

Accessibility, Orientation and Scenery as Natural and Physical Environmental Factors in Hospital Design Case of Konya Hospitals

¹Dicle AYDIN, ²Mine SUNGUR

¹Department of Architecture, Faculty of Engineering and Architecture, Necmettin Erbakan University, Konya/ Turkey

²Ph.D. Student, Department of Interior Architecture and Environmental Design, Faculty of Fine Arts, Selcuk University, Konya/ Turkey

**Corresponding Authors: Mine SUNGUR, Ph.D. Student, Department of Interior Architecture and Environmental Design, Faculty of Fine Arts, Selcuk University, Konya/ Turkey*

ABSTRACT

The positive effects of daylight on the healing processes of patients staying in intensive care units or sickrooms of the hospitals are well-known. Therefore, the effects of garden/courtyard arrangement of hospitals have been researched in terms of healing and patients' user satisfaction. The significance of directions and signs for hospital access has been determined. This paper adds; (i) the significance of landscape planning and parking lot-building relation when access concept is dealt in terms of pedestrian and vehicle. (ii) The significance of the relation of building-entrance and environment, outdoor-indoor space size. (iii) The necessity for determination of space size, allocated for hospitals in city centers in terms of not only closed-area need but also parking lot and green area design required for environmental planning. (iv) The necessity of urban texture character in site selection of hospitals and the fact that public green area arrangements are required in environment. And the probe of the quality of urban texture (already available and to be existed) in environment and field size (especially parking and landscape) in site selection of hospitals for city construction plan has to be performed by local administrations or residential areas where pedestrian and vehicles are intense in the day, must not be preferred. Concluding, the urban texture/view must be taken into consideration in architectural design, and the hospitals must be noticeable in the city.

Keywords: hospital, accessibility, orientation, scenery, natural environmental factors, physical environmental factors

INTRODUCTION

The physical environments, in which we exist, live and share many things, affect people in terms of psychological, biological, ergonomic and social meanings, and the space characteristics reveal its life quality. Many building types encountered as public space in these days shelter many building users due to the quality of the presented service. The quality of the building and its relation with the environment come out as the components that should be questioned for the intensively used public type of buildings. Not only the lived and directly experienced medium but also the environment in which the building exists becomes an input increasing the using value of the building, because every building gains value in its own context by affecting the environment

and being affected from the environment. In this sense, the public buildings have functions serving to the city and sometimes to the surrounding cities due to their type of functions. The health buildings are considered in a wide range starting from the small-scale of the health care centers to the branch hospitals such as training and research hospitals, oncology hospitals, maternity hospitals. The most comprehensive service is given at the hospitals both in terms of the prevalence and the content of the provided service.

Healthcare structures are service buildings combining different functions such as diagnosis-treatment areas, operating rooms, patient care units, polyclinics, administrative units, cafeteria, laundry room and technical services. Hospitals that undertaking both healthcare-related

activities and the functions common for all public institutions have three types of users:

- healthcare and service personnel,
- patients and
- visitors

The comfort and security of these users is largely affected by the function-related features of the building. Some of these features are the characteristics of the physical environment, ergonomics, psychological and organizational factors. Physical environment is accepted as a design input used in both patient treatment and ensuring user comfort. Any individual who comes to a hospital for health reasons enters into an unfamiliar environment and stays away from his/her familiar environment for a while. Therefore, the physical hospital environment is of great importance since it positively affects the users, particularly patients; the appropriate designs can therefore have positive physical, spiritual and social effects on the individuals; such positive effects on the patient healing process can shorten the hospitalization period. The quality of the environment and the environment-building interaction affect the “use value” of the building. Furthermore, the quality of the environment and the location of the hospital may be a preference factor in selecting the hospital.

Within the scope of hospital design, the environmental factors can be classified as

- concepts such as the features of the hospital “area”, location, orientation and scenery
- Environmental factors that can be measured in functional, behavioral, technical and aesthetic terms according to the user perception of the hospital interior spaces. According to Carpman and Grant (1993), from both aspects, the environment supports health and treatment facilities, and the positive interaction between the environment and individual can reduce stress.

According to Piyal (2002), the user efficiency in a hospital, a structure operating like a factory, is related to provision of a healthy and comfortable environment for the users. The presentation of a healthy and comfortable hospital environment should not be perceived as the inner space arrangement, selected colors, comfort equipments and the provided service.

The user starts to develop an impression on the hospital while approaching the hospital site and

before entering the building. The factors affecting the users and improving the quality are the access to the hospital area, vehicle and pedestrian routes, parking area arrangement, orientations and green space.

Within the scope of the environmental factor, the main concept addressed by the present study is accessibility, parking area, scenery and orientation; defined as the requirements for improving the quality of the hospital design. This study discusses how these concepts are addressed as design inputs within the architectural design stages of the urban hospitals; how sufficient they are; and their effects on users.

Kızılay Health Centre, Private Konya Farabi Hospital, Private Konya BSK Hospital and Başkent Hospital, all located in Konya Province of Turkey, were selected as the research hospitals that are all similar in terms of capacity, land, patient potential, the number of administrative and medical personnel, and equipment. A comparative analysis was made on these hospitals - having different location and environmental characteristics- to find the level of attention paid to the components of the environmental factor and define the sources of the negativities with the aim of contributing to the future designs.

SEARCH METHODS

In the research, two basic methods were used;

- the survey method (questions about vehicle-pedestrian access and parking adequacy that we defined as the two basic components of accessibility),
- visual analysis and cluster analysis (the evaluation of the cluster analyses and the visual analyses performed for orientation and scenery using the architectural drawings, photographs and interviews related to the selected hospitals).

The questionnaire survey included 100 patients treated at the polyclinics of the four hospitals selected for the study, and the survey questions prepared as the theoretical background were based on the accessibility criteria.

The orientation and scenery factors were analyzed on the basis of the patient care units (clinics) where the inpatient treatment is given and which is effective on the architectural

structure of the whole building. In the study, four hospitals are analyzed in two headlines and evaluated by clustering analyses. With this technique providing the placement of the data in separate clusters according to the variables, it is aimed to make the (scenery and orientation) analyses of the hospitals. With the findings of these analyses and the clustering analyses of the buildings, the evaluation is realized according to

the criteria. The three point likert scale evaluates the design of each hospital as good [3], fair [2] and poor [1]. The evaluation is made with both the total success and the data obtained in the scope of the criteria. The criteria of the analyses forming the research method are shown in Table 1. Figure-1 shows the addressed environmental components and the methods used in the scope of this study.

Table1. Clustering analyses values.

Orientation	Scenery
<p>A1 Patient room looking east.</p> <ul style="list-style-type: none"> ❖ Good (3) The existence of sunlight control without breaking the connection with the outer space (Sunlight breaking equipments) ❖ Medium (2) The existence of sunlight control mechanism (the visual disconnection between outer and inner spaces) ❖ Bad (poor) (1) The non-existence of sunlight control mechanism. <p>A2 Patient room looking south.</p> <ul style="list-style-type: none"> ❖ Good (3) The existence of sunlight control without breaking the connection with the outer space (Sunlight breaking equipments) ❖ Medium (2) The existence of sunlight control mechanism (the visual disconnection between outer and inner spaces) ❖ Bad (poor) (1) The non-existence of sunlight control mechanism. <p>A3 Patient room looking west.</p> <ul style="list-style-type: none"> ❖ Good (3) The existence of sunlight control without breaking the connection with the outer space (Sunlight breaking equipments) ❖ Medium (2) The existence of sunlight control mechanism (the visual disconnection between outer and inner spaces) ❖ Bad (poor) (1) The non-existence of sunlight control mechanism. <p>A4 Patient room looking southwest and southeast.</p> <ul style="list-style-type: none"> ❖ Good (3) The existence of sunlight control without breaking the connection with the outer space (Sunlight breaking equipments) ❖ Medium (2) The existence of sunlight control mechanism (the visual disconnection between outer and inner spaces) ❖ Bad (poor) (1) The non-existence of sunlight control mechanism. <p>A5 Patient room looking north.</p> <ul style="list-style-type: none"> ❖ Good (3) ----- ❖ Medium (2) ---- ❖ Bad (poor) (1) The sun is never seen. 	<p>B1 The existence of hospital garden</p> <ul style="list-style-type: none"> ❖ Good (3) The existence of spacious outer space appealing to the users with green texture. ❖ Medium (2) Exists but not sufficient, small but regular. ❖ Bad (Poor) (1) Irregular, and insufficient field size. <p>B2 The existence of green belt around the hospital (public garden or limited public garden)</p> <ul style="list-style-type: none"> ❖ Good (3) The existence of arranged public green belt seen from the patient room. ❖ Medium (2) The existence of unregulated public green belt seen from the patient room. ❖ Bad (Poor) (1) The existence of green area seen in the environment parcels from the patient room. <p>B3 The quality of the urban texture. (green area arrangement, low rise building, regular roads, clear field of view)</p> <ul style="list-style-type: none"> ❖ Good (3) The existence of regular urban texture (in terms of green area, building, roads, pedestrian roads) ❖ Medium (2) The combination of regular or irregular urban texture. ❖ Bad (Poor) (1) The existence of irregular and complicated urban texture. <p>B4 The outdoor space perception from the building.</p> <ul style="list-style-type: none"> ❖ Good (3) Having a spacious viewing area from the building, the existence of qualified views of the surrounding texture. ❖ Medium (2) The existence of spacious viewing area with the surrounding the building (The adequacy of the space between buildings, non-crowded urban texture) ❖ Bad (Poor) (1) Non-existence of urban aperture, existence of crowded urban texture.

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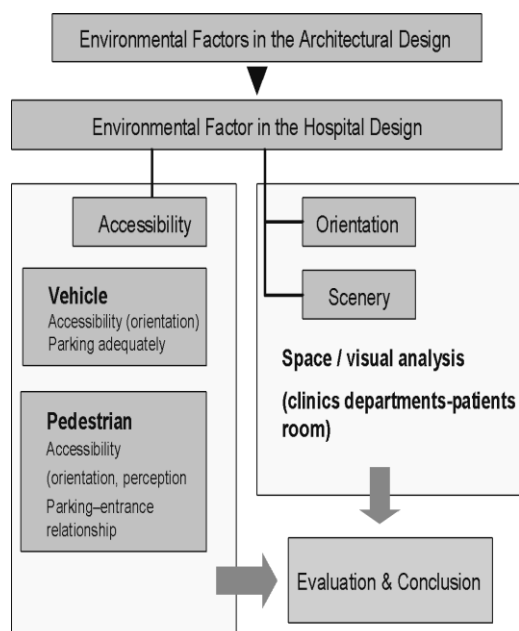


Figure1. Study Method.

THE EFFECTS OF THE ENVIRONMENTAL FACTORS ON THE ARCHITECTURAL DESIGN PROCESS OF THE HOSPITAL BUILDINGS

In general meaning, environment is the whole of the natural and artificial elements conditioning the human life (Ekinçi and Ozan, 2006). The environment is also defined as the biological, physical, social, economic and cultural settings where living things establish life-long relations and interact with each other (Anonymous, 2002). The human-environment relationship began in ancient times as a passive harmony, when people were trying to adapt to the environmental conditions and to find environments appropriate for living. However, this relationship has evolved into a sovereignty relationship, in which people try to dominate, direct and shape the nature (Aysel, 2004). The environmental factors addressed as a design input in architecture may be classified into three groups

Table2. Classification of environmental factors in architectural design

	Natural environs	Artificial environs	Socio cultural environs
Environmental factors in architectural design process	Climate – orientation Flora and fauna Topography Natural preservation area Disaster circumstances	Territorial buildings / density Accessibility Public places and other functions Noise and bad odor analysis Historical and cultural heritage	Cultural values Social norms

Accessibility

The accessibility of the hospital building and its surrounding is related to its location and the location's easy accessibility. Easy and fast access from any corner of the city and being positioned on the public transport route (metro,

- natural environment,
- artificial environment and
- Socio-cultural environment (Table - 2).

For each architectural design, all these three factors are evaluated as a design input rejected or taken into consideration for shaping the design.. After being subjected to the intellectual questioning of the designer/architecture, these components are analyzed to shape the final product, and the intended function of the proposed building also constitutes an input to this process. Hospital structures are complicated by the number and diversity of the users and the co-existence of multiple functions. In this scope, the analysis of the “building-environment” relationship by considering the “function” property becomes an important process for a design approach meeting the user satisfaction and the functional requirements. Hospitals are the social units that cannot be isolated from the external environment but have to reconcile basic objectives and environmental facilities (Çetinkaya, 1985; Aydın, 2001).

Within this social unit, the “patient” is considered as the primary user. Today, patient-centered designs are developed by considering the environmental arrangements and factors. The subject of the research is to investigate to what extent the designer considered the accessibility, orientation and scenery components and the arrangements (aimed to increase the patient satisfaction when coming to/leaving the hospital through the use of artificial and natural environments as the design inputs). Determining the importance of the components (accessibility, orientation and scenery) addressed by the present study for hospital design is of great importance for the conceptual background.

light rail system, train, bus, shared taxi) can be a good solution for the location problem. Due to their functions, hospitals increase the environmental density in their surrounding and create a centre of attraction in the city. Therefore, a hospital built in an already-dense

area of the city will also cause problems associated with the increasing density. For this reason, it is important to make accessibility arrangements for both pedestrians and vehicles. Carr (2008) associated an easy detection of a hospital with an inviting appearance, directive way-finding signs guiding towards the main approach and the relationship between the parking area and hospital entrance. According to the British Medical Association (2011), the principles of accessibility for vehicle and pedestrian approach are as follows:

- Routes should be clearly marked, and the roads, widths and turning circles should be safe and convenient
- The site design should accommodate public transport access having regard to the proximity, otherwise the public transport stops.
- Parking areas, access routes, loading docks and entrances should be well lit.

The external way-finding and sign posting strategy should be of high quality and fully integrated into the design solution and should support intuitive way-finding by land marks, hard and soft landscape design, arrangement in the parking area and public transport points (BMA, 2011). In addition, “Visible and easy to understand way-finding signs reduce the stress and anxiety of patients and visitors who may be disoriented in unfamiliar surroundings. The aids to way-finding include clear, unambiguous signage, information desks, “you-are-here” maps, the use of colors and symbols and views and glimpses of the local area” (Huelat, 2007; Byrne 2008). The pedestrian routes should be obvious, well sign-posted, and safe from vehicles with safe crossings, free of obstacles, pleasantly landscaped and well lit at night (BMA, 2011). Moreover, the interior space accessibility is as important as the exterior space accessibility for the patient, since people may generally lose their way in a hospital with complex functions and an institutional structure. A well-designed guidance/way-finding system can minimize the feeling of “getting lost” among patients and visitors (Miller and Lewis, 1999).

Orientation

The environmental factors effective on hospital design include climate, direction of the building, wind and sunlight. In hospitals, the orientation should be analyzed as a design input for each

hospital function, and the orientation of many functions, such as laboratories, patient rooms, waiting areas, intensive care units and operation rooms, should be analyzed in terms of user comfort, their operational costs and health conditions. For instance, the orientation of an intensive care unit to a frontage receiving sunlight is not an appropriate option, as this increases the ambient temperature and in turn requires frequent commissioning of air-conditioning systems, which will be risk factors for pathogens in sterile hospital environments.

North, south, west and east orientation options should be addressed separately, considering the hospital functions. The patient care unit is an important determinant for the design of hospitals that the guidance states that such units should be oriented towards the east-south-southeast from both patient and use aspect (Aydin, 2009). The orientation of patient bed units towards the north front is not desired; however, some difficulties, such as unattractive vistas, noise or limited area may complicate the building orientation preferences. Tezel (1985) explained that this situation applies particularly in urban hospitals and emphasized that the orientation options are limited in narrow sites. In such cases, the building rises in the appropriate front and necessary measures are taken for user satisfaction.

The orientation in hospitals is related to the possibility of benefitting from sunlight (Golden et al., 2005). The natural sunlight is known to delay the perceptions of pain and demand for medical intervention (Walch et al., 2005). The hospitalized patients with depression may have more favorable outcomes, including shorter and less costly stays, if they are assigned to sunnier rooms rather than rooms that receive less daylight or are always in the shade. Benedetti et al. (2001) found that the patients hospitalized for depression stayed an average of 3.7 fewer days if they were assigned east-facing rooms exposed to morning light, compared to the patients in west-facing rooms with less sunlight. Depression is a serious problem, not only for mental health patients, but also for the patients with cardiovascular disease or cancer. A Canadian investigation of myocardial infarction patients in an intensive care unit suggested that female patients had shorter stays if their rooms were sited to provide higher daylight exposure (Beauchemin and Hays, 1998). Thompson (2009) emphasized that the patient care units should have locations having natural view, day

lighting and ideally opportunities for natural ventilation. And he has added that the achievement to this type of building form presents many advantages to benefit from ideal sun light. Additionally, the waiting areas and way-finding nodes should also be placed to maximize the day lighting and the opportunity of green views or direct access to nature.

Scenery

The importance of sunlight for areas used by outpatients and inpatients as well as employees has already been discussed. However, the scenery viewed from the transparent surfaces that establish the visual connection between the internal and external spaces is important for the hospital users, particularly patients. Cohen-Mansfield and Werner (1999) stated that the features of exterior spaces and the design of hospitals have clear positive effects on patients. Relaxing and pleasing arrangements have positive effects on the healing process of the patients. Karlin and Zeiss (2006) expressed that the natural scenery is a healing design factor that reduces stress and fatigue, and Ulrich (1984) emphasized that the natural scenery reduces the hospitalization periods. Gardens, environmental and artistic features within the hospital complex also assist the navigation for patients and visitors, as they act as landmarks that people use to orientate themselves (Huelat, 2007; Byrne, 2008). Professionally-arranged hospital gardens have positive effects on patients, their attendants and personnel.

Patients who are able to view natural scenery and navigate well-arranged gardens experience fewer post-operational complications (headache, nausea etc.); are recorded to feel less pain compared to those taking pain killers like analgesics; patients staying in patient rooms with windows viewing an attractive scenery are stated to leave the hospital earlier than those staying in patient rooms that face onto a wall (Ulrich, 1999).

Many healthcare organizations are seeking to create more therapeutic environments as part of a goal of improving the quality of care with lower cost. The development of therapeutic environments may contribute to reduced lengths of stay and improved health outcomes (Thompson, 2009). Patients can spend many hours in bed or sitting, with little to do. Therefore, the scenery viewed from the places where patients spend time (particularly patient rooms) turn out to be as important as the

hospital gardens. Negative urban environments and a structural element or structural arrangements that block the view are undesired sceneries. The influence of the immediate environment on patients' sense of wellbeing and actual recovery was the subject of a 2003 report from NHS Estates. The study indicated that the architectural environment can contribute to the treatment of patients and significantly affect their health outcomes, concluding that patients are sensitive to their architectural environment, and modern buildings affect patients more positively than the older ones. Better-designed hospitals create an overall improved atmosphere leading to patients with mental health problems being less confrontational and general patients requiring less analgesic medication (Lawson, 2004; BMA, 2011).

The laboratory and clinical studies have shown that viewing the nature assists stress recovery, evident in physiological changes; such as in blood pressure and heart activity. The research has demonstrated that the looking at built scenes lack of any natural elements (rooms, buildings, and parking lots) is significantly less effective in fostering restoration and may worsen stress. The visual exposure to nature improves the outcomes such as stress and pain. A study in a Swedish hospital found that the heart-surgery patients in intensive care units who were assigned a picture with a landscape scene reported less anxiety/stress and had reduced analgesic demand compared with a control group (Ulrich, 1991). The hospital gardens not only provide restorative or calming views of nature, but also can reduce stress and improve outcomes through other mechanisms, including fostering access to social interaction and providing opportunities for positive escape and a sense of control with respect to stressful clinical settings (Ulrich, 1999). A study by Whitehouse et al. (2001) indicated that the patients and families who used hospital gardens reported positive mood changes and reduced stress. Shepler (2001) and NSF (2001) emphasized that the green patterns and scenery increase not only the patient's but also the attendant's satisfaction.

ASSESSMENT OF PHYSICAL AND NATURAL ENVIRONMENTAL EFFECTS ON HOSPITAL BUILDINGS

Four hospitals located at the centre of Konya (Turkey), at locations with differing population densities, were selected in order to evaluate their

physical environmental factors (accessibility, orientation and scenery). The data obtained via interviews, observations and survey were evaluated in terms of the pedestrian-vehicle access, orientation and the environmental arrangements constituting the scenery. The accessibility analysis of the hospitals was carried out according to the surveys and observations. The evaluations for the orientation and scenery analyses were made on the basis of the technical drawings and the grades of visual analysis and the cluster analysis.

Case 1: Kızılay Health Centre

Kızılay Health Centre is a 45-bed general hospital established in 2006 on a 1500-m² closed area. Embedded in the developing/improving old city pattern, the hospital is surrounded by low-storey buildings (1 to 4 storeys). Buildings and the single-storey structures around the hospital are used for commercial purposes. A 7-storey building, *Kızılay Health Centre*, forms a difference in the urban pattern of Konya. Polyclinics are located in the first, second and fourth storey's; patient rooms in the third and fifth storey's; and operating theaters in the sixth storey.

Accessibility

The vehicle routes to the south, west and north of the hospital ensure access to the city centre and feed the commercial texture; therefore, they are used heavily during the daytime hours. The vehicle traffic increased with the commercial function results in dense pedestrian traffic. These high volumes of vehicle and pedestrian traffic become problematic when combined with the density caused by the hospital. The pedestrian access to the hospital is ensured via the vehicle roads surrounding the hospital. The height of the hospital differentiates it from the surrounding buildings, which facilitates the detection of the hospital. However, the dense texture of the region and the lack of way-finding signage were found to make the hospital "detectable" by only 12% of the users, while other users emphasized that the hospital was "not detectable at all" (20%), detectable in very low rates (24%) and detectable in low rates (28%). Forty-eight percent (48%) of users stated that the way-finding signs were inadequate for pedestrian-vehicle access, while 20% expressed that they could find the hospital with the help of

the address description. Forty-four percent (44%) of the patients stated that it was their first visit to the hospital. While 84% of the patients preferred to use a private vehicle for the hospital visit, 4% came on foot and 12% used public transport. Those who traveled to the hospital via their private vehicles used paid parking areas located around the hospital, since the parking area of the hospital is allocated for hospital personnel. This situation breaks the relationship between the hospital entrance and the parking area, and 64% of the users mentioned this as a factor complicating the access to the hospital. The paid parking area belongs to the public sector and so is shared with visitors to the other buildings or the commercial texture in the vicinity of the hospital. Therefore, the paid parking capacity does not meet the need of the hospital users (Table 4).

Direction of the building

Kızılay Health Centre is located on north-south axis that the long surfaces of the geometry have west and east orientations. The patient rooms at the upper storeys are also oriented towards the east and west directions. There are no solar shading surface elements in both directions, and the solar control is provided with the curtain existing at the windows. However, the patients and their relatives indicated the increase at room temperatures especially for the rooms at the west and the discomfort due to high temperature (Table 4).

Scenery

As previously mentioned, the hospital is surrounded by commercial buildings. The west-oriented patient rooms have a view onto the parking area, low-storey buildings and vehicle roads, while the east-oriented patient rooms face onto the old commercial texture and low-storey buildings. The patients and their attendants stated that the vehicle roads close to the hospital make noise particularly during the daytime hours. There is no designated and arranged green space around the hospital. The patients regarded this as negativity and expressed the need for an adequate and well-arranged environment where they can get fresh air, walk and sit, especially when waiting for their patients. The relationship of the Kızılay Health Centre with the external environment is summarized in Table 4.

Table 4. The natural and physical environmental characteristics of the Kızılay Health Centre

		ACCESSIBILITY		ORIENTATION		SCENERY	
		PEDESTRIAN-VEHICLE ACCESS	PARKING AREAS	2 POLYCLINIC UNIT	HOSPITAL BED UNIT		
PHOTOGRAPHS	SCHEME						
	OVERVIEW (1)						
OVERVIEW (2)							

Case 2: Private Konya Farabi Hospital

Private Konya Farabi Hospital is a 105-bed hospital established in 2009 on an area of 10.500m². It is located close to the expressway. There are high-storey buildings (7 to 11 storeys) and public parking areas around the hospital. Due to its health-related function, the building pattern of the hospital differentiates from the other buildings in the area. There are polyclinics in the first and second storeys; the patient rooms at the third, fourth, fifth and sixth storeys; and the operating rooms, diagnosis units and intensive care units at the first basement storey.

Accessibility

The expressway located at the west of the hospital is used for the access to the hospital and ensures the access to the city centre. The secondary roads at the north and south of the hospital are used for the access to the hospital from the surrounding residential areas. The hospital is detectable and seen from the main vehicle axis that facilitates your access. The distance between the hospital and the expressway lessens the heavy traffic flow and noise to some extent. There is no specific axis allocated for pedestrian access to the hospital; however, the pedestrians use the sidewalks arranged alongside the vehicle road. The survey showed that 48% of the patients stated that the signage on the main road facilitates the access to the hospital access; 32% stated that they found the hospital easily since they have visited it previously; and the remaining patients stated that they did not have difficulty in finding the hospital as they had the address description.

Seventy-six percent (76%) of the participants underlined that they used their private vehicle for coming to the hospital. The remote location of the hospital from the city centre plays an important role in this result. However, 24% of the participants used public transport for the access to the hospital. The participants arriving by private vehicles park at the other buildings or along the road, since the hospital has inadequate parking capacity. This situation results in an insufficient relationship between the hospital entrance and the parking area (Table 5).

Direction of the building:

The L-shaped hospital building has polyclinics and an entrance hall in the north-south direction and patient rooms in the east-west direction. The windows are recessed into the wall surfaces, which is a positive design in terms of reducing the negative effects of the westerly sunlight. The depth at the surface increases the shadow effect (Table 5).

Scenery:

The Private Konya Farabi Hospital is surrounded by residential areas and public garden. The east-oriented patient rooms view the hospital parking area, construction site and an undeveloped area scheduled for housing, while the west-oriented patient rooms view the public garden, public car park and the main road. The public green space close to the hospital offers good scenery; however, the lack of green space directly accessible to hospital users constitutes negativity. The distance from the expressway minimizes the noise caused by the vehicle traffic (Table 5).

Table 5. The natural and physical environmental characteristics of the Private Farabi Hospital

SCHEME	ACCESSIBILITY		ORIENTATION		SCENERY	
	PEDESTRIAN-VEHICLE ACCESS	PARKING AREAS	POLYCLINIC UNIT	HOSPITAL BED UNIT		
						
PHOTOGRAPHS						
OVERVIEW (1)						
OVERVIEW (2)						

Case 3: Baskent University Konya Application Hospital and Research Centre

Baskent University Konya Application Hospital and Research Centre is a 200-bed hospital established in 2003 on 22,000 m² closed-area. It is surrounded by a high-rise (5 to 12 storey) building pattern, and the basement storey of the surrounding buildings is used for commercial functions (such as restaurants, pharmacies, butcher etc.). Some of the polyclinics exist at the basement storey; the remaining polyclinics are at the first and second storeys; the operation rooms at the second storey; the patient rooms are from third to sixth storey; and the dining hall at the seventh storey.

Accessibility

The main vehicle axis enabling the access to the city centre is located at the east direction of the hospital site. The vehicle access to the hospital is generally achieved via this axis. Moreover, the roads at the north and west of the hospital ensure connection with the residential zone, which is less densely-populated. The vehicle roads also ensure the pedestrian access to the hospital. The data revealed that 4% of the participants came to the hospital on foot, 68% via private vehicle and 28% via public transport. Since the hospital is located on the main road, 84% of the participants were found to have no difficulty accessing the hospital; while 16% expressed that the address description helped them to find the hospital. The way-markers in front of the hospital are visible from the main road, which increases the visibility of the hospital.

The hospital is easily identified, since it was differentiated from the surrounding pattern by

its architectural style (92%). The entrance to the polyclinic is easily identified from the main approach road (52% - very easily and 48% - easily). There are parking areas at the north and south of the hospital. The parking area to the south is allocated for patients/visitors and was described as adequate by 64% and inadequate by 36% of the users. The latter stated that they experienced particular difficulty in the morning hours, i.e. the time of high demand for parking. During the hours when the parking area is full, 4% of the users park their vehicles in empty spaces around the hospital site or along the roads, and eighty percent (80%) of the users expressed positive attitudes toward the parking area-entrance relationship. The large parking area and the facility to park in the surrounding empty spaces resulted in 20% of the participants defining the parking area-entrance relationship as "far away".

Direction of the building

Başkent University Konya Application Hospital and Research Centre has a form consisting of a rectangle and a circle parallel to each other. The rectangular block is larger than the circular one and is designed as the patient rooms block and receives sunlight from the east and west directions. Since there are nurse stations and additional spaces, elevators and stairways on the east, there are only a limited number of patient rooms at the east side. Most of the patient rooms have a westerly orientation, which is a negative solution for getting sunlight. Although solar shading elements were used at the west side, having less number of patient rooms at the east side is not a right solution (Table 6).

Scenery

Both east and west-oriented patient rooms have the view of adjacent buildings. The scenery at the east side of the building has the texture of a dwelling area, and the existence of the roadway also in this direction increases the distance and

provides a sight to a large area. There is no green space arranged in the hospital garden for the users. The relationship of Başkent University Konya Application Hospital and Research Centre with the external environment is summarized in Table 6.

Table 6. The natural and physical environmental characteristics of the Başkent University Konya Application Hospital and Research Centre

	ACCESSIBILITY		ORIENTATION	SCENERY
SCHEME	PEDESTRIAN-VEHICLE ACCESS 	PARKING AREAS 	ORIENTATION POLYCLINIC UNIT HOSPITAL BED UNIT 	SCENERY
PHOTOGRAPHS				

Case 4: Private BSK Konya Hospital

Private BSK Konya Hospital is a 90-bed hospital established in 2006 on an 11,000 m² closed area. The hospital building is located on the road to Beyşehir and is surrounded by an old housing texture (1–3 storeys), a primary school and empty parcels zoned for housing. There are polyclinics at the basement and first storeys; the patient rooms at the second and third storeys; and the operating rooms and intensive care units exist at the fourth storey of the hospital.

Accessibility

Since the hospital is located on the Beyşehir ring road, the vehicle and public transport access to the hospital is good. The pedestrian access is achieved, as in the other cases, via the sidewalks adjacent to the vehicle roads rather than a specifically-allocated axis. While 80% of the users accessed the hospital via their private vehicles, 20% used the public transport. Forty percent (40%) of the survey participants were visiting the hospital for the first time while the other sixty percent (60%) has already known the location. While 20% of the visitors found the location of the hospital with the help of an address description, 16% found it due to its material and stylistic difference and 4% with the help of signs on the main road. The descriptive

table in the main entrance of the hospital was stated by 92% of respondents as an access-facilitating element. The hospital has inadequate outdoor parking for patients and visitors. Half of the first basement storey of the hospital and the entire second basement storeys are arranged as a parking area.

The indoor parking area is allocated by the hospital management for the use of hospital personnel. The patients therefore park on the secondary roads close to the hospital and the surrounding empty parcels. This situation negatively affects the hospital-parking area relationship and, as a result, 32% of the users found the parking area-entrance relationship as "weak". Due to the lack of an outdoor parking area, people park their vehicles along the vehicle road in front of the hospital, which blocks and even threatens the already-heavy traffic flow (Table 7).

Direction of the building

Private BSK Konya Hospital is positioned on the east-west axis, in compliance with the geometry of the land. The patient rooms are oriented towards the east, south and north directions and concentrated on the east and south directions mainly. The patient rooms oriented towards the north direction do not

Accessibility, Orientation and Scenery as Natural and Physical Environmental Factors in Hospital Design Case of Konya Hospitals

receive any direct sunlight. And sunlight reflecting elements were used in the east and south frontages to prevent the sunlight from entering the patient rooms with a sharp angle.

Scenery

The west-oriented patient rooms view the main vehicle road, while the east and south-oriented patient rooms view buildings. There is no green space/layout arranged within the hospital area. The quad established to the north front enriches

the interior and exterior spaces and features small green plants.

However, this solution was not stated as "sufficient" by the users. In general, the view and the perceived scenery from the patient rooms consist of the roadways and the low-rise buildings in the surroundings. In this area, there is no landscaped green area, but the trees located in the gardens of houses and at roadsides constitute the green tissue in the surrounding (Table 7).

Table 7. The natural and physical environmental characteristics of the Private BSK Konya Hospital

	ACCESSIBILITY		ORIENTATION	SCENERY
	PEDESTRIAN-VEHICLE ACCESS	PARKING AREAS		
SCHEME				
PHOTOGRAPHS				

EVALUATION

When the hospitals at the City Center of Konya were evaluated according to the concepts considered in the research context, the location of the hospital was observed to be the privileged factor in terms of accessibility. Additionally, it was also experienced that the private car access to the hospital was mostly preferred instead of the pedestrian access for four of the all selected hospitals. Therefore, it is certain that a number of factors that are irrelevant about our research subject are effective on hospital selection. In the field of architectural design, we have to focus on an issue about the appropriateness of the locations of the hospitals inside the city in terms of accessibility by car in any case beyond the closeness and being known (awareness). It was observed by the study that the requirements of the access to the hospital by car have been ignored for all the selected hospitals. The users coming to the hospital by their private vehicles or brought by the relatives experience difficulties in finding a parking area belonging to the hospital. The users who park their vehicles into public areas not belonging to the hospital, roadsides or empty sites in the

surroundings are questioning the *parking area - hospital entrance* relationship. The basic reason of this is the relationship between the site size and the building size. When the results obtained by the cluster analysis were evaluated for the orientation and scenery components, it was seen that the orientation in the hospitals has not been usually considered by the designers. It was determined that the west and north orientations defined as negative especially due to climatic conditions and geographical location has been ignored and no solution has been searched using necessary architectural members. In terms of orientation, the one evaluated as "bad" ($x_a=1.75$) became the 4th Example. Although the south and east facades are the ideal directions of the hospital, the average "poor" value obtained for the hospital in the cluster analysis may be due to the north facade of the hospital. Having the equal number of rooms in this facade with the southern facade supports the negativity. In terms of orientation, the hospital evaluated as "good" ($x_a=3$) became the 3rd Example. Curtains were used as the precaution against the sun light of the facades of the negative directions for the Examples 1 and 2 of "medium" ($x_a=2$) value

(Table 8). In terms of scenery, the existence of hospital garden and the outdoor arranged for the use of patients and their relatives were accepted as a positive value looked for inner city hospitals. The hospitals considered as the research area do not have this positive value. Because of the example hospitals located according to ground floor area with the setback distance and zoning rules, the outdoor space does not provide any benefit in terms of scenery. Since the area between the hospital building and the land border was not large enough, the landscape design was consisted of a pedestrian lane, a few number of benches and sequentially placed trees.

In general, the scenery becomes the close surroundings of the hospitals inside the views of the hospitals. In terms of scenery, Example 2 became the hospital evaluated with “good” ($x_a=2,5$) value. The urban texture around Example 2 is new and regular. At the same time, the existence of public green space located near the hospital inside the hospital view has

increased the quality and become effective in taking “good” value. Although the exterior space out of the hospital has been arranged, it had “medium ($x_a = 2$)” value due to not being sufficiently large. The cause of Example 1 getting the “bad” ($x_a=1.25$) value in terms of scenery is due to the hospital not having any outdoor spaces. The other reasons for the “bad” value can be listed as the unfavorable scenery formed by the buildings surrounding the hospital in an old, dense, very crowded and irregular texture of the city and not having any green space nearby the hospital. The Examples 3 and 4 located inside the city also took the “medium” ($x_a=1.75$) value. As seen from the Table-8 the obtained value is close to the lower limit of the "medium" value. There is no sufficient garden area for both hospitals. Although there is an outdoor arrangement supported with grass and trees, its size is not large enough to be seen from the patient rooms, and it is not sufficient enough for the use of patients (Table 8).

Table8. The values of the hospitals according to their orientation and scenery properties

	Orientation					Average	Scenery				Average
	A1	A2	A3	A4	A5		B1	B2	B3	B4	
Example field 1(Kızılay)	2	-	2	-	-	2	1	1	1	2	1.25
Example field 2(Farabi)	2	-	2	-	-	2	2	3	3	2	2.5
Example field 3(Başkent)	3	-	3	-	-	3	2	1	2	2	1.75
Example field 4 (BSK)	3	3	-	-	1	1.75	1	2	2	2	1.75

Triple Likert Type Scale for A – B: $1 \leq \text{Poor} \leq 1,67$, $1,67 < \text{Fair} \leq 2,34$, $2,34 < \text{Good} \leq 3$

CONCLUSION

The components constituting the environmental factors of hospitals are the design inputs that should be analyzed and considered during the architectural design. Being independent from their urban locations, the hospitals serve not only to the close neighborhood but also the whole city. Therefore, heavy vehicle access -in addition to pedestrian access- to the hospital requires the analysis of the vehicle approaches. The most basic needs of the users arriving to the hospitals by their private vehicles are way-finding and adequate parking capacity. Therefore, an adequate parking provision related to the building entrances within the hospital area is a positive solution. It is quite problematic to meet the parking demands within the urban areas with heavy traffic and dense development. Moreover, the size of the urban hospital areas does not permit the extensive parking area arrangements. Therefore, the relationship between the size of the hospital site and hospital

building should be addressed by considering the quality of the service provided for the patients (number of beds, polyclinics, etc). The open space/exterior space requirements of the hospital should be considered to the same extent as for the interior spaces. The outdoor space should not be limited to the pedestrian approach and the parking area arrangement; more precisely, it should also cover the layout arrangement.

The land decisions related to the hospitals or healthcare facilities should be made on the basis of the functions of the surrounding buildings and the building density. The provision of the public open spaces, greenery, water elements and low-rise buildings that support the positive scenery should constitute the characteristics of the texture surrounding the hospital. The hospital scenery consists of only the layout to be arranged in the hospital area but also the structures and the public open spaces in the field of view. Therefore, the character of the adjacent environment texture is of great importance. This

requires a holistic approach towards the construction plan.

The orientation of patient rooms towards the attractive scenery and to east and west -two ideal fronts- will increase the user satisfaction and positively affect the healing process. The introduction of appropriate measures in case of orientation to undesired frontages will also increase the user satisfaction.

As a conclusion, the location and environmental structuring, the land size (decisions specified in the construction plans), the transport network (access and orientation from the main vehicle approaches) and the accessibility turn out to be important elements for hospitals located in the city centers. The low-density buildings and the public spaces (parks, gardens, layout elements) around the hospital area, the hospital areas arranged in such a way to include the parking areas, green spaces and orientations that maximize the utilization of sunlight and the scenery are the determinants in the creation of high-quality hospital buildings.

The environmental conditions ignored in architectural design will cause problems during the use. Therefore, in terms of complexity, the environmental values for the hospital buildings requiring knowledge-based design periods should be analyzed at the beginning of the design process and right decisions should be taken. The sizes of the areas defined as "health construction areas inside the city" by the municipalities should be questioned at first. The size of the design area should be evaluated whether it is sufficient enough to increase the environmental quality i.e. the use value of the hospital or not. The hospital standards of Health Ministry that is the decision-maker institution for the approval of the health buildings should involve not only the criteria in terms of building and space but also the criteria about the location, environmental values and size of the construction-site. The higher construction and equipment costs of these buildings providing public health service should be seriously considered, and the decisions taken before the project should be well-examined in detail.

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AUTHOR’S BIOGRAPHY

Dicle Aydin is a Prof. Dr. in the department of Architecture in the Faculty of Engineering & Architecture of Necmettin Erbakan University. She received her Master of Science (M.Sc.) and Doctor of Philosophy (Ph.D.) degrees in building design from the same university. She received Ph.D. degree in 2001 about architectural programming on hospital. Her interests are about the developing design and programming criteria, different building /spaces, performance concept, evaluation of reusing buildings for new functions and design-application problems. Her published articles in the academic journals are about hospital programming, building characteristics in vernacular settlements, reuse and programming, evaluation of buildings and space quality. She has attended several conferences and presented papers.

dicleaydin@konya.edu.tr/daydin70@hotmail.com

Mine SUNGUR graduated from Selcuk University, Faculty of Engineering & Architecture, Department of Architecture. She received her “master of architecture” along with “master of science in architecture” degree at Selcuk University, Institute of Natural and Applied Sciences, Architecture Department in 2010. She has been a Ph.D. student since 2010 in the Architectural Design Department of Selcuk University. Her research interest subjects are shape grammar, hospital design and application problems. karakoyun@selcuk.edu.tr