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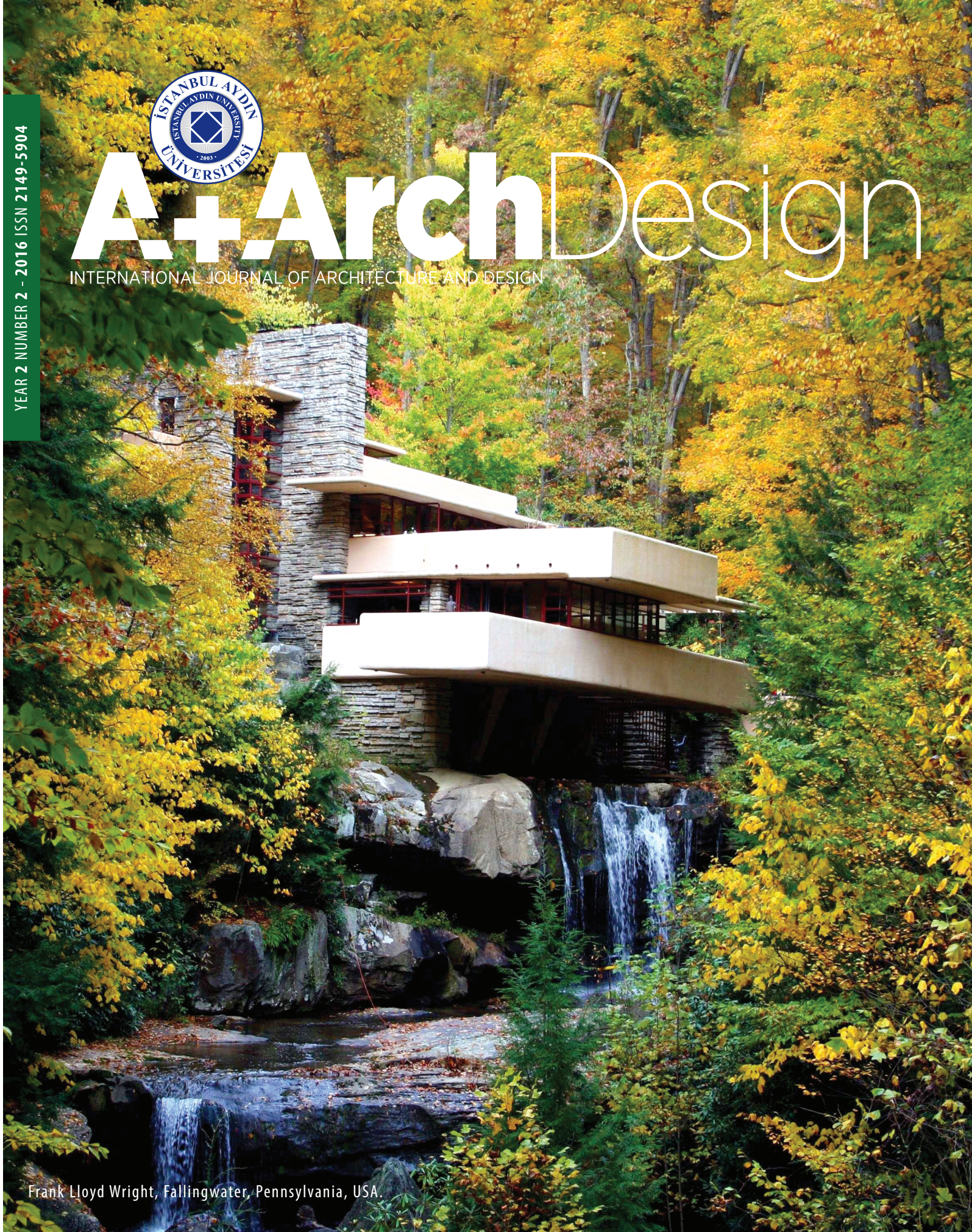

Frank Lloyd Wright, Fallingwater, Pennsylvania, USA.

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From Editor - *Editörden*

The international journal A+ArchDesign is expecting manuscripts worldwide, reporting on original theoretical and/or experimental work and tutorial expositions of permanent reference value are welcome. Proposals can be focused on new and timely research topics and innovative issues for sharing knowledge and experiences in the fields of Architecture- Interior Design, Urban Planning and Landscape Architecture, Industrial Design, Civil Engineering-Sciences.

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Prof. Dr. Bilge IŞIK

An Experience of the Soil: Modeling Intervation

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Abstract: *This article focuses on experiencing the boundaries of architecture and built space through direct observations and experiences gained from the intervention to the environment. This article aims to understand kinesthetic perception as an important experimentation field in architectural education. In this context, architecture students at Namık Kemal University experienced kinesthetic perception, by observing haptic and corporeal intervention to the natural environment. Therefore, this article is a small-scale experiment to understand kinesthetic perception in architectural education.*

Keywords: *Kinesthetic perception,void, tracing movement, plow*

Bir Toprak Deneyimi: Müdahaleyi Modelleme

Özet: *Bu makale, mimarlık ve yapılı çevrenin sınırlarını kavramada doğrudan gözlem ve çevreye müdahale üzerinden deneyimlemeye odaklanır. Makale, kinestetik algıyı mimarlık eğitiminde önemli bir deneyimleme alanı olarak ele alır. Bu çerçevede Namık Kemal Üniversitesi mimarlık bölümü öğrencileri kinestetik algıyı, doğal çevrede dokunsal ve bedensel müdahale üzerinden gözlemleyerek deneyimlediler. Bu makale, mimarlık eğitimindeki estetik algıyı kavramaya yönelik küçük ölçekte bir deneydir.*

Anahtar kelimeler: *Kinestetik algı, boşluk, hareketi izleme, pulluk*

1. MODELING INTERVATION

Tekirdağ, as one of the largest economies in production of vegetable oil industry in Turkey is located by the waterfront of the Marmara Sea. Invaded by large beds of sunflowers and canola, perpendicularly aligned to the sea, the landscape of Tekirdağ is blurred with yellow color during the spring months (Figures 1, 2, 3). The city has a great potential of organic farming and edible gardens.

Figure 1. The canola landscape

However, facing with the disadvantages of becoming a greater municipality, Tekirdağ has been losing its natural and human-formed environment: Farming is slightly disappearing, leaving in to concrete housing blocks without any regard for the natural environment. The city grows with the dichotomy: The built space versus the nature.

Figure 2. Waterfront and the hills

Figure 3.Waterfront and the hills

Based on the rapid decrease in agricultural areas, first and second year architecture students at Namık Kemal University raised questions on the formation of the boundaries between inside and outside in the soil in regard of environmental awareness. The students observed agriculture vehicles and analyzed corporeal movements and morphologies as an intervention by the traces of a plow in movement. The plow, as one of the major agricultural vehicles used for cultivation of soil, sowing the seeds and planting, modifies the soil layer three-dimensionally. This intervention the soil forms a specific rhythmic pattern in different speeds (Figures 4, 5, 6).

Figure 4. The plow in movement

Figure 5. The plow in movement

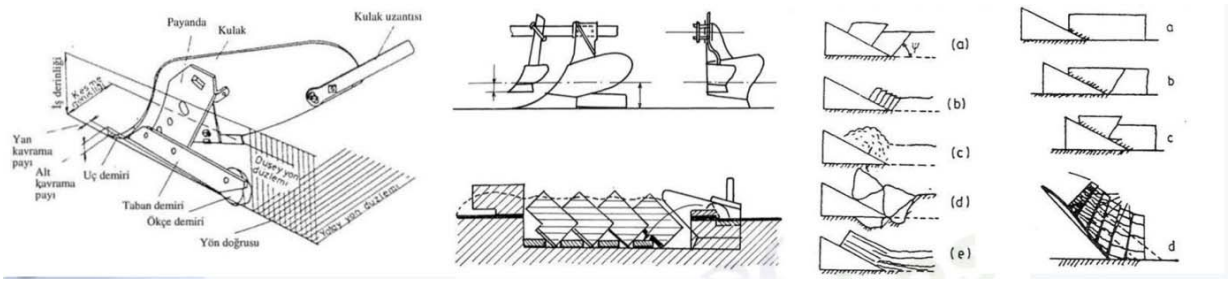

Figure 6. The plow section [1: 74, 75, 8]

In a simultaneous work, the students watched a dance movie, Pina by Wim Wenders. The film's fragmentary dance scenes and the corporeal interaction with the space were represented as a collage work. Following this, they experimented with the built space through corporeal interventions the void through their body and on-site infill installation works (Figures 7, 8). Later, they observed the sound and body movements of a dancer, craftsman, musician and the lines of repetitive movement in space and later experienced built space through corporeal movements and interaction with surrounding space. Considering the corporeal lines and movements, the students represented the movements into a series of relief works with cardboards (Figure 9). The random movements reflected as a spatial transformation and a metaphoric world of experience of the visual stimuli, perception, tactile, all of which enabled to create an "embodied consciousness," as Merleau-Ponty and Pallasmaa mentions in the Eyes of the Skin: Architecture and the Senses [2: 79]. Later, the students were asked how it feels like to be a certain building or a form, as mentioned by Forrest Wilson's "What It Feels Like to Be a Building" book.

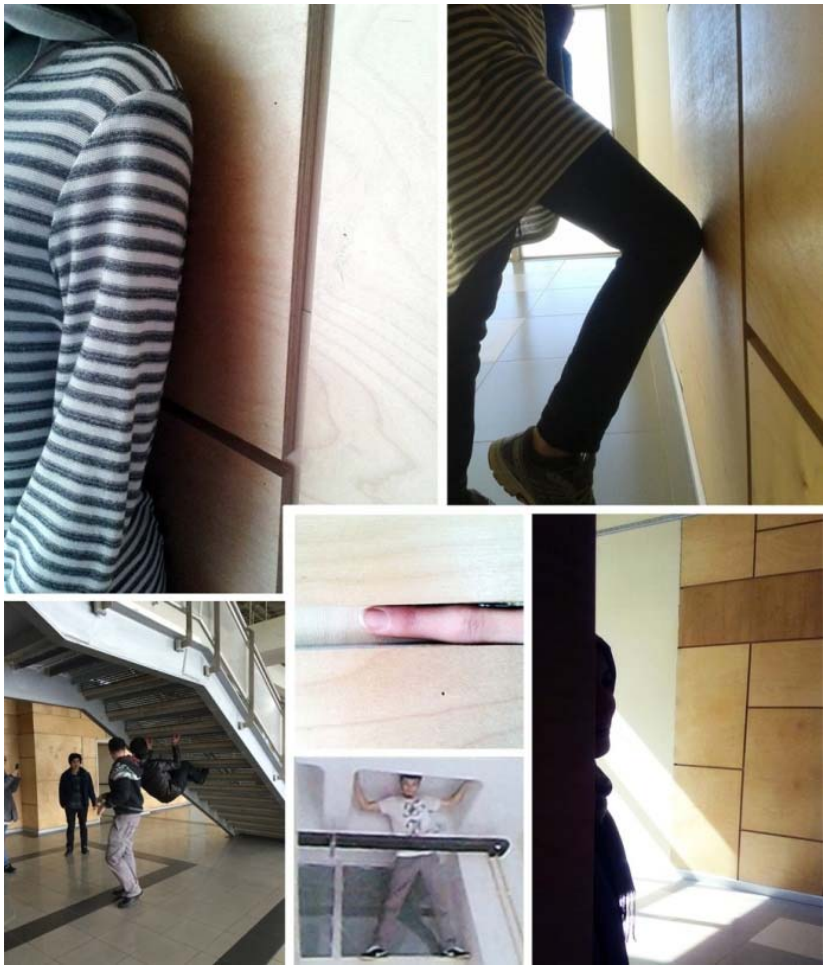

Figure 7. Surfaces triggering haptic and corporeal experiments (Photograph by Şeydanur Aydın, Esen Gökçe Özdamar)

Figure 8. On-site infill installation to the void, group work

Figure 9. Body movements of a craftsman and a dancer represented as a relief work. The process is a transition from an anthropomorphic perception of movement to an experienced space and topography

In his book, Wilson draws attention to understanding of the existence of a space through a phenomenological approach (Figure 10) [3]. In his metaphoric projections; kinesthetic and cognitive perception are engaged and trigger anthropomorphic metaphors for the creation of space, like gravity and pressure. The tectonics of a building is understood through human scale and how different forces take place in constructing space; a column, a brick wall or a cathedral. The physical body is taken as an interface and anthropomorphic metaphor for transgressing the boundaries for a creative perception of space.

Figure 10. Perceiving built space through body [3: various pages from Wilson]

2. ON PERCEPTION OF MOVEMENT

Pallasmaa defines *that "including vision, are extensions of the tactile sense" [2: 10]. This refers to the other senses that do not complement the vision, which is a dominant sense. Pallasmaa argues the dominancy of visual perception as a sensory organ in western cultures. For Merleau-Ponty perception is "always a process of creative receptivity, a composing rather than a copying of the external world, ..., "a formation already bound up with a larger whole, already endowed with meaning" [4: 110].*

According to psychologist Vernon, in the perception of space, "..the observer may continue examining the object and piecing together the various sensory impressions until he has made up his mind what it is. In everyday-life situations where objects can be clearly seen there will be corroboration between a variety of different types of information as to the nature of the objects. Shape, colour, texture, spatial position, movement or absence of movement, will all be congruent, and will fit what the observer expects to encounter in such situations" [5:32]. In the perception of matters of movement, space-time perception is

inseparable from the body of the situation of the object. Visual sense motivates kinesthetic perception and corporeal perception, and this is why we feel like moving when we are watching a running race or a bird flying. “Thus if we are in a vehicle which tilts to one side, we automatically adjust the position of the body until it is vertical, by means of “postural reflexes” - the immediate reflex responses to sensations of change of position [5:121]....perception of movement depends on the relative movements of objects and their backgrounds or surroundings, rather than upon the movement of images across the retina [5: 143].

The body is the general instrument of “comprehension” [4: 112]. In anthropomorphic architecture, the body exists in all forms of architecture: from analogy to human body in a physical state, such as Ginger and Fred building in Prague by Frank Gehry. Ginger and Fred is “the human body in a particular gesture of togetherness” and display the human body in motion. However, “the human body is a complex whole of external and internal forms, measurements, proportions, symmetry, forces, gender, posture, senses…” [6: 27-28].

Kinesthetic perception has along ago been in the research area of architecture. It is directly linked to visual and corporeal relation, since a phenomena is perceived through physical sensors in the muscles. As a sense of the movement (kinein) to move, and aesthesis, kinaesthesia is “a sense mediated by end organs located in muscles, tendons, and joints and stimulated by bodily movement and tensions,” and relatedly the “sensory experience derived from this sense…” [7: 482]. Also named as by kinaesthesia by Henry Charlton Bastian “muscle sense” as well as feedback from tendons, joints, and skin play a role in perception [7:482]. This perception is the sense of movement and sensory experience and forms a memory of movement of the body. An important feature of kinesthetic perception is the tactile of the surface that triggers the movement. Physically, the sensors in the muscles of replicate a similar movement to the observed object. This perception can also enable and undermine a phenomenological interpretation of space in design process.

Deriving from kinesthetic perception, the students thought on how space and objects of static formation evoke movement which mind completes, moves and transforms. After analyzing the intervention of the plow to the soil, the students modeled the movements as a negative space in plaster injected soap bars (Figures 11, 12, 13). In these works, the emphasis was to understand built environment through different layers of perception and motivate students for developing holistic architectural thought through a hybridization of senses. The materials were chosen to create a limitation for ideas, but the material was seen as a body in the process of making the form. The students transformed the nature of the material as they related to their perception of the observed phenomena.

Figure 11. Atmosphere of the intervention of the plow
(Courtesy of Oğuz Uğurlu, Şeyda Kıraç, Taha Yunus Aydın, Emel Yılmaz)

Figure 12. Plow movement modeled with plaster (Courtesy of Büşra Çağlar)

Figure 13. Plow movement in colored plaster poured in soap bars

The void in the soap bars were evaluated as a spatial configuration and a process of a temporary intervention. The students perceived the lines and loops in the soil as an "experienceable surface" [8: 134] (Figures 14, 15, 16, 17, 18). Mapping this intervention enabled a bodily-kinesthetic and spatial experience. In these works, the emphasis was to understand built environment through different layers of perception. The materials were chosen to create a limitation for ideas, but the material was seen as a body in the process of making meaning within it. The movements reflected as a spatial transformation and a metaphoric world of experience of the visual stimuli.

Figure 14. left: Colored plaster relief (Courtesy of Emel Yılmaz);
Figure 15. right: Lines of the plow in the soil (Courtesy of Miraç Melikşah Yalçın)

Figure 16. left: Lines of the plow in the soil (Courtesy of EmineDündar)
Figure 17. right: The sweep of the plow after duration (Courtesy of Büşra Çağlar)

Figure 18. Circular movement of the plow

In integration into creative fields such as art, design and architecture, an awareness of kinesthetic perception and searching for ways to improve it enables holistic approach and the formation of an empathetic bridging between the subject and object. As such, in the synectics approach in problem solving methodologies as defined by Gordon in the 1960s, the designer puts himself to the condition of the designed object and tries to feel like how it is stored or how it stands. Therefore, the alienization and de-alienization of objects to be designed evoke a kind of spatial awareness of the designer. This leads to a more efficient design process, where the designer understands the psychological process he /she operates [9: 6].

Therefore, the role of increasing kinesthetic awareness in design process and the perception of space may help demolishing the borders between the subject and object and enable and understanding of the environment as a process by both thinking and making. In this context, the students created metaphors, or "a powerful juxtaposition or "transfer" of ideas as Pallasmaa defines for metaphors from relationship to music, dance and corporeal relations [2: 79]. The movement of the plow was experienced in a variety of ways and the design process helped students experience corporeal, kinesthetic and spatial perception and transforming linear and circular movement in terms of form/function, idea/space, space/experience, thus enabling an environmental awareness.

3.CONCLUSION

The process and the work mentioned in this article emphasized more than a formal translation of modelling mechanistic movement. The translation of sensing through kinesthetic perception as well as

the other senses enabled an environmental awareness where the physical body is realized as an interface and an extension of the tactile sense.

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Sustainable Temporary Architecture[1]


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Abstract: *This research concerns about the shelter designing in post disaster cases and its ability to apply the sustainability principles. First, temporary architecture design has defined, then by defining the post disaster steps, the principles of sustainable architecture is explained. Thus the applicability of the principles of the shelter has been shown and has been used as basis for evaluating the application techniques in shelters. These techniques was classified into three classes: tents, prefabricated shelter and earth buildings. Finally, a general conclusion of the research and its assessment was done, and it explains how the most convenient for using each class.*

Keywords: *Disaster, shelter, dwelling, sustainability*

Sürdürülebilir Geçici Mimari

Özet: *Bu araştırma afet sonrasında kullanılacak barınakların tasarımı ve bu barınakların sürdürülebilirlik ilkelerine uygun şekilde tasarlanmasının yollarını araştırmaktadır. Öncelikle, geçici mimari tasarım konsepti tanımlanmış, daha sonra olağanüstü durum aşamaları açıklanarak sürdürülebilir mimari prensipleri değerlendirilmiştir. Böylelikle barınakların uygulanabilirlik ilkeleri gösterilmiş ve dayanak olarak barınaklarda uygulama tekniklerini değerlendirmek için kullanılmıştır. Bu uygulama teknikleri üç sınıfta (çadırlar, prefabrik barınaklar ve kerpiç barınaklar) irdelenmiştir. Son olarak genel değerlendirmeler ve analizler ortaya konulmuştur ve her sınıf nasıl en kullanışlı şekilde kullanabileceği anlatılmıştır.*

Anahtar Kelimeler: *Afet, barınak, mesken, sürdürülebilirlik*

1. INTRODUCTION

The disasters like earthquakes, landslides, floods, rocks fall, fires, avalanche, storm, rising of ground water, and wars have extensive and violent effects, cause loss of life and property, substantial effect on the communal life. The huge number of damaged and collapsed buildings after the disaster creates a housing problem needing urgent attention.

Accommodation is a major problem following any disaster because of its effects in physical, social, psychological and environmental ways. The rebuilding and inhabit victims after disasters could also lead to new models that enable urban and rural renewal in settlements. The emergency accommodation conditions, created for disasters victims, concentrate on overcoming the negative post-disaster conditions

[1] This article was prepared by named "Proposal for An Innovative Housing Approach in Extraordinary Stuation by Using 3D Printing" graduate thesis, conducted by Assist. Prof. Dr. Ufuk Fatih KÜÇÜKALİ, Institute of Science and Technology in the Department of Architecture in Istanbul Aydin University in 2016.

and protecting the victims from external effects. The construction of temporary housings necessarily entails a process radically different from the construction of housings at normal.

Rapidly there is increasing in need of energy and housing in the world according to the speed of the population increase, while there is limit of resources to achieve our needs by industrializing and technologically developing world.

Therefore the opportunity of facing an environmental harm or disaster increasing by the time. The constructing of buildings acts a main role in this fact, so one of our goals should be taking into consideration to apply sustainability criterions during planning and designing new buildings.

Moreover, and as it is important to apply sustainability criterions to new permanent buildings, it is more important to apply it to the temporary dwellings especially by consideration the economy side in temporary architecture.

2. THE CONCEPT OF SUSTAINABLE TEMPORARY ARCHITECTURE

2.1 Defining Temporary

A reviewing of the post-disaster cases in many countries around the world lead us to conclude that passing directly to permanent housing stage from the emergency stage is impossible. We should find another stage which represent the period from the termination of the emergency aid stage until normal living was established in permanent houses, and that what we call “temporary stage”.

Consequently, we can analyse the post-disaster period into three stages like this (Figure 1):

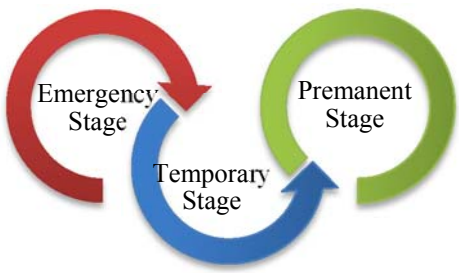


Figure 1. The three stages of post-disaster period

Emergency Stage is the stage that the homeless victims making their own accommodation positions or provided with emergency tents by governments or charities [1].

Temporary Stage must start in a shortest period after disaster and emergency stage. It continues until the permanent houses are completed. In this stage, the housing is solved by the temporary dwellings. The length of the rehabilitation stage is a consequence of providing the permanent housing and is never determined in advance. Due to the delay of the reconstruction stage, in some cases the temporary stage may continue up to 30 years [2]. In such cases, the temporary houses undertake extemporary functions related with the usage style and period.

Permanent Stage develops and rebuild disaster stricken region or reconstruct accommodation complexes and aims to provide proper permanent housing for the victims in a short period.

2.2. Defining Sustainability

Brundtland (1987) first put the now-traditional concept of sustainability forward as '"Sustainable development seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future' [3].

The preservation and developing of the resources are at the base of the sustainability and sustainable development. The assessment of the resources by their continuous preservation, especially the defense of the renewable resources without going beyond their renewal limits to the development form the base of the development philosophy preserving the environment [4].

There are many principles that the temporary architecture should achieve to reach sustainability. Fundamental elements has been choesen wich cover most of the sustainability principles in temporary architecture, and that takes us to the third chapter of this research.

3. SUSTAINABLE TEMPORARY ARCHITECTURE PRINCIPLES

3.1. Budget

The issue of the cost of construction work is one that is rarely far from the minds of construction clients, design teams, constructors and, of course, quantity surveyors. Generally, there are two types of costs in construction operation: capital costs and lifecycle costs, and in our case, it is very important to concentrate on both of them at the same time.Actually, in sustainable temporary architecture and in such post-disaster cases the client is the victims themselves or charities so undoubtedly the cost should be reduced to the maximum extent.The factors which affect the cost of the building include: the identity and priorities of the client, the nature of the project and who is responsible for developing its design, the choice of procurement options, the prevailing market conditions and legislative constraints.

3.2. Processing Period

As mentioned in "Defining Temporary" section, we must reduce the emergency relief stage as much as possible so we have to make a strategy or framework to inhabit the victims and to alleviate stress and sufferings of them in a short period of time. After required infrastructure is made, the critical part of rehabilitation stage is housing construction, because it is the real step that allows us to move from emergency to temporary stage.

There are a lot of solutions to reduce the construction period such as producing the shelters in factories while the infrastructure are being make in the site and all we have to do is to put them on its foundation which we already made there. Until now this is the most famous and used strategy, but in some cases - especially in wars- this could not be very useful because it may be expensive little bit and we have to transport these shelters to the site and this adds another costs. In other solutions, we can depend on the victims themselves to build by clay or any other material but this normally take a long period.

3.3. Usage Duration

When a desire to make a building in temporary (rehabilitation) stage as reliable as possible we should to think about its robustness and continuance because in some cases this stage could continue for a long period so the buildings or shelters we have to made must be robust for even years.

Several principles must be considered for understanding what robust design stands for, and as we think about a long time, so in the first place the main consideration should be an extreme environmental effects, everything in nature presents natural variation. It cannot be avoided but it can be controlled. In the other hand, the comfort of the victims in there shelters is also an important idea because a long time means that

the family which lives in this shelter will have needs widely like permanent accommodation. Therefore, the tent system, which normally used in the emergency stage, does not serve our purpose or even a one-room shelter –which is the most famous one.

3.4. Materials

In the design phase of any building industry, appropriate material selection is critical for the entire project. A poor choice of material may affect the quality of the project, lead to high cost during the long term operation and maintenance phases, and even endangering humans and the environment [5]. By intellectually integrating building materials and methods, a sustainable building may meet users' needs, reduce impact on future generations, and promote environment quality, economic vitality, and social benefits [6].

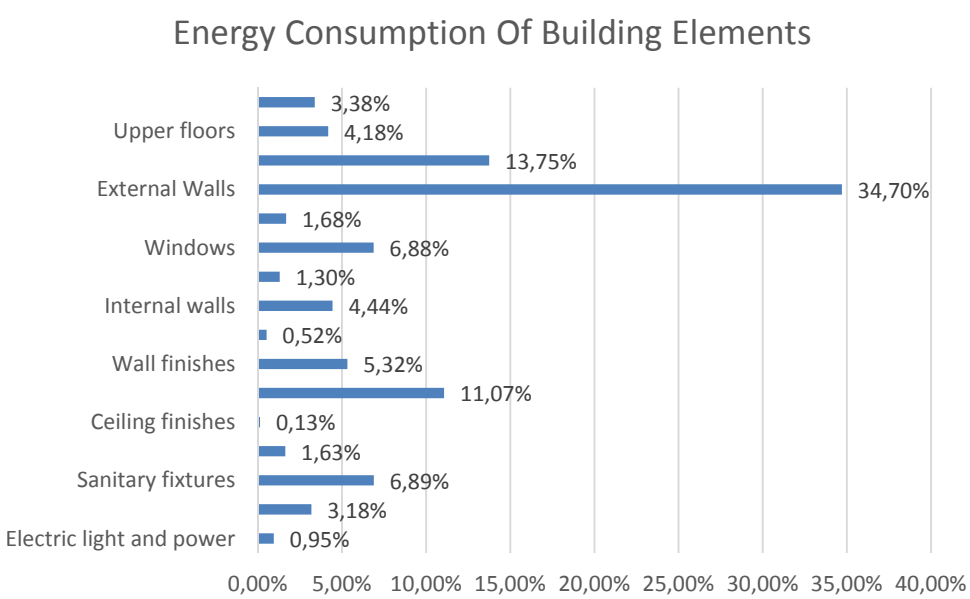
The conservation of environmental resources includes both the minimization of consumptive practices and protection of quality, of both non-renewable and renewable natural resources: doing more with less. Minimizing usage of valuable natural resources is an obvious element of sustainable practices. The mantra of "reduce, reuse, recycle," can be interpreted for this idea as: reduce consumption, reuse existing resources (salvage, recycled content or recyclable materials), and recycle waste produced [7].

3.5. Energy

Comparisons of energy savings are dependent on the energy intensities used within each dwelling. Homes have varied consumption rates depending on design, features and use. Comparisons must consider these factors and their costs [7].

In sustainable temporary architecture, the case is different from the cities because we do not have any infrastructures or even it could be so far from our site. Furthermore, the energy may be generated form charities. Therefore, to reduce the costs for these charities -that could continue for a long period- and by considering the lack of infrastructure we will find that the best way to providing our buildings in rehabilitation stage with energy is the sustainable one.

Table 1 Energy-consuming of building elements [8]



3.6. Water

Sustainable water reuse is a central theme in sustainable temporary architecture; water is a finite resource intrinsically linked to energy. Energy is required to pump and move water throughout the building system. Additional energy is consumed by treatment processes that result in water which meets acceptable quality standards. Similarly, water cannot be infinitely pumped from potable sources to meet victims needs. Sustainable solutions are required that meet current and projected need as well as preserve natural and human cycles. Responsible water management increases water efficiency and both indoor and outdoor environments benefit from it.

Through the implementation of water management strategies, such as water reclamation, conservation, or decentralized water reuse, the issues associated with water need may be alleviated. Various water strategies can be implemented to increase water use efficiency such as conservation, recycling, reclaimed water, green roof, and native landscaping [9].

3.7. Flexible Of Capacity

As we know, every family is a unique case and has her own properties, average of privacy and a different number of persons. Therefore and as architects, we should find a best solution to save this family's properties.

In post-disaster cases, some people think that this is not an important principle because we have to find roofs for a huge number of families. This could be excisable in emergency relief stage but since we are moving toward temporary stage, which could continue for long period as we said, so it is meaningless to deal with all the families as they share the same conditions. One of the best ways to achieve our goal is to make a design with flexible of capacity that allow us to build according to the family.

4. TEMPORARY ARCHITECTURE SYSTEMS AND TECHNIQUES

4.1. Tents

Tents are the oldest and most enduring form of housing. Early nomadic societies required housing they could move from place to place in order to find food. This often meant moving from moderate to extreme environments (Figure 2).

Any shelter used by these people needed to be robust and flexible. One such shelter is the Yurt. Used by Turkish and Mongolian tribes, this shelter was and is the primary dwelling of the tribesmen. It is disassembled and carried across long distances.Tents are temporary enclosures used to house people or goods. Their uses vary to include recreation, refugee housing, and military shelters [10].

Figure 2. View of the tent structures [11]

The emergency tents are not intended to be a permanent solution, but a movable foundation that could be upgraded over time by residents [12]. Nevertheless, if these tents are used for a longer period than foreseen, the devastating and inhuman situation increases. Sheltering not only concerns the provision of a physical structure; it also has to satisfy a number of other requirements [13].

These structures range in size from single-person dwellings to warehouses. The wide variations in both use and size make tent structure design a considerable challenge.

4.1.1. Sustainability assessment

Budget: Generally, these types of shelters do not cost a lot of money as capital budget. Simple tent could even be made by the humans with simple equipment. It just could cost a little if we have to transfer them for a long distance.

Processing period: We can construct these shelters with couple of hours and we could work with the victims to process it. It is just constructing the structure then holding the cover to it, and this consequently taking a very short period.

Usage duration: One of the main disadvantages of lightweight shelter is being short lifespan. It is very affected with environmental effects. Neither the structure nor the cover could resist the rain or storms or other external effects. The cover could worn out by the time. Moreover, and by considering the lack of privacy or any other social needs for the family, we should not let the victims accommodate in such environment for a long period.

Materials: The structure material could be steel or PVC and both of them are reusable and recyclable, after the finishing of using it we can disassemble it and store it for the next mission or we can recycle it be melting and reduce it for other uses. Nevertheless, main problem here is the cover; it is neither reusable nor recyclable and farther more the life span of it is short. These materials has a lack of thermal insulation and it cannot resist the environmental and climate effects. All what we can do after few months is to throw it away and bring a new one to cover the main structure and that is the worth part in tents.

Energy: Basically, in this system there is no any consideration about energy. The heating could be by gas or firewood, and however this heat will leak by the cover of tent.

Water: In an organized camp from these tents, we cannot talk about any type of water reaching or getting out from the tent by pipes. Normally the water is brought from main sources in the camp by gallons. The WC and bathrooms are combined in some points and regardless of privacy it is normally stay unclean and unhealthy.

Flexible of Capacity: We can achieve this property by producing a number of models considering the number of persons who will accommodate in this tent; that could be achievable before producing. However, normally the tent produced as standard for five person's family and we cannot add any additional spaces. Therefore, we cannot consider it as flexible theoretically.

Tents						
Budget	Possessing period	Usage duration	Materials	Energy	Water	Flexible of capacity
√	√	χ	χ	χ	χ	√

Table 2. The conclusion of tents sustainability

4.2. Earth buildings

The mud, and because of its plasticity, is the first used building material. There is no problem about finding or producing it and it could be formed easily. Earth and muddy mixtures are used as a building material in a variety of ways for ancient times.

Around the world, there are a lot of refugee families, who find in traditional techniques ways to build dwellings that meets their basic needs. Many refugees use building techniques that have evolved for years taking into consideration their specific environmental surroundings, in order to build functional houses. These techniques are usually based on cheap building materials, easily found in the area and frequently long lasting (Figure 3).

Figure 3. Earthen buildings, Syria [14]

Earth buildings may constitute an intermediate technology and offer an alternative to both modern and traditional technologies, since it uses natural materials that are readily available, it is durable, and gives good and healthy indoor characteristics improving the comfort of its inhabitants; such a technique can possibly be easily transmitted and used by local people [15].

4.2.1. Sustainability assessment

Budget: Building materials is just soil, straw and wood and those are normally located in most of conditions. They are cheap and available for every one. It is a common and traditional technique so it does not need a very experience and the manpower could be the inhabitance themselves.

The owner can build furniture, such as benches and beds or even niches or bookshelves that may help reduce costs since there is no need to buy them elsewhere, and they can be made even after the house is finished. It is possible to add cob furniture to the building or to create niches or bookshelves after the wall has been built [15].

Processing period: Despite we do not have a loss of time about transferring materials or any other equipment which could be made locally, but the construction operation of these buildings often take long period relatively, vary depending on the type of construction.

Usage duration: This system provide a very long of usage duration and we could mention here that there are a lot of people around the world from old history until now living in such earth buildings as a permanent house. Because of its sensitivity of water, it may needs some repair every now and then and that depends on the environmental conditions. Therefore, we can say that it will be a good choice for sheltering in dry regions.

Materials: There are several advantages over compared to other building materials such as: affordable, low-priced, providing healthy lifestyle, natural local resources, minimal of waste generated during the production fire resistance.

Energy: This type of shelters is very effective from energy point. Initially, we can fulfil the main construction operation without any need for energy. In the other hand, the design of earth homes, and their usually thick walls make the atmosphere comfortable, and the interior temperatures quite stable.

Water: Since these dwellings could have many rooms and could contain even bathrooms so we can do water infrastructure and apply many techniques for conservation and water recycling. Moreover, in earth dwelling especially dome roof ones, we can add some simple equipment, which allow us to harvest rainwater, storing and reusing it in different ways.

Flexible of Capacity: Actually, the flexibility of earth buildings depends on the technique of building. Some techniques allow adding another spaces even after the finishing of construction and others need to be rebuild to change the design. However, in both cases that will not costs more than additional amount of soil and that is a big advantage here.

Table 3. The conclusion of earth building sustainability

Earth Buildings						
Budget	Possessing period	Usage duration	Materials	Energy	Water	Flexible of capacity
√	χ	√	√	√	√	---

4.3. Prefabricated Shelters

"Prefabrication" literally means carrying out work earlier (typically moving it from the site to a controlled work environment), aiming for a better use of resources and improved control, and reducing skill requiring operations on site - all in the interest of speed and profit. All building work uses materials (like sand, concrete, earth, formed on site) and components (units like bricks, sections like joists or assemblies like windows, necessarily prefabricated). Conventional prefabrication in high-tech and industrialized environments involves centralized factories, novel materials and stable organizations, but this is not necessarily the case in other environments (Figure 4, 5) [16].

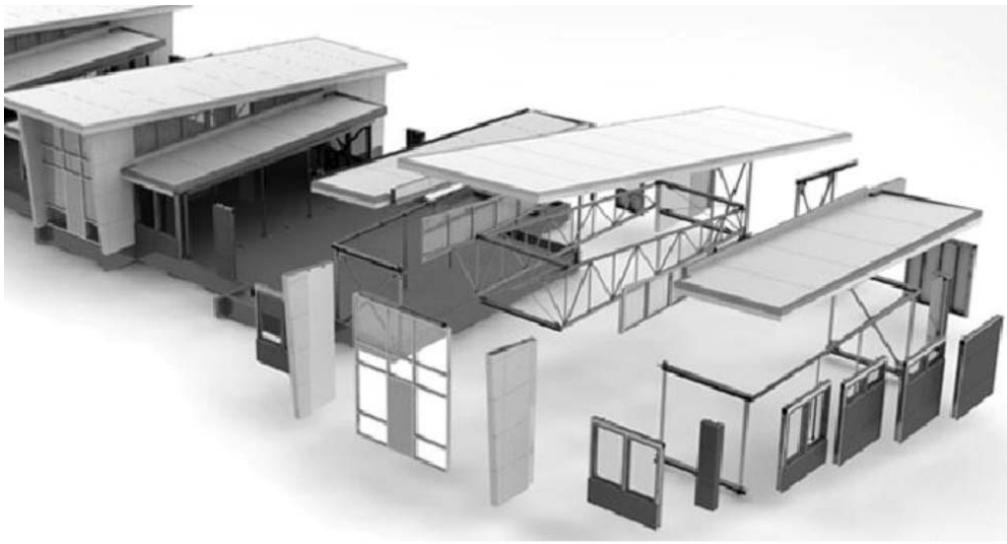


Figure 4. Prefabric structure component [17]

Figure 5. Modular prefabric structure [18]

Typically, four stages make up a modular construction project. First, design development by the developer and plan approval by any regulating authorities; second, assembly of module components in a factory; third, transportation of modules to the project site; and fourth, erection of modular units to form the building [19].

A form of prefabrication already exists in developing countries, which uses local materials and avoids high-tech industrialized operations, and which is based on a multiplication of resources such as small-scale local entrepreneurs. Facilitating a decentralized, low-tech, homegrown prefabrication capability of this sort may significantly contribute to post-disaster reconstruction [16].

4.3.1. Sustainability assessment

Budget: We can say that this type of shelters often cost a lot which make it difficult to offered even by charities, normally this shelters produced by supporting form governments and this is the most disadvantage here.

Processing period: As mentioned in "Types" section, we have two techniques to be applied here, however, in both of them the processing period is in the minimal stage.
Of course, we have a loosing of time for shipping and transforming, but if we want to talk about the period of the processing in the site, we can say that it will not exceed a couple of hours. We have to prepare the infrastructure like the equipment of energy and water... etc., for every shelter base and then all we have to do is to place the shelter and connecting the extensions there. Naturally, it will take little more

time in the site for joining the components if we used an "unjointed modular building" type and that depending on the size of the dwelling, but it still just a little time.

Usage duration: The modular shelters have the longest usage duration cooperative to the other temporary architecture systems. Because of its good materials, it could continue for a long time without a needing of repair or to be replace. It is useful for every climate or whether, and we it could be produced to appropriate any region in the world and that make it an international choice as sustainable temporary architecture. In the other hand, when the need of it ends we can dismantled and reuse it elsewhere and that is a very important point here.

Materials: The material in modular buildings allows many innovations and that make it a very advantage point. Since we are producing the shelter in the factory so we have a large number of material to choose and that depends on the budget and the climate. Modular buildings are constructed with a range of materials similar to conventional site-built construction. We have wood, steel, concrete and the most common in post-disaster cases is the mixtures. It could achieve thermal isolation, low carbon footprint, fire resistance, zero of waste, fully recyclable and it does not affected by crack, water or any other external impacts, all what we have to do here is to choose a good material and start producing.

Energy: As we are using a thermal isolation material, so we are reducing the heating that escape by the envelope of the building. In the other hand, the energy could be reached to the shelter from external network or we can even use the green resources like solar, wind energy or any other sustainable resource. We can attach a solar system to every shelter and that make it an independent unit or apply a general green energy system and make it an external network for a complex of shelters.

Water: The water efficiency of prefabricated system does not different a lot from the earth buildings.
The shelter could be connected by pipes with a main network and be supplied by some techniques to achieve the sustainability of water like reusing the grey water and rain harvesting…. etc. We have to mention here that these dwellings do not always have their own bath or WC, it could be assembled in points in the camp and using in public and even this public baths is prefabricated and come like a module.

Flexible of Capacity: The most important and unique property of the prefabricated buildings is its great flexibility and ability to change of its design and flexibility. In this system, we can add or remove one module or more to change the space and have a variety of volumes to appropriate every family and every situation. Moreover, we have a lot of different components and we can use it like Meccano game to form the best design, dimensions and space to suite every case.

Table 4. The conclusion of Prefabricated shelters sustainability

Prefabricated Buildings						
Budget	Possessing period	Usage duration	Materials	Energy	Water	Flexible of capacity
χ	√	√	√	√	√	√

5. CONCLUSION AND ASSESSMENT

By looking to the table 5 and the previous chapter, we can conclude the following:

- The tents: are not a suitable choice as a sustainable solution but it is the best in the emergency period because of it has the shortest processing period and it could made by the victims themselves.
- The earth buildings: is very suitable for the case that there are no a high budget for building and the victims do not leave the disaster place, so the people can build their own dwellings, which can even continue as a permanent buildings.
- The prefabricated shelters: could use for building camps for a large number of displaced people, which need a large number of shelters in a short period, and this type could just apply by a governments or charities because of its high budget.

Table 5. The conclusion of temporary architecture systems and techniques

Temporary Architecture Systems And Techniques			
	Tents	**Earth Buildings**	**Prefabricated Shelters**
Budget	√	√	χ
Possessing period	√	χ	√
Usage Duration	χ	√	√
Materials	χ	√	√
Energy	χ	√	√
Water	χ	√	√
Flexible of capacity	√	---	√

As a result, prefabricated shelters option that provides most of the criteria examined in the table above. but other two options tents and earth buldings are less provide than prefabricated shelters.

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Wind Catchers and Energy Efficiency in Buildings[1]

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Abstract: *This study is based on traditional ventilation methods. Since wind energy, one of the renewable energy resources, has long been used in settlement designs and practices, it is examined as the most important goal of the study. Architect Arastu (in 4th century BC) and Roman Architect Vitrivius (in 1st century BC) first dwelled upon wind energy management in urban design and architecture in historical period. It is intended to evaluate Wind Catcher as a cooling system and as the most important natural ventilation method of buildings. Thus, wind catcher is commonly seen in local architecture of Iran where there is a hot, arid and humid climate. Cities that have been designed for centuries according to climate conditions and weather conditions in hot-arid and hot-humid regions of Iran are taken as examples. Traditional Iranian architecture is directly affected from sun, wind, humidity, cold, hot air and all other weather conditions in various regions.*

Keywords: *Interior ventilation, natural ventilation, wind energy, wind catcher*

Rüzgar Tutucular ve Binalardaki Enerji Verimliliği

Özet: *Bu çalışma geleneksel havalandırma yöntemleri üzerinedir. Rüzgar enerjisi yenilenebilir enerji kaynaklarından biri olduğundan beri yerleşim tasarımı ve uygulamalarında kullanılmaktadır. Bu çalışmanın amacıda bu konu üzerinedir. Tarihsel süreçte ilk olarak Mimar Arastu'nun ve Romalı mimar Vitrivius'un kentsel tasarım ve mimarlıkta rüzgar enerji yönetimi konuları üzerinde durdukları görülmüştür. Rüzgar tutucular soğutma sistemleri olmalarının yanı sıra binalar için en önemli doğal havalandırma araçlarıdır. Bu nedenle rüzgar tutucular sıcak, kurak ve nemli iklimlerin olduğu İran' ın yerel mimarisinde çokca görülür. Yüzyıllardır İran'ın sıcak-kurak ve sıcak-nemli bölgelerindeki iklim ve hava durumlarına göre tasarlanan şehirler örnek olarak ele alınabilir. Geleneksel İran mimarisi farklı bölgelerdeki güneş, rüzgar, soğuk, sıcak hava ve diğer bütün hava koşullarından doğrudan etkilenmektedir.*

Anahtar Kelimeler: *İç mekan aydınlatma, doğal aydınlatma, rüzgar enerjisi, rüzgar tutucu*

1. INTRODUCTION

Annual average rate of global wind energy use in recent years is reported to be around 30% [1]. It is also a natural energy resource with the highest global consumption. Thus, total global capacity of wind power reached to 24,000 MW in 2001. Wind power consumption may substantially decrease carbon dioxide

[1] This article was prepared by named *"Energy Saving In Green Buildings and Rüzgar Baca as Traditional Methods"* graduate thesis, conducted by Prof. Dr. Bilge IŞIK, Institute of Science and Technology in the Department of Architecture in Istanbul Aydin University in 2016.

production since it protects the environment and prevents green gas emissions. Another striking point is low initial investment cost of wind energy among renewable energy types. A considerable drop may be seen in costs with expanding technology, increasing number of turbines and elimination of restrictions on wind energy use. Electricity power generated from fossil fuels is cheaper than electricity power generated by wind turbines.

A major part of total global energy consumption results from building heating and cooling. The application of optimum and effective methods, minimum use of global fossil fuel reserves and maximum use of renewable energy have drawn attention of architects and engineers in recent years.

This study aims at increasing natural ventilation efficiency, eliminating previous restrictions and contributing to the re-use of wind catcher as the most prominent natural ventilation method. The first part of study gives the definition of ventilation and explains natural ventilation methods and the second part explains the definition, function and performance of wind catcher.

2. VENTILATION

Fresh air inflow from outside to inside by using different tools and various methods in order to change air in a confined space is ventilation. It seems possible to replace stale air with fresh air in a confined space in order to maintain health conditions of interiors not only through mechanic ventilation systems but also with traditional methods. However, ventilation provides an instable protection against toxic gases, vapour and smoke. On the other hand, an effective ventilation method provides means for people to inhale fresh air without being subject to any discomfort. *Natural ventilation* that enables fresh air inflow from outside to inside generally without using air conditioner, cooler or other mechanical devices plays a prominent role in energy savings and protection of human health [3]. Another noteworthy point is *passive cooling* concept that provides heat comfort conditions in buildings without using industrial methods. For example, building windows at various sizes instead of using mechanic ventilation devices indoors.

Most people generally prefer natural ventilation rather than complex mechanic ventilation since it is easy to apply. Some measures need to be taken for proper natural ventilation of environments and interiors that have different functions. Natural ventilation is more effective in rooms that do not have large sizes. Natural ventilation is not considered appropriate for interiors such as kitchens that need special ventilation. It is suggested to build windows as high as possible in order to prevent discomforting air flows and enable outflow of heated and rising air. Air flow generally results from pressure differences from direct wind direction and reserve wind direction. Thus, some conditions should be considered during the construction phase of buildings in order to be able to benefit from this advantage [2].

2.1. Natural Ventilation Methods

The following methods are used for natural ventilation function according to different conditions.

Shadowing

Creating elements or areas such as porticos or eaves against extreme heating throughout the day. Thus, proper natural ventilation may be provided by benefiting from the temperature differences between direct sunlight and shadows. For example, SABAT element used in cities which are shaped by traditional Iranian architectural methods (Figure1) [4].

Figure 1. SABAT used in hot-arid cities of Iran [4].

Directing breeze
During the construction phase: Taking measures such as leaning buildings toward wind flow direction and building opposite windows for producing effective air flow. For example, designing long and narrow streets.

Preventing discomforting wind flow
Planting dense green fields for decreasing severe flow and creating an effective scene.

Making air humid
Designing pools in buildings for making the breeze cool and humid for human health and heat comfort.

Use of dome forms
Roofs that are built in the form of dome always direct the breeze inwards. Since solar radiation is not the same in different parts of roofs, temperature differences occur and thus, air flow occurs.

Use of materials with high thermal capacity
Hot air insulation properties of conventional materials such as bricks or cobs are suggested.

Building thermal (solar) chimneys
An outlet chimney is built in hot regions for facilitating interior ventilation and thus, ensuring outflow of hot air.

Using yards
Yards create air with low temperature and high humidity due to their climatic behaviours and since they have dense green fields and water pool.

2. WIND CATCHER

Wind catcher, designed according to wind flow rate and direction, is suggested as the most natural ventilation method (Figure 2). After hot wind hits the wall within the wind catcher, it is directed downwards and it draws cool air, which is cooled through the pool in the garden, with vacuum to the living environment and thus, cools the room [5]. Hot wind only passes through dry corridors in regions with high humidity rate, i.e. it is directed inwards without using the pool. Wind catcher is shaped by conventional material such as brick, adobe, mud, plaster and wood. Thus, wind catcher, which can adapt to all climatic conditions in terms of construction and cost, is designed in various forms in different geographical regions as the most prominent element of traditional cities.

Figure 2. Traditional wind catchers in the city of Yazd in Iran [3]

2.1. Wind Catchers Types

Wind catchers are classified into different types according to their view.

Type 1/ One Sided Wind-Catcher

It is designed as unidirectional as the simplest type of wind catchers (Figure 3, 4). It is the generally preferred type for interior ventilation in terms of cost although it is built in the roof in a very small size and in the simplest manner like chimney flue. In this method, wind catcher should be built only according to proper breeze and cool air flow in order to prevent possible damages from severe hurricanes and storms and should be closed in other wings. Single-duct wind catchers may sometimes be in the reverse direction of discomforting and severe winds. Only 3% of the wind towers in Yazd were unidirectional [6].

Figure 3. View of wind catcher type 1: one sided;
right picture: A view of a one-sided wind tower in Ardakan city, Yazd province, Iran [7]

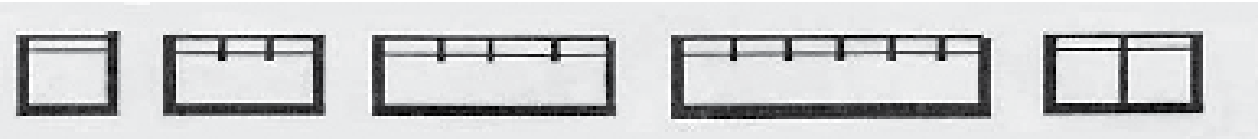

Figure 4. Plan of wind catcher type 1: one sided [8,9].

Type 2 / Two Sided Wind-Catcher
Bidirectional wind catcher is comprised of two thin and long inlets that rotate in contrast to each other (Figure 5,6). In a survey by Roaf [6], 17% of the towers are of this kind in Yazd and all are found on the ordinary houses.

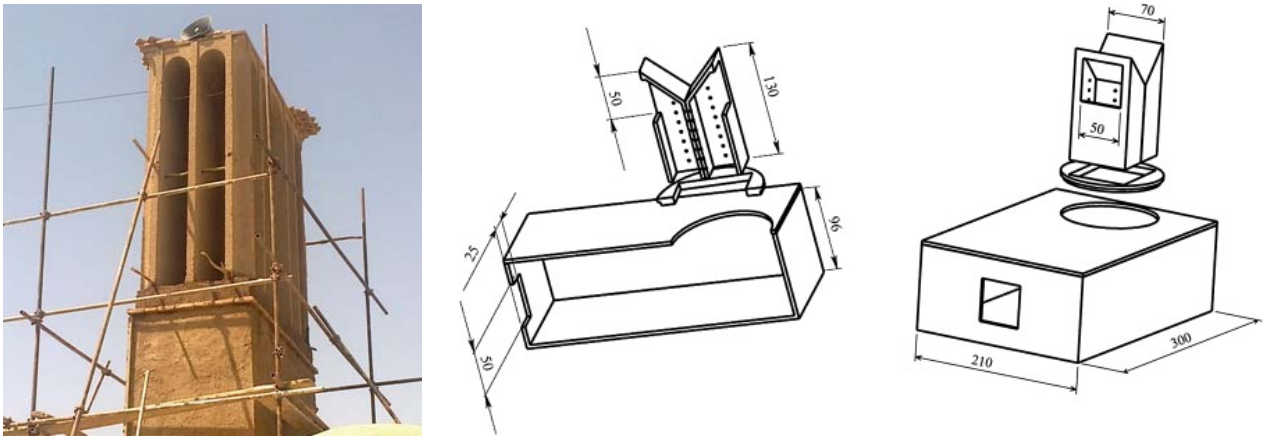

Figure 5. View and dimension of wind catcher type 2: two sided [10]

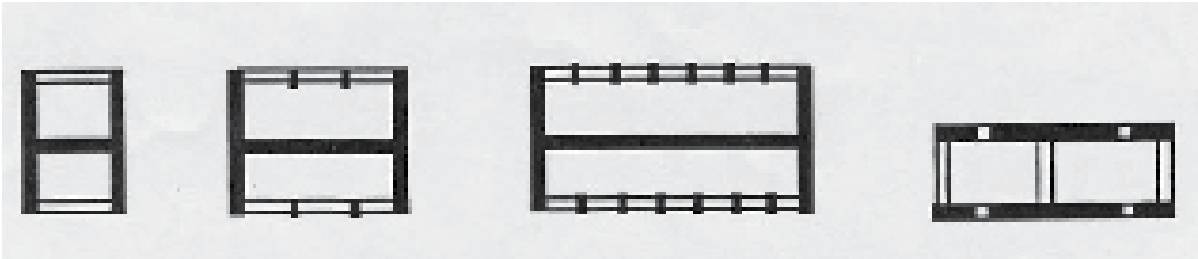

Figure 6. Plan of wind catcher type 2: two sided [8,9]

Type 3 / Three-Sided
This tri-directional type uses air flows from three different sides.

Type 4 / Four-Sided
This quadri-directional type is designed in a more detailed and comprehensive manner than other wind catcher types. Internal ducts are generally separated into different sections with brick, wood or gypsum (Figure 7, 8) [11].

Figure 7. View of wind catcher type 4 [3,12]

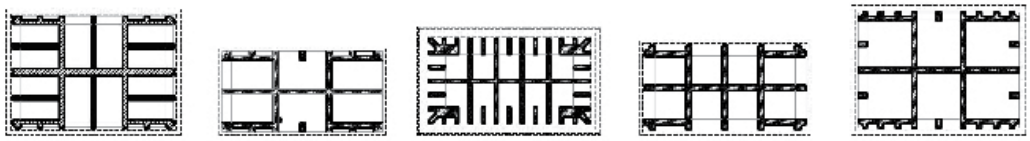

Figure 8. Plan of wind catcher type 4 [13].

Type 5 / The Hexahedral and Octahedral
As a multi-directional wind catcher, it is used in regions where weather conditions allow in terms of climate conditions.

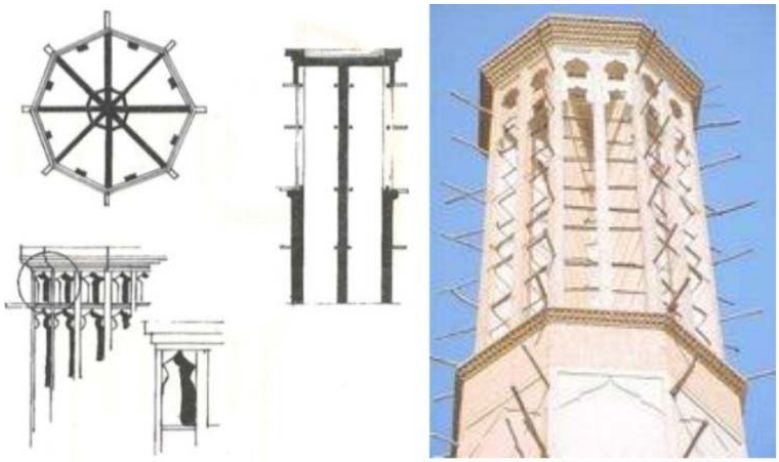

Figure 9. View of wind catcher type 5[9]

Type 6 / Pipe Like (Chopoghi)
Exterior form is designed in cylindrical form and appears as a circular pipe as differently from other types that have cubic shape. However, it is the same with versatile type of internal ducts.

Figure 10. View of wind catcher type 6: pipe like (Chopoghi) [9]

2.2. Function of Wind Catcher

The existence of wind catchers in houses used to represent reputation and welfare of families in terms of traditional life styles. Its size – big or small – was related to economic condition of house owners. Thus, it is possible to determine economic condition and welfare of every family at first sight according to the external form of wind catchers in a city or in any settlement. Wind catcher is the optimum ventilation method for breathing houses (Figure 11) that are located in the core of regions with hot-arid weather conditions such as deserts. It also provides fresh air flow in rooms, basement and all liveable parts of a house. Thus, wind catcher should be directed to optimum air flow for a more effective performance. The basic function of wind catcher is summarized in two parts. Its first function is to direct cold and fresh air to interior spaces and its second function is to discharge stale and hot air to outside with vacuum effect.

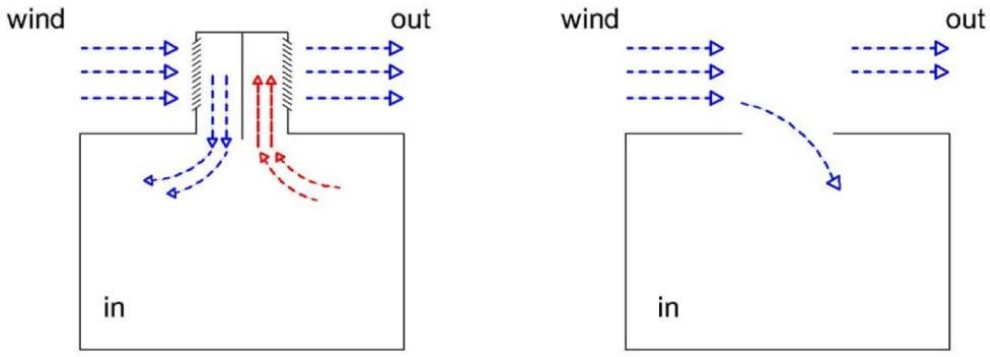

Figure 11. Air flow in a building with and without a wind-catcher edited by Narguess Khatami [14]

2.3. Components of Wind Catcher

A wind catcher is generally composed of five parts, i.e. stem, shelves, blade, opening and roof.

Shelf: It is the top of the wind catchers including blades and air flow ducts.

Stem: Wind catcher has a depth of 1m-2.5m mostly and durable wood should be placed at half meter intervals to make it stronger.

Blade: It is designed as a wind barrier element and has architectural benefits. For example, it is perceived as a component that is influential on frontal view and shape of wind catcher.

Opening: 40cm-60cm space between two blades. The number of openings of wind catcher depends on room width and wind flow intensity but the number is never an even number.

Roof: The upper part of wind catcher is covered with CAPILE or in the form of staircase roof, which helps its performance [15].

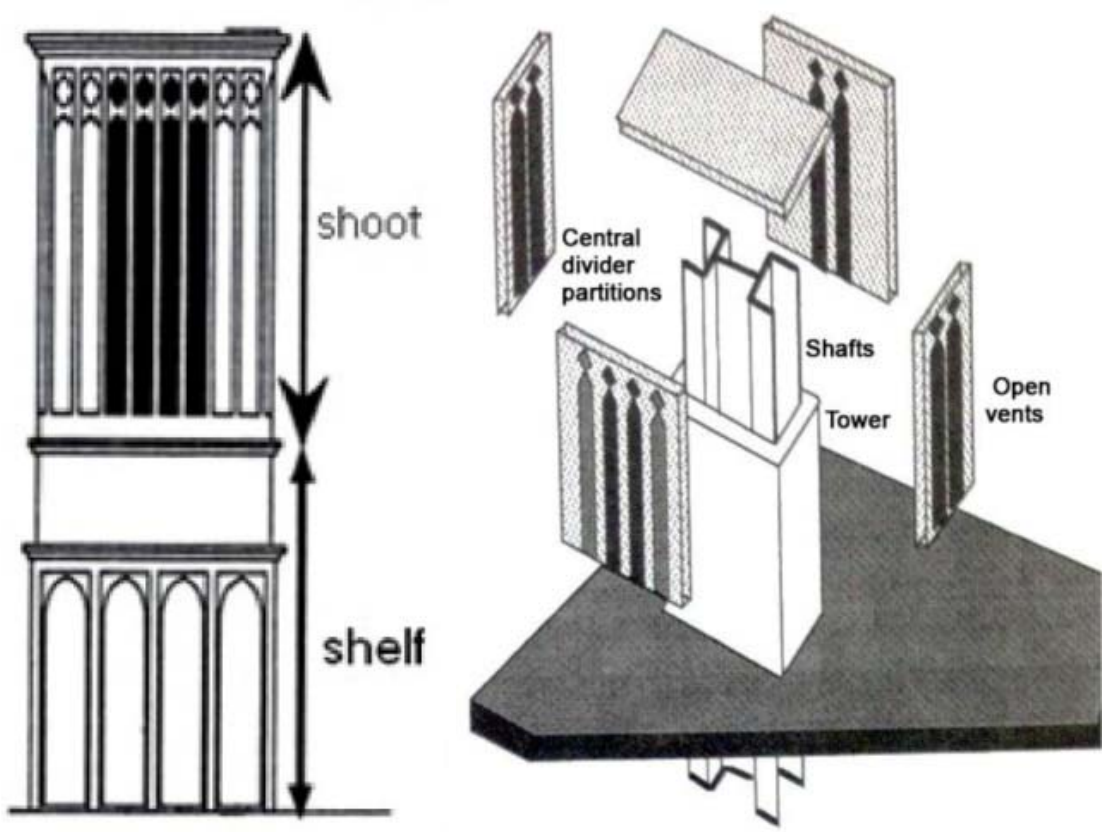

Figure 11. left: Shelf and stem in wind catcher [16]; right: wind-catcher elements [19]

2.4. Performance of Wind Catcher

Two basic operation modes are observed in wind catcher performance although it has various forms for interior ventilation and is used in different climatic regions.

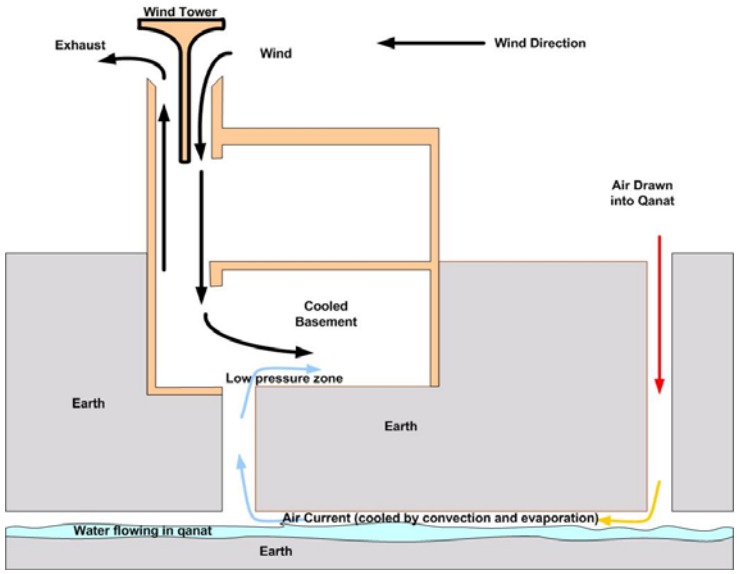

Figure 12. Performance of Wind Catcher [9]

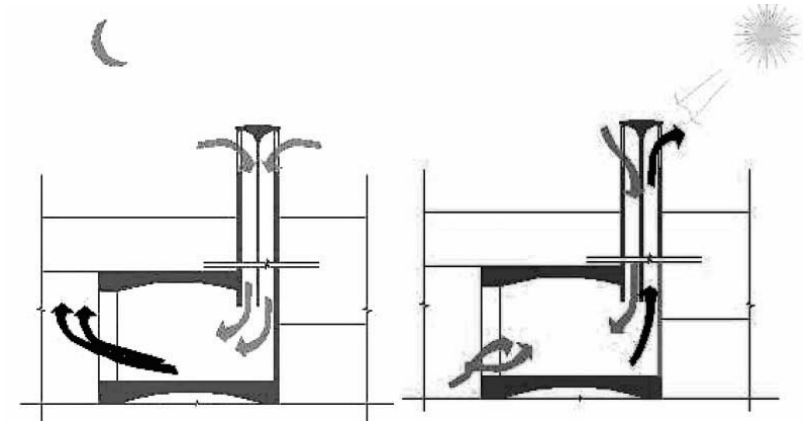

Figure 13. Wind-catcher function during the day and night [17]

Draught and Vacuum of Openings

When wind hits the openings, pressure difference occurs in the other direction since air flows intensively and thus, hot and dry air is directed downwards (draught) and stale air of room is extracted outwards in the opposite direction (vacuum). In the meantime, air cleaned and humidified through pool is directed to interior space.

Temperature Difference

It is the second method for wind catcher performance that draws attention of experts less. In fact, wind catcher operates on the principle of temperature difference when wind does not flow. Air in the stem of wind catcher is heated during the daylight and rises upwards. For compensating this lack of air, stale air from interiors is extracted outwards while cool air of yard is drawn inwards. In the night time when air outside is cold, air is directed downwards and it is heated due to temperature stored in walls. This cycle continues until the temperature of air outside and wall temperature become equal. Since it is not possible to build a pool on the ground floor in some regions, duct water remains on the basement floor and passes through wind catcher's ducts (Figure 14) [11].

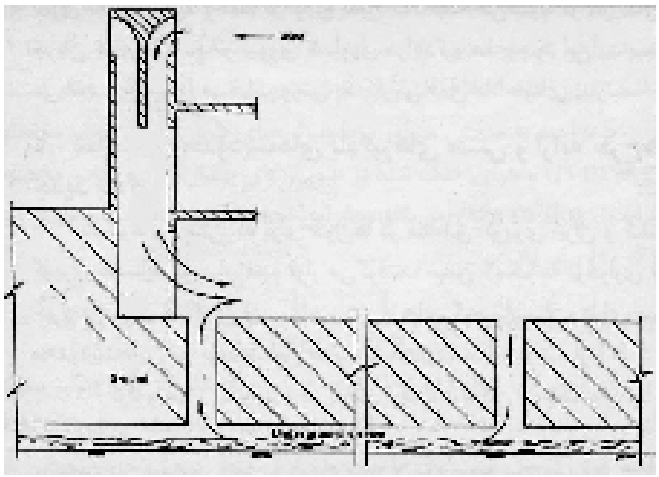

Figure 14. Wind catcher and wing water

3. CONCLUSION

Despite all technological developments, wind catcher is an important factor that completes ventilation system as a component giving an identity to buildings in terms of vernacular architecture and meets cooling requirements of buildings. It also increases energy efficiency due to climatic adaptation and provides cost efficiency since it can be built from recyclable materials. Thus, wind catcher is considered an important object that ensures sustainability of buildings and large-scale cities in dry-hot regions. In conclusion, it is necessary to modernize traditional natural ventilation methods instead of complex technological solutions in order to evaluate the performance of wind catcher. Thus, wind catcher provides heat comfort conditions for a building through natural ventilation depending on different seasons and contributes to human and environmental health. For example, first zero-emission office building (Figure 15).

Figure 15. left: first zero-emission, eco-friendly office;
right: First zero-emission, eco-friendly office A. Wind catcher; ventilation means in summer season.
B. Solar collectors, hot water and power generation means.
C. High amounts of heat insulation [18].

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Space Syntax Strategies: A Lesson from Iranian Traditional City, Case Study is Kashan

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Abstract: *This study aims to overcome particularly some of the new urban problems shaping the urban form in Iranian traditional cities, or in other words, to present conceivable applications on the appearance of Iranian traditional city problems like in Kashan. This article aims to focus on presenting some perspective of the traditional city of Iran which has the capacity to be used in raising the quality of life in modern cities of the country. The important part of this study is upon enhancing the stability rather than the developments based on street network and urban developments based upon space syntax theory. Study tried to show how there is little equilibrium between availability and stability in the historical cities. Interactions of the built environment and urban topic such as environment, transportation and the social human relations arise from such strategies. Sense of place and community, environment and sustainable transportation are an important subjects for space syntax.More human oriented planning is needed to make an equilibrium between accessibility and sustainability. New strategies need to be developed to progress on this topic. Analysis results of the traditional area of Kashan city can also be suggeseted for the medium-sized cities of the center, east, south of Iran. In the last part of study, it was determined space syntax strategies from the analysis of Darb-e-Yallan and Darb-Esfahan.*

Keywords: *Traditional urbanism, Kashan, urban developments, Space Syntax theory, environment, Darb-e-Yallan, Darb-Esfahan.*

Space Syntax Stratejileri: İran'ın Geleneksel Şehirlerinden izlenimler, Kashan örneği

Özet: *Mevcut araştırma Iran geleneksel şehirlerindeki özellikle kent formunu şekillendiren yeni şehir problemlerinden bazıları ile başa çıkabilmeyi yada diğer bir deyişle Kashan şehrinde olduğu gibi Iran geleneksel şehri problemleri görünümleri üzerine muhtemel uygulamaları göstermeyi amaçlamıştır. Bu çalışmanın önemli kısmı space syntax teorisine dayalı kentsel gelişmelerin ve cadde ağı tabanlı gelişmelerden çok istikrarı artırma üzerinedir. Tarihsel şehirlerde kullanılabilirlik ve istikrar arasındaki nasıl bazı dengelerin olduğunun gösterilmesine çalışılmıştır. Yapılı çevre ve şehir arasındaki ilişkiler çevre, ulaşım, sosyal ilişkiler gibi ilkelerden yayılmaktadır. Mekan hissi ve topluluk, çevre ve sürdürülebilir ulaşım space syntax'ın önemli konularındandır. Ulaşım ve sürdürülebilirlik arasında dengeli bir tasarım için daha insan odaklı bir planlamaya ihtiyaç vardır. Bu konuda ilerleyebilmek için yeni stratejiler geliştirilmelidir. Bu çalışmadaki Kashan şehri analiz sonuçları, Iran'ın merkezi, doğu ve güneyinin orta ölçekli şehirleri için önerilebilir. Çalışmanın son bölümünde Darb-e-Yallan and Darb-Esfahan'ın analizlerinden space syntax ilkeleri belirlenmiştir.*

Anahtar Kelimeler: *Geleneksel şehircilik, Kashan, kentsel gelişmeler, Space Syntax teorisi, çevre, Darb-e-Yallan, Darb-Esfahan.*

1. INTRODUCTION

Space syntax was first developed by Hillier and Hanson [1, 2] who have presented a considerable communication with how people move through and use urban spaces and buildings and how they have achieved some set of measures for space configuration.

Space syntax is best defined as a research program that inquire the relationship between space and human societies from the prospect of a general theorization of the organization of dwell space in all its various forms; settlements, buildings, cities, or even landscapes [3]. The basic concept of the theory is that the built environment has an undeniable result on the social behavior of the people [4]. The space syntax theory is one of the best idea to help planners and architects who have further perception of the interaction between the human behaviors and built environment.

Consistent statistical relationship between configurationally properties of people and space layouts was presented in studies of space syntax and cognition, meaning that spatial cognition is the ability to remember and form a map of space. Relations between spaces means spatial "configuration". In the form of building floor plans or plans of the urban fabric in general, the initial object of studies within space syntax is studied in the configured space [5,6,7,8].

"The Social Logic of Space" was published in 1984 [1]. After the book title became familiar on space syntax subject during the past 25 years, this theory has been prosperous to bring many architects and planners from all around the world together in an association and great amount of literature. Space syntax theory has been used to specify the effects of the space properties on social activities, such as pedestrian traffic or way finding [9, 10, 11].

How the automobile streets affected the organic texture of Kashan is the first aim to use Space Syntax theory in this article., space syntax theory survey is made in traditional Kashan city since the historical core of Kashan city is one of the great examples of the traditional Iranian cities that can be found in big cities. It is possible to claim that Kashan is unique; the askew, dead-end allies and thin routes with short doorways which have reduced to the level of yards still remind the passenger of the traditional life style and urbanism. Of course there are valuable urban textures in some smaller cities but less than in comparison to the larger cities like Esfahan, Kerman and Shiraz. The main reason for selecting this city as case study is that pure historical traditional urban has still remained through the centuries.

2. RESEARCH METHODS

The research methods used three above-mentioned sorties are relying on the literature revision and straight witnessing, and application of space syntax theory that has been applied to present some more witness are describing in regularity to investigate space syntax in Kashan historical and traditional city.

Literature revision: goal of solving modern problems on re-presentation of traditional urbanism is the mean of idea on the basis of this issue. For having a better understanding about what has happened on the neo traditional expansion of modern world and also what the Iran traditional urbanism has looked like, the literature revision and library are giving an intense study on the issue. Their nature and history are base core of the presented concept.

Straight witnessing: is the main idea to review the case study area, and it's essential to be straight witnessing. In result of witnessing, the new urban environment and traditional elected area are related to the case study city, so in this situation, the author needs to have common conception of clue problems and life style in traditional area of the city. Having been in connection wth the settlement of the historical

neighborhood is a good indicator of traditional life style for the author. This concept of method received from the residents has influence on this research. Thus, this method of contiguity is the observation by specifying the boundary of the neighborhood units of the city.

Application of space syntax: using such tools that can produce numerical data for analysis can be helpful on research. Part of Iran has always suffered fatality from the little or invalid raw information. This application has been feasible to demonstrate the change in the social behavior and the customs of the settlement on the city, affected by the built environment. More explanation on this theory is necessary for quick introduction on previous research methods.

2.1. Sample Area

One of the oldest city at central Iran is Kashan. Sialk Hills or tape sialk is the oldest point of Kashan that has been one of the biggest urban civilization of Iran. The estimate research of sialk civilization has been active since the sixth millennium B.C. to the first millennium B.C. City is located in northern part of Esfahan province (Figure 1). Currently, approximately 270000 settlements are living in the city. Thus after Esfahan city, it is one of the biggest cities of Esfahan province [12].

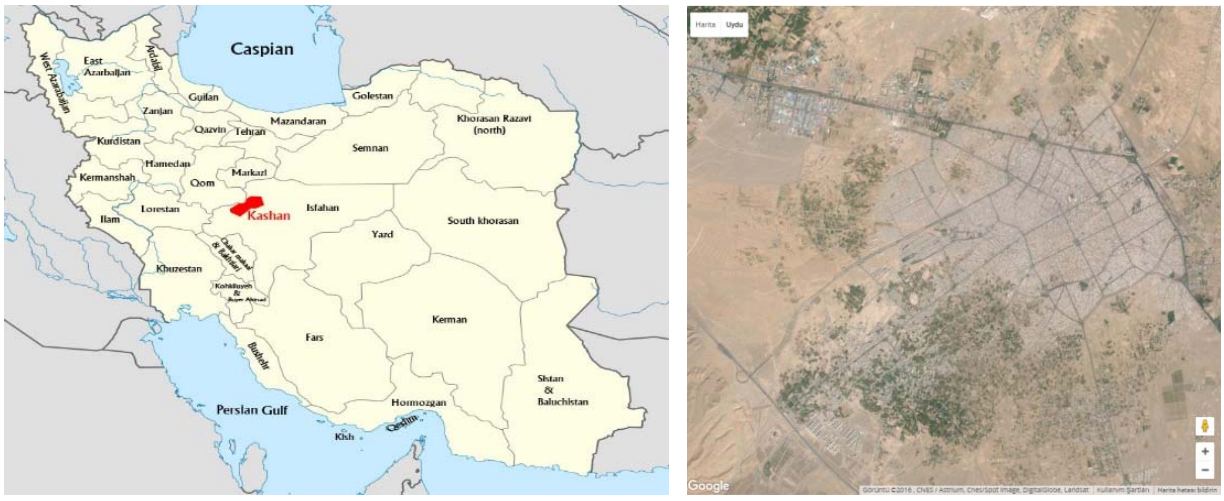

Figure 1. left: Location of Kashan city in the center of Iran;, rihgt: Kashan city satellite view from google map and Iranshenasi Publishing co., the Urban/Tourism Map of Kashan, 1/15000, Tehran. [13]

According to Iranian urban planning the other same traditional cities of Iran form the core separation into some major neighborhoods that each of them is a part of the neighborhood unit. According to the map in Kashan, Sultan Mir-Ahamd has been the largest neighborhood unit as Soltan-Mir-Ahmad was located in southwest of the city and attached to the city castle (Arg), and Meidan-e- Amir Neighborhood unit was the second large unit in Kashan otherwise the smallest neighborhood unit is Arabha.

In the historical core of Kashan 7 main neighborhoods were recognized out of 44 neighborhood units, however; only two of the neighborhood unit characteristics of Kashan are briefly reviewed in this article (Figure 2).

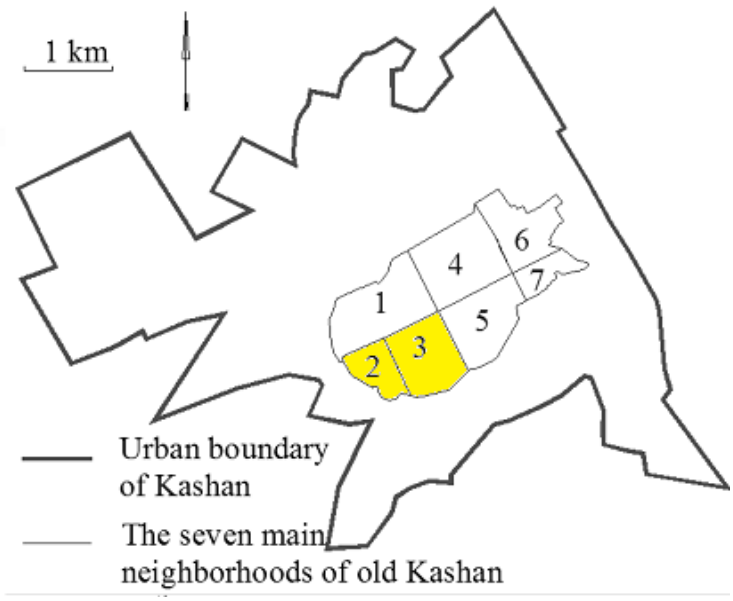

Figure 2. The main neighborhoods of the core of Kashan, Kheirabadi, M. (1993), Iranian Cities: Formation and Development, University of Texas Press. [14]

Darb-e-Yallan is called the first neighborhood that is observed. Two centers are defined for the unit on basis of the unit Darb-e-Yalan (Figure 3). A social center is the first one that consists of Darb-e-Yalan Mosque which had been the social central of the unit. The second center was located in the geometric center of the unit including the shops that joined the place on the other way and everyone could easily reach them. According to Google, the longest route from one of the houses to the shops was 185 meters and the longest way to the mosque was 285 meters, therefore such places were used by the residents to meet and socialize with each other [15].

Darb-Esfahan is called the second neighborhood that contains two units, first of which is Kushk-e-Safi and the second Taghi-Khan. Both are attached together and inter-relations could be shown (Figure 4). Neighboring units of the residents of each unit had accessibility to each other's centers. Ab Anbar and some small shops are located on the center of this unit. All residents of the unit had easy access to the center.

This part of the city is considered as one of the good examples of the Iranian urban form, Darb-e-Yallan and Darb-Esfahan are now located in the south of all other historical neighborhoods. The attention to the neighborhoods and the neighborhood units of Kashan gives good conception of how small communities were shaped by limited number of households. Although not all of the neighborhood units had all the gentleness and facilities otherwise units were located so close , it was actually not needed for them to have all the facilities. Walking distances in the neighborhood units is another opinion of sustainable urbanism in Kashan.

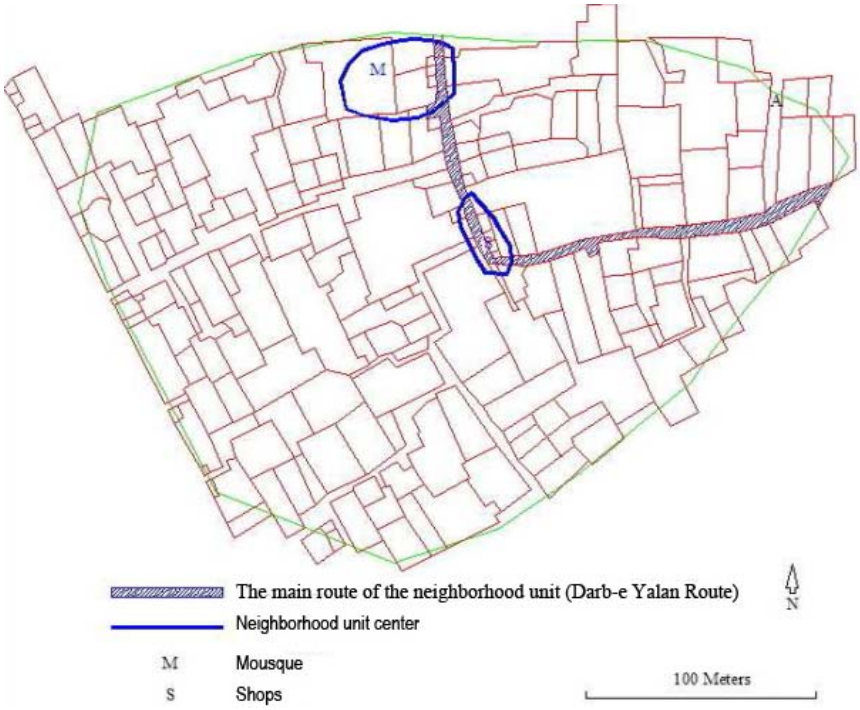

Figure 3. Illustration of urban texture of Darb-e-Yalan neighborhood unit and its centers. Map adopted and developed by the author from one of the maps of Tarh-o-Manzar Consulting Engineers Co. [16]

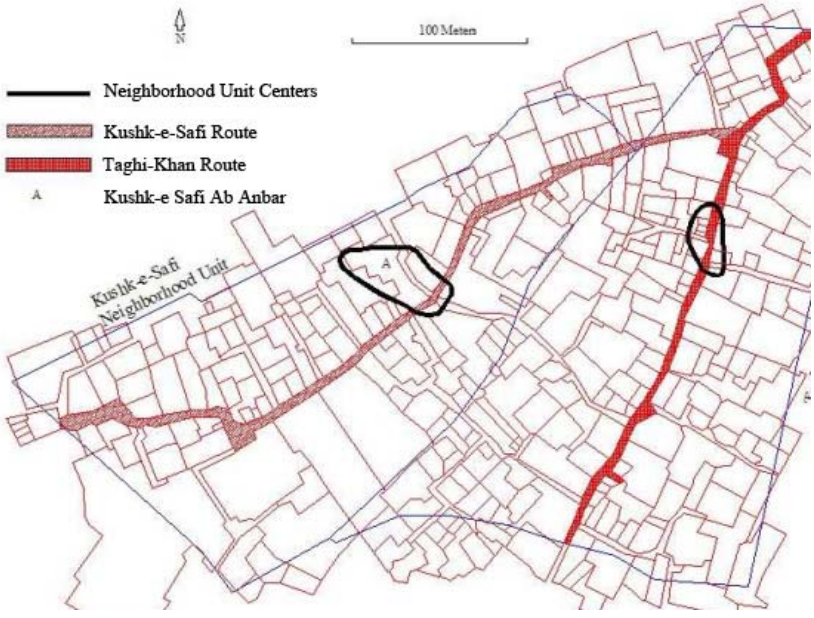

Figure 4. Illustration of the urban texture of Kushk-e-Safi and Taghi-Khan neighborhood units in Darb-Esfahan neighbourhood. Map adopted and developed by the author from one of the maps of Tarh-o-Manzar Consulting Engineers Co. [16]

3. ANALYZE OF SPACE SYNTAX IN THE CORE OF KASHAN AND (DARB-E-YALLAN, DARB-ESFAHAN)

As mentioned about two neighborhoods of Kashan, unit centers could consist of all of some social amenities and living. They could provide the people of each neighborhood unit the needed living materials from the next door centers or within their unit. Indeed in part of the areas is small of the unit thus the distance between the centers was quite short so people could increase the necessary that they could provide from their unit center.

In this research study, measured is the first type of accessibility, that accessibility from one point to any part of the city. Space syntax theory is applied in case of Kashan Depth map was used. For attending the accessibility of Kashan, WebMapatHome, which is also a software developed by UCL is applied on texture. The axial maps with all the new streets on the core of the city were exported to the environment of WebMapatHome. In Auto Cad and the Drawing Exchange Format file.

Map was made of 1738 lines, five indexes of the space syntax theory including connection, integration, total depth, mean depth, and Relative asymmetry were measured for each of the maps.

The outcome of the analysis of the mean integration shows that the whole city was increased after the neighborhoods were built through the streets. The same happened to the connection. The total depth and mean depth were reduce in the latter city of Kashan. The result of the Space Syntax analysis in Kahsan, Figures 5 show the differences in connection, integration and mean depth of the city after construction of the new streets.

Figure 5. Integration of Kashan's routes before and after the construction of the automobile streets Obviously increased integration on the city after the streets were built and the connection was promoted slightly. Before and after the construction of the streets can be seen in Table 1,2,3 The major values for the five indexes of the core of the city. Mashhadizadeh Dehaghani, N. (1994), spatial Analysis of Space Syntax Symposium On Urban Planning in Iran. [17]

Table 1. The Space Syntax indicators for the historical core of Kashan, before and after the construction of the automobile streets.

	Number of lines	Integration	Connectivity	Mean depth	Total depth	RRA
The core of Kashan-***before*** constructions of streets	1738	0.394	2.321	21.220	38475	0.0235
After constructions of streets	1794	0.743	2.449	12.478	22386	0.0117

Outcome of the space syntax analysis is that the mobility through the city streets became easier on physical meaning of the integration and connectivity on Table 1,2,3 Thus, mobility includes both non-motorized and motorized movement because people could easily access the narrow allies of the city center. The analysed neighborhood units Kushk-e-Safi and Taghi-Khan in Darb-Esfahan and Darb-e-Yalan show the change in mobility after the new wide streets were built in Kashan.

Table 2. Comparison of the Space Syntax indicators of Taghi-Khan neighborhood unit of Darb-Esfahan, before and after the construction of the new streets.

	Area (hectares)	Number of lines	Integration	Connectivity	Mean depth	Total depth	RRA
Taghi-Khan neighborhood unit ***before*** constructions of streets	4.6	22	0.456	2.32	21.220	38475	0.0235
Taghi-Khan neighborhood unit ***after*** constructions of streets	4.6	22	0.665	2.88	12.478	22386	0.0117

Table 3. Comparison of the Space Syntax indicators of Darb-e-Yalan neighborhood unit before and after the construction of the new streets.

	Area (hectares)	Number of lines	Integration	Connectivity	Mean depth	Total depth	RRA
Darb-e-Yalan neighborhood unit ***before*** constructions of streets	4.7	21	0.451	2.5	19.128	33075	0.0215
Darb-e-Yalan neighborhood unit ***after*** Constructions of streets	4.7	21	0.730	2.5	12.478	22486	0.0129

In Kashan, the mobility of the people was promoted by the streets and response of the old texture of Kashan against street building differed slightly from another desire cities in center of Iran. Meantime is not possible to emphasis that the neighborhoods of Kashan became more vibrant and livable. The reason for the sign of such results in the above tables is that the neighborhood centers lost significance to the streets.

According to the map of integration of the new Kashan indicate that are local old streets less than integration values of the main streets that are also used by car drivers. This includes both car use and

pedestrian use. In fact for the social activities and for the residents any more the neighborhood centers are not a vibrant axis and rush of people from neighborhoods to the streets are related to high values for the integration of the new texture.

Using space syntax theory on this part of the city tell us that integration and connectivity of the city as a whole, the city center and many other parts of the city has been improved and accessibility of the city is now higher than before and this is absolutely a good quality that promotes mobility otherwise in center of areas sustainable mobility modes can be promoted within reasonable walking distances.

4. CONCLUSION

In this study on the first section, it is indicated that space syntax provides facility to investigate the communication between various human activities and space attributes on the basis of computational and mathematical measurements. In this study and reviewed of space syntax theory, some of the areas in Kashan and core of the city tells us that it has relation with spatial cognition. They propose that there is a specimen underlying this communication and there is an important correlation among the syntactic property on the real space and property.

The conformity are the mean finding on the study of Kashan:

- The latter witnessing was continued in the figure of literature revision space syntax analysis.
- The unit are based on the neighborhood that are available to formal part of the unit the neighborhood have inward-looking and self-contained and also independent identities, the historical core of Kashan organized on the base of the neighborhood units and neighborhoods.
- Also traditional residents had used amenities and living with sense of belonging to their place this sense origin of enhanced by the unique identity of the urban amenities.
- Now accessibility on the core of city is higher than before and this situation is evidently showed of good quality that promotes mobility.

In this study, researchers believe that measurement of space configuration by space syntax and connection between the properties built an area. The outcome for the recommended medium-sized cities of the center, south, east of Iran to create better quality of life in the Iranian cities.

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Abbreviations
RRA Real Relative Asymmetry, **SS** Space Syntax, **UCL** University College London

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Abstract should not exceed 200 words with the word "Abstract" in 11 pt. italic, bold, abstract text in 11 pt. italic, all in Times New Roman font in Microsoft Word format. Papers written in English should have an abstract in Turkish, or the other way round. Paper title should also be translated along with the abstract.

Key Words not exceeding 5 should be in 11 pt. In addition, the designation of five keywords in both languages is essential.

Main Text: Maintitle should be in 11 pt. bold, capital letters and text body 11 pt. both with Times New Roman font in Microsoft Word format. The maintitle of the first section should start after double space following the keywords, the text will follow maintitles and subtitles with no space. There should also be single line spacing between the previous text and the subtitle.

Sections: Figures and Tables should be placed into the text body and captions for both should be 11 pt. Table numbers and captions should be placed before the Table. Formulas should be numbered sequentially. Referring to formulas should be as Eqn (.).

Conclusion section should have a title written in 11 pt. bold, capital letters and the text in 11 pt. all in Times New Roman font in Microsoft Word format. Conclusion should not be a version of the Abstract.

Reference numbers should be given in the main text as it is in the reference list in brackets as illustrated below:
Books:
[1] **Siegesmund, S., Snethlage, R., 2014.** Stone in Architecture: Properties, Durability. Springer; 5edition.
Papers:
[2] **Sirel, A., 2013.** An Urban Fabric mainly Based on Adobe: The old city of Van Kerpic, kerpic'13 – New Generation Earthern Architecture: Learning from Heritage International Conference Istanbul Aydın University, Turkey, 11-15 September 2013, 315-319.

Short Biography of the authors should follow references after a single line space, names in 11 pt. surnames in 11 pt. and the text in 11 pt. The text should not exceed 50 words.

Length of the Manuscript should not exceed 20 pages excluding Figures and Tables.