of the 60s and 70s, the architectural practice of its architect, surrounding urban fabric, and the accommodation culture of Istanbul, can be observed. In this study, an analysis of the period was made through this motel accordingly. It is also aimed to trace the motel's transformation through interviews, archive and field studies, newspaper searches, and parallel readings from memoirs and relevant literature, increase its recognition and contribute to the modern architectural heritage of the 1960s.

KEYWORDS: Architectural Heritage, Istanbul, Melih Koray, Modern Architecture, Sayfiye Culture, Transformation of the Urban Space.

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1. INTRODUCTION

Tamara Motel, one of the examples of Istanbul's civil architectural history, stands as a less known and celebrated accommodation building. The building comes out as an important subject of research due to it sharing an approximately 11.000m² plot with three historical buildings -two kiosks and an outbuilding- and being designed for both sports club and beach use. The building also occupies a distinguished status in the field of architectural history due to it being a motel building of architectural quality today, in Turkey, where the examples of 1960s architectural practice are limited, their documentation is challenging and modernist motel buildings are hard to come by. The plot, in which the building rests, too has a history of disagreements and interventions, spanning form nearly the second half of the 20th century to today. The main focus of this research, however, is the accommodation building itself and its construction process within the architecturally rich plot as a representation of the architectural practice and the role of the architect of its time. Even though the motel was left outside of the spotlight of architectural history, it still stands as a viable example on which the architectural approaches of the 60s and 70s and the accommodational culture of Istanbul can be observed. In this context, this research is structured around generating and documenting information about this motel building within the framework of tourism architecture and architecture in general in addition to highlighting it as an architectural object. To achieve these goals, a research aim emphasizing on increasing the recognition and tracking the change of this building and the plot in which it is located with the help of interviews, archive and newspaper index searches, field surveys and parallel readings between memoirs and related literature and making an academic contribution to the heritage of the modernist architecture of the 60s is formed. Consequently, such research would provide an opportunity to take a closer look at the stirring architectural environment of post World War II Istanbul, monitor the role of the architect and understand the lifestyle and sea-related recreational culture proposed by the era.

2. MELIH KORAY: A "FAÇADE ARCHITECT"

Melih Koray (1928-2019) is an architect, who has mainly produced on and close to Bağdat Avenue and played an important role in the development of designs for region's apartment buildings between 1950 and 1980 -an era with political, economic and cultural changes. Koray, who has graduated from the State Academy of Fine Arts (D.G.S.A.) in 1951, started working as a freelance architect in 1953 (chamber reg. no: 909). His production which is mostly centered around Kadıköy, Istanbul, also includes projects located in Ankara, Bursa and even Jeddah and Medina, outside of Turkey.³ It can be said that, in 1950s Turkey, where 80% of the architects worked in the public sector (Kaçel, 2010, 114), Koray took a challenging but privileged path with opening a private practice and maintaining it with continuous work.

Buildings such as Villa Adalet Gürel in İdealtepe (1952), Villa Fahrettin Soysal in Fenerbahçe (1953), Zafer, Korur, Dilman, Hayırlı, Erenkoy Palas, Rahmi, Gül, Çatalcesme Palas, Camat and Çam apartments between Kızıltoprak and Suadiye, Kent, Özoğuz, Moda Palas apartments in Moda, Koray Multi-Purpose Complex in Küçükbakkalköy and "Floating House" indicate that the main bulk of Koray's body of work consists of residential projects which are located at the Anatolian part of Istanbul. With more than 150 buildings under his name in Kadıköy⁴ however, Koray is also the architect of various qualified buildings of differentiating scale and function such as Kadıköy Theatre, Altıyol Efes Bazaar, Hasanpaşa Kâtibim Factory, Van Disaster Housing (Figure 1).⁵ Among these buildings, Tamara Motel⁶ stands out as a less-known and appreciated accommodation building.

³ Koray (n.d.); interview with Melih Koray (son of the architect Melih Koray, personal communication, August 3, 2019).

⁴ Besides his professional occupations, Koray also became a municipal candidate for Kadıköy from Doğru Yol Political Party at the Local Election of 1989 (*Cumhuriyet*, 1989, February 19, 8; *Cumhuriyet*, 1989, February 26, 8; Kalkan, 1989, 7).

⁵ ("Yılların Mimarı Melih KORAY ile Dünden Bugüne", 2014; Koray, n.d.)

⁶ Being initially designed as a part of a complete tourism facility, Tamara Motel was eventually realized as a separate building standing next to the group of buildings which were managed as Bostanci Sea Club with which it shared its plot. The club changed its name many times in the following years, on the other hand, no specific name for the motel was encountered at the documents during the research. For this reason, in this research, the motel is referred to as "Tamara Motel", the name it has filed under (as "Tamara Moteli" in Turkish) in the Koray Archive.



Figure 1. Koray's various buildings (Koray, n.d.).

Meanwhile, during the period beginning with the end of the 1960s and continuing throughout 70s, Bağdat Avenue and its proximity was -and acted out as- a stage for developing individual architectural approaches and a fertile environment in terms of façade design (Tanyeli, 2004, 317). Koray too was one of the architects searching for his unique voice in this context where an "apartment architecture" was in development. Between 1960 and 1980, Koray, becomes famous as a "façade architect" with his façade designs and stands out with his original use and combination of various building materials, colors and textures and search for elevational compositions. Right-angular geometric façade compositions enriched with -in some cases- operational sunshades, flower beds, hand-rails; large windows that enable well-lit and well-ventilated indoor spaces and provide a strong connection between interior and exterior spaces and spacious balconies were the prominent features of his designs. Elements such as; a balance between solid and void, rhythmically recurring components and their staggered use and a meticulous approach to architectural detailing and material selection were equally effective at the formation of his façades.

3. THE PLOT IN WHICH THE MOTEL RESTS: 309/2

Before going further with a detailed analysis of the motel, an insight to the history of the plot -within the larger historical context of Bostanci and its surroundings- and the figures who were involved with the transformation of the plot throughout the changing economic and social conditions of the times should be given.

The plot of the motel (city block 309, plot 2), where two kiosks of different historical origins and an outbuilding are located, covers an area of 11.001,5m² ⁷ and is situated at the Bostancı neighborhood of Kadıköy, surrounded by Çetin Emeç Boulevard, Yamacı Tahir Street, Bostan Tüccarı Street, and Kasadar Street. Bağdat Avenue, which divides the settlements between Kızıltoprak and Bostancı, can be named as the main axis of the area of the plot with Haydarpaşa-Gebze suburban rail line as a secondary one. As a result of this, these axes, along with the Marmara Sea, can be accepted as strong reference points for analyzing the plot's transformation within the urban context (Figure 2).

⁷ Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1805719.



Figure 2. Image produced by the authors based on the satellite image of 2019.

As an area of modernization and urbanization in its way, Kadıköy region itself is one of the major settlements of the Anatolian side of Istanbul. In both Byzantine and Ottoman times, Kadıköy and its surroundings were a sayfiye⁸ for the upper-class executives and a prominent agriculture zone (Akbulut, 1994, 332). The most important transportation axis of the area, Bağdat Avenue too has a history dating back to the Byzantine times. In the Ottoman Era, the axis is known to be used by trade caravans and the army during the campaigns to the eastern regions (Eyice, 1993a, 528-529). After the second half of the 19th century, especially with the establishment of the sea and railroad connections to the city, Bağdat Avenue and its environs became a site for urban development. With the completion of the Haydarpaşa-İzmit railroad line in 1872 and its revision in 1888, settlements mainly established by the Ottoman upper-class continued developing around the station sites (Dölen, 1994, 49) (Figure 3). The Legal Code of Land of 1858 and Construction Law of 1882 -which enabled the subdivision of land- have supported the transformation of the these lands around the railways into settlements (Salah, 2013, 54-55, 69-70) where citizens of upper-middle-income lived in kiosks during the end of 19th century and the beginning of the 20th century, with the availability of travel by both sea and railroads (Akın, 2010, 22).

⁸ "The word *sayfiye* -derived from *sayf* which means summer in Ottoman Turkish- defines a settlement or area that is used for seasonal recreational and leisure purposes particularly in the summers" (Salah, 2013, 42).



Figure 3. Street network, railways and land plots in 1918 (image produced by the authors based on the map of Necip Bey, 1918 found in Istanbul Urban Database [http://www.istanbulurbandatabase.com/]).

The plot, notable for his size and monumental trees in such a context, contains three registered buildings (two kiosks and an outbuilding) as mentioned before.⁹ From the 20th century to the present, it has also been the subject of a large -in some cases construction law-related- controversy between the owner, tenant, local government and central government, diversified with various parameters. As a result, the strategies used by these actors in different eras of this controversy can be identified as one of the elements affecting the physical environment of the plot. The masonry kiosk at the seaside was built in 1903 by Edouard Huguenin (1856-1926) who came to Istanbul as the deputy general director of the Anatolian Railway Company in 1890, and worked as the general director from 1908 to 1917 (Ekdal, 2014, 335).¹⁰ Karay's this statement supports that this kiosk was one one of the few buildings at the seaside during that era:

"At the whole seaside, from Fenerbahce to Bostancı, only Horoz Ali Paşa Kiosk and a vegetable garden existed in Cadıbostanı at the beginning of this era. Later the number of buildings goes up to four/five. The most important ones are Sadi Bey, Hügnen and later Cemil and Ragıp Paşa kiosks..." (Karay, 1996, 120).¹¹

The other historical building on the plot is thought to be a 350-year-old monastery belonging to Jesuit priests which also existed when Huguenin purchased the land to build his home. After Huguenin, the kiosk and the monastery were sold to a Russian family coming from Georgia (Ekdal, 2014, 336)¹² (Figure 4).

⁹ Two kiosks in the plot were registered as "Examples of Civil Architecture to Be Protected" by the verdict #8781 of the Higher Council of Immovable Antiquities and Monuments (HCIAM) dated December 20, 1975, with their surveys approved by the verdict #9946 of HCIAM dated July 9, 1977 in addition to the plot itself being identified as a 1st Degree Natural Protected Area due to the presence of grown trees -again- by the verdict #8781, dated December 20, 1975 of HCIAM (Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1806379).

¹⁰ Said kiosk was mentioned as "the historical kiosk of Von Sanders" in the documents at the Kadıköy Municipality Archive, however, no further information on this name was found during the research (see Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1805993, BB1805989, BB1805999, BB1805856, BB1805953). With "*Safer Law*", enacted on June 8, 1868, foreigners were granted the right to purchase land (Levi, 2006, 56-57). Edouard Huguenin's purchase of this site can be related to the enactment of this law.

¹¹ Karay, who lived during the periods of Abdülaziz, Abdulhamid II and the Republic, between 1888 and 1965, sheds light on the social changes in these periods in his book.

¹² Eyice (1993b, 304) states that, after 1926, Huguenin's kiosk was purchased by a family who has migrated from Russia and renamed after its daughter as Villa Etery, and passed to Taçspor Sports Club in the 70s. A title deed issued to Tamara Parker for these two kiosks is dated February 27, 1942 (Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1805719).



Figure 4. Two kiosks and the motel (motel on the left image [Authors' photographs, April 18, 2019]).

The construction process of the motel, which constitutes the main axis of this research, starts when the owner of the land, a member of the said Russian family, Tamara Parker, commissions a project for a tourist facility located at the site.¹³ Later, Parker forms a partnership with Hayrullah Kefoğlu and rents him the seaside kiosk.¹⁴ Kefoğlu builds annexes to the kiosk, including a "beach, restaurant, discotheque and an American bar", opens it in 1967 as Bostancı Sea Club and manages it. The motel, designed by Koray¹⁵ through Parker's commission, is built, licensed (in 1968)¹⁶ and permitted for utilization (in 1969)¹⁷, while a dispute between tenant Kefoğlu,

¹³ Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1806595, BB1806593, BB1806608.

¹⁴ Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1805924, BB1805947, BB1806013.

¹⁵ In a document written to the board of directors of Bostancı Sea Club, dated June 2, 1970, Koray states that he is the architect of the motel (Kadıköy Municipality Directorate of Housing and Urban Development Archive. BB1805920). Besides, although not mentioned in the site plans, Koray is also stated as the designer of the site plan in a notarized statement record, dated June 2, 1970, reached during the research (Kadıköy Municipality Directorate of Housing and Urban Development Archive. BB1805922). However, a document -found in the plot's file at the Kadıköy Municipality Archive- used for the application for the utilization permit, is signed by Ergin Gömüç, M.Arch. (chamber reg. no: 2948). On this document, Gömüç's office address is written as Efes Han 1st Floor No: 1, a commercial building where Koray's office is also located. The document also states that it "should be filled by the technical personnel in charge of the technical matters" (Kadıköy Municipality Directorate of Housing and Urban Development Archive. BB1805761). Therefore, it can be deduced that these two figures must have worked together on this project.

¹⁶ Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1805761.

¹⁷ Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1805759.

property owner Parker and Kadıköy Municipality is continuing¹⁸. During the 80s, the facility adjacent to the kiosk operates under the name "Gala Club".¹⁹ Later in the 90s same facility is used as Taçspor Sports Club.²⁰ (Figure 5)



Figure 5. The plot in 1966 (image produced by the authors from the aerial photograph of the same year found in İstanbul Metropolitan Municipality Map [<u>https://sehirharitasi.ibb.gov.tr/</u>]).

4. THE COUNTERPART OF MODERNISATION IN DAILY LIFE: THE RELATIONSHIP WITH THE SEA

At this point, analyzing a sea club and a motel through the context of the production of the changes that create modernism through the destruction of traditionalism, would help to understand the distinctive circumstances of the era. The reflections of the changes in the social life and the urban environment on the sea-related recreational culture can also be spotted on this plot with the construction of this motel. From this point of view, centers of daily life and the lifestyle of the area such as beach clubs, clubs, open-air cinemas, shops, and a sayfiye character hold an important place in the historical narrative of the plot.

One of the traces of the varying lifestyles and urban fabric along Bağdat Avenue and its surroundings can be found amongst its relationship with the sea. The existence of beach clubs near the plot is well-known before 1967, the year when Tamara Parker and Hayrullah Kefoğlu formed their partnership. The image of the beach as

¹⁸ A large number of documents related to this dispute have been reached in the Kadıköy Municipality Directorate of Housing and Urban Development Archive.

¹⁹ Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1805993, BB1805953.

²⁰ Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1805742, BB1805741, BB1805737, BB1805739.

a symbol of modern social life got even stronger after the Early Republican Period when Istanbul met the beach clubs. As a matter of fact, since the 1930s, beach clubs in Suadiye, Caddebostan, Moda and Fenerbahçe appeared, as the most prominent physical manifestations of the region's modernization process, as similarly pointed out by Bozdoğan: "The modernity is made visible, above all, with the exhibition of healthy bodies in public spaces and consequently the top two activities where the 'body' is exhibited mostly -dance and sports- are central to the culture of the early republic" (Bozdoğan, 2010). Thereby, these beach clubs which possess additional architectural functions beyond beach-use, became one of the representational spaces of the Republican ideology by acting out as centers of attraction where men and women came together (Figure 6).



Figure 6. (Ögel, Tanman, and Alışık, 2018, 408)

As a result, with the transformation of small bays into beach clubs, Bağdat Avenue and its environs gained popularity at an increasing rate in the 1930s. These beach clubs acted out as summer resorts for people living on the European side of Istanbul and even for visitors from other major cities. After Suadiye Beach Club, Caddebostan Beach Club was opened. And, in 1935, Bağdat Avenue was paved and railed with tram lines. After 1935, the land on both sides of the avenue was divided into plots where villas were built. After the 1950s, there came an era where housing became a product of a defined demand, kiosks were demolished and masonry villas were built in their places. In the 1950s and the 60s, with the influence of the clubs where balls were organized, cafés, open-air cinemas and, especially, the minorities, who came to their summer homes, the area gained a privileged position. The reasons for this change can be listed as, the availability of fast travel for the capital, the tendency of transforming the economic system into a market society and the increase in social mobility, after World War II. Between 1952 and 1954, with the first central plan of Kadıköy, the area got approved for a building height of 9.5m. The dismantling of the tram lines and the planting of the plane trees on Bağdat Avenue came later, in 1958. In the 1970s, speculative building renovations and development plan operations that allowed the "demolish-build-sell" concept were made possible with the influence of the condominium law of 1965 among other things, turning Bağdat Avenue and its surroundings into a settlement for the upper-middle class (Yazıcıoğlu, 2001, 50-53).

Along with the effects of all these changes on Bağdat Avenue and its immediate surroundings, open layout planning -permitted with the inurement of Bostanci-Erenköy Region Development Plan, scaled 1/5000 in 1972-paved the way for the increase in building density and height. With the addition of the opening of the First Bosphorus Bridge to this equation in 1973, Bağdat Avenue and its environs became a suitable location for housing (Hür, 1994, 178). The area ceased to be a seasonal neighborhood and became a crowded part of the

city after the 70s with the continuing demolition of villas, masonry houses and kiosks and the construction of the apartments in their places (Figure 7). Koray too was one of the architects of the many qualified buildings that were built in the area. The architectural identities -especially design principles applied in the façades- of these buildings, designed by architects such as Turgut Cansever, Utarit Izgi, and Maruf Onal, along with Koray, became references for other architects and eventually were adopted by them.



Figure 7. From kiosk to villa and from villa to apartment (Ekdal, 2014; Mortaş, 1936; Altunç, 2009).

Atilla Yücel states that, even with the present social unrest, the twenty-year period after the 1960s was a time of important developments such as; industrial and economic progress, the emergence of a pluralist world view and other new concepts along with it and the formation of an urban lifestyle with related behaviors and values (Yücel, 2007, 127). In the 1980s, the daily life has fully shifted from the coast to Bağdat Avenue as a result of the spatial concentration, turning "The Avenue" into a place where Istanbul's unification process with the world is most visible. The cinema complexes, restaurants, cafés and shops which took the places of the old clubs and open-air cinemas have increased in number which resulted in the continuation of Bağdat Avenue's role as the social center of the area (Yücel, 2008, 26). With the embankment and arrangement of the seaside from Kalamış to Bostancı between 1984 and 1987, the coastal road was opened and the traffic was rearranged as one-way on Bağdat Avenue (Eyice, 1993a, 529).

5. A MODERNIST ACCOMMODATION BUILDING: TAMARA MOTEL

As stated above, Bostanci, along with other neighborhoods that are located in the Anatolian side of Istanbul and a part of Kadıköy such as Erenköy, Fenerbahçe, Göztepe, and Caddebostan, has become an important sayfiye settlement in the second part of the 19th century and the beginning of the 20th century. Although the beach culture continued gaining popularity during the 1940s and the 50s in the area, there came a period after the 1960s in which beaches were closed after falling into disrepair for many reasons such as industrialization, migration, sea pollution and changes in holiday culture. As an example, Suadiye Beach, which was opened in 1929 and contained a hotel, a club, and a restaurant, remained open until 1962 (Ekdal, 2004, 165-166). However, the attempt to transform the plot, which Tamara Motel is a part of, into a tourism facility dates back exactly to this period. On a site plan of the plot, scaled 1/500 and dated November 16, 1964, accommodation units, bungalows, a restaurant adjacent to the kiosk at the seaside, a "cabana", a pool, showers, and cabins can be seen (Figure 8).²¹ Tamara Parker²², who was living in the masonry kiosk that was located at the northeastern part of the plot, rents the seaside kiosk as a workplace for five years starting from 1967, three years after the production of this site plan. It can be said that, even though the beach clubs of the era were reaching the end of their lifetime, this action was as an attempt by Parker and her tenant Hayrullah Kefoğlu to become one of the club/beach club managers by building a tourism facility containing a discotheque, a restaurant, and beach cabins. For instance, the first beach club of the area, Suadiye Beach Club, contained a hotel, a club, a beach, a nightclub, and a mini-golf course, and in the 1960s, the club ran under the name of Club Reşat (Altunç, 2009, 71-72, 75). Regarding Caddebostan Beach and Club, opened after Suadiye Beach Club, Ekdal (2004, 164) gives the following information: "Apart from the cabins leaned against the road, two-storey longitudinal buildings were rented during the summer seasons and customers coming from Istanbul and Ankara stayed there along with their families the whole season. (...) The sounds of the women, men, and children who filled the beach on hot summer

²¹ Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1806595.

²² Parker, whose address is stated as "Bostancı Yazmacı Tahir Street No: 40" in various documents, was born in Tbilisi, Georgia (Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1805924, BB1806013).

days disappeared with the sunset only to be substituted by the music coming from the adjacent Caddebostan Club". Süreyya Beach Club, which was located to the east of the plot and opened in 1946 by the owner, Süreyya Ilmen, was another example of a complete facility that was established to meet the holiday-related needs of the area with its club, hotel and private changing rooms in addition to its beach (Gürel, 2018, 152-153). Therefore, the continuing demand for a beach club near the site seems to be effective in the decision of these two entrepreneurs to open a "tourism facility" that will benefit from the sea nearby. The transformation of Bostanci into a major settlement through the advantage of the availability of transportation by sea and railways and the vista of the site can be listed as other important factors that were probably effective in this decision. On the other hand, the plot was reserved for tourism facilities and the function of each building that will be built was determined with the Bostanci-Erenköy Development Plan of 1/500 scale, dated May 9, 1966. According to this plan, no extensions can be built to the existing kiosks and the existing trees will be protected.²³ In other words, the use of the plot was functionally restricted.



Figure 8. Site plan, 16.11.1964 (Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1806595).

On a larger scale, sayfiye resorts were known to be providing their services since the second part of the 19th century in the areas of Istanbul generally populated by non-muslims such as the neighborhoods located in the shores of Bosphorus, the Princes' Islands and Moda. During the Republican Era, the number of these resorts was decreased and their locations were changed due to the shift in the locations of the recreational neighborhoods. However, motels and camping facilities were built in the same period. One of the examples of these facilities, Çınar Hotel, was a city-hotel associated with the sea in terms of scale and management, in the 1950s (Yağan, 2018, 230-231). Ataköy motels, which consisted of 3 blocks and 22 rooms, were built and put into service as an extension of the Ataköy Beach Club later, in 1959 (Gürel, 2018, 171). In this respect, it should be emphasized that, compared to Tamara Motel, no other motel of similar scale can be found, that have been designed with a

²³ Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1805753.

modernist architectural approach and built, especially in a residential district that was continuously increasing in density, during the same period.

According to the partnership agreement between Tamara Parker and Hayrullah Kefoğlu,

"Only Hayrullah Kefoğlu of the partners has the right to determine the name and the format of the enterprise. The enterprise will launch with the buildings and facilities that are readily available at the site as of 1.1.1967. Both partners may decide to build new facilities together, if necessary. The construction costs of the facilities that will be decided to be built (discotheque, restaurant, beach cabin, etc.), will be covered by Hayrullah Kefoğlu."²⁴

The interesting thing is that after this initiative, Tamara Parker founded a company called Turistik Yapı Incorporated Company and built a motel on the northwest side of the plot on her own.²⁵ In a site plan dated November 16, 1967, it is seen that the accommodation function of the facility was handled via detached units that were in relation to the service units. In this site plan, a four-storey linear block stands out from the detached and semi-detached units of 6.5m height and contiguous units of 9.5m height. It is understood that the motel building Tamara Parker was built is, in fact, this linear four-storey block from the site plan which is further away from the sea, compared to other units.²⁶

The motel, which is designed by Melih Koray, is an important representation of its time with its spatial organization and morphological properties. The motel also does not differ from the architect's residences, which followed a consistent modernist attitude between 1960 and 1970. However, it is observed that this time, this attitude was carefully assumed in an accommodation building. The mass of the building is a rectangular prism, a basic geometrical form. The effect of this horizontal mass is strengthened with the help of balconies and the terraces which generate a movement on the façade. However, a balance of horizontal and vertical is also achieved through the wide window openings, wooden/metal latticed sun shades and flower beds and railings on the balconies. Therefore, even though the building seems to have been designed as a singular right-angled prismatic mass which refers to the International Style at first glance, it also possesses a strong plastic understanding in detail and the composition of 20th-century modernism in the context of Istanbul, and for this reason, an important part of the city's civil architectural memory (Figure 9).

²⁴ Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1806013.

²⁵ During this period, a law on the establishment of a new Ministry of Tourism Promotion, separate from the Press-Publication and Tourism Ministry, entered into force after being published in the Official Gazette, in 1963 (*The Official Gazette*, 1963). Also, the State Planning Organization has prepared the Five-Year Development Plans, which have been put into effect since 1963, that set out the priorities of state investments. In the State Planning Organization Report of 1963, the decisions of granting adequate and economically suitable loans to tourism facilities through the Tourism Bank and investigating the possibility of a limited-time building tax exemption for new hotels and motels that are suitable for tourism (State Planning Organization of the Prime Ministry of Turkish Republic, 1963, 428). However, it is not known whether these developments were effective in the preparation of the previously mentioned site plan for a tourism facility and then in the construction of the motel by Tamara Parker through the establishment of Turistik Yapı Incorporated Company because a tourism facility is visible in the site plan of the plot, dated November 16, 1964 and scaled 1/500, drawn before the establishment of the company. The following text is written on a note on this site plan: "The rooms will be registered as motel rooms in the title deed. Will not be sold individually, as a residence" (Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1806595).

²⁶ At this point, it can be said that Parker preferred to engage in this commercial enterprise independently due to her continuing dispute with Hayrullah Kefoğlu.



Figure 9. (Authors' photograph, April 18, 2019)

The motel was constructed using a reinforced concrete frame system and has four storeys, with a basement floor, a ground floor, and two standard floors. The longitudinal façades of the building face east-west direction and the narrow façades -which consist of blank walls that generate a movement effect via cantilevering at the top floor- face north-south direction. The movement effect, generated by the cantilevering parts of the longitudinal façades, is further increased with the recession of the ground floor. This recession, while reducing the weight of the building psychologically, also forms a canopy for the units on the ground floor.

The formation of the motel, in terms of floor plans, is as remarkable as its façade solutions. There are two different units for different types of users and these units, which are also effective in the composition of the façade, are the 9 motel rooms on the ground floor and the 9 duplex rooms on the first floor that continue on the second floor. The rooms on the ground floor of the motel, which is situated at the corner of the site where Yazmaci Tahir Street and Bostan Tüccari Street intersect, each have separate entrances, accessible from Yazmaci Tahir Street (Figure 10). This street, which extends perpendicular to the sea, probably served as the main axis to the sea during the period when beaches were still popular. The elevation of the ground floor of the motel from the ground level and the fact that each unit on the ground floor has a porch with a staircase of its own supports this assumption and provides independence for the ground floor units. These small units, which are composed of a living room with a kitchen in an alcove and a bathroom, expand to the garden at the front with their large sliding windows and terraces.



Figure 10. Koray, n.d.

The open-air corridor of the first floor, that also acts as a canopy for the entrances of the units on the ground floor, is reached via a u-shaped stair which is used as a terminating element for the horizontally extending mass of the building. This corridor is bordered by a metal railing that strengthens the horizontal effect on the western façade. In the duplex units located on this corridor, we are greeted with a space containing the living room -with a kitchen alcove- and the wooden staircase. This space, having a view and a balcony of its own, was probably designed to provide a necessary space for a dining table arrangement. The balcony here, which is also reached via a large window spanning from the floor to the ceiling, can be used as a living area in the summer months. The position and role of the kitchen is another prominent element in the spatial organization of the floor. Located to the right of the narrowly organized entrance hall, the kitchen was specially designed in an alcove. This alcoved design separates the kitchen in the unified kitchen-living-dining area. The separation of the kitchen along with the design choice to connect the kitchen to the open-air corridor through a window can be interpreted as a reflection of the modernized living conditions. The second floor is designed with a room overlying the open-air corridor at the west, a second room overlying the balcony at the east and a bathroom in between.

Another element that attracts attention at the entrances of the duplex units is the design of the staircase. These open-riser staircases, which are supported by two metal stringer beams, strengthen the separation of the living area and the entrance while establishing a visual connection between the two spaces. The open-riser design, that is used here to enhance the plastic qualities of the stairs, provides natural light to both the narrow entrance and the upper floor landing. The railings of the stairs are built with fine workmanship and special detailing using wood and metal hollow section profiles (Figure 11). The preference of such specialized duplex units in an accommodation building built in Bostanci in a period when the apartment buildings were increasing in number in its immediate vicinity, can be accepted as another manifestation of the originality of the building. On the other hand, it can be said that the designs of the units of the motel, while referring to the class/identity-related tendencies of the period, give hints about the characteristics of the sea club²⁷ or beach users. In addition to

²⁷ In a document, dated 18.09.1969, the outbuildings of the Bostanci Sea Club are listed as: "1 room, kitchen laundry, 1 room, 1 living room, 1 dining room, 2 rooms, 4 rooms on a corridor reached via a wooden staircase, adjacent to this building, to the left, a 2x7 American buffet, a kitchen, 2 toilets, a 8x6 discotheque, a 2x3 reception building, cabinets on 2 floors -33 on

these, the functional organization of the motel, which resembles that of a dwelling unit rather than a short-term accommodation building, separates it from its counterparts.



Figure 11. Authors' photograph, April 18, 2019

Apart from the inherent rationality of the motel typology, it is realized that design inputs such as vistas, climate and positioning are partially considered in the design of the building. At the same time, it is possible to say that the motel does not integrate with the "place" it was located in and possesses a very abstract relationship with nature. While the long façade of the motel, where the units are located, is directed towards the garden to receive the eastern light, the other long facade that contains the service areas and the rooms on the upper floor of the duplex units, faces west. The wide openings created by the sliding windows on these façades indicate a relationship with the vista. The wooden/metal sunshades, which can be accepted as one of the most characteristic architectural elements of the building, are repeated also on these façades. The combined use of transparency and translucency with these sunshades creates an impressive contrast and contributes to the composition of the façade in terms of color, permeability, textural richness. As a part of the diversity of detail encountered in Koray's architecture, these panels, which are fixed to the beams of the upper and lower floors, are among the main factors affecting the form of the building (Figure 12). Mobile versions of these sunshades were used in Koray's Dilman Apartment of 1966.²⁸ It can be considered that Koray preferred the use of this architectural element as an easy way to create a façade aesthetic and for its allowance for a low-cost façade design. As a matter of fact, Koray explains the creation of this architectural element, along with its details, under the conditions and material limitations of the period with the following statement: "We didn't have the necessary materials too back then. We thought and described how to build for each project with the materials at hand" ("Yılların Mimarı Melih KORAY ile Dünden Bugüne", 2014; Koray, n.d.). These functional sunshades, which can also be considered as an interpretation of structural ornamentation, are laid horizontally along the façade in an intermittent and rhythmical manner, with wooden railings placed between each sunshade supporting this rhythm with their balusters. Thus, the wide window openings, along with the wooden sunshades

the first and 28 on the second floor- at the seaside, 1 beverage stall, 1 12x... kiddy pool" (Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1806051, BB1806052, BB1806055).

²⁸ An earlier example of these mobile metal/wooden sunshades was encountered at the Turkish Pavilion of 1958 Brussels World's Fair, designed by the team of Utarit İzgi, S. Muhlis Türkmen, Hamdi Şensoy, and İlhan Türegün (Durhan, 2010).

and hand-rails in front of them, are used to divide and enliven the right-angular prismatic mass of the building. Therefore, it is realized that the design of the whole building from its details to the arrangement of the architectural elements used are determined by regulating lines.



Figure 12. Authors' photograph, April 18, 2019

Even the flower beds on the balconies of the first floor, overlooking the garden densely filled with trees, contribute to this approach and the plurality of the materials used. The façade of the building which forms a visual continuity gains a characteristic effect with the help of these flower beds that are "the ornamental elements" of the façade, as well as the solid-void relationship. Thanks to these ornamental façade elements, the horizontal effect created by the balconies is balanced, while a visual and climatic threshold is created between indoor and outdoor spaces. The textured detail of the flower beds, created with the use of fragmented stones, is a decorative element that was encountered especially in the late 1960s which many architects used in their projects. However, it is worth noting that a decorative approach was not preferred in this building and the building is a modernist example with the simple proportions of its façade.

In addition, it should be emphasized that the building was designed in a period when innovations in construction technology and industry started to occur in Turkey. Tamara Motel is one of the important examples of civil architecture in Istanbul, with its prismatic mass, the organization of its plan, its façade composition, the use of materials as a representation of its period, detailing and the lifestyle it offers.

6. CONCLUSION

With this study, this little-known accommodation building in Istanbul was tried to be made visible and an analysis of the period was made through it. Tamara Motel has been evaluated in terms of historical and cultural change of the plot on which it is located, its construction process, authentical formal features and spatial organization, its architectural details, and place in the accommodation culture.

It is realized that the building makes references to the International Style through its balanced plan and façade organization and its structural system that is organized as required by the function, with skillfully designed

façades containing wooden/metal sunshades and mastery in detailing within an overall simplicity strengthening its modernist stance. The building stands out as an example that helps us understand the architectural approach of Koray, an architect who was in search of an authenticity of form while following the international architectural agenda. Thus, Bozdoğan states that Turkish architects have become active participants in the localization and adoption of the International Style rather than staying as passive receivers of an imported aesthetic, transforming both their professional culture and local building practice (Bozdoğan, 2008, 117). In addition to the strong effect of its façade; the design of the floor plans, the spatial richness and the diversity it provides to the user makes the motel an important reference about the accommodation buildings of the period. It also stands as an example of the accommodation building production of the period by being an accommodation building possessing duplex units and having an open-air corridor in Bostanci in the 1960s. Bringing forward a motel of Melih Koray, who has designed a large number of apartment buildings, mostly on Bağdat Avenue and discussing his little-known architecture, will make it possible to comprehend the entirety of Koray's architecture as well as to see the overall position of the period within the general production of architecture.

The building is one of Koray's original designs that have survived almost without a formal change and although it has some building physics-related problems, structurally, it is in good condition. However, function-wise, it is known that this accommodation building has not been used for a long time. There are various threats to the future use of this building and plot²⁹, which are located in a district of Istanbul whose economic value is continuously increasing. As a matter of fact, it was spotted that during the writing process of this paper, the wooden/metal sunshades of the building were removed (Figure 13). Nevertheless, the building is an important heritage of the modern architecture with its architectural value, arising from its reflection of the design approach and the architectural understanding of the period in which it was built; cultural/historical value, as a part of the urban memory; functional and economic value, originating from its continuing ability to meet the needs in the case of a re-use and a continuity value with the help of this type of a protective re-use. On the other hand, documenting the apartment buildings and other projects designed by the architecture of Koray. The information obtained by the documentation of these buildings through the temporal changes and transformations they have undergone as architectural objects during their life-span, will also enable many architectural, social, economic and cultural analyses of the period.



Figure 13. Authors' photographs, July 1, 2018 [left]; October 6, 2019 [right]

²⁹ The plot, which was identified as "Natural Protected Area" due to the presence of grown trees, was reidentified as "3rd Degree Natural Protected Area" by the 5th Conservation Council of Cultural and Natural Properties in 2010. The two kiosks in the plot which were registered in 1975 were identified as "1st Group Cultural Property to Be Protected" in 2010 and the outbuilding was identified as "2nd Group Cultural Property to Be Protected" in 2016 (Kadıköy Municipality Directorate of Housing and Urban Development Archive, BB1806307, BB1806574). Today, the whole plot is registered as "Natural Protected-Sustainable Protection and Controlled Use Area" by the verdict of the General Directorate for Protection of Natural Properties of the Ministry of Environment and Urbanisation, dated December 4, 2017 ("istanbul ili, Kadıköy ilçesi," 2017). The "Sustainable Protection and Controlled Use Area" status, given to the plot with the Principal Verdict on the Protection and Usage Provisions for the Natural Protected Areas, published in the Official Gazette on 25.01.2017, is defined as, "Sites where naturally and culturally appropriate low-intensity activities, tourism, and settlements affecting, in harmony with or supporting the protection of the sensitive sites to be protected or nature protection sites are allowed" (*The Official Gazette*, 2017).

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ENERGY EFFICIENT ATRIUM DESIGN FOR DIFFERENT CLIMATE ZONES

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ABSTRACT

Atriums are places that should have different energy-efficient strategies depending on climatic charecteristics. With in the scope of energy efficient building parameters in atrium design; air movements, heat gain-loss ratio, relationship with adjacent spaces, natural light and glass facade/roof relationship and orientation factors should be considered together with the whole building. Buildings having a specific plan type or form of general properties, it is seen that atrium typology bears a resemblance.D esigning the atrium space as in proportion to the building, significantly affects the annual energy consumption of the building. Despite the fact that natural ventilation and cooling strategies are effective in the period requiring cooling scenarios due to the difference in climate characteristics, energy efficient strategies through natural lighting and with passive design solutions it is possible to optimise of building thermal performance (heating-cooling). Height has desicive impact on the control strategies in atriums. While energy efficiency can be controlled more easily in low-rise buildings, the negative effects of climate on comfort in high-rise buildings. It's necessary be addressed together with automation-based sensitive control strategies. When the examples of buildings with atrium are examined in modern architecture, it is seen that the centered atrium is more prevalent, but the greenhouse type and more complex types are configured with different control techniques in warm and humid areas.

KEYWORDS: Atrium Design, Atrium Types, Energy Efficiency, Energy Efficient Strategies, Passive Design.

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1. INTRODUCTION

Designing the physical environment by human since the past has been determined by the climate conditions. When we examine our building history, the courtyard was used in Traditional Turkish Architecture for the same purposes as the atrium. In our civil architecture, there are residences with inner courtyards and outer courtyards, inns and caravanserais with centered and open courtyards. In traditional Turkish architecture, while design of the courtyard, the orientation, the choice of the open and closed courtyard type are determined according to the climate of the region where the building is located (Bozkurt and Altınçekiç, 2013).

The first use of the atrium is encountered in Roman houses as a spacious entrance space. This area serving as a semi-social space is on the centre of entry and exit without being covered by a canopy. As a semi-open space, one feature is that it has a relationship with the outdoor space. However, by the century 19th, variations has began in courtyard spaces with enhancement of steel and glass technology (Göçer, 2006; Hung, 2003).

In 1986, Bednar (1986) and Saxon (1986) investigated the pros and cons of the first atrium buildings formed by covering the courtyard owing to development of various covering systems on the aspect of influencing building performance as an energy strategy.

In his book Saxon (1986), in which he examines the atriums standing as a milestone chronologically, he states that the high-tech and nature-sensitive atrium was designed with the effects of greenhouse development, the conservation of building and energy.

It is a positive feature of the atrium that can be used in all climates to provide a more livable environment in the building against the extreme adverse impact of climate. Moreover, it also has a positive effect on the energy efficiency of the atrium in lighting which is useful in many climates, except for its use in directions or situations leading glare. Yet, in terms of heating, cooling and ventilation loads, several parameters should be taken into consideration simultaneously during design of the atrium.

2. THE RELATIONSHIP BETWEEN CLIMATE AND ATRIUM

The physical events (greenhouse effect and air stratification) occurring in the interior of buildings with atrium complicate the energy consumption control, determining energy performance in these buildings and providing convenient air-conditioning on the basis of the purpose of usage. In addition to these physical events, the type of atrium and the climate zones also play a crucial role to determine the proper heating and cooling strategies in buildings. The climate data affect the choosing of atrium type in accordance with balance of the loads heating and cooling.

In areas where the heating load of building is more, depending on the dimentions, aspect ratio, and height of the place, etc. all change the energy performance.

On the contrary, atriums having a wide transparent surface causes over-heating and increases in heat loss affects negatively to energy efficiency. Although glazing system of the atrium enhance the solar heat gain, the main factor for energy efficiency is increasing the nightime heat loss during heating period. Providing the air tightness in envelope is a considerable stage in the design and construction of buildings. Moreover, winter night time and summer day time control strategies can increase the total energy performance of atriums significantly.

Atrium design for temperate climates, cooling and heating loads must be considered in year based solutions, it is also approved that cooling strategies takes a considering the cooling loads are more important in total energy consumption (Göçer, 2006). The automation system ensuring the heating strategies to work in the heating period, passive-active cooling and heating strategies also affects the performance in cooling periods.

The cooling is priotity in warm climates. The precautions taken against high air temperature, humidity, and solar radiations coming directly gain importance in terms of the reduction in energy consumption. These types of precations in cooling aimed atriums are the exact opposite of the heating aimed atriums. In cooling aimed atriums, avoiding the solar effect as much as possible is intended (Göçer, 2006).

In energy efficient building design atriums are one of the key components which can alter the total energy performance, so choosing the proper type and control strategy regarding the climate zone has vital importance,

especially buildings with high internal gains. Depending on the function in the interior, it is necessary to maintain a specific ambient temperature. The heating loads in atriums for long-term use is quite more than for short-term use in general.

The research on the performance of the atrium in terms of climate characteristics has started 2004, in Turkey. The pioneering study of Yaşa (2004) was an experimental study which evaluates natural air conditioning with different 17 aperture design on a yard. In the real model with a 2-story courtyard made by Yaşa (2004) made of transparent plexiglass, 17 different courtyards were formed by emptying the axes. In this model, horizontally 36 points and vertically 32 points tested in a wind tunnel. Consequently, it is observed that the wind speed exceeds the comfort levels in models containing openning on the windward but not on the leeward (Yaşa, 2004).

According to Göçer (2006), in his study of appropriate glass choice for atriums is Comfort Low-E glass as the least heating loads option for adjacent areas in Istanbul's climate. In addition, Low-E glass material is the least energy consuming option in heating performance, the flat couple glass material is the least energy consuming option in lighting performance (Göçer,2006).

Farhoudi (2016) introduces 20-storey atriums as the most energy consuming type in various climates in his study of investigation on annual energy consumption under the climate conditions of Calgary, Paris, Singapore, and Phoenix. In this study, central atriums are stimulating as 5,10 and 20-storey and in the shape of square and rectangle. Besides, the least consumption of energy occurred in less storey and centered square type of atriums. It is put forward that the volume of atriums is directly proportionate to the energy consumption.

Tabesh and Sertyeşilışık (2016) tested a two-stage simulation of integrated usage of yard and atrium with Design Builder and Energy Plus in Turkey's province of Istanbul, Ankara, Antalya, Erzurum, and Diyarbakır. They studied merely on the basis of thermal performance evaluation and concluded that the courtyard design in summer and atrium design in winter provides energy efficiency. Moreover, the transformation courtyard into an atrium made sensitive in İstanbul, Antalya and Diyarbakır in hot-temparete climates but not in Ankara and Erzurum, coldcontinental climates.

When experimental studies were being conducted in the worldwide literature, in 1996, Said et al. measured the air stratification in a wide single place thanks to the enhancement of measurement tools (Said et al., 1996). In the 2000s, as studies have taken advantage of computer technology, the energy performance measuring became study of simulation method.

Since the energy performance of atrium depends on various parameters, the researches conducted on the basis of the material, shape, location, and size of the components that compose the place provides researchers with the opportunity to compare outcomes more elaborately. Aldawoud and Clark (2008) worked on the advantageous usage of courtyard and atrium regarding different climate zones, different types of glazing, and story height. It is found out, atrium at higher floors, using the atrium after the second floor in cold zones, and using courtyard in warm climates are more effective energy solutions in atrium design.

Mohsenin and Hu (2015) investigated atrium within the context of their types by making experimental measurement different atrium types (centered, linear and single-sided atriums). Roof lighting levels were also measured for different heights. Moreover, it is experienced that centered atrium is inadequate in terms of lighting in their case and when the roof lights horizontal height is 1/7 of the atrium depth, the level of daylight improves (Mohsenin, 2015).

Moosavi and Hu (2015) evaluated air conditioning performance by measuring temperature, humidity, and air exchange in different points of an atrium containing a water wall and a chimney outlet in a subtropical climate. The decrease in humidity and temperature by means of stack effect in chimney, during working times is observed and they suggested more comfortable space to be used in interior arrangemet by determining the comfort level of measurement points.

In some studies, acoustic performance is taken into consideration too regarding indoor comfort. Li et al. (2015) evaluated thermal, indoor air quality, acoustic, and satisfaction of occupants all together by means of a quartered compass in order to evaluate user satisfaction. Comparisons between conventional building type and green building type is analyzed in both simulation and post occupancy evaluation. According to this study, bridge-type atrium in a high-rise green building delivers the best performance. Relying on the post occupancy
evaluation, linear type in high-rise building and relying on the building performance, one-sided atrium in low-rise resulted in the worst case comparing to other referance buildings (Li et al, 2015).

3. ENERGY EFFICIENCY IN ATRIUMS

Atrium desing must be considered in different aspects, which have both advantages and disadvantages for energy efficiency. Complex air movements occur inside of the atrium, unlike other spaces due to the fact that it is a space interconnecting the volume of all stories of buildings and the pressure difference arised from the bottom to the top. The size of its volume and the width of the total area of the envelope exposed to outdoor climatic conditions differentiate it from other spaces in terms of energy efficiency. These properties have two main effects on energy efficiency:

To provide solar heat gain; the atrium provides heat gain through the solar radiation from the transparent facade and/or roof. Whereas it is an effect that is studied to be reduced in warm climates, it should be aimed to increase in cold climates.

To take advantage of the stack effect; these are air flows originated from the rise of heated air in the volume. Air flows accumulated on the top parts of the volume is the effect of stratification. It affects indoor air quality at upper elevations in both warm and cold climate zones (Gemi, 2006; Göçer, 2006).

These effects constitute an advantage on the behalf of different parameters regarding energy gain. Advantages for energy efficiency are the increase in the level of light in the lower floors, serving as a buffer zone between main spaces and outdoor weather conditions, making use of the stack effect to provide adjacent areas with natural ventilation, reinforcing cooling by generating cross-ventilation, working as an air gathering space by both collecting air from adjacent areas and releasing the air outside, benefiting from the orientation owing to have a large building envelope exposed to outdoor air conditions.

In cold climate zones, to reduce heating loads in atriums, increasing heat gain and preventing heat losses are primary energy efficient targets. To achieve these goals, utilization the orientation with solar heat gain in space organization, heat gain with thermal mass, the design as a pre-heating fresh air source for adjacent areas, the design as a buffer zone to prevent from heat loss by infiltration in adjacent areas, glazing ratio and material selection for ensuring sufficient light level in adjacent areas are priorities.

In warm and warm-humid climate zones, in order to reduce the cooling and ventilation loads in the atriums, cooling through increasing the air movement and preventing excessive heat gains are the primary energy efficient targets. To achieve these goals; utilization the orientation to prevent excessive heat gain in space organization, increasing cooling by air movement, night cooling with using thermal mass, design as a pre-cooled fresh air source, buffer zone for adjacent areas, indirect lighting and shading design to prevent excessive heat gain, glazing ratio and material selection to supply adequate light levels to adjacent areas are priorities.

While during the warm period of mild climate zones, the strategies for warm climate are valid, during the heating period the effect of cold climate conditions on the performance should be taken into consideration. In mild climate zones, controls and advantageous strategies depending on outdoor weather conditions should be determined and controlled by the automation system during mild periods.

Thermal performance measurements; the factors such as temperature level, main radiant temperature which measures the average temperature of the surfaces around a certain point, air flow rates (due to its effect on cooling) are evaluated.

In warm and humid climate zones, wet bulb globe temperature, indoor air quality, wind speed, air flow rates, relative humidity values are used to calculate cooling loads in measurements and simulations. In the calculation of cooling loads, measurements and simulations are conducted in hot periods when the cooling systems operate with the highest performance.

In the literature, CFD, Fluent, TRNSYS, Design Builder, Energy Plus, EDSL TAS 3D, DIVA for Rhino, DOE2.1E, Dynamic Therma Model, Ecotect software are used as simulation tools. In most of the studies, instead of annual energy consumption, loads in the short term is determined and compared by making measurements and simulations together (Mohsenin, 2015; Mohsenin & Hu, 2015; Gemi, 2006; Littlefair, 2002; Alraddadi, 2004;

Ghasemi et al, 2015; Shafiei & Moosavi, 2016; Yaşa, 2004; Chow et al, 2013; Hussein & Ousthuizen, 2021). Various energy efficient strategies are simulated in different climates, compared with each other that under the circumstances of no strategy has been implemented, and the state in which the systems bring the least load is determined.

In order to measure the level of daylighting in atrium spaces, daylight factor, average daylight factor, spatial daylight capacity, well index, balcony well index values are used in academic studies. These values have been experimentally measured in studies evaluating the lighting level with various sensors or simulation tools (Mohsenin, 2015; Littlefair, 2002; Alraddadi, 2004; Ghasemi et al; 2015; Chow et al, 2013; Saxon, 1994).

When evaluating user comfort, there are studies that take an account Predicted Percentage Dissatisfied (PPD) value, which is what percentage of the people satisfied with the thermal environment in the building, the Predicted Mean Vote (PMV) value, which is a parameter related to how people in an environment perceive the environment (Fanger, 1970; Ekici, 2013). The PMW / PPD index is the mathematical expression of the thermal physiology as of the human being adjusted to the temperature perceptions recorded by people in conditioned spaces (Fanger, 1970). ASHRAE Standard 55 states that in order for an environment to be considered as comfortable, if the environment is thermally homogeneously distributed, 90% of the people in that environment, 80% is considered as an acceptable value (Ekici, 2013; Fanger, 1970).

4. ATRIUM TYPES IN ENERGY EFFICIENCY

In order to achieve energy gain strategies, the atrium is primarily affected by the factor of orientation when climate data is taken into consideration. The orientation is the choise requires altering control systems, thermal state in atrium, air quality and lighting in both warm and cold climate zones. Regarding the building envelope area and heat gain/loss, the location and the size of the atrium in the building is important. Types of the atrium are analyzed in accordance with the location in the building to evaluate energy efficient strategies. In addition to the formerly specified type of atriums in the literature, various types of the atrium are also figured by taking account of the new building examples that are compatible with energy efficiency. In this context, types of the atrium are listed as follows:

4.1. One-sided atrium:

This is the most common type of atrium with a centered atrium. If it is in the south direction, prevents against the excessive heat gain and air stratification should be taken (Hastings, 1994;Atria Systems, 2016; Gemi,2006).

4.2. Two-sided atrium:

Because of the irritative effects on eyesight low angel radiation from east and west sunlight, linear type is emplaced on the direction of north-south, and solar control system is design at the south facade of the atrium (Hastings, 1994; Atria Systems, 2016; Gemi, 2006).

4.3. Three-sided atrium:

The energy efficiency is attained by emplacing in the utility direction with balancing solar heat loss and heat gain (Hastings, 1994; Atria Systems, 2016; Gemi, 2006).

4.5. Centered Atrium:

It is the type of atrium that glass surface is only at the roof. That's why the properties of the glazing system have various impacts on performance. I this type, providing more luminous ambient with ceiling glazing, but horizontal glazing above roof floor with opaque ceiling diminishes lighting level and thereby the view of the sky

is restricted. It is easier to control air monement in the atrium. Adjacent areas constitute a buffer zone between outdoor air conditions and atrium (Hastings, 1994; Atria Systems, 2016; Gemi, 2006; Bednar, 1986).

4.6. Opposite sided atrium:

It can be utilized to take advantage of the benefits from each of two sides opposite direction as north-south causing different heat gain/loss in winter and summer. Yet, attention needs to be paid to the airflow on the junction points (Hastings, 1994; Atria Systems, 2016; Gemi, 2006; Bednar, 1986).

4.7. Bridge atrium:

In the atrium connecting different higher blocks from each other, the air stratification at high levels with buoyancy effects should regard as an impact on the energy performance of the higher block (Atria Systems, 2016; Gemi, 2006; Saxon, 1989).



Chart 1. Types of Atrium (Hastings, 1994; Atria Systems, 2016; Gemi, 2006; Saxon, 1989; Bednar, 1986).

4.7. Podium atrium:

The effect of shading in the direction of north depending on the direction is needed to be planned especially with respect to comfort priority of different climates in atriums emplaced between high rise building and low-rise adjacent areas (Atria Systems, 2016; Gemi, 2006; Saxon, 1989).

4.8. Multiple horizontal arrangement:

It is the atrium emplaced in the way that horizontal regular repetetion through building width. It is preferred in a wide-planned building in order to satisfy the need for natural light and generates air movement in volume as such in centered atrium (Atria Systems, 2016; Gemi, 2006; Saxon, 1989; Bednar, 1986).

4.9. Multiple vertical arrangements:

It is the partial atrium scattered specific stories of high-rise buildings. It provides different air-condition opportunities in building owing to these places are not connected to each other. Moreover, air stratification level decreases at upstairs compared to the atriums continued throughout the building. In this way, the comfort level increases (Atria Systems, 2016; Gemi, 2006; Saxon, 1989).

4.10. Arcade atrium (terraced):

It is the atrium constituted by gradual shifting in the one side of volume of the atrium at downstairs or upstairs. Separating the adjacent areas from the atrium volume can provide a different kind of stack effect. The air stratification level slides to the bottom or top elevations due to pressure and volume.

4.11. Spiral atrium:

It offers an opportunity for the utilization of the single atrium volume in different facades of the building. Yet, attention should be paid to the air stratification at upstairs and up-downstairs pressure difference due to the wind effect. The negative impact of stack effect on comfort conditions should refrain with pressurization.

4.12. Greenhouse type atrium:

Serving as a double facade at tower sides, it creates a buffer zone between adjacent places and outdoor air conditions. As in atriums continued throughout the tower, the negative effect of stack effect and air stratification are refrained. Plaza type of atriums is considered in this category.

All factors need to be taken into consideration simultaneously in the choice of atrium type to balancing of gain and loss of energy. Volume sizing also should be configured up to annual energy consumption balance aim.

5. PARAMETERS IN BUILDINGS WITH ATRIUM FOR ENERGY PERFORMANCE

5.1. Heating Strategies

In cold climates, thanks to the atrium, the passive heating is feasible to take a great amount of sunlight in and store this energy in thermal mass in times of winter days. Likewise, this self-sufficient heating capacity may contribute to heat adjacent places too. Being a buffer zone between adjacent place and outdoor air conditions, it reduces the heat loss in places.

Under climate conditions when heating period is more dominant, it is necessary to take into account the orientation, slope of roof, thermal performance of the outdoor glazing and the properties of materials used in the interior, to be compatible with air conditioning, cooling, and heating systems.

Heat losses emerging from natural ventilating can be reduced by mixing the interior and exterior air in the atrium volume. In the prevention from heat losses derived from infiltration and natural air conditioning, it is possible to retain the heat in preconditioning in atrium but it is also essential to pay attention in the stage of underconstruction the junction point of materials to avoid air leakage. To ensure airtightness, a special gasket, metal panels filled with foam insulation can be used in curtain walls and glazing systems.

In winter period, the control on heat loss is important, especially where the night service is available as in hospitals and hotels. The expected thermal comfort under the circumstance of night should be known in advance and then required precautions are taken according to it. Night louvers may be utilized inside of the glazing in terms of control and usage convenience (Gemi, 2006).

If an atrium is generated with giving priority to heating strategies, shadings can be used to prevent excessive solar heat gains when cooling is needed. Incoming long-wave infrared light have to obstruct before passing it to the surface of glazing. Otherwise, condensation occurs between glass and interior shading so may result in an increase in the consumption costs by causing harm to building materials.

5.2. Cooling Strategies

Passive cooling depends on the outdoor air, the difference between indoor and outdoor temperature, the thermal condition of the building, the conducting between thermal mass and ventilation, the rate of night ventilating, and the control strategy. In summer period, the active system is required to cooling in the atriums that designed according to the winter conditions with great solar heat gain. That is why the fundamental priority in cooling should be given to constrain overheat gain.

Mechanical cooling can be altered into an energy-efficient system by utilization of natural resource such as the wind, the sun (solar radiation), and the soil (via ground-coupled heat exchanger). The cooling system should be reinforced with the ventilation system because the air movement at the appropriate speed for building occupants is between 0,5 m/s and 3 m/s for this reason it creates physiological cooling. This thermal comfort mechanism should be at the exact level with the human comfort (Yaşa, 2004).

Depending on the location, the north direction should be preferred in warm climates in compliance with the orientation. In mild and cold climate, the atrium should be placed in the direction of the south but shading elements should be used in times of cooling need is raised.

Cross ventilation should be used in the cooling of the atrium and adjacent places. It also creates a more favorable interior place comfort for adjacent places. If the outdoor temperature is fewer than the interior temperature stemmed from the usage or absence of air movement, cross ventilation becomes an effective method. Yet, when the outdoor temperature and humidity is high, it even can cause interior places' temperature to rise more. Therefore, in the final situation, the average temperature is to be considered not the maximum temperature. The cross ventilation also avoids air stratification so heated air volume can no longer escalate and push down the mild air. In warm climates, it is necessary for atrium to boost the cooling system comparing to the case of absence of it by gathering heated air. Cross ventilation would be more efficient in both warm and cold climates if the control of air inlet and outlet is ensured automatically. Moreover, It is needed to pay regard to airflow to not exceed the comfort levels in the cross ventilation. The atrium should not give rise to turbulence or venturi effect like in the narrowing corridor.

In both the cross ventilation and the stack effect ventilation, the ambient temperature is needed to be stabilized by carrying out the temperature measurement at the point of air inlet and outlet and by reinforcing with the active systems if it is needed. Considering the thermal mass usage along with the stack effect, delaying heating by night-cooled thermal mass may be used as a cooling strategy.

Shading prevents interior place from solar heating and user from glare and direct sunlight. Being a wide range of lighting at the sky, shading systems should be motorized to provide sufficient lights and avoid over-heating when needed. It is required to have shading as much as needed in summer period and to control heat loss and leakage in winter period.

5.3. Ventilation Strategies

Since the very past, increasing the place volume and creating adequate air movement within the comfort levels are methods of passive ventilation in a natural design for crowded places. Atrium is the aesthetic and functional solution for places that fulfills this method exactly. Evaluating the size of the volume and inputs concerning climate and orientation simultaneously contributes to ventilation positively.

There are various parameters in supplying indoor comfort regarding intended usage. The amount of clean air required per person, depending on the function of the atrium space, increases the energy consumption, especially in the air conditioning units of atriums that do not have natural ventilation. In atriums where natural ventilation is used, an air change is required that will not create turbulence and maintain the comfort conditions.

In wind force studies, Beaufort determined that wind velocity greater than 9 m/s hinders the walking (Vipikedia, 2021). Yet, according to ISO 7730, the wind velocity of 0,10 m/s in winters and 0,12 m/s in summers are allowed for interior places such as an office. Also, the percentage of forming turbulence is required to be between 30% and 60% (EN ISO 7730, 2005).

The air stratifications taking place in the atrium is a considerable disadvantage affecting the interior air quality. The humidity above the comfort level that occurs depending on the size of the volume and adversely affects the user in adjacent spaces close to the atrium roof level causes the formation of CO² and temperature layer.

The air stratification is specially confronted in high-rise buildings where active ventilation is utilized fully. The absence of aperture in building envelope due to extreme weather conditions pose problems of increasing stratification at upper elevations where it is above the neutral pressure level in high-raise buildings. In their study investigating the pressure differences in high-rise buildings, Mijorski and Cambelli (2016) stated that atriums designed throughout a high-rise building impairs the inlet and outlet elements at the building envelope such as doors, windows, vents. This pressure differences causes undesirable air flows in immense volumes like atriums, leads unwelcomed gas such as smoke, odor to spread all over the building. Additionally, it deteriorates heating and cooling systems due to in large quantities air leakage and makes the active systems perform excessively (Mijorski,& Cambelli, 2016).

Relative humidity influencing the building materials' lifecycle negatively increases the sensible temperature in hot-humid climates and damages the comfort conditions. Therefore, the relative humidity level should be maintained at 30-40% in winters and 45-55% in summers (Comfort conditions for space, 2016). If the measured humidity level exceeds the comfort levels, several passive strategies are determined to decrease relative humidity level or temperature. As support to decrease the cooling load of the building, the fresh air taken from the ground level of the atrium and release out from the roof of the atrium by cross-ventilation in the way that heated to rise up owing to buoyancy forces. In this way, the humidity and heat are removed. With the shading elements on the exterior side of the glazing system, solar radiation are prevented before it enter inside of the volume and so excessive humidity should be restrained.

The wind ventilation could be provided in the shape of the cross-ventilation, the oneway ventilation, and the wind turbulence (Laskari, 2008; Sev, 2009; Yaşa, 2004). Prior to benefit from the wind energy with the intention of ventilation, It is required to be sure that the predominant wind direction is not blocked by other buildings and topographic characteristics and atrium is needed to have aperture or side at the windward. Based on the velocity of the predominant wind, several passive methods can be used. Utilization of the stack effect derived from the wind direction and pressure difference inside of the volume as a supporter to ventilation depends on the climate, wind direction, orientation, height of the atrium, the directions of the air inlet and outlet.

The ventilation with rising air effect (buoyancy effect) occurs through air exchange among different air density layers. Concurrently, this passive method which also can decrease the cooling load removes the heated air from the volume. Allowing the heated rising air to its natural draft to exhaust at the high elevations could be carried out without the energy consumption. Having a small difference in interior and exterior temperature in summer period, the buoyancy effect decreases. For this reason, thermal masses or fans making the air exhaust to outdoor could be use. However, thermal mass should be avoided to heat adjacent places in summer period.

5.4. Lighting Strategies

The configuration of the atrium, the glazing system, and the reflectivity of the interior surfaces determine the interior lighting, as well as the light of the local sky and the sunbeams' angel of incidence as the main source of lighting. The atrium section should be wide enough to allow sunlight to spread to the lower floors. Narrow and long atriums in horizontal or vertical dimensions reduce the lighting degree of adjacent spaces. In order to provide maximum benefit in the minimum area, especially in narrow-sectioned atriums, in order to increase the luminous value, reflective interior surfaces can be used to spread daylight to the lower floors.

Daylight factor, average daylight factor, spatial daylight capacity values are used to measure the level of ligting in spaces. These values can be measured experimentally with various sensors or simulation tools such as Dialux, Relux, Radiance, Velux and Daysim.

In order to prevent horizontal beams coming from the east and west directions of the building, sunshades controlled according to the position of the sun should be used in a such way that not to cause glare in all climate conditions. The glare problem is an issue that designers have been aware of since the first years when atriums were designed. In the early years of industrialization, the horizontal structural elements of the glazing system were used for this purpose. Lighting can be limited with different glass options by means of developing technology (Saxon, 1989).

5.6. Shading Systems

The increasing need for cooling requires to prevent heat gain in hot climates or hot period. Having a large area of glazing envelope of atriums, shading has a great impact on energy performance. By the enhancement of the solar heat gain system, shading is needed to prevent the system from working in times of need for cooling or to make it work as a cooling system.

The elements of shading should be designed regarding the weather data as fitting the intended purpose. The glazing system could be provided by the shading elements such as curtains, louvers, or blinds and by the innovative glasses (froste glazing, smart glazing, electrochromic glazing, configuring the different level of transparency, etc.) creating various transmissivity levels at the glazing system. It is also designed by splitting it with a nontransparent element from different angles (Göçer, 2006; Dickie, 2006; Eşsiz, 2004).

The external shading elements are used for controlling glare and when the sunlight is not wanted to heat the inside air volume via conduction and convection. While it is used effectively in times that requires cooling to prevent heat gain as the first step of providing passive cooling, if it is integrated with photovoltaic panels, it provides additional energy gain in times that requires heating. (Altın, 2014; Murray, 2013; Skylight & Atrium Window Coverings, 2021; Tavil, 2006).

As the purpose is to avoid glare, shading could be used on the internal side of the glazing system. The internal shading elements can sustain cooling to some extent because of blocking heating of the volume via radiation. Located in the internal side of the glazing system, curtain, louver, and blinds lead to an increase in interior temperature and condensation between the glass surface and shading element owing to solar radiation that already have entered the place (Dickie, 20016).

In shading between the double-glass, the continuum of the heat transmission to interior place via solar radiation should be considered in the absence of the shading. Not being compatible with the interventions, changes and correctability are the disadvantages of shading in the glazing system.

Electrochromic glasses, low emissivity (Low-E) glasses, solar control glasses, ETFE systems, semi-opaque materials, aerogel glases, and translucent facades are the options of glasses to control solar radiation with materials. It should be paid attention to these materials' heat transfer coefficients must be accordant with the U values for energy conservation in the atrium envelope in standars (Ulusoy, 2012; Eşsiz, 2004; Tavil, 2006).

5.7. Renewable Energy Strategies In Atriums

The wide building envelope of atriums creates a convenient surface for photovoltaic panels integrated with the building. When it is used on the transparent facade, it can also function as a shading element to a certain extent

depending on the shading rate of the used system. When it is used on the vertical transparent facade, it can be designed intermittently that prevents glare. The PV utilization in the atrium is more prevalent in the glass roof systems. Generally, stable panels are used. The cellular density of it is determined at a level that does not diminish the interior lighting. PV panels rotatable according to angle of sunlight also serve as a sunshade to prevent the atrium from directly incoming sunlight and from solar heat gain.

5.8. Operation Strategies

In establishing the control strategies, climatic factors and user characteristics should be regarded simultaneously. Which activities taking place at the ground of the atrium and which functions situated at the adjacent place of the atrium are needed to be known. The design of control systems on the building not serving at night will be different. Whereas a control system is adequate to ensure comfort condition during the working times, the comfort condition should be sustained during the nights at the buildings used also at night such as hospital and hotel. The temperature comfort level should be determined with regard to use frequency to thermal comfort conditions. The heating of atriums serving as a transition area differs from the heating of atriums that user frequency is short and peak.

The disadvantageous aspect of the lighting for comfort condition is glaring. The automatic control of shading elements with respect to the angle of daylight is needed to be applied at the glass facades in the direction of east and west that may cause glitter. In all climates, but especially in hot climates, it is make sure that excessive lighting above the comfort level depending on the skylight does not occur at the atrium and adjacent places. That is why, the lighting controls should be based on the outdoor daylight value and data of sun lights' angle (Göçer, 2006; Chow et al, 2013).

Though photoelectric light control may reduce the energy cost in the atrium, it also may cause greenhouse gas generation and pollution. The light control on the basis of daylight is a more efficient option for atriums (Chow et al, 2013).

The control of heating, cooling, and ventilation levels vary from each other by climate. The priority is given to cooling and shading in hot climates and to lighting and heat control in cold climates.

In cold climates, the night cooling control to enhance the heat gain capacity of thermal mass, heating system on-off control, ventilation system control should be done. In warm and hot climates, shading system control, ventilation system control, cooling system control, and humidity balance control should be done. In mild climates, depending on the outdoor measurement, the on-off control of unwanted systems should be done. Control of avoiding air stratification and glare should be done under all climate conditions.

6. ATRIUM EXAMPLES FROM ENERGY EFFICIENT BUILDINGS

In this study, the energy efficient strategies in various types of atriums from different climates all over the world are investigated. Considering the local climate characteristics, the properties of heating, cooling, lighting, ventilation, renevable energy and control systems are listed for the examined atriums of buildings if they are accessible. In addition to atriums of building, the properties of green, sustainable and smart building are also analyzed.

Buildings and their locations are evaluated on climate, general properties of the building, energy-efficient features, heating, cooling, ventilation, lighting, the renevable energy role of the atrium, and operational strategies through the template chart from Figure 16. The north direction is taken at the top of the page.

*Structure, Location				temperature	humidity			aim	atrium type
climate zone * ASHR	AE and	Köppen Griger clima	te class	*avarage	* avg.	wind direction	* avg.		
	* im	age		* plan * general pro	operties			* energ properti sustainat	gy efficient es, rewards, ole properties
HEATING		* strategies impleme	ented in	the structure	2				
COOLING		* strategies impleme	ented in	the structure	2				
VENTILATION		* strategies impleme	ented in	the structure	2				
LIGHTING ENERGY GAIN		* strategies impleme * strategies impleme	ented in	the structure	2				
OPERATION		* strategies impleme	ented in	the structure	2				

Figure 1. Building and Atrium evaluation template chart.

Chart 2.	Genzyme Center	(Genzyme Center,	, 2004;	Genzyme	Center G	Gets Na	itural Ai	r Flow,	2010;	Genzyme
			Secti	on, 2010).						

Genzyme Center, N	lassachusetts, USA	temperature	humidity	pu	1	aim	type
climate zone 5B dry, warm	continental climate	10,5	67%	wi	/	lighting	centered
double prismat facade atrium garden	ic skylight operable windows	Construction Building are Number of S Office buildi 42% less en- water compa buildings	n date: 200 a: 31.958 r Storey: 12 ing ergy, %34 aring to tra	03 n2 less adition	al	LEED platin U shaped roller bli surfaces, Heliosta Pv, Rain wate Low voltage Operable w Low solvent con (interior air Thermostat at	um rating nds, Reflacting at, Green Roof, r recycling, armature, rindows, ttent materials quality), the offices.
HEATING	Double facade space creat	tes a buffer zone	e around t	he bui	ldin	g	
COOLING							
VENTILATION	air stratification is prevent both fresh air inlet and exh	ted by air releaso naust air outlet.	e via atriu	mroof	At	rium provides adjac	ent places with
	Heliostats used at the root	f for increase th	e lighting	level i	nsid	e. Artifical lighting	load is reduced
LIGHTING	by using reflactor at interio	or atrium and su	rfaces.				
RENEVABLE ENERGY	It have PV utilisation at th	e roof					
OPERATION	Sensors at the windows di	iminish heat los	s.				

Chart 3. One Angel Square (Most 'Outstanding' BREEAM One Angel Square Officially Opens in Manchester, 2013; The Co-operative Group's new HQ will produce 80 percent less carbon and halve its energy use, 2021).

One Angel S	quare, London	temperature	humidity	pu 1		aim	type
climate zone 5B dry, warm	continental climate	10,1	73%	wi /	lightir	ng, ventilation	arcade
double passive skin facade via atri precondition air	warm air thermal mass cool air rainwater	Construction Building area Office struct 962 m2 atriu 14-storey	n date:201 a: 30430 m re m	2	High Outstan Orienta No fac direc schem	nest scoring BRE ding (in United K tion atrium roof t ade to only facin tion by triangula a provides benef daylight further.	EAM (nigdom) o south. g north r plan ĩt from
HEATING	Heat is stored by termal mas jeothermal energy. Adjacent middle and bottom stairs.	s at the mid-st places are no	tairs. Pass t seperate	sive heat ed by gla	ing and coo ss to maxin	oling is provided nize solar heating	by at the
COOLING	In the atrium, supporting to adjacent place in south direct	cooling is witl ction exposed	n natural v to much c	ventilatio laylight	n. Over-he s prevente	ating at the wall of d by covering wit	of th glass .
It is ventilated with natural air inlet to both spaces adjacent to the atrium and atrium. Outlet is roof level for exhausting that raised air by buoyancy forces. With the reflectivity of interior atrium surface and the south terraced atrium roof, provides moutility lighing with daylight.							tlet is at es more
RENEVABLE ENERGY							
OPERATION	The heating systems is supp	ported with do	uble skin	facade a	nd precond	dition system.	

Chart 4. Kelley Engineering Center (Oregon State University, School of Electrical Engineering and Computer Science (<u>From "The Ecological Engineer: Glumac" Kelley Engineering Center, 2011</u>; Oregon State University,

Kalla	Engineering	Contor Oregon USA	temperature	humidit	-		aim	type
Kelle	ey Engineering	Center, Oregon, USA	temperature		- -		diiii	opposit
climate zone	4A cold conti	nental climate	12,0	73%	wing	V	ventilation	e sided
south skylight atrium rainwater reclamation			t Continental Year of com 153,000 sf	climate missioni	ng: 2	2005	LEED Gold certificate. 3 energy than referenc certificate is consumed. roof, partial glazing is sloping part. These winc be closed by movable e The priority is given to ventilation.	5% less ed in At atrium used at dows can lements natural
HEA	TING	Atrium balances the ove face the north direction, automation system.	rall temperature internal shading	in warm g system	n wea com	thers. bined	Even if the windows at th with it is controlled with	e roof
COC	LING	The night cooling with th	nermal mass is u	sed.				
VENTI	LATION	atrium serves as a volur system opens the air out atrium roof. Carbon mor	ne that exhaust a tlet and provides noxide monitorir	air is gat fresh ai ng system	here rwit nisu	d and (h dire) Ised.	evacuated. The night cool ction from neighboring pl	ing aces to
LIGH	ITING	By making use of the day restricted lighting is cre	light passed fro eated with semi-	m vertica opaque a	al an triur	d slop n roof	ing south windows. Indire material.	ect and
RENEVAB	LE ENERGY							
Active energy usage only is needed with lig are capable of manage heating and cooling on energy gaining maximization by regulat detecting the openness of each windows. Th condition of bad weathers and opens all of						t sens erately eratior closes	ors only. Operable windo v at every single space. It i n of the HVAC system acco the every windows under night expansions (night fu	ws that s based ording to the usbing)

2021).

Chart 5. Ravensbourne College (Ravensbourne College by Foreign Office Architects, 2010; Foa, 2011).

Ravensbo	ourne College,	Peninsula in London, UK	temperature	humidit	pr	7	aim	type
climate zone	5B dry, warm	continental climate	10,1	73%	wir		thermal comfort	centered
			Constructio 5-storey Atrium prov physical con sections.	n date:20 ides visu	010 ual a betw	and	It has BREEAM certif atrium involving the en located on the middle of scheme oriented on the r southeast directio The building won a B Construction Industry A 2011.	icate. trence is f the plan horthwest- on. British Award in
HEA	TING							
соо	LING	atrium volume determines p north and south facades' ad	performance Ivantages are	of all strue benefite	uctu ed be	re. Dur ecause	ing warm and cold seaso of atrium facing north ar	ons, both nd south
VENTIL	ATION	Atrium located on the two c cross ventilation	lifferent faca	de an int	erco	nnecte	ed provides natural ventil	ation via
LIGH	TING	The entrance at the northwe reduced glazing are designe	est receives d ed to prevent	irect day glitter on	light the	t from : directi	southeast atrium. All faca on of east and west.	ades

Chart 6. Phoenix Central Library (Inside Phoenix' Burton Barr Central Public Library, 2008; <u>Precedent</u> <u>Reearch, 2010</u>; Phoenix Central Library, 2004).

Ph	oenix Central L	ibrary, Arizona,US		temperature	humidit	σ	/	aim	type
climate zone	2B hot-dry cli	mate region		19,5	38%	win	<	ventilation	centered
reast hore shares	hot or exh cost or die not spring	usted	wood -	library build Year of comr 6-storey.	ling. missioni	INC. 1	1995	The structre located on t south direction has opa and west facade	he north- que east s.
HEA	TING							<u>8</u>	
сос	DLING	To provide cooling a prevent solar heat g and warm air on the south facade.	it night, ain. Hig top sto	louvres are u h-ceiled is im rey. Horizonta	ised at th plement al movin	he no ted to ng sh	orth fa o ensu adings	cade consisting of glass s re user not to be affected s prevent over heat gainig	by dirty at the
VENTI	LATION	High capacity chimn	ney struc	cture is used	for warn	nano	d dirty	air outlet at atrium roof.	
LIGF	ITING	Natural lighting is p east and west glarin indirect lighting by r in the shape of sailc for reading rooms. C accordance with the	rovided g, the ir reflectin loth are On the so	through the r iterior side of g the light rea e designed to buth facade, t of the sunbear	minimize f opaque ceived fr avoid di the solut ms is des	ed wi e eas rom t rect tion o signe	indows t and v he ceil sunlig of hori ed.	s at the roof. In order to p west facade is detailed to ling. On the north facade ht and maximize natural zontal moving shadings i	revent provide , louvres lighting n
RENEVAB	LE ENERGY								
OPER	ATION	The sunblinds on the	e south	facade are ac	ljusted a	iccoi	ding t	o the angle of the sunbear	ms.

Debis Tower	, Berlin, Germany	temperature	humidit	p		aim	type
climate zone 5, warm co	ontinental climate	8,5	69%	wir		lighting	centered
	Construction Building are 7 storey atri tower Office struct	n date: 19 ea: 44779 um and 2 tre	998 9 m2 21 st	orey	The roof of the atrium I the middle of the con covered by moving fros louvre so the sunlight provided. Movable glass panels double facade	ocated on nplex is ted glass control is is used in	
HEATING	Outdoor layer of doubl	e-facade movable	e provide	es he	atgaiı	n and reduces heat loss	in cold
COOLING							
VENTILATION	Ventilation is performe outer glass panels pivo	d by natural air t t open up to 70 de	aken from egrees for	m ou r wa	tdoor rm-we	to between double facac ather ventilation	le. The
	At the roof of the atrium	n, inner frosted gl	ass louv	re sy	/stem	moving according to the	location
LIGHTING	of the sun ensures bette	r spreading of da	ylight.				
RENEVABLE ENERGY							
OPERATION	controlled by us utomatically con	ers depe trollable	ndin glas	g on tl s louv	ne winter and summer co vre system at the roof of a	onditions atrium.	

	Vasconcelos Library, Mexico			temperature	humidit		\mathbf{X}	aim	type
						ind	7		horizontol
climate zone	1, semitropica	al high altitude	climate	18,0	80%	≥		lighting	multiple
			atrium atrium atrium	Construction Area: 38091 horizontal n atrium throu rectangular Plan located of north-sou	n date:20 m2 nultiple o ughout th plan sch d on the o th	007 cente ne lo neme direc	erred ng tion	Natural light require buildig is provided lighting from th In the spaces wh bookshelves are, t transpared floor is allowing daylight to lower storie	d for library by indirect e roof. ere the he semi- made, for o reach the es.
HEAT	FING								
C00	LING								
VENTIL	ATION								
	Natural lighting is provided by increasing the level of lighting with vertical windows on the ceiling of the entire building. The level of lighting can be reached to the lower stories by choosing semi-opaque floor materials. The long east and west facades of the building are								ws on the es by Iding are
LIGH	UNU	grass and unet	. sumgnus	prevented by	snaung	з.			

Chart 8. Vasconcelos Library (Vasconcelos Library / Alberto Kalach, 2010).

Festo Te	chnology Cente	er, Stuttgart, German	iy.	temperature	humidit		N	aim	type
						g	~ '		three
climate zone	5, warm and r	mild climate, Cfb		10,5	77%	wi		thermal comfort	sided
				Construction Office buildi Atrium area: 4-storey.	n date: 2 ing. : 1028 m	0001		Utilisation of pneumati atrium roof . Vertical side window U: 1.4 W/m2K characte By shading and therma cooling at night, reach temperature that 25 deg the 4th storey during the season. The highest temperat recorded as 20 degrees i on the 1st storey with s thermal mass, low-e gl. heat recovery syste	c ETFE in s with eristic. Il mass bed the grees on summer uure is n winter hading, ass and em.
HEA	TING	With the use of ETFE	in the a	itrium ceiling	, heat lo	ss is	reduc	ed.	
		Night cooling is pro	vided by	the thermal	mass. ET	ГFE р	rovide	s shading to prevent exce	ssive
CO0	LING	solar heating.							
VENTIL	ATION								
LIGH	TING	ETFE also ensures th	nat the d	aylight is sha	aded by 5	50%.			
RENEVABI	LE ENERGY								
OPER	ATION	ETFE material espec material.	ially wh	en an air-infl	ation sy	stem	nis alr	eady a intirinsic automat	ed

Chart 9. Festo Tecnology Center (Gemi, 2006).

1	he EDGE, Ams	sterdam, Holanda		temperature	MOIUST	[7	aim	type
						g			three
climate zone	5, Warman	d mild climate, Cwb		8,5	84%	wir		lighting, ventilation	sided
S Qe Q	nlight	daylight atrium	N reuse	Construction 15-storey of Total Usable 39,910 m2	n date :2 fice buil e Floor A	014 ding rea:		Atrium can be used as a area. Intense daylig obtained with the large volume. The atrium fac north direction. PV pa utilized on the south fa produces up to 102% ene use. Aquifer thermal e storage generates ene heating and cooling. Th rainwater collection sys ecological corridor was o between the building a motorway in site. It won Outstanding %98,4 Highe	working ht is e atrium ces the nel is icade. It ergy of its energy ergy for ere is a item. An designed and the BREEAM est Score.
HEA	TING	In the atrium, energy	efficie	nt heating is _l	orovided	l by r	aydar	t heating as locally.	
COC	ling								
VENTI	LATION	Atrium serves as a bu	uffer zo	ne between ir	ndoor an	nd ou	itdoor	weather conditions.	
LIGH	ITING	There is no glare prol volume also positive	blem er ly affeo	merging from cted the lighti	the atriung.	um fa	aces th	e north. The size of the at	rium
RENEVAB	LE ENERGY	There is a PV 720 m2	on the	south facade	e of the b	uild	ing, wł	nich is not an atrium.	
OPER	ATION	There are 30000 sens	sors in 2.	the building o	detecting	g day	light,	occupancy, motion, humi	dity,

Chart 10. The EDGE, Amsterdam (The Edge: Amsterdam office building with highest BREEAM score to date, 2017).

Low Energy Offise,	temperature humidit				aim	type			
climate zone 1, tropical cli	mate	27,0	80%	wir		lighting, ventilation	centered		
entrance	Climate: Tro Construction	pic n Date: 20	004		The glazing of atrium is 1cm single glass and steel frame. Glass heat and light transmittance provides 51% sola radiating and 65% daylight.				
HEATING									
COOLING	In atrium temperature are p and adjacent spaces are div local cooling can work mor	vrevented sud vided by glazi e effectively.	denly to ng for ai	peak b r-cond	y the itior	e water wall system. The a ning seperately. In this wa	atrium ay, office		
	The rising air by buoyancy e	effect is throw	vn out wi	th the	roof	chimney system. Cross			
VENTILATION	ventilation is provided by the lobby entrance.								
LIGHTING	Lighting is restricted by minimizing atrium glazing.								
RENEVABLE ENERGY									
OPERATION	the temperature of roof chir	nney outlet is	used for	r contr	ollin	g air-condition system.			

Chat 11. LEO Office, Malezya (Moosavi et al. 2015; Low Energy Office, 2010; Purtajaya Perdana Berhad, 2020).

Chart 12. The Bow Tower (Griffiths, 2013; The Bow Also Rises, 2013).

Th	temperature humidit			$\overline{}$	aim	type				
					р	7	lighting, thermal	vertical		
climate zone	7, cold climat	e	13,0	50%	wiı		comfort	multiple		
			construction 6-storey atri repeating bu 58-storey to 199.781 m2	n date :20 ums in a uilding w wer. building	013 a ver gare	tical in the ma.	The concave facade pro gain in the south, the facade disables the eff wind in the north. The ground feeling is giver plants used on the st atriums connected with It is also protected from winter conditions due to rise building around the	vides heat e convex fect of the e natural n with the cories of a stairway. m extreme o the high- e building.		
HEAT	ING	Atriums located on the conc	cave south fac	cade of t	he to	ower pr	rovide passive heat gain	by solar ra		
C00	ling									
		it is provided that ites i air to the upstones of the tower building, free from the effect of wind								
		as recirculation volume at that level. Hence, it serves as a buffer zone between the storey								
VENTIL	ATION	where it is located and extre	eme outdoor v	weather	cond	ditions				
LIGH	TING	The wide glazing facade red	uces the artif	icial ligł	nting	g need o	of the building.			

Chart 13. Harbin Tower (Harbin Twin Towers Proposal / spatial practice, 2013; Harbin Twin Towers in Harbin, China by spatial practice, 2013)

Н	temperature	humidit	pc	X	aim	type				
climate zone	3, cold climat	ie,	3,5 63% 5		lighting	two sided				
			Date: under Atrium creat one corner co schema. Building are	constructed by en of the squ	triu ction nptyi uare 0 m2	ng plan	The atrium is designed as a volume between double facade layers. It is an opposite sided atrium located on the southeast and north west facades in different stories. The atrium creates microclimate effect in high storey.			
HEA	TING	Atriums in the south direction	on provide pa	assive he	eat ga	ain du	ring the cold season			
	The atrium in the upper half	If of the tower in the northwest direction provides passive cooling								
COO										
	etween the storey where it is located and extreme outdoor weather									
VENTI	LATION	conditions.								
	THE	Natural lighting is provided	a throughout the building with atriums on opposite sides of the							
LIGH	HING	ories.								

Keelung terminal, Taiwan			temperature humidit			1/	aim	type		
						Ι	Z		centered	
						pu			greenho	
climate zone	2, semitropica	al climate		23,0	76%	٧i		lighting, ventilation	use	
buffer zone cross ventilation centered and greenhouse atrium deep atrium and natural lightino			Date: under The building aerodynami considering winds. The t a 4-storey w stories.	construct shas an c model the nort ower, whe	hern hich he, has	1. 1 is on s 14	The greenhouse type atrium is in the northeast and southweast, the centered atrium is in the southwest direction. Centered atrium figured on section diagonally has a positive effect on exhauisting of polluted air and its drive up from lower stories.			
HEA	TING									
соо	LING	The cool air in the lower stories of the centered atriums intersects a greenhouse type atrium at the upper level and provides cooling with natural air flow. Horizontal structural elements work as a sunshade.								
VENTIL	ATION	Two different types of atirum offer cross ventilation. Centered atrium figured on section diagonally that provide ventilation to the wide ground storey also reduces cooling loads by providing natural air flow.								
LIGH	TING	The light taken from the facade provides direct lighting to the centered atriums. Due to the plan scheme geting narrower as it rises, natural light is penetrated to the wide ground stories through the center atriums.								
RENEVABI	E ENERGY									
OPER	ATION	CO2 sensors control in storey parapets. Office temperature is 24 degree, greenhouse type peripheral atrium temperature is 26 degree. Radiant effective floor cooling is planned with dry air. Windows is operable.								

Chart 14. Keelung Terminal (Keelung Terminal, Taiwan : New Building Complex, 2012).

Secul Light DA	temperature	humidity	/	<u> </u>	aim	type				
Seour Light Di	IC Tower, Seo	JI, KUlea		numurty	+	\swarrow	ann			
			/	1				centered		
				1	pu			green		
climate zone	4, humid con	tinental climate	10,5	68%	٨i		lighting, ventilating	house		
atrium		Date: under The 133-stor atriums that greenhouse. atrium is the circulation	construct rey tower t centered The cente e vertical area.	tion has Janc ered	two	The central atrium spac air to be drawn into th tunnel passively on th The effect of air stratifi prevented by placin peripheral atrium in the greenhouse and vertical The centered atrium is the upper stories of tow greenhouse type atrium on throughout of to	e allows ne wind e tower. cation is g the form of a divided. used on ver and a n is used ower.			
HEA	TING	In the central atrium used o	on the upper s	tories, he	atis	gaine	d from the rising air.			
COO	LING	Air handling unit located or	n every 20 sto	ries are a	ilso	used fc	or cooling purposes.			
	Air handling unit are placed	d in vertical g	reenhous	e atr	'ium as	s a divide allowing the po	lluted			
VENTI	ATION	air to be drawn with its nat	ural flow.							
		Heliostats are considered on the roof to increase the lighting in the lower stories. The								
		dimensions of the central a	trium are des	igned in a	acco	rdance	e with the penetration of s	unlight		
LIGH	TING	to the entire building.								
RENEVAB	LE ENERGY	It is planned to obtain ener	gy from the w	ind turbir	ne or	n the ro	oof.			

Chart 15. Seoul Light DMC Tower (Digital Media City Landmark Tower in Seoul, 2009; Seoul Light DMC Tower, 2011).

Chart 16. The Korea Electric Power Corporation Headquarters (KEPCO Office Complex : H Associates, 202.	1;
Korea Electric Power Corporation Headquarters, 2010).	

The Korea Electric Power Corporation hq., Korea			temperature	temperature humidit 🕁			aim	type		
climate zone	4, humid sem	itropical climate	14,0	70%	win	Ŋ	ventilation	spiral		
solar panel air inlet heat pump			Date: under 120.000 m2	consturc	ttion rea.	NET	Thanks to the large area of the building, geothermal energy is used. Rainwater collection system and gray water treatment system are used. With the spiral form of the atrium, it starts with the south direction on the ground and settles on the west, north, east and again south facades, respectively. Green roof is used throuhout site.			
HEA	TING	Water of heating system is be utilized from the south	s preheated ur at ground leve	ndergrou I that wil	nd w I bee	ith geo en colo	othermal energy. The atriu 1.	m will		
сос	Geothermal heat will also be used in cooling. It is thought that the hot and humid air wil COOLING and be exhaust with its natural flow in the atrium.							will rise		
VENTI	LATION	The spiral atrium will prov with the entrance area at t	/ide natural ai he atrium grou	r flow. Ci und level	ross	ventil	ation will be provided by i	intaking		
LIGH		It is planned to obtain energy from the wind turbine and the collectors in the recreation area.								

The examined atriums focus on a specific energy-efficient system based on the its'climate zone conditions. As the lighting and heating strategies are developed mostly in cold climates, the cooling and ventilation intended strategies are developed especially in warm climates. In chart 17, annual average temperature, average humidity, and predominant wind direction of building location are demonstrated with aimed strategies in atriums.

The implementation of the lighting strategies, which are the starting point of the atrium, as an energy-efficient strategy, is seen in the buildings that were built in previous years. Owing to innovation in construction technology over time, energy efficiency from not only one system but also several systems is aimed at high-rise buildings that have not been constructed yet. Energy-efficient designs have been developed for more than one system in the One Angel Square, Seoul light DMC Tower and Keulung Terminal buildings of these buildings. Only One Angel Square has been constructed and it owns the highest certificate of Bream.

Chart 17. The prior aimed strategies of cases, with values annual average temperature, humidity and predominant wind direction of its region (<u>Weather Data, 2021;</u> Forecast Weather Data, 2021; Wind Roses, 2021).

	Climate									
	An	nual Aver	age	Aimed Strategies in Atriums			IAG			
	tomno	humiditu	wind	natural lighting	natural ventilation	termal comfort	FUNCTION	TYPE OF		
	tempe	numiaity		ing include	ventilation	connore	FUNCTION	ATRIUM	ION DATE	
Genzyme Center , Massachusetts, US	10,5	67%	4				office	centered	2003	
One Angel Square, London	10,1	73%	$\overline{\mathbf{v}}$				office	arcade	2012	
Kelley Engeneering Center, Oregon, USA	12	73%	≯				education	opposite sided	2005	
Ravensbourne Collage, Peninsula in London, UK	10,1	73%	$\overline{\mathbf{A}}$				education	centered	2010	
Phoenix Central Library, Arizona,USA	19,5	38%	¥				library	centered	1995	
Debis Tower, Berlin, Germany	8,5	69%	ſ				office	centered	1998	
Vasconcelos Library, Mexico	18	80%	\checkmark				library	multiple horizontal	2007	
FESTO Technology Center , Sttutgart Germany	10,5	77%	$\overline{\mathbf{A}}$				shopping	three sided	2001	
The EDGE , Amsterdam	8,5	84%	\mathbf{k}				shopping	three sided	2014	
LEO Office, Malaysia	27	80%					office	centered	2004	
The Bow, Calgary, CANADA	13	50%	$\mathbf{\lambda}$				office	multiple vertical	2013	
The Harbin Towers, Harbin, China	3,5	63%	A.				multifunctional	two sided	-	
Keelung terminal, Taiwan	23	76%	1				transportation	centered, greenhouse	-	
Seoul Light DMC Tower in Seoul, Korea	10,5	68%	$\overline{\lambda}$				hotel	centered, multiple vertical	_	
The Korea Electric Power Corporation hq.	14	70%					multifunctional	spiral	_	

7. CONCLUSION

In this study, energy-efficient construction strategies in atriums, could be advantageous at night and disadvantageous at days at the same time and warm-season these advantages could turn into a disadvantage when there is a need for heating. When existing buildings and designs are examined, centered atriums are widely used. In recent years, spiral, arcade, greenhouse type, and vertical multiple arrangement atriums are also confronted. The reason why centered atriums are prevalent demonstrates the intention to increase the natural lighting. Whereas, atriums are also energy-efficient strategies for heating, cooling, and ventilation.

In the next studies, the energy efficiency should be examined in atriums in which the above-ground level of the building consists of merely the atrium volume. Atrium is a space containing complicated heat transfer mechanisms caused by the movement the immense amount of air volume. This complexity is needed to be turned into a benefit on energy efficiency by simulations. These simulation tools must be capable to calculate the impact of heating, cooling, lighting, and ventilation loads on the annual energy consumption of the building and also to make a comparison between stated comfort conditions and for each trial of designs during the stage of design and taking decision.

While it is known that, there is a discrepancy between simulation results and the energy consumption realization of the building after built due to unpredictable behaviors of users, they should be utilized to attain energy efficiency as the fastest and least costly tool in the design stage. In terms of wholistic design, a simulation calculating the energy efficiency and safety in the event of fire simultaneously and adapting the contradictory solution of each of two disciplines according to each other should be configured.

Different energy efficiency systems should be designed by both optimizing the the gain among themselves and not contradicting with the other construction systems. Ensuring the entegrated design strategy as a result of

different coherent systems providing the user comfort creates the ideal building notion in terms of environmental building control. When this ideal's energy efficiency and energy-efficient system at building is designed by calculating advantageous and disadvantageous consumption in different climates, the total energy consumption will reduce and so the natural resources will conservated. Hence, the current living conditions will be sustained for the next generations and the building will attain this superior feature in line with this purpose.

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DATA MINING APPROACH FOR SOCIAL INTEGRATION ASSESSMENT: ANTALYA COASTLINE CASE

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ABSTRACT

Coast is not only the fringe between land and sea but also a dynamic contest area based on ecological, social, and economic values. In a way, coasts and cities have some similarities regarding countless variables that affect form and processes. However, considering the coastal cities, littoral effects are the most important agents that shape the city, starting from urban development to social structure. On many levels, vibrant interface offered by the edge actually creates the city's identity through the collective memory of dwellers. In that sense, the combination of urban and coastal concepts originate even more complex variables such as publicness of land, usage types, or preferences. From this point of view, this research is structured to reveal the relations between social integration and characteristics of coastal edges. Therefore, this paper presents a decoding approach of dynamic interactions between spatial features and relative user preferences on the Antalya coastline via data mining methodology. For this matter, the coastal edge around the city center was evaluated by spatial, social, and vicinity variables regarding urban context. Basically, it developed on three phases which are data gathering, mining and exploration of outcomes, finally evaluation and spatial strategies. While GIS-based analyses and online user questionnaires generate data-gathering phase, and where the answers were analyzed with naïve Bayes theorem for exploring the probabilistic relations, creates second phase. At the end, all spatial, social, and vicinity variables were utilized together as future design strategies. Results showed the strengths, weaknesses, and correlations along the coastline regarding land-use, publicness, naturality, accessibility, and nearby amenities on preferences. With this approach, the research gains importance for addressing the socio-spatial dynamics that focused on city-coast intersection by means of both with spatial analysis and social behavior patterns obtained from surveys. In particular, user experiences and preferences on coastal that evaluated within the data mining method, differs in terms of analyzing user perception and repetitive behaviors unlike geotagged point cloud data form social media. As a consequence, results and insights showed the extracted information has potentials as guidance in the planning and design processes for evaluating the city and coastal relations in a more integrated way.

KEYWORDS: Data mining, Naïve Bayes, Public Survey, Social Integration, Antalya Coastal usage.

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1. INTRODUCTION

Data mining in urban researches is very noteworthy for obtaining complex dynamics of urban texture and revealing the obscure agents. These methods, which serve as decision support systems especially in planning and design processes, mostly use spatial big data such as social media (Ferrari, et al., 2011; Jiang, et al., 2012) or mobility (Ma, et al., 2013; Yuan, et al., 2012) as a source. However, when they are anonymous geotagged data clouds, they mostly beneficial to clarify the spatial relations rather than individual user preferences and perception of space. These type of spatial data sources reflect more general and inferential effect, unlike the participatory social analysis methods such as interviews and surveys, which require much more time (Lee, et al., 2013). When specific issues such as coastal cities are considered, social integration within the coastal and urban context gains importance as well as physical, ecological or economic factors. Especially, visual or activity-based experiences of dwellers within coastal edges have a great impact on city identity. At this point, Antalya is one of the Mediterranean cities where the social interaction is the intense. From its historical processes to economic activities and urban culture, it stands out as a powerful maritime city that located on the south shore of Turkey, pertinent to the tourism potentials (Akış, 2007).

Major elements that shape cities are mostly land-use types, physical layout patterns and structures, as parts of the urban form (Dempsey, et al., 2010). Elements can be measured by density, land use matrix, accessibility, open space and green space values regarding indexes as geometric calculations of landform and configurations (Song & Knaap, 2004; Zhao, et al., 2011). Besides, urban and coastal relations can take a significant role in form and usage types. Especially coastal cities indicate a dependent growth tendency due to the limits and opportunities. Harbors and ports that coastal cities have, depend on the international and transboundary relations and legislations. Therefore, economic impacts on coastal lands are subject to the pressure of the competitive sectors such as production, agriculture, and infrastructure. This makes major alterations on spatial usage and social structure either (Tibbetts, 2002). From this point of view, it should be embracing that coasts are not only the boundaries between land and sea, but also a dynamic interface zone, covering partially sea and backshore area which includes economic and social activities with their physical projections on land (Avci, 2017). Edge interfaces generated from coastal effects also have quantifiable values besides obscure worth indicating the urban life and social structure. Urban vitality and open space usage preferences can be the examples, for that matter.

Jacobs defines urban vitality as a measure regarding citizens' positive impulses getting from activities or energy allied with living area vicinity. As a strong connection with diversity, urban vitality has various core enriching dynamics like curing the gray areas, varying the amenities, buildings, and urban structure (Jacobs, 2016). Furthermore, measures like accessibility, points of interests, and perceptual evaluation of open spaces can be consider as other essential measures (Ardıç, et al., 2020). However, today's modern cities face degradation due to open space interactions and social integration deficiencies. It can be said that open space usage preferences and relative vitality issues cannot be comprehended as one way of perspective like physical or social manner only. This complex, multilayered and abstract issue has a vital role in the decision process of design. For this matter, pivot point was adjusted to the decoding urban system through coastal lenses.

Cities are living systems that collect more and diverse data every day. Main concern here is that the more system gets complex, the more data get complicated and incomprehensible. Especially multivarious data entities in urban studies lay emphasis on knowledge discovery methods (Batty, 2013; Gil, et al., 2012). According to Fayyad et al. (1996, p.39) knowledge discovery covers the whole process of exploration steps to get favorable data and meaningful patterns. The mining incorporates the essential element to extract and rectify obtained information via certain algorithms (Fayyad, et al., 1996). This process especially originates from subtracting the solutions similar to cluttering urban system issues where large numbers of spatial data accumulate. As such, it seems to be a rewarding methodology to explore the information hidden in urbanized structures, both physical and social. Physical studies that monitored via spatial analyses of urban fabric focus on land use patterns and relations mostly (Sokmenoglu, et al., 2010). Besides, social structures are examined to analyze dynamic system such as urban mobility and relative spatial dispersion. In general, the data considered within the scope of these studies

are generally from geotagged point clouds of individual discourse and images taken on social media (Gao, et al., 2017; Zhou & Zhang, 2016) or similarly, the place and time of use of smart cards used for urban access (Zhong, et al., 2014). It can be said that these investigations predominantly yield temporal point density maps that provide anonymous or limited demographic characteristics. At this point, the general approach of urban activity analysis and spatial functions(Niu & Silva, 2020). Therefore, collecting data through purpose-specific questionnaires on the analysis of cause-effect relationships and spatial perception of social behaviors enables the analysis of repetitive social behaviors depending on time and place (Jiang, et al., 2012). On the other hand, although there are various studies on the study of urban space, the researches on the analysis of the relations between the user and the space, and coastal morphology and usage relations, are still quite inadequate. Such that, considering the knowledge discovery context, mostly coastal morphologies were focused as spatial characteristics in a limited number of studies(Bulteau, et al., 2015).

Thus, main purpose of this research is to investigate the social integration value of coastal features via data mining methodology. Unlike the examples of method mentioned above, the spatial inferences about the city-coastal intersection were obtained from the user experience survey with the naive Bayes theorem. In contrast to the frequently used social media data, study area were considered with a specific usage preferences data set such including place of residence, motivation, or access styles etc.

2. STUDY AREA

Antalya is a coastal city which is located on the southern borders of Turkey in the Mediterranean Sea (Fig. 1). Throughout history, the city has been witnessed various marine civilizations from the Bergama Kingdom to the Rome Empire. As a coastal city, sea and land interface has always been the most influential impact that shapes the city form. As a landmark, these historical marks can be traced back to the Kaleiçi Old Town (Antalya Büyükşehir Belediyesi, n.d). Even today, the coastline is holding power over the city, which is the largest one on the Mediterranean Sea, to rule economic, ecologic, and social values. A strong link between land and sea engendered the city identity, and this was pursued by tourism attraction especially with the period of 1980, the neoliberal transformation (Esengil & Kahvecioğlu, 2016). Thereby, Antalya is the most well-known tourist attraction center of the Mediterranean coastline known as the Turkish Riviera. Starting from 80's, the city has been growing with a robust tourism influence. This effect can be seen in both population increase and coastal alterations as in five-star hotels, harbors, etc. All of the natural and cultural values stem from this dynamic edge relation, such as long beaches, historical settlements that reveal the diverse touristic types such as summer, cave. Besides natural values, artificially structured values stand out as such; all-in-one tourisms and some specialized golf tourism premises that build on marshlands nearby the sea. Especially on the east side, the Lara Beach has been congested with large premises of resorts. Each of them blocked the public usage and ecological continuity, as linear stripes from sea to hinterlands along the beach, which is a very high-worthy natural feature of the city, known as the golden sand. On the other hand, various public beaches are available inside the urban context. In the west side, 10km long Konyaaltı beach, which differs from Lara regarding pebble material and social integration, is very popular too (Çiner, 2019; Işık & Zoğal, 2017).



Figure 1. Location of Antalya city and study area.

Clearly, it can be seen; whole shoreline profiles are formed by accumulating ecological, geological, and social drivers either (Fig. 2). Therefore, due to the diversified coastal formations, land use types and social integration effects in a state of flux along shore of Antalya which is approximately 640km long (The Ministry of Culture and Tourism, n.d). Regarding such a diversity, this paper aims to reveal the interplays between various characteristics that play roles on spatial, vicinity, and social perspectives. Within this research, the study area was limited as center core of the city to get the maximized social integration dynamics. Therefore, an approximately 40km long coastal stripe was investigated starting from Konyaalti to Muratpaşa and Aksu districts.



Figure 2. Coastline formations alongshore. From left to right a. fjords (Url2), b. Düden Waterfall (Url3), c. Beachpark (Url4)

3. MATERIALS AND METHODOLOGY

Aim of this research is built upon the knowledge discovery process that contains physical and social variables gathered from both analyses and public questionnaires. Through these explorations, there are two essential questions about urban vitality, usage preferences and coastal features from geological formations to physical amenities. Questions are; what are the effects of coastal spatial and vicinity features regarding inhabitants' usage routines and tendencies? And, what are the types of coastal edge interactions that serve as agents to vitality?

From this point of view, paper attempts to propound the relational factors of Antalya coastline's usage preferences by using socio-physical data evaluations of coastal characteristics and their relations with the urban context. For this reason, the coastline is examined into three main variables: social, spatial, and vicinity relations by decoding the dependencies using a data mining approach via naïve Bayes theorem. Regarding this, site-specific insights can be attained to extract the hidden information about residents and the city, analyze the strengths and weaknesses, and make some deductions on future predictions on positive and negative effects.

Thus, main steps for social integration assessment was structured on three main pillars: Firstly, data gatheringpreparations second, data mining and exploration of outputs via obtained and optimized solutions finally, evaluation of selected districts for design strategies (Fig. 3). Data gathering and preparation step comprise of analyses were conducted in Arc GIS (10.3.1) by using WGS 1984 projection to get the spatial knowledge as maps and attribute tables, also questionnaires to get the social tendencies, perspectives, and habits regarding the study area. The data mining step is about decoding the usage preferences allied with activity types, frequencies, motivations, accessibility opportunities based on proximity, and means of transporting along the coastline. Through this process, as an executive algorithm, naïve Bayes theorem was used for extracting meaningful knowledge and iterative patterns from public perspectives. Finally, evaluation of subtracted information and maps contextualized to get existence situations and future predictions along the coastline.



Figure 3. Research methodology flow (1. step is data gathering and preparation, 2. step is exploration with naïve Bayes theorem in data mining methodology and exploration of outputs via obtained, 3. step is evaluation of selected districts for design strategies via combined data from spatial, vicinity and social variables.

3.1. Variables

3.1.1. Spatial variables

To understand fragile and complex coastal cities and their reflections on land, diverse analyses should be done. The main idea here is to reveal the links and associative public reflexes on the edges. Therefore, the study area was examined as a 500-meter stripe along the central coastline (approximately 80km long) of Antalya city which is the largest city of Mediterranean sea. Majority of this stripe was consisted of hinterland where the spatial relations within settlement and coastal edge. Besides, 100m stripe was composed of coastal elements that shaped by relations between geomorphological substitutes and dynamic effects of littoral alterations.

The coasts are differentiating each other by means of with and geomorphologies; however, in coastal terminology there are specified regions where littoral characters and correspondingly usage typologies altered. Starting from above sea level, junction edge with land which vary by region and, plain space through settlement,

consisted of nearshore, foreshore - backshore and, hinterland zones. The nearshore zone, where effected by dynamic tidal alterations, cover the region for sea activities like cruising. Foreshore zone is under effect by dynamic tidal alterations, constitutes the intertidal zone of beach. The rest of the beach is named as backshore until a cliff, vegetation or urban texture starts as hinterland. These foreshore and backshore zones constitute the most vivid usage activities (Bird, 2011).

Thus, the methodological approach of this research is to make a detailed investigation on forms, functions and usage interplays. On the purpose of generating a powerful deduction from these, GIS-based analyses were conducted on a 1/2.500 scale, by using aerial base maps that powered by ArcGIS. Both coastal formations, which are basically sourced from geomorphological features that located in nearshore and foreshore area; and naturality and publicness variables, that are stem from land use typologies of hinterlands above sea level, were analyzed in this step.



Figure 4. Coastal formations based on geomorphological discrimination of Antalya Bay.

Essential effects that change the social dynamics on coastal edges are shaped by geomorphological typologies as in substance of coastal formations. For that matter, a substantial structure of Antalya Bay known as tufa geomorphology was examined. According to researches, tufas lay along the Mediterranean Sea in a specific geological typology which was shaped by three main rivers; Göksu, Düden, and Aksu in Antalya. Therefore, through the edge from the Belek region to Göksu river nappe formation and between Örnekköy region and Konyayaltı Beach, medium terrace of tufas are dominant (Çıner, et al., 2008; Glover & Robertson, 2003; Koşun, et al., 2019). While tufas serve as the parent material of the fjords of Antalya Bay, alluvial plains that lay down rest of the bay, is substance for various and well-known beaches. In addition, around Düden river, which has a superb influence on tufa regenerations, there are diverse waterfalls located where offer important vista points for urban vitality. In the light of these informations, the 500m study area is divided into 4 pieces to descend further relations between usage characteristics and formations (Fig. 4).



Figure 5. Naturality dispersion based on land use types and hard structure density.

As the second phase of the spatial analyses, investigating the land use typologies along the study area were conducted. Using the open street basemap in GIS, all open area typologies, public or private identities, and naturality value based on structural density were attained regarding defining attributes. In that sense, point, polyline, and polygon-based mapping was conducted. Naturality parameter was defined from natural area to industrial placement following 1-9 scaled range. In this segmentation, where natural areas get 9 or 8, semi-natural areas such as parks attain values between 7-5 depending on structural features. Also, settlement texture gains in a range between 4-1 regarding structural intensity. While drawing the land use attributes defined as texts in variety from the settlement, harbor to vacant lots and parks, all areas' publicness characteristics were identified as private, semi-private, and public entities, as well as naturality values. Then, both naturality values which were reclassified into 5 categories (Fig. 5), and publicness characterization (Fig. 6) were converted into raster maps to extract data from spatial dispersion along the study area.



Figure 6. Publicness characterization based on land use types along coastline.

3.1.2. Vicinity Variables

Urban open space usage and immediate environments within urban context have substantial interrelations. Especially, popularity degree of public usage in open spaces has been shown correlations with points of interests (POI's) and accessibility opportunities (Ardıç, et al., 2020). Points of interests can be indicated as places or attraction points where public usages concentrate around, such as restaurants, shops, tourist areas, or parks (Gao, et al., 2017). On the other hand, Gehl(2013) pointed out POIs as mutual reactions where they can actually be located around densely used areas or places that people likely get around (Gehl, 2013). In addition to this, accessibility is one of the essential criteria for urban vitality and livable cities. In assistance with transportation opportunities, physical and perceptual conditions, livable spaces can be created. Favorable accessibilities, particularly public transportation such as buses or trains and pedestrianized opportunities, make highly positive impacts on the neighborhood choice of inhabitants (Saghapour & Moridpour, 2019).



Figure 7. Relative density of amenities along study area.

From this point, points of interests and accessibility conditions along the coastline were analyzed via GIS-based mapping as spatial variables. Thus, both POIs and accessibility potentials were examined as density-based approaches due to the syndetic values. To bringing into the view of public attraction nodes as POIs, all potentials such as restaurants, cafes, and hotels, were drawn by using Open Street Map(OSM) data that featured in ArcGIS as base map. These point data were determined as peripheral amenities. In a similar manner, to get the accessibility assessment, main roads, boulevards, secondary, tertiary roads were drawn in ArcGIS over OSM data, including detailed footpaths in parks and bike and train roads either. After the drawing phase, both amenities and accessibility were analyzed and mapped via Kernel density tool. Basically, Kernel density's working principle stems from the estimation of point data concentrations under favour of smoothed and sustained study area surface, which reflects the denseness (Borruso, 2008). By means of these tools, not only point data (amenities), but also line data (accessibility opportunities) were mapped. Figure 7 represents the amenities along the study area, and figure 8 represents the accessibility of coastline in a 200m stripe accessible area boundaries. It can be seen that, point of interest and accessibility have been widely used as metrics in urban studies to obtain the land use types and behavioral tendencies in the public realm. However, this research takes this investigation one step further via gathering personal behavior and preferences about specific open space activities on a specific area and access type, etc. From this aspect, social variables were developed to bridge the obscure gap between spatial characteristics, vicinity entities, and public behavior.



Figure 8. Relative accessibility opportunities along coastline.

3.1.3. Social Variables

Urban studies and survey methodologies has been always share strong relations. Especially on the interpretation of land use dynamics upon planning processes, diverse survey techniques were used such as primary, secondary, qualitative, quantitative, spatial, or non-spatial (Pissourios, 2019). In the scope of research, inhabitants' usage preferences were substantial to obtain the social integration outcome. Thus, a questionnaire was created, which was structured into three main sections. The first section consists of user credentials as inhabitancy, age, neighborhood, and region. The second section was constructed to get the general city perception over predefined keywords and their importance ranking on a 1 to 5 scale. Prominent keywords such as rain, sun, summer were chosen as climatic factors examples; sea, fjords, sand, or pebble beaches were chosen as physical and coastal factors examples; and keywords related to specific locations like Cumhuriyet square, Yivli minaret, or greenhouses were chosen for representing the city identity. Finally, the third section was structured to attain personal open space usage types (in assistance with predefined activities ex: walking, biking, trekking, etc.), frequency (in assistance with predefined activities ex: weekly, summertime, none, etc.), access types (in assistance with predefined activities ex: mass transportation, train, on foot, etc.), and motivations (in assistance with predefined activities ex: nature, accessibility, compatibility of activity, etc.), depending upon spatial information as coastal districts. Here, the study area was divided into 15 regions by using the outputs obtained from the spatial and vicinity analyses made in the previous steps (Fig. 9). The primary objective was to gather essential knowledge from dwellers about open space usage preferences and space perceptions for coast line.

The survey was created and published via an online platform. In this way, it has been opened to everyone who lives in Antalya currently or to whom had an idea and experience somehow. This diversification was worthy considering the touristic character in order to present substantial insights about social integration on many levels. Consequently, 164 participant's detailed answers were gathered in excel spreadsheets. Through the process, four of them were excluded to ease the data generalization due to the information deficiencies. Considering the population of the sample universe is about 2.5 million and the developed possibility estimation was on personal preferences is difficult, it can be argued that the obtained answers are sufficient for making inferences. Within the acceptable error level (max 10%), it can be seen that the subject of the survey and the answers are relevant in terms of content (Yazicioglu & Erdogan, 2004). Thus, participant evaluations obtained with this approach created a suitable data pool for the social evaluation stage of the research.



Figure 9. 15 districts of study area on public survey.

3.2. Data Mining

Data mining, generally associated with knowledge discovery from data (KDD), is the automated or appropriated patterns' extraction to represent the implicit knowledge in large databases (Han, et al., 2011). The primary objective is to provide substantial and evidence-based inferences through deeper exploration from data and to generate results pertinent to convenient policies or regulations on strategic levels (Sokmenoglu, et al., 2010). There are various methodologies to procure meaningful knowledge from a large volume of diverse data warehouses. Bayesian classification methods can be considered as an example, for that matter.

Bayes classifiers are statistical classifiers that can predict the probabilistic memberships among a particular class. In correspondence with this method, "Naïve Bayesian classifiers" displayed high accuracy and speed performance in decision trees and neural network classifiers. The simplified probabilistic approach of Naïve Bayesian theorem, which is based upon the assumption of all attributes' values are independent in a given class, is named as *class-conditional independence* (Han, et al., 2011). From the point that how estimation calculations could be made, Naïve Bayes classifier becomes prominent sourced from Bayesian theorem as in the equation below in equation 1 (Han, et al., 2011):

$$P(Ci|\mathbf{X}) = \frac{P(\mathbf{X}|Ci).P(Ci)}{P(\mathbf{X})}$$
(1)

Where X is an n-dimensional attribute in a training set of tuple, C is the given tuple that classifier will predict the highest posterior probability conditioned on X. Thus, to find out the maximum posterior hypothesis is represented as P(Ci|X). In that matter, as P(X) is constant for all classes, only P(X|Ci). P(Ci) needs to be maximized. The starting point of compelling computation issue, *class-conditional independence* is made. While all attributes have no dependent relationships between each other, all attribute estimations can be calculated as in the below definition in equation 2 (Han, et al., 2011):

$$P(\mathbf{X}|Ci) = \prod_{k=1}^{n} P(\mathbf{X}k|Ci)$$
$$= P(\mathbf{X}1|Ci) \times P(\mathbf{X}2|Ci) \times \dots \times P(\mathbf{X}n|Ci) \quad (2)$$

The structure of Bayesian networks, which includes all attributes' probabilistic dependency relations rather than determining one single output in regression or other statistical methods, provides considerable advantages, particularly in complex and uncertain systems like urban studies. (Çinicioğlu, et al., 2013). In the light of this information, relationships of all attributes of coastal usage preferences obtained from the public survey were classified in the Rapid Miner program (version 9.8) (Url-1) by Naïve Bayesian method. Before the mining process, all obtained data were transposed and restructured to clarify titles and relational subunits. During the process, preferences data imported and classified depending on each coastal district defined in the survey before. At this stage, the objective is to attain considerable preferability of all districts and their optimum preferability

opportunities. By using the auto-model extension of Rapid Miner, all districts were evaluated with the neighborhood, region, inhabitancy, activity types, accessibility types, frequency, and motivation constraints. Then, to find out the best preferred conditions of all districts, prescriptive analytics were run in model simulator within auto-model. During this step, all districts' attribute results were recorded both via participants' preferences and optimized parameters for most preferred conditions (Fig. 10 and 11).



Figure 10. Screen shot from Rapid Miner, probability results of district 1 regarding participants answers.



Figure 11. Screen shot from Rapid Miner, optimized results of district 1 regarding usage preferability.

4. RESULTS & DISCUSSIONS

In this part of the research, after mining process, results were examined via comparing preferability values of all districts and optimized values that reflect the potentials. By the instrumentality of naïve Bayes theorem, the social usage tendencies of all districts were extracted specifically via survey answers. As a result, the probability of using tendency (Yes/No as answers) and preferability values that illustrate the both spatial, such as neighborhood or accessibility, and social perception of areas such as motivation to choose etc. Presumably, each mining step had differentiated performance due to the disequilibrium on participant's experiences and perspectives regarding inhabitancy. Considering cumulative answers, total region count was 8 and respectively, total neighborhood count was 10; however, Muratpaşa and Arapsuyu where the most participants from. Thus, these region and neighborhood answers were dominated the preferability values, as shown in table 1. To avoid this misleading projection on districts and also get more comprehensive insights for the potentials along coastline, an optimization process were executed via same data extracting approach. In this way, the best probabilistic projection for all districts were obtained (Table 2).

Considering the table 1, it is seen that the districts with the highest preference were 3rd and 4th ones. Although model performance values such as standard deviation and accuracy of these values remain controversial, it is known that these areas where the highest Point of Interest (POI) are populated in Antalya coastline. In fact, "Beach Park" which is the most well-known and popular recreational open spaces alongshore, are located in these specific districts. When considered from this point of view, the performance of the mining model was
consistent. Although there were multiple samples with a standard deviation of more than 1 for other districts, the model accuracy values were above 80%.

The rest of the areas were predominantly parallel to the average values of about 0.10-0.15. However, the crucial point here were, the districts below average: Districts of 12th (0.02), 13th (0.03), 11th (0.03), 7th (0.05) and 14th (0.06), respectively. The obvious justification for low social integration value for 12th district was military side effect, and for 13th district was concentration of private properties which dominate the whole city-coastal interface from sea level to hinterland. Aside from this, It was necessary to deepen the cause-effect relations of 7th, 11th and 14th districts regarding spatial and vicinity variables.

	Preferability values									Performance			
District	Region	Neigh.	Activity	Access	Freq.	Inh.	Motivation	Probability Y/N	Answers Y/N	Model Standart deviation %	Accuracy %	Class recall Error%	Class precision Y/N %
1	Muratpaşa	Arapsuyu	Water sports	On foot	Summer	Yes	Nature	0.15	0.20	1	83.0	0.10	0.6
2	Muratpaşa	Arapsuyu	Air sports	On foot	Summer	Yes	Nature	0.14	0.27	1.5	80.2	0.08	1.0
3	Muratpaşa	Arapsuyu	Swimmimg	On foot	Summer	Yes	Nature	0.64	0.40	3.5	72.5	0.33	0.7
4	Muratpaşa	Arapsuyu	Walking	On foot	Summer	Yes	Nature	0.59	0.45	3.1	74.5	0.45	0.8
5	Muratpaşa	Arapsuyu	Air sports	On foot	Summer	Yes	Nature	0.16	0.21	0.6	83.7	0.12	0.8
6	Muratpaşa	Arapsuyu	Hiking	On foot	Summer	Yes	Nature	0.18	0.14	1.4	87.2	0.00	0.0
7	Muratpaşa	Arapsuyu	Swimmimg	On foot	Summer	Yes	Nature	0.05	0.16	2.9	86.1	0.00	0.0
8	Muratpaşa	Arapsuyu	Biking	On foot	Summer	Yes	Nature	0.15	0.14	1.1	87.2	0.08	0.5
9	Muratpaşa	Arapsuyu	Biking	On foot	Summer	Yes	Nature	0.15	0.12	2.5	89.1	0.00	0.0
10	Muratpaşa	Arapsuyu	Hiking	On foot	Summer	Yes	Nature	0.11	0.08	1.6	94.1	0.28	0.8
11	Muratpaşa	Arapsuyu	Water sports	On foot	Summer	Yes	Nature	0.03	0.07	1.7	93.8	0.00	0.0
12	Muratpaşa	Arapsuyu	Water sports	On foot	Summer	Yes	Nature	0.02	0.03	1	97.3	0.00	0.0
13	Muratpaşa	Arapsuyu	Sigtseeing	On foot	Summer	Yes	Nature	0.03	0.03	1.4	96.5	0.00	0.0
14	Muratpaşa	Arapsuyu	Recreation	On foot	Summer	Yes	Nature	0.06	0.05	1.4	94.8	0.00	0.0
15	Muratpaşa	Arapsuyu	Hiking	On foot	Summer	Yes	Nature	0.18	0.03	1.9	97.0	0.17	0.51

Table 1. Usage tendencies and preferability values of all districts with standart deviation, accuracy, class recall and precision values (Red ones are contradictive and bold ones are the supportive ones with yes answers).

Following the preferability values that reveal the existing status of the districts in line with the answers given, to get deeper understanding by comparisons, optimized preferability values were generated. Considering the table 2, it was seen that the probability of all districts' usage preferences, except the 12th area which is the military zone in general, has increased. It proves that the 3rd and 4th districts, which were highly preferred in the current situation, still maintain the same line and offer an important interface for the city-coast interaction. In addition to these, the 5th district with an average value (0.16) in the existing situation offers an important potential (2.57) as the extension of linear continuity with. In this way, strengthening social integration by considering spatial continuity can offer an important inference.

Among the other fields that remain at average in existing preference approaches; the most preferred circumstances of 1st, 10th, and 15th districts reached up to 3 that indicates an important social use potential. For this reason, it would be good to deepen the preference values of these districts by addressing the cause-effect relations spatially.

	Optimized preferability values									
District	Region	Neigh.	Activity	Access	Freq.	Inhab.	Motivation	Optimisation Standard deviation	Best probability Y/N	
1	Kemer	Beldibi	Hiking	Public transportation	Annual	Periodic	Natural beauties	1	3.17	
2	Konyaaltı	Ahatlı	Enjoy a scenery	Public transportation	Winter	Yes	Easy access	1	1.78	
3	Gazipaşa	Gökçam	Recreation	Public transportation	Monthly	Yes	Amenities	1	1.94	
4	Döşemealtı	Molla Yusuf	Swimmimg	On foot	Daily	Periodic	Amenities	1	2.45	
5	Döşemealtı	Ahatlı	Enjoy a scenery	Bike	Weekly	Periodic	Amenities	1	2.57	
6	Gazipaşa	Ahatlı	Enjoy a scenery	On foot	Winter	Periodic	Easy access	1	1.33	
7	Döşemealtı	Atatürk	Enjoy a scenery	On foot	Annual	Periodic	Amenities	1	1.44	
8	Döşemealtı	Cumhuriyet	Enjoy a scenery	On foot	Daily	Periodic	Easy access	1	1.50	
9	Kemer	Kızılarık	Enjoy a scenery	On foot	Winter	Periodic	Easy access	1	0.72	
10	Muratpaşa	Yeşilbahçe	Walking	On foot	Winter	Periodic	Easy access	1	3.00	
11	Muratpaşa	Yeşilbahçe	Enjoy a scenery	On foot	Winter	Periodic	Natural beauties	1	1.08	
12	Aksu	Uncalı	Hiking	Rail transport	Daily	Yes	Suitability	1	0.02	
13	Döşemealtı	Kızıltoprak	Biking	On foot	Annual	Periodic	Natural beauties	1	1.56	
14	Döşemealtı	Үаğса	Swimmimg	Public transportation	Annual	Periodic	Amenities	1	2.45	
15	Gazipaşa	Konuksever	Air sports	On foot	Weekly	Periodic	Natural beauties	1	3.00	

Table 2. Best preferability probabilities of all districts which are optimized with 1 standard deviation (Red ones are contradictive and bold ones are the supportive ones with yes answers).

Evaluations were made as yet, showed the preferability values of current coastal usage and their potentials by means of social integration. While some districts' preferability values can be preserved and supported in terms of potentials by rudimentary effort; on the other hand, different strategies should be developed for the realization of the potentials of some unpreferable districts in the existing situation. Therefore, unpreferable and low potential districts were stand out. With this approach the 7th, 10th and 14th districts were considered with the 3rd district which was taken as constant (Fig. 12).

	District 3	District 7	District 11	District 14
Accessibility			And the second	
Publicity	-Dane	and the second s		5 m 10
Naturality	alla realization	bratt.	Real Property in	the gamma
Geomorphology	Attorief plain, facult			Routed plans, basely
Amenities	Motion level available		mat least area as	Part Protes

Figure 12. Comparison via spatial and vicinity variables through 3rd, 7th, 10th and 14th districts from social integration.

General character of the 3rd district was the linear and uninterrupted spatial allocation which allows natural and public beaches located on alluvial plains. The high social integration value of this district sourced from both accessibility alongshore and strong spatial and visual connection between coast edge and urbanized pattern which stand as a background. The fact that balanced settlement typology varying from residential to commercial support both recreational amenities nearby and also, bring advantages to pedestrian accessibility which is by far the most preferred method for Antalya shoreline. As an advantage of the coastal form of beach as alluvial plains, generates direct interaction from the sea towards the hinterland apart form effect of linearity through coastline.

With this structure, one of the most important impact that increased the value of social integration was sea activities, which are the biggest economic income source of summer tourism.

Also, 14th district was located very similar coastal form except material of beach which is fine scaled. Considering form of the district, it can be seen that the area is divided into two separate regions which is only one can be publicly accessible. Although natural structure continues along both shoreline and hinterland, coastline accessibility was restricted by hotel compounds. This zone has dominantly natural substance that interrupted by large structural compounds which were located both west and east sides from 13th to end of the 15th districts, and altered horizontally and vertically. However, if certain environment and conditions are provided, it was predicted that social integration value of district will goes up by following these assumptions and strategies:

There are environmental possibilities on the west side where the coast and city interaction was established. Also, according to user preferences, accessibility type of this area was public transportation for the most preferred activity specified as swimming. In this case, in order to realize the potential of district, new possibilities can be introduced to diversify and support coastal utilization without blocking the both visual and spatial interaction between the coast and hinterland. Also, district may have some problem on accessibility due to the back of beyond location, it could be beneficial to increase the alongshore public transportation facilities periodically.

Conversely, 7th district which is located in center of public usage, showed unexpectedly low preference value (0.05). This tendency can be read from the optimized value and user behavior which are predominantly preferred as pedestrian accesses for scenery provided by fjords. However, it can be interpreted that the area is interrupted as in publicness and accessibility manner, and this situation is reflecting negatively on user preferences. Although, it represents similar preferability value with 11th district which exhibits a similar coastal formation character; there is a notable gap between optimized values. It can be argued that the reason behind is that continuous natural and public land use characteristics supported by relatively relentless access opportunities. The main similarity of these two districts was that the visual and spatial relationship with the coast was interrupted alongshore. As a matter of fact, in 7th district this relation was provided by a single narrow corridor that connect city through Karaalioğlu Park. Due to impoundment by residential settlement around the park, limits the potential of the district which is located in the historical center of the city. In this respect, considering the 11th region, the strongest relationship between the coast and the city is the eastern side, where is the most accessible part. This area operates as a green network system called Düdenpark, which surrounds the riverside and reaches the sea through cliffs. The biggest interaction point of the district, where waterfall creates a vista point. Although there are opportunities to support the open space in the immediate vicinity, private residential areas surrounding both sides of the park limit the shoreline largely visually and spatially. So much so that in the city where the interaction of the coast increases the most in the summer months, it has been inferred that this area is frequently used for outdoor recreation and sightseeing in winter. From this point, some assumptions and strategies deduced as follows:

Green and open space configuration of both districts display crucial potentials. In the 7th district, vertical relations between the settlement area and the coast can be developed via comprehensive design approach on sport facilities and cultural structures which restrict the public space integrity of the park. In addition, the precious touristic value of Kaleiçi Old Town, which is located right next to this district, has been found to be inconsistent with the usage preferences of the participants. Therefore, at this point, offering new environmental opportunities that can be used by locals via coherent environmental design approaches, will also support local tourism.

The 11th district is located at relatively far from the city center. Although pedestrian access, which was widely preferred across the coastal line, provides an advantage for those living nearby, it has an important urban park that can also attract visitors from the rest of the city. In order to make benefit from of this potential, the social integration value of the region can be supported by alternative public accessibilities. In addition, due to the existing usage frequency value as winter time, park design can be examined by taking into account the shading and the outdoor comfort value. Because Antalya is a city that has very high temperature and solar radiation effect can be seen.

5. CONCLUSION

In this research spatial and vicinity relations with social variables as in survey answers, were considered in general framework, it can be concluded that coastal formations are essential for determining the activity types. Such that tendency of the fjords to be preferred as scenery effect, beaches are prominent for recreation and swimming. On the other hand, accessibility, amenities, and publicness value stand forward as vital effects for open space usage tendencies and motivations. It was deduced that the most preferred districts are common, in terms of providing various vicinity opportunities on wide, natural, and public surfaces that support the coastal interactions like swimming. Thus, in some large public parks which have high natural values on fjords, it has been observed that they are not preferred as their potentials despite of interrupted in terms of public land use and relative accessibility. This situation creates negative effects on public usage preferences, even if the areas located in the hearth of the city center.

Within the scope of the study, addressing the relationship between the coastal and urban space with both spatial analysis and the method of information discovery from user experiences provided an important tool for revealing the overlaid data. In particular, the results of the GIS-based analysis and social preferences sometimes present opposing situations, leading to inferences that touch the dynamics of urban life. To get deeper inferences from there, other various parameters should be included to mining process. Although, within the scope of this research, more inclusive information which collected from participants such as urban identity and spatial perception, the discussion was structured on a specific data on coastal usage. In future phases of the research, these attributes will enrich the insights and details of strategies. In addition, increasing the sample size by developing user behavior data, will present more comprehensive inferences about study areas. As such, the research exhibits a methodology to analyze the social and spatial dynamics of many coastal cities. Substantial information can be extracted for various coastal cities by using diversified variables regarding different climate, urban form and demographic conditions.

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SENSORY PERFORMANCE EVALUATION OF SPACE IN A SEMI-OPEN SHOPPING CENTER WITH COGNITIVE AND SENSORY MAPPING

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ABSTRACT

The identity, design and usage characteristics of architectural spaces effect the user experience and perception. In terms of evaluating a perceptional space performance the experience and perception levels of users are the most effective indicators. Cognitive perception of a particular space stimulated by sensorial characteristic as well as the services and facilities due to the functional identities of spaces. Cognitive mapping and sensorial evaluation methods are frequently used tools in spational perception performance assessment. Shopping malls are commercial and recreational venues offering many and diverse activities and services together. Due to the functional features of shopping malls user experience should be kept at an optimum level. In this study, the Mavibahçe Shopping Center, which has open, closed, and green areas unlike typical shopping center designs was selected as the research area. The most perceived (open-green area; main circulation lines) and least memorable areas (building masses) and spaces in the mall in terms of architecture were determined and questionnaires including sensory scales prepared for these spaces were applied. In addition, the cognitive perception and access level of the study area were analyzed using cognitive mapping, sensory mapping and Space Snytax methods. As a result of the study, it was determined that the open areas of the space are perceived more than the closed areas, and design decisions that can be applied in the space have been developed.

KEYWORDS: Space Perception, Sensory Mapping, Cognitive Mapping Space Syntax, Mavibahçe Shopping Center.

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1. INTRODUCTION

Sensorial data during the time of visit of space effects users experience and spatial perception. This sensorial perceptions creates the identity of space. Cognitive mapping is a research method that elicits and explores the interconnected essence of environment and human activities (Powel, 2010). Cognitive maps are helpful sets of shorthand images shift from community to community, and person to person, coming about from our inclinations, preferences, and individual encounters (Downs and Stea, 2017). According to Kitchin and Freundschuh (2000), the aim of cognitive mapping is to figure out how we come to understand spatial relations based on both primary and secondary sources of information (e.g., maps). To put it another way, how people learn, manage, and use spatial knowledge in relation to the world around them. They also explain the goal of the cognitive mapping research, which is to understanding spatial behavior and how spatial choices and decisions are made, answering inquiries about spatial knowledge acquirement, conducting and actualization of comprehension.

Purchasing consumer products and services is one of the most important elements of spatial behavior in an urban setting. Thus, customer behaviour habits and activities pose a significant challenge for retail planning, both in terms of the positioning of retail facilities and the ease with which they can be accessed. As a result, understanding the stimulus of customer spatial behavior is important for designers (Downs, 1970). It has been recognised long ago the user perception and experience in a space affected by sensorial responses to architectureal scale, matelrials, rhythm, colour, and lighting (Rasmussen, 1964). The experience of architecture though all the senses beyond the sight is argued by The Danish architect Steel Eiler Rasmussen over the decades ago. Seeing, smelling, touching, listening to while moving through the scape unifies as the components of architectural and spatial experience and those underlying elements help formation of spatial behavior and get place in mind to constitute perceptions which have the role decoding and recalling the image of cognitive maps in our mind.

Maps are typically conceived of and used as a directional instrument, a visual representation of locations that adhere to certain size, distance, sign, and legend conventions. However, mapping as a methodological instrument has evolved beyond its application as a navigational aid. Maps have been used to register and interpret socio- and psychogeographic notions of location, social interactions, and/or cognitive processes in many many fields and disciplines. A variety of academics have written about the multisensory nature of the image. (Powel, 2010). Visuals can represent the other senses such as hearing, touching, smelling, testing. Because cognition, motion, and the senses are inextricably linked, often embodied, and taking place inside bodies and visual mapping methods elicits any act of senseing by the act of seeing (Pink, 2006; Powel, 2010).

It may be argued also that sense-by-sense approach ignores the mind's inherently multisensory existence, as well as the numerous connections between the senses that have been shown (Spence,2020). "This neglect is particularly striking given that the natural environment, the built environment, and the atmosphere of a space are nothing if not multisensory" (Bille & Sorensen, 2018; Spence, 2020).

Sensing of a place is the integration of data comes from all of body receptors. Sensorial maps based on five senses (sound, smell, sight, taste, touch) enable to discuss data in a broader sense, conveys datasets and sensory stimulation through media combinations. Within the sigle-sense maps applications sound and smell takes more place than taste and touch. Sensory maps represent the environment as it is experimentally perceived, drawing attention on a variety of human imaging experiences to highlight the spatial sensorial features that are not visible (McLean, 2019).

Architectural structures with different functions gain spatial identity with their usage characteristics. The experience and satisfaction levels of users from these areas are the most effective indicators in terms of evaluating the spatial sensorial performance of an area. The aim of this research is relevant to the literature discussed in this paper is to determine what components users perceive in a semi-open shopping mall experience with a sensorial evaluation of space performance, and to determine how the users value and response the perceived components. The sensorial data also was classified in the experience space by the mapping method while bringing together architectural and psychological science to produce approaches.

The satisfaction level of the users from a certain area is shaped by the sensory perception that the spaces stimulate in them, as well as the services they offer due to the functional identities of the spaces. Cognitive mapping and sensory mapping and measurement methods are frequently used tools in spatial perception performance evaluation. Shopping malls are recreational areas that are mostly located in urban areas and offer many and diverse activities and services together. Due to their functional features, shopping malls are commercial areas where user experiences should be kept at an optimum level. In this study, the Mavibahçe Shopping Center, which has both open and closed areas, was selected as an exemplary area, unlike classical shopping center designs. The most perceived and least memorable areas and spaces in terms of architecture were determined, and questionnaires containing sensory scales prepared for these spaces were applied. As a result of the study, the sensory performance of the study area, which is directly related to the user satisfaction level, was measured, and solutions were developed for spaces perceived negatively by the users.

2. MATERIAL AND METHOD

2.1. Defining the Study Area

The main material of the study is Mavibahçe Shopping Center located in Karşıyaka district of İzmir province, which has been selected as the sample area (Figure 1).



Figure 1. The location of the study area

Mavibahçe Mall is established on an area of 165.000 m2 and is a large-scale shopping mall with a parking capacity of 2000 vehicles and numerous services and recreational opportunities. The shopping center subject to research consists of four building blocks, terraced passages between them and an open-green area in the form of a courtyard located between the building blocks (Karadan& Birişçi, 2020) (Figure 2).



GROUND FLOOR PLAN

Figure 2. Site plan of the study area

Mavibahçe Shopping Mall was chosen as an exemplary area in the study because it is a shopping mall that offers a wide range of services and recreational opportunities with an intensive use.

The full and empty site plans of the area presented to the participants within the scope of the research, sensory performance evaluation questionnaire forms, IBM Statistics SPSS 26.0 software used in the evaluation of the surveys, Adobe Photoshop CS6 used in the visualization of the maps, Autocad 2016 and Depth mapX.5 used in the spatial syntax analysis are other materials of the research.

2.2. Method

The method of the study consists of three stages (Figure 3).



Figure 3. Method flow chart

In the first stage of the study, a literature search was conducted on the subject and the concepts related to the subject were examined within the scope of previous scientific studies.

Using the guided sampling method during the sample determination stage in the study, 20 students who took the "Current Urbanism Discussions" course from the university common elective courses at Izmir Katip Çelebi University were determined as the participants of the study. In the guided sampling method, a part of the universe is chosen as a guided subgroup instead of a sample representing the universe. In such studies, a subgroup that can represent the research problem rather than the whole population is considered as a sample (Sencer and Sencer, 1978). The subjects of urban space perception, space and human psychology, and sensory performance of the space were explained to the students in question two weeks before the application in the field of research. In the second stage of the study, techniques for measuring the level of cognitive and sensory perception of the space were applied. Participants who have visited Mavibahçe Shopping Center, which is designated as the study area, at least 5 times before, were taken to the shopping center collectively and they were able to experience the place by visiting the open and closed areas on the ground floor of the area for 1 hour and sitting in the common areas. Since the interiors of the four structural blocks that make up the shopping mall have the same architectural character on all floors, only the ground floor and the open-green area in the form of an inner courtyard were evaluated within the scope of the study.

The site layout plan of the shopping mall was given to the participants who experienced the area by processing only the boundaries, they were asked to draw the spatial details (entrances, axes, aesthetic-functional design elements, furniture elements, plants, etc.) that remained in mind during their trips, thus the cognitive mapping phase of the area was carried out.



Figure 4. Cognitive mapping study example

These maps were combined with the map overlaying technique, processed into the site plan according to the number of repetitions of the repeating spatial elements, and the common cognitive map of all participants was visualized (Figure 4).

In the next stage, the current layout plan of the ground floor of Mavibahçe Shopping Center was given to the participants in order to map their sensory perceptions. The participants were asked to process the sensory criteria (auditory, visual, olfactory, tactile, sensory) encoded in the legend into the site plan depending on what they felt in the field (Figure 5).





Figure 5. Sample of sensory mapping study

The data obtained via the sensory mapping study were combined with the layout plan of the study area with the help of Photoshop CS6 program.

In the next stage, a questionnaire prepared using five scales described with auditory, visual, olfactory, tactile and sensory titles was applied in order to evaluate the space perceptions in the light of the emotions felt by the participants throughout the space.

Participants were asked to score the emotions given in the questionnaire with a 5-point Likert Scale, with 1 at least 5 at most, according to their level of feeling in the space in general. Frequency analysis, one of the descriptive statistical analysis, was used to evaluate the questionnaires.

In the last stage, the integration and accessibility level of the study area was determined using the Space Syntax method. One of the most important concepts of the Space Syntax method is the Integration Value. Integration Value indicates the points where people are most likely to come together. Places with high integration value refer to the places with the highest accessibility (Gündoğdu, 2014; Göksüzer, 2013). For this reason, in this study, the integration values of the area were drawn from the axial map of the 2D Autocad drawings of the study area, and the area was analyzed with the help of Depth Mapx5, a Spatial Syntax Analysis program. As a result of the analysis, the axial maps drawn were visualized according to the global integration values (R), and the Rmax, Rmin and Raverage values were also calculated.

The method that enables us to read the organization of space on a topological plane is called space syntax. Space Syntax method is used in; defining the physical structure of the city, examining the relationship between the pedestrian movement and the design of the city, the accessibility of a space depending on the pedestrian movement, organizing the human movement in areas such as a multifunctional hospital, museum, show center, researching the effect of any structure on the city, determining the relationship between crime and space and the accessibility to public spaces. The Space Syntax method enables us to understand the social logic that creates the spatial texture beyond the form of the space. The primary purpose of the Space Syntax method is to seek the potential of the physical space to bring people together depending on the movement within the space (Çil, 2006). In the method, spaces are expressed with axes. The maps prepared by determining the maximum field of view from a point and allowing us to read the movement in the space are called axial maps (Önder & Gigi, 2017). According to the spatial syntax method; Spatial analysis is determined by values such as integration, connectivity, depht, control, inteligibility, etc. (Önder & Gigi, 2017; Göksüzer, 2013; Özyılmaz, 2009).

3. FINDINGS

In this study, a method trial was carried out for the sensory performance evaluation of spaces. The study is structured as a method that includes four-step analysis. In the first stage, cognitive maps obtained from 20 participants who were determined by the guided sampling method, were overlapped. The chosen participants who went to the study area at least 5 times and experienced the field before the experiment, were trained on perception of space and sensory space perception. Thus, the most perceived, most memorable and low perceived space components such as axes, building masses, and outdoor design elements were determined. The cognitive maps drawn by the participants were overlaid, the perception frequencies of the space and design elements were counted and visualized on the space layout plan, and the findings obtained at this stage are presented in Figure 6.



Figure 6. Perception frequency of space and design elements according to cognitive mapping method

According to Figure 6, while the elements most perceived by the participants in the Mavibahçe AVM ground floor and courtyard are determined as main axes and building masses; It was observed that pool 3, one of the landscape design elements at the courtyard entrances of the space, was not perceived by any of the participants, and that the pool in question was not drawn in any of the cognitive maps. In addition, it was determined that the perception and retention levels of landscape design elements other than the main axis line are quite low. Outdoor plants are generally remembered in groups and clusters; it was observed that it was worked on the cognitive maps with the expressions "green area", "trees" and "flowers" by the participants. When the interior spaces of the study area were evaluated, it was found that the participants used the same spatial expressions in the whole area and wrote expressions such as "shops" and "cafes" while drawing cognitive maps of the interiors.

With the sensory mapping technique applied in the second stage of the study, the participants were asked to mark their positive and negative feelings in auditory, visual, olfactory, tactile and sensory terms depending on where they felt in the field in order to determine which sensory values were perceived by the participants in which parts of the study area. The sensory maps marked by all the participants were overlaid, and the positive and negative sensory data perceived by the participants were processed on the site layout plan according to their marking frequency. For each scale, the participants were given separate empty site plans, and each participant was made to mark their sensory perceptions in the field on these five separate empty site plans at this stage. The results obtained at this stage are shown in Figure 7.

According to the sensory mapping method data obtained from the participants, shown in Figure 7, the study area felt positive emotions mostly in the visual category; It has been determined that visually negative feelings are expressed in the interior spaces of the study area.



Figure 7. According to the sensory mapping method, the positive and negative emotions experienced by the participants in the field

When the scent perceptions are examined; It was determined that the markings of the participants on the map did not concentrate significantly in a certain space of the area, and the places where negative olfactory sensory expressions were detected as a result of the analysis were seen in the garbage bins and their immediate vicinity. While the most negative sensory perception is detected as auditory in the field, it is seen that this perception is significantly concentrated in the cafes and their surroundings. It has been determined that the study area does not offer a significant experience to the users in the tactile sense, only positive tactile perception expressions are grouped around the bridge over the aquarium pool in the open area. It was observed that the positive sensory perceptions of the participants were concentrated in the open areas of the space, while their negative emotions were mostly marked in closed areas and crowded areas such as cafes with a high usage.

While examining the sensory performance of the space chosen as the sample area within the scope of the study, the sensory scale was used to determine the emotions experienced in the field as well as four types of senses (auditory, visual, olfactory, tactile) perceived by the sensory organs. With the sensory mapping method, the positive or negative sensory perception belonging to which sensory scale is determined in which part of the field; A questionnaire was conducted in order to identify sensory experiences with defined expressions of emotions. The data obtained through the questionnaire (Table 1) were evaluated with IBM Statistics SPSS 26.0 software.

	SCALE	SD	MEAN		SCALE	SD	MEAN
	Noisy	1.03	3		Colorful	0.76	4,05
	Wide	0.76	3.95		Bright	1.33	3,1
	Pleasant	1.1	2.95		Textured	0.88	3,65
	Increasing	0.85	3.1		Patterned	1.05	3,55
	Decreasing	0.94	2.6		Big	0.89	4,2
RV	Musical	0.69	1.55		Spacious	0.93	4,15
іто	Natural / belong to nature	1.05	2.6		High	0.99	3,65
	Silent	0.91	1.75		Illuminated / Luminous	0.89	3,95
	Sonorous	0.76	2.55		Clean	0.83	4,05
	Annoying	0.94	2.45		Detailed	0.81	3,85
	Constant	1.08	2		Open	0.79	3,9
	Monotone	1.29	2.75		Crowd	1.07	3,25
	Artificial	1.41	3.1		Nature/ Natural	1.01	3,2
	High temperature	1.15	2.45	JAL	Colourless/ grey	0.69	1,5
	(climatic)			VISI			
	Coarse texture	1.16	2.25		Mate	0.89	2,05
	Heavy	1.41	2.9		Smooth	0.89	1,95
	Intensive	1.18	2.65		Simple	1.14	2,15
	Hard 0.9		2.85		Small	0.76	1,55
	Hot (material)	1.32	2.45		Constricted	0.76	1,45
	Solid	1.15	3.45		Low	0.88	1.6
	Wet	0.91	1.9		Variable / heights	1.16	2.25
	Low temperature (climatic)	1.37	2.75		Dark	0.88	1.6
	Smooth texture	0.8	2.7		Dirty	0.75	1.4
TIIA	lightweight	1.21	2.25		Rough	0.91	1.9
TAC	Sparse	0.69	1.95		Closed	0.76	1.55
	Smooth	1.16	2.25		Quiet	1.18	2.15
	Cold (material)	1.33	2.75		Structural	0.66	3.3
	Flexible	0.79	1.75		Sharp	1,08	2
	Dry	0.94	3.45		Pervasive / active	0,93	2,15
					Specific / evident	1	2,55
				TIVE	Clean /fresh	0,97	3
				LFAC	Soft	1,02	3,1
				Ō	Soft / Breeze	1	3,55
					Incomprehensible	1,51	2,8
					Dirty	0,79	1,75

Table 1. Findings regarding the emotions that the participants felt in the place

According to the data in Table 1; When the answers given by the participants in the scale regarding auditory feelings were evaluated, it was determined that they felt moderate noise in the place and this noise was felt in a wide area. In addition, the artificial sound perception level (mean:3.00) in the area was calculated higher than the natural sound perception level (mean:2.60). When the scale analysis results regarding the visual senses experienced by the participants in the field were examined, it was found that the participants gave the highest score with the "mean:4.05" on the "colored" and "clean" options; In general, it was observed that positive emotion expressions were higher than negative emotions in the scale related to visual senses, and among the negative emotions felt by the participants in the visual category, the option "crowded" got the highest score with an "average of 3.00".

In the analysis of the olfactory senses, while the "soft-breezed" olfactory senses got the highest score; It was determined that the participants generally felt "clean and fresh" odors at a moderate level (mean: 3.00). In the tactile sensory perception level analysis, "solid surfaces" and "dry surfaces" (mean: 3.45) came to the fore. Among the types of emotions presented to the participants on the emotional scale, it was determined that the options "attractive - inviting" (mean: 3.85), "safe" (mean: 3.80), "spacious" (mean: 3.50) received the highest score.

In the last stage of the study, the integration level of the field was determined using the space syntax method (Figure 7).





Figure 8. Global Integration analysis

	Values
Raverage	2.12
Rmax.	3.33
Rmin	1.2

Table 2.	Global	Integration	(R)	values
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In the space syntax method, the spaces that are mostly passed through are called "integrated", the less frequently passed places are called "segregated". Integrated spaces have the potential to bring together all the people who live in one place or who are there for any reason. According to the results of the global integration analysis regarding the study area shown in Figure 8, it has been determined that the global integration level of the area is high (Table 2) and there is no spatial or connective design error that will affect the users' perception level of the area.

4. RESULTS AND CONCLUSION

In the study of Henry and Furness (1993), an experiment to compare spatial perception in a real and virtual space was conducted in a museum gallery. The perceptional space evaluation of twenty-four architects toured the museum gallery in a real and virtual environment show that viewing a space in a computer simulation environments yield results underestimated on scale and dimension of space.

A similar research Hidayetoğlu et. al. examined to understand the effects of complex plan schemes with high level of complexity on spatial experience and perception performance. As a result, architecture students as the subjects of the experiment show that there is no significant impact of architectural training on users' perception and the buildings show complexity were perceived simpler in the evalutions with the increasement of user's spatial experience (Hidayetoglu, Yildirim, and Cagatay, 2010). In another experimental study of Manav and Yener (2011) conducted to see if there is a relationship between perception and lighting quality and arrangement. Perception of participants and their evaluation in a room organized with four different lighting arrangement were analyzed. Consequently, the results showed perception differs with different lighting arrangement.

In this study, the sensory performance of a semi-open shopping center was examined with cognitive and sensory mapping methods, and the findings of the study were detailed with the questionnaires applied to the participants and the space syntax method. Within the scope of the study, the perception level of the spatial design elements by the users and the sensory perceptions of the users about the space were examined. As a result of the study, it was determined that the open areas of the space are perceived more than the closed areas; While the users drew the open space in detail on the cognitive maps they drew, they depicted all of the interior spaces with a similar character. In open areas, it was determined that the perception levels of design elements around the main arteries are higher, and the perception levels of landscape design elements in intermediate arteries and entrances are very low. As a result of the evaluation of the sensory maps, it was determined that the negative perception was higher than the positive perception only in the auditory category, the positive perception was at the highest level in the visual category, and it was experienced as being spread throughout the open space of the study area. Sensory questionnaire results support the results obtained in the sensory mapping stage, and it was observed that positive emotions were more than negative emotions in all of the scales. The space syntax analysis performed at the last stage of the study showed that the overall integration value of the area is quite high; It was concluded that the mall was designed in a way that would positively affect the users' perception of the space and the usage level of the space. The interior spaces should be placed in the memory of the users with their spatial design features, and the positive sensory perception of the users

should be increased in their experiences of the space apart from the service they receive at the shopping center. For this purpose, some design decisions that can be applied in the space are listed below;

Use of catchy regional symbols (nodes, art installations, landmarks, sculptural features, green areas and water elements) in the interior,

Giving different color codes to interior colors or building masses

Using direction and sign system with distinct characteristic and common design language,

adding different thematic design elements to each building block,

adding sensory character to the area (smells, sounds, etc.).

In the open areas of the study area, strengthening the intermediate arteries, use of different flooring elements, color-pattern differences, the use of accent plants, shape and texture differences in plants are applications that can increase the level of perception and retention of the area.

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A RESEARCH ON THE SPATIAL AND TEMPORAL DEVELOPMENT OF GREEN AREAS, ISTANBUL BAKIRKÖY DISTRICT CASE

YILDIZ AKSOY¹

ABSTRACT

Bakırköy, one of the charming summer resorts of the past, was the most beautiful district of Istanbul with its own people, beautiful stonework, Greek houses, and wooden two-three-story houses and green areas. Now, Bakırköy is the most crowded district of Istanbul. Its green areas are replaced by concrete buildings everywhere. The main reason for choosing Bakırköy as the research area is the extreme population increase and unplanned settlement and the loss of green areas with new housing planning. The increasing rate of green areas in cities does not match the population growth rate, and the amount of green areas per person is decreasing. For this reason, the amount, distribution, and use of green areas should be handled and implemented within a plan. In the first stage of the research, the green area situation was determined in the Bakırköy district. Due diligence of green areas is starting from a past period and brought to the present, thus revealing the development trend. The green area situation of Bakırköy District has been discussed in terms of active green areas. The green space situation calculated throughout the district was compared with the green space norms, thus the green space deficit was revealed. Following the green area situation assessment throughout the district, the green area status at the neighborhood level was determined. It was provided to compare and examine the use decisions available in the neighborhood unit and the determination of open green areas. The aim of the research is to display whether the amount of active green areas per person can reach with the active green area norm of 10 m2 / per capita together with the importance and meaning of green areas in terms of today's urban life in the example of Bakırköy district.

KEYWORDS: Bakırköy, Active Green Areas, Per Capita Green Area.

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1. INTRODUCTION

The rapid growth of cities in the twentieth century has caused many problems arising from improper land use (Romero-Lankao & Dodman, 2011; Wang et al., 2012).

Land use, in the narrow sense, is especially the using of the land for agriculture and forestry, while in a broad sense, all kinds of using from the land, including making a residential area, transportation, commerce, industry, and tourism (Çepel, 1996).

The rapid growth of cities creates opportunities for creating new green areas and strengthening existing green areas (Rovai et al., 2014).

Open spaces in cities are generally considered parks or green areas are widely known for their usefulness in facts, although they are decreasing in most cities (James et al., 2015).

Urban open spaces include parks and green areas and airspace above sidewalks and roads, undeveloped land, open water, and landscape and airport associated with various building categories. Open or unused spaces also provide some relaxation and also can be turned into green areas in deeply urbanized environments (Kim et al., 2018).

1. 1. Materials and Methods

The research material consists of active green areas in Bakırköy District. Green areas of Bakırköy district have been discussed at the district level and at the neighborhood level. Bakırkoy consists of three regions; Yeşilköy-Yeşilyurt-Florya region, Kartaltepe, Zuhuratbaba, Osmaniye, Cevizlik, Sakızağacı, Zeytinlik, Yenimahalle and Ataköy regions. Yeşilköy-Yeşilyurt-Florya region is considered as Florya, Yesilyurt and Yeşilköy neighborhoods. Bakırköy Center is Kartaltepe, Osmaniye, Zuhuratbaba, Zeytinlik, Yeni Mahalle, Cevizlik and Sakızağacı neighborhoods, and Ataköy Region consists of 1st, 2nd , 3-4th, 4th, 5th, 7-8, 9-10th and 11th neighborhoods are handled.

Available active green areas in each neighborhood are classified as children's playgrounds, parks, and sports areas. Active green areas at the district level are divided into two groups as green areas under the responsibility of Bakırköy Municipality and under the responsibility of Istanbul Metropolitan Municipality. The spatial sizes of the green areas under the responsibility of the Istanbul Metropolitan Municipality are not included in this study.

The basic materials of the study consist of quantitative data for the green areas of Bakırköy District. When looking at the functional distribution of Bakırköy green areas; active green areas constitute grove areas, park areas, children's playgrounds, and sports areas.

The methodology of the research is based on the analysis of the quantitative data obtained for the active green areas of Bakırköy District in terms of spatial size and per capita values within the framework of spatial competence. As a result of the research; It has been revealed that active green areas have an uneven distribution at the district level in terms of spatial competence opportunities and are insufficient in terms of spatial standards.

1. 2. Study Area

The research area has Zeytinburnu in the east, Küçükçekmece in the west, Güngören and Bahçelievler districts in the north, and the Marmara Sea in the South (Figure 1).



Figure 1. Location of Bakırköy (https://qezilecekyerlertr.com/bakirkoy-nerede/)

Old Sirkeci - Halkalı suburban railway and the new Marmaray and E-5 highway pass through the research area. Bakırköy district can be easily reached by E-5, as well as by Sirkeci - Bakırköy coastal road and sea buses, Metro, Marmaray and Metrobus.

2. THE URBANIZATION PROCESS OF BAKIRKÖY

Bakirkoy is one of the districts in Istanbul where the housing problem is experienced most severely with all its dimensions. Bakirköy has been started to lose its texture consisting of historical mansions and wooden houses, which is protected in the 1950s, with the rapid urbanization that started in the 1960s. Under this rapid development of Bakirköy, the region's selection for industrial investments has a great effect. The acceleration of the industrialization and urbanization process with the 1950s, a real population explosion, and the pace of this process until today created a major housing problem in Bakirköy. With intense immigration in the 1950s, Bakirköy witnessed a real population explosion. Since 1955, Bakirköy has experienced rapid urbanization and therefore, as a result of rapid population growth, large infrastructure and urbanization problems have been brought with it. While unplanned and unhealthy urbanization was experienced in one part of Bakirköy, a regular, planned urbanization process was experienced in another part. (Aksoy and Ergun, 2009).

The rapidly increasing urban population expanded the boundaries of urban areas and required the emergence of new residential areas (Esen, 2019).

Unplanned, unscheduled, and random construction, the disruption of the urban structure, and the damage to the ecosystem display unplanned urbanization. As a result of random, irregular, and uncontrolled construction, the urban texture is destroyed on the one hand, and natural resources (air, water, soil, and environment) are unconsciously degraded and damaged on the other hand (Aksoy and Ergun, 2009).

Unplanned urbanization puts pressure on open and green areas, agricultural lands, and forest areas. It causes the destruction of open spaces and green areas in existing residential areas (Abo-El-Wafa et al., 2019).

2. 1. Spatial and Temporal Analysis of the Green Area Situation of Bakırköy District

When the green area status of Bakırköy district in the last 40 years is examined within the population-green area relationship: The total active green area amount in Bakırköy district in 1980 was 858.765 m² (Table 1).

There was no population increase between 1980 and 2000. Because in 1980, Bahçelievler, Güngören, Bağcılar districts were included in Bakırköy. Bahçelievler, Güngören and Bağcılar districts were established with the law number 3806 dated 27.05.1992 and separated from Bakırköy district. Bakırköy population was 208223 people in 2000 (http://bakirkoy.gov.tr/nufus-durumu).

When the population growth between 2000 and 2020 is examined, despite the increase of 18006 people, there has been a decrease of 365,059 m² active green areas. When the population is considered in terms of green area relation, while 8.4 m² active green area per person decreased in 2000, this value decreased by 2.3 m² in 2020 and became 6.1 m² active green area per person.

The green area situation of Bakırköy district should not be considered only as a population-area relationship. It is necessary to look at the locations and distributions of these areas within the neighborhood settlement texture. It is seen that the most active green area per person in Bakırköy district is in Florya with 19.2 m² (Table 2). Florya Atatürk grove constitutes 532.941 m² of the existing green areas.

While the least active green areas per capita are in Sakızağacı (0.6 m²/ person) and Zuhuratbaba (0.8 m²/ person) districts, it has been revealed that there is no active green area in Zeytinlik and Yenimahall (Table 2).

Years	Populaton	Actve Green Areas	Per Person Actve Green
		Surface (m ²)	Area (m²)
1980*	882505***	858.765	1,0
2000*	208223	1.742.355	8,4
2020**	226229****	1.377.296	6,1

Table 1. Population-Green Area Status of Bakırköy District by Years

* Aksoy, Y. (2001). The Determination of exciting green area situation Istanbul, Ph.D Thesis, İTÜ Graduate School of Science Engineering and Technology, Istanbul.

** It was produced from Bakırköy Municipality Park and Gardens Directorate and İstanbul Metropolitan Municipality Parks and Gardens Directorate (<u>https://yesil.istanbul/ekosistemharitasi</u>) data.

*** Bahçelievler, Güngören, Bağcılar districts were included in Bakırköy in 1980.

^{****}https://data.tuik.gov.tr/Bulten/Index?p=Adrese-Dayali-Nufus-Kayit-Sistemi-Sonuclari-2020

Neighborhood	Area (m²)	Population	m²/ person
Florya (Şenlikköy+Basınköy)	661041	34367	19,2
Yeşilyurt	21470	8.562	2,5
Yeşilköy	281132	24.814	11,3
Kartaltepe	32104	37.275	0,9
Osmaniye	152026	23.783	6,4
Zuhuratbaba	16336	21.518	0,8
Zeytinlik	-	5.189	-
Yenimahalle	-	6.618	-
Cevizlik	4451	5.177	0,9
Sakızağacı	4721	8.260	0,6
Ataköy 1. Kısım	3919	1.693	2,3
Ataköy 2-5-6. Kısım	139366	14.255	9,8
Ataköy 3-4-11. Kısım	17763	8.312	2,1
Ataköy 7-8-9-10. Kısım	42967	26.406	1,6
BAKIRKÖY	1377296	226229	6,1

Table 2. Populaton-Green Area Status of Bakırköy District at the Neighborhood Level

3. RESULTS

As a result of the research, it was revealed that 330.479 m² active green area was built by the Bakırköy municipality and 1.046.817 m² active green area was built by the Metropolitan Municipality. According to the green area norm, which is 10 m² actively used for one person, there must be an active green area of 2,262,290 m² in 2020 in the Bakırköy district. When the active green areas built by the Metropolitan Municipality are included in the green areas built by the District Municipality, there is a total of 1.377.296 m² active green area in Bakırköy District. In this case, 884.994 m² active green area deficit and 3.9 m² norm deficit per person have emerged in Bakırköy district.

Green areas in Bakırköy district are not structured according to the number of the population or the rules regarding green space needs. This suggests that the available green spaces are unevenly distributed, rather than being part of a system.

It is not enough to have a 6.1 $\ensuremath{\mathsf{m}}^2$ active green area per person in Bakırköy District.

Well-established and maintained green spaces play a key role in achieving high quality of life and sustainability in urban environments. Therefore, green areas should be carefully calculated and evaluated in urban landscape planning. Because urban planning is not only about building the environment, but also about the integration of green spaces in the urban fabric.

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