ANALYSIS OF THE WAYFINDING SYSTEM IN A UNIVERSITY BASED TERTIARY CARE HOSPITAL

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ANALYSIS OF THE WAYFINDING SYSTEM IN A UNIVERSITY BASED TERTIARY CARE HOSPITAL

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ABSTRACT

ANALYSIS OF THE WAYFINDING SYSTEM IN A UNIVERSITY BASED TERTIARY CARE HOSPITAL

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The ease of wayfinding in a complex environment can be understood by the users of the environment. Wayfinding, as a spatial problem solving activity, in a hospital can become a problem for the first time users. The aim of this study is to analyze the existing wayfinding system of a university based tertiary care hospital from the users' point of views; in other words, to understand the usability of the wayfinding system within the hospital. A questionnaire was administered to the users of the hospital. The results of the study indicated that the majority of the users were familiar with the hospital and spatial familiarity decreased the possibility of getting lost. The users found the number of signs sufficient and they had no difficulty in finding the elevators, staircases, main entrance, departments, information desks, and doctors' rooms since they were legible and visible from the circulation system, except for the academic campus. This study suggests that additional signage and you-are-here maps should be integrated into the wayfinding system of the hospital when an expansion has been done to the hospital layout.

Keywords: Hospital, Wayfinding, Wayfinding System,

ÖZ

ÜÇÜNCÜ BASAMAK ÜNİVERSİTE HASTANESİNDE YÖN BULMA SİSTEMİNİN DEĞERLENDİRİLMESİ

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Karmaşık bir çevrede yön bulma kolaylığı, o çevreyi kullananlar tarafından anlaşılmaktadır. Bir hastanede yön bulma, bir mekânsal problem çözme etkinliği olarak, hastaneyi ilk kez kullananlar için bir sorun haline gelebilir. Bu çalışmanın amacı, üçüncü basamak üniversite hastanesinin mevcut yön bulma sistemini kullanıcıların bakış açısından analiz etmektir, bir başka deyişle, yön bulma sisteminin hastane içinde kullanılabilirliğini anlamaktır. Hastane kullanıcılarına bir anket uygulanmıştır. Çalışmanın sonuçları, kullanıcıların çoğunun hastaneye aşina olduğunu ve mekansal aşinalığın kaybolma olasılığını azalttığını göstermiştir. Kullanıcılar, yönlendirme işaretlerinin yeterli sayıda olduğunu belirtmişler ve dolaşırken yeterince okunaklı ve görülebilir olduklarından akademik yerleşke hariç asansör, merdiven, ana giriş, bölümler, danışma masaları ve doktor odalarını bulmada herhangi bir zorluk çekmemişlerdir. Bu çalışma, hastane yerleşim planında bir genişleme yapıldığında ek yönlendirme işaretleri ve ‘siz buradasınız’ haritaları hastanenin yön bulma sistemine entegre edilmesi gerektiğini önermektedir.

Anahtar Kelimeler: Hastane, Yön Bulma, Yön Bulma Sistemleri

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1. INTRODUCTION

Wayfinding is a spatial problem solving activity in which humans face every day. Finding one's way in large built environments, such as hospitals, transportation centers, governmental facilities, shopping malls or university buildings can be challenging and frustrating for humans. Large built environments can be complex and maze-like due to the number of hallways and decision points (O'Neill, 1991). Wayfinding in a complex built environment can be problematic when the person has little or no prior knowledge about the environment resulting in a feeling of disorientation.

Hospitals, as one of the public facilities, can become disorienting environments due to the complexity of their functions and programs, and architectural configuration. They consist of various activities such as treatments, inspections and healing, and various facilities, such as administrative offices, laundry, kitchen, cafeterias, technical and mechanical rooms, mortuary and laboratories (Kazanasmaz, 2004). Hospitals with multi-functions become complicated and hard to navigate for first time patients and visitors. Wayfinding in a hospital becomes a problem when patients and visitors have to find their ways from the entrance to their appointment due to anxiety and emotional tension. Unfamiliarity with the building, unclarity of decision points and routes with missing or incomplete cues such as signs and architectural features can put the patients and visitors into stressful situations. Developing universal signs in hospitals when people come from different cultures, backgrounds and speak different languages (Lee, Dazkir, Paik, & Coskun, 2014).

Although there is an awareness of the role of wayfinding in hospitals, a majority of studies in hospital design focus on aesthetic physical environments (Paul, 2013). Carpman and Grant (1993) indicated that for patients and visitors' wayfinding was found to be one of the major sources of stress related with the physical setting. Architects and administrators who usually decide on the design of hospitals usually

fail to consider the needs of the patients and visitors and the wayfinding system as a result this increases stress, isolation and illness (Paul, 2013). Patients and visitors who are there for the first time have to find their destination without the help of an acquired cognitive map. As a result they have to depend on the external information that exists in the environment and is communicated through architectural cues and graphical cues such as maps and sign systems. However, when there is a lack of sufficient wayfinding systems or environmental cues, wayfinding becomes problematic. A "coordinated wayfinding system" is needed in hospitals that focus on the importance of nomenclature, number, context, placement and visibility of signs (Carpman, Grant & Simons, 1986; cited in Devlin, 2014).

1.1. Aim of the Study

Wayfinding, as a problem solving activity, requires individuals to identify their location and reach their destinations. The ease of wayfinding in a complex environment can be understood by the users of the environment. The aim of this study is to analyze the existing wayfinding system of a university based tertiary care hospital from the users' point of views. In other words, to understand the usability of the wayfinding system within the hospital and to understand whether or not the users find the wayfinding system sufficient. Despite the awareness of the role of wayfinding in hospitals, a majority of studies in hospital design focused on the aesthetics of the physical environments. However, this study will focus on the wayfinding system from a user perspective. This study will provide a deeper understanding in the usage of the wayfinding system in the university based tertiary care hospital

1.2. Structure of the Thesis

The thesis consists of five chapters. The first chapter is the introduction in which the importance of wayfinding especially in hospitals, the aim of the study and the

structure of the thesis are stated. The second chapter explores the concept of wayfinding, spatial knowledge, architectural and graphical components of the wayfinding design and individual differences consisting of gender differences, spatial familiarity and age differences in wayfinding.

In the third chapter, hospital design is examined with respect to architectural and graphical components within the hospital. The architectural components are stated as spatial layout, circulation systems and paths, and entrances and exits. The graphical components are indicated as signage, maps and color coding.

In the fourth chapter, the case study is described with the aim, research questions and hypotheses. The participants, who are patients and visitors of the hospital are identified, the description of the site and the methodology of the case study are defined. Then the results are evaluated and discussed. In the last chapter, major conclusions about the study and suggestions for further research are stated.

2. WAYFINDING

2.1. Definition of Wayfinding

Wayfinding as a spatial problem solving activity, is the process of reaching a destination, whether in familiar or unfamiliar environments (Arthur & Passini, 1992). Likewise, Giuliani (2001) indicated that "successful design should allow people to: determine their location within a setting, determine their destination, and develop a plan that will take them from their location to their destination" (p.43). In addition, he stated that identifying, marking, grouping, linking and organizing spaces should be included in the design of wayfinding systems. Being aware of the surrounding environment is important for finding one's way in the environment.

Finding one's way is a purposive, directed, and motivated activity (Golledge, 1999). According to Arthur and Passini (1992), wayfinding consists of three processes. These processes consist of decision making, decision execution and information processing. Wayfinding necessitates complete involvement with the environment (Passini, 1984).

Wayfinding in a complex built environment can be problematic when the person has little or no prior knowledge about the environment resulting in a feeling of disorientation. Large built environments can be complex and maze-like due to the number of hallways and decision points (O'Neill, 1991). Richter and Klippel (2002) asserted that in order to successfully reach a specified destination, orientation in an unknown environment is an important factor and requires usually external information. For people to feel secure and safe, they need to know where they are in complex unfamiliar environments. During wayfinding, spatial knowledge about one's current location, destination and the spatial relation between them is needed. Without this knowledge people can become disoriented and this can cause stress and

frustration. People who are trying to reach a specific destination can experience frustration during disorientation (Passini, 1984). Inadequate wayfinding systems can result in waste of time and productivity since staff can direct visitors to their destination (Arthur & Passini, 1992).

2.2. Types of Spatial Knowledge

When individuals experience a new environment, they unconsciously develop a mental map of the environment that is referred to as a cognitive map. The cognitive map helps us to find our way in unfamiliar environments and it is continually refined and updated as the environment is re-explored (Sancaktar, 2006). The cognitive map is "a mental representation, or set of representations, of the spatial layout of the environment" (Montello & Freundschuh, 2005, p. 68). Cognitive maps consist of five elements that are paths, edges, landmarks, districts and nodes (Lynch, 1960). Paths are linear separators that define channels of movement, such as streets or walkways. Edges are linear elements that are not used as paths by the observer; they are barriers or boundaries, such as walls. Landmarks are visible reference points that may be large objects that are in sharp contrast to their immediate surroundings or on a local scale; they can be buildings, signs or stores. Districts are large areas that have recognizable, common perceived identity, homogeneity or character, which differentiates them from other areas and the observer mentally enters. Nodes are focal points that consist of intensive activity to and from people may travel or with similar characteristics (Darken & Sibert, 1993; Nasar, 1998; Paul, 2013). Cognitive mapping is a major component of spatial knowledge that consists of the processes that an individual carries out consciously or unconsciously during wayfinding. Finding one's way around with the aid of a cognitive map requires the development of landmark, route or survey knowledge.

2.2.1. Landmark Knowledge

Landmark knowledge is derived from the knowledge of noticeable objects in an environment (Schlender, Peters, & Wienhöfer, 2000). "Landmark knowledge involves the use of highly salient objects to help orient oneself in a new environment, providing a means of organizing, anchoring, or remembering information" (Nash, Edwards, Thompson, & Barfield, 2000, p.13). In landmark knowledge, information about the shape, size, color and contextual information about landmarks, or memorable and distinctive objects in an environment are presented (Chen & Stanney, 1999; Sadeghian, Kantardzic, Lozitskiy, & Sheta, 2006). Landmarks are believed to play critical roles in route knowledge by indicating the decision points along a path and helping the traveler to remember the procedures needed to reach a destination, and in survey knowledge by providing regional anchors that help them to determine the distances and directions (Chen & Stanney, 1999; Sadeghian et al., 2006).

2.2.2. Route Knowledge

Montello, Hegarty, Richardson and Waller (2004) define route knowledge as "an internal representation of the procedures necessary for finding one's way from place to place" (p.270). It refers to the person's ability to navigate from one location to another and is based on an egocentric frame of reference (Ruddle & Peruch, 2004). Route knowledge is the knowledge of routes that connect landmarks into a travel sequence (Montello & Freundschuh, 2005). Route knowledge consists of "information about the order of landmarks and minimal information about the appropriate action to perform at "choice-point" landmarks, such as "turn right" or "continue forward" (Montello, 1998, p.144). Route knowledge is assessed either by directional pointing tasks in which the participants have to point to previously explored or unexplored targets during their navigation between two target locations, or by measuring the participants' ability to orient themselves relative to known landmarks or features in the environment (Nash et al., 2000).

2.2.3. Survey Knowledge

Survey knowledge is achieved with the combination of routes and landmarks into a cognitive map. It is characterized as "the ability to conceptualize the space as a whole" (Van Dijk, op den Akker, Nijholt, & Zwiers, 2003, p.117). Survey knowledge refers "to the global configuration of environments such as the location of objects relative to a fixed coordinate system" (Ruddle and Peruch, 2004, p.301). Survey knowledge can be considered as the ultimate stage of navigational knowledge acquisition because it is based on a world centered frame of reference; the user has the ability to take shortcuts, create efficient routes, point directly between landmarks and utilize increasingly abstract terms of reference, such as cardinal directions (Kallai, Makany, Karadi, & Jacobs, 2005; Nash et al., 2000). A person with complete survey knowledge is said to have navigational awareness (Nash et al., 2000).

2.3. Components of Wayfinding Design

Finding one's way in an unfamiliar environment can be problematic. However, well design of wayfinding can help designers and architects to enhance building performance. Good wayfinding design can facilitate user access, increase satisfaction, reduce confusion and stress of visitors and decrease the mistakes of employees, reducing effort and increasing productivity (Evans & McCoy, 1998). "The ability to find one's way into, through, and out of a building is clearly a prerequisite for the satisfaction of higher goals," (Weisman, 1981, p.189).

Arthur and Passini (1992) indicated that

> "Wayfinding requirements, whether they be at the regional, urban or architectural scale, are integral to the design process - from the most general, overall spatial organization of the setting to the articulation of the form-giving features, and right down to the individual architectural and graphic messages. Wayfinding requirements shape the setting, affect the choice of circulation system, and contribute to the design of the interior. This is particularly true in large building complexes" (p.42).

Accordingly, the components of wayfinding design can be stated as architectural and graphical that provide sources of spatial knowledge to people.

2.3.1. Architectural Components of Wayfinding Design

There are two architectural components of wayfinding design that are used in the building: architectural legibility and spatial configuration.

2.3.1.1. Architectural Legibility

The wayfinding performance is influenced by the form of the environment. The environmental form, which consists of the overall form and its elements, is related to the concept of legibility (Abu-Obeid, 1998). Legibility has become an indicator for the wayfinding process (Werner & Schindler, 2004). The spatial organization of an environment can be understood by legibility (Arthur & Passini, 1992). Abu-Ghazzeh (1996) defined legibility as "the degree to which a building or group of buildings facilitate the ability of users to find their way around" (p.303). "The legibility of key architectural elements, such as entrances, horizontal and vertical circulation and major landmarks, is a prerequisite to understanding the spatial organization of a building. […] The addition or deletion of certain architectural elements, for example, signage, can manipulate legibility of a place" (Doğu & Erkip, 2000, p.732). Likewise, Arthur and Passini (1992) indicated that clear articulation and coherent grouping of interior and exterior spaces, legible circulation systems design, and integrating communication systems can provide legibility within an environment

Various design features can influence legibility such as visual access, architectural differentiation, the use of signs and room numbers to provide identification or directional information and plan configuration (Weisman, 1981). According to Demirbaş (2001), the ease of wayfinding for many people can be influenced by the legibility of the architectural environment, which is an important design issue. The

space has a low legibility factor, if it does not have a clear spatial organization and does not help with wayfinding (Doğu & Erkip, 2000). Coherent and legible environments are important for the people who use them. Legible buildings are not simplistic, dull or boring, "settings must possess distinctive landmarks and regions which, along with understandable path networks, allow users to know where they are and how to make their way to desired destinations" (Abu-Ghazzeh, 1996, p.303).

2.3.1.2. Spatial Configuration

The spatial configuration of a building is a significant factor in the wayfinding performance (Werner & Schindler, 2004). The spatial content, form, organization and circulation define the spatial configuration of the setting (Werner & Schindler, 2004). The spatial configuration and the pictorial elements such as the buildings' contours, shapes, surface qualities, spatial qualities and entrances are factors that influence the wayfinding performance (Abu-Obeid, 1998).

The spatial configuration has an important role since the environmental characteristics can affect the individual's spatial decisions. Werner and Schindler (2004) claimed that spatial configuration and other architectural features are important sources of information during wayfinding. If the building enables easy and error free navigation then it is considered as a design success (Werner & Schindler, 2004). Likewise Passini (1984) stated that "although the architecture and the spatial configuration of a building generate the wayfinding problems people have to solve, they are also a wayfinding support system in that they contain the information necessary to solve the problem" (p.110).

Werner and Schindler (2004) reported that "a high positive correlation is usually found between the perceived figural complexity of a floor plan and the difficulties in navigating the space […], how the appearance of architectural features like hallways, entries, or atriums, in addition to appropriate signage can assist and guide users in their wayfinding task" (pp.462-463). Features like the functional characteristics, axis

of symmetry, elongation, use of visual textures, a 'you-are-here' map and visible structures such as an atrium, the outside landscape and other prominent features are helpful for the wayfinding performance (Werner & Schindler, 2004).

The plan configuration of the building can influence the wayfinding behavior of the individual and the accuracy of the mental image. Studies showed that the wayfinding performance is mainly influenced by the complexity of the floor plan configuration. Buildings that are organized around a simple orthogonal grid with regular angles are less problematic than irregular designs. Symmetry axes, elongation, use of visible structures such as an atrium, the outside landscape or other prominent features provide comprehensible environments (Werner & Schindler, 2004). O'Neill (1991) found that floor plan complexity influenced wayfinding performance negatively, when plan complexity was increased, errors also increased.

Haq and Zimring (2003) indicated that visibility is an important issue in movement as it is easier to find a destination that one can see. According to Başkaya, Wilson and Özcan (2004), the uniformity of architectural composition and the lack of reference points increased wayfinding difficulties, whereas visual access to the main destinations made wayfinding easier. They found that remembering a regular but asymmetrical floor plan was easier than a regular but symmetrical layout and a simple corridor system allowed for easy orientation.

Çubukcu and Nasar (2005) found that environments with simple layout and higher physical differentiation provided better spatial knowledge than environments with complex layout and lower physical differentiation. The simple layouts also had significantly lower selection, sketching and navigation errors than the complex ones.

The circulation system is one of the key elements of a building that helps to develop a mental map. The building is understood better with a well-designed circulation system (Arthur & Passini, 1992). Circulation system of the building should be identifiable and obvious for easy understanding from the initial contact,

and important adjacent activities should be exposed to the circulation system (Pollett & Haskell, 1979).

Doğu and Erkip (2000) stated that the form of a building's volume gives cues about the internal organization and the circulation system to the users. The circulation system is an important organizing element of a layout and is an important aspect that influences people as they navigate within the building in which they make their wayfinding decisions (Arthur & Passini, 1992). A visual and an auditory access is provided to the users when the organization of the buildings are around an open core or atrium even if the form of the circulation system is not visible (Doğu & Erkip, 2000).

Vertical circulation elements such as stairs, elevators, and ramps should be perceptible for maintaining easy communication to the users (Giuliani, 2001). Giuliani (2001) stated that the entries and circulation spaces were the first contact of people with the building interior. Thus, a sense of openness for improving the acquisition of knowledge about the building layout and social organization should be provided.

2.3.2. Graphical Components of Wayfinding Design

Graphical components can also be influential during wayfinding in an unfamiliar environment. Maps and sign systems are two primary graphical components of wayfinding design.

2.3.2.1. Maps

Maps provide information to understand where one is in the building and the whole of the building (Pollett & Haskell, 1979). Devlin and Bernstein (1995) claimed that maps play an important role in people's lives. The effectiveness of maps depends on

their relation to the actual environment and to pre-visit information. Interior maps should be placed at key nodes in a circulation system and on each floor level. Exterior maps should be located so that they are legible from a parked vehicle (Pollett & Haskell, 1979).

Maps may include visual properties of a drawing to represent geographical information of the environment. Generally, maps are used for three purposes as guides to exploration, as substitutes for exploration and as the basis for directions (Hunt & Waller, 1999). Using familiar pictograms for reinforcing the text and providing you-are-here (YAH) symbols are important for emphasizing information (Giuliani, 2001).

According to Marquez, Oman and Liu (2004), maps are useful because they provide spatial information about the environment beyond what can be seen and depicted in a physical small space. They claimed that YAH maps were more beneficial than regular maps since they indicated the users their locations within the environment and surrounding areas (Marquez et al., 2004). A YAH map needs to be placed along paths and positioned near decision points. The number of YAH maps to be placed depends on the length of the route and the number of necessary turns. YAH maps should include an overall map of the complex and detailed maps of the buildings in specific areas to achieve effective graphic communication (Muhlhausen, 2006). It should be positioned in an asymmetrical part of the environment for easy identification on the map, it should be perceived from a distance and it should be easily accessible (Richter & Klippel, 2002). A YAH map is required at the entrances since visitors orient themselves at these points and decide their destinations.

Arthur and Passini (1992) indicated that the usage of maps is easy with the following recommendations:

- Maps should be placed at decision points to reduce confusion. In addition, maps constitute great importance for buildings with more than one floor.
- Maps should be placed on the ground floor of the building and especially in buildings that contain multiple floors.

- Maps must contain clear information that point to specific information such as restaurants, telephones, emergency shelters, public restrooms, strollers, first aid stations and information kiosks.
- The graphic of maps should be understandable and large enough to promote the information.
- Color maps should not produce glare on the surface and the information must be highlighted to be readable for people with impaired vision.

2.3.2.2. Signs Systems

Signs and spatial information are considered vital in the wayfinding design. They are placed in suitable places and are highly useful in accessing important information during wayfinding such as reaching a destination and exiting from the building. According to O'Neill (1991), signage is used to improve wayfinding efficiency especially in settings with complex floor plan configurations in which wayfinding is problematic such as subways, hospitals, and large governmental buildings. Richter and Klippel (2002) claimed that information provided by a sign is the faster process of receiving information. However, signage can be problematic as it shows just directions, not routes and at every decision point a new sign is needed.

Pollett and Haskell (1979) indicated that three types of signs exist that are identification signs, directional signs and descriptive signs. Identification signs provide information about the location and they generally include names and pictographs (Arthur & Passini, 1992). Directional signs consist of the arrow and some directional indicators for showing people which way they need to go (Arthur & Passini, 1992). Descriptive signs inform people where they are and where they have arrived. It involves building signage, floor numbers and room identifiers provided at the point of destination (Arthur & Passini, 1992).

Location, content, illumination and color of signs are important in representing beneficial and functional information systems. The location of the signs should be

visible at transitional areas and at intersections. This gains importance in places that contain large lounges such as large hospitals, airports and other complex buildings, when the spatial organization of the building cannot be viewed from the vantage point (Pollett & Haskell, 1979; Passini, 1984).

Signs should be easily seen under all circumstances, in other words it should be legible and easily recognizable. The text that represents the sign should be written in large font and be readable; there should be high contrast between the color of the typography and the background for ease of reading and also the impact of color on interpretation and understanding of the content. The legibility of the sign affects the readability of the sign. There should not be more than five messages and five lines of text in a single sign, character height, stroke width, font type, surface characteristics should be considered, artificial and natural illumination should be designed to prevent glare on signage, color schemes used should be described easily by names (Pollett & Haskell, 1979; Passini, 1984).

2.4. Individual Differences in Wayfinding

Individual differences are also considered as factors that affect wayfinding. Various aspects of individual differences such as gender differences, spatial familiarity and age differences have been examined through previous studies.

2.4.1. Gender Differences

Gender is an important factor that influences the use of architectural and graphic components in wayfinding design and affects the wayfinding process. Studies have shown that males and females utilize different strategies types and focus on different elements in the environment (Sandstrom, Kaufman and Huettel, 1998)

Sandstrom and colleagues (1998) stated that males and females used different navigational strategies during the self-report measures. Females used topographic strategies, which used landmarks, whereas males employed a Euclidean strategy, which relied on distances and directions (Dabbs, Chang, Strong and Milun, 1998; Lawton & Kallai, 2002). Males formed a more accurate representation of the Euclidean or geometric properties, whereas females formed a more accurate representation of the landmarks in the 2D environment (Sandstrom et al., 1998).

Cornell, Sorenson and Mio (2003) reported that males tend to be more confident in their spatial and geographic abilities when compared to females. Devlin and Bernstein (1995) reported that males use visual spatial cues more than females in a virtual campus tour. Furthermore, Sandstrom et al. (1998) indicated that females rely on landmark information, whereas, males prefer to use both landmark and geometric information in the given spatial task.

When giving navigational directions, females mention about landmarks more and other visual objects along a route, demonstrate greater accuracy in remembering landmarks and in estimating distances to landmarks, and utilize a route-based navigation strategy. On the other hand, males use more cardinal directions and an orientation strategy (Cherney, Brabec & Runco, 2008; Dabbs et al., 1998; Sandstrom et al., 1998; Saucier et al., 2003). Studies have shown a male advantage on tasks requiring survey knowledge, for example pointing directions, drawing a sketch map and estimating travel distances (Çubukcu & Nasar, 2005; Devlin & Bernstein, 1995). Furthermore, Chen, Chang and Chang (2009) indicated that males have a better movement performance when compared to females.

2.4.2. Spatial Familiarity

Spatial familiarity with the built environment is another factor affecting wayfinding. According to Prestopnik and Ewoldsen (2000), the length of time living in an environment is important for developing a sense of familiarity as the most

important factor in predicting wayfinding. People who rated themselves as more familiar with the environment were more accurate than people who were less familiar with the environment (Prestopnik & Ewoldsen, 2000). As familiarity with the environment increases, spatial description tasks become easier. Familiarity with an environment can be gained by experiencing it directly or indirectly.

O'Neill (1992) stated that as familiarity with an environment increases, performance in wayfinding improved and the degree of complexity of the layout became less important. Likewise, Hunt and Waller (1999) indicated that as people became familiar with the environment, they first acquired landmarks, paths and finally developed configurational knowledge of the key locations. Chebat, Chebat and Therrien (2005) stated that people familiar with the environment used more information stored in their long-term memories and unfamiliar people used external sources more, such as maps, signs, and other people. They also claimed that people who were familiar asked less help for wayfinding and used fewer maps than people who were unfamiliar with the environment.

2.4.3. Age Differences

Another factor that influences wayfinding is the age difference. Çubukcu and Nasar (2005) indicated that age produced a significant effect on navigation errors; as age increased, performance declined. Galea and Kimura (1993) found that younger participants scored higher on landmark selection task, scene recognition, distance ranking, map placement, and route execution tasks than older adults did. Iaria, Palermo, Committeri and Barton (2009) reported differences in spatial navigation between young and older adults. Likewise, older adults self-reported a decline in several wayfinding abilities and skills and often avoided unfamiliar environments in order to reduce the risk of getting lost (Bryden, Charlton, Oxley, & Lowndes, 2010).

3. WAYFINDING IN HOSPITALS

A hospital is an institution for health care providing patient treatment by specialized staff and equipment and sometimes provides long term patient stays (Paul, 2013). The physical environment of a hospital may be the most challenging area in architecture in terms of wayfinding. Wayfinding in a hospital becomes a problem when patients and visitors in a hospital have to find their ways from the parking garage, to the main entrance, and to their appointment (Paul, 2013). In hospitals, wayfinding is important since patients who are likely to be stressed, may have to navigate to various locations within the hospital (Arthur & Passini, 1992). In addition, wayfinding is found to be one of the major sources of stress for patients and visitors' related with the physical setting (Carpman & Grant, 1993). This can be a difficult task since hospitals are characterized by confusion and disorientation (Arthur & Passini, 1992).

Since hospitals do not have a standard plan, they are arranged and designed in several ways, and they have a large number of first time users (Paul, 2013). Many hospital users can be unfamiliar with the particular space. They come from different cultural backgrounds, speak different languages, and are often late, nervous and concerned (Paul, 2013). Unfamiliarity with the building, unclarity of decision points and routes with missing or incomplete cues such as signs and architectural features can put the patients and visitors into stressful situations.

A good wayfinding design should be considered for the first time users. Patients and visitors who are there for the first time have to find their destination without the help of an acquired cognitive map. As a result they have to depend on the external information that exists in the environment and is communicated through architectural components and graphical components such as maps and sign systems. However,

when there is a lack of sufficient wayfinding systems or environmental cues, wayfinding becomes problematic.

Good wayfinding design enables healing because it provides people with a sense of control and empowerment, reduces stress, anxiety and fear (Huelat, 2007). It is stated that wayfinding complexity causes stress related problems such as increased blood pressure and headaches (Huelat, 2007). In addition, poor wayfinding design can cause time and concentration loss of staff due to first time users who interrupt the staff to ask for directions, loss of business and dissatisfaction due to user frustration and missed appointments (Arthur & Passini, 1992; Carpman & Grant, 1993). As hospitals grow and expand, the requirement for good wayfinding systems becomes more important. When new buildings or units are added and routes are changed, the environment that patients and visitors used previously may be different. Wayfinding systems should be accessible to and usable by people with the widest range of abilities language, social and cultural background (Arthur & Passini, 1992).

3.1. Architectural Components in Hospital

The architectural components in the hospital can be considered as the spatial layout, circulation systems and paths, and entrances and exits.

3.1.1. Spatial Layout

Arthur and Passini (1992) asserted that "spatial planning provides the context for wayfinding and sets the stage for the problem-solving performance" (p.43). The circulation system, the location of entrances and exits, major destinations and the organization of the spaces as well as the visual accessibility are determined by the spatial planning (Arthur & Passini, 1992). Spatial planning consists of the identification of spatial units and understanding their purpose, function and relationships to other units. According to these relationships and functions, spatial

units can be grouped into zones of common function or identity (International Health Facility Guidelines, 2016).

The spatial layout of a hospital is considered as the most important feature for wayfinding. It can affect the user's experience and satisfaction. The design of the hospital spatial layout should be legible and should ease wayfinding. A logical system of units in which functions are situated in close proximity (Carpman & Grant, 1993), separating inpatient and outpatient circulation paths (Malkin, 1992), creating well structured paths and avoiding to provide too many navigation choices to the users (Hunter, 2009) and differentiating distinct locations (Malkin, 1992) are suggestions that are provided to ease wayfinding related with the spatial layout.

3.1.2. Circulation Systems and Paths

In addition to the spatial layout, circulation systems and paths must be taken into consideration when designing hospitals in order to provide a clear and understandable wayfinding system for the patients and visitors. Patients and visitors should have the ability to access specific places inside the hospital easily and find their way out of the building.

The circulation system in the hospitals must have a high degree of flexibility to accommodate the planning requirements. Also, it must have the capability of developing through the years of service and according to the requirements that exist in each period. The circulation systems and paths that exist in hospitals are not similar to those in commercial and residential buildings, which remain unchanged during the period of service. In hospitals, the circulation systems must be able to accommodate the repeated waves of renovation and expansion according to the changes and technological progresses. Most hospitals seek on developing their own circulation systems every 10 years in order to provide better different services, as a result, the architectural planning of hospitals, from the beginning, should allow the

possibility of expansion, manage changing needs and allow the flexibility to meet the new requirements (Passini, 1984).

The circulation system is the main organizing element of a building. People use circulation systems in order to develop a mental map. The corridors should be legible from the entrance point for the users who are unfamiliar and familiar with the setting. Corridors in hospitals can be quite long; as a result this can cause disorientation for the users. A long corridor with blank walls, undifferentiated doors, lack of reference to the exterior can be uninviting and disorienting (Malkin, 1992; Paul, 2013). Likewise, long and undifferentiated tunnels and bridges should not be preferred. In order to make corridors welcoming and easier in wayfinding, they should be divided and differentiated with architectural features like color, texture, landmark, special graphics such as wall hangings, paintings to look at, and lighting. They should be lit in a way that enables safe and comfortable movement (Malkin, 1992; Paul, 2013).

In addition, horizontal and vertical circulation systems must be designed easily and simply. Departments or units that are on a single floor are connected with horizontal circulation; whereas, movement between floors is facilitated by vertical circulation consisting of staircases and elevators. Stair lobbies and elevators should be visible, differentiated and highlighted with landmarks or various architectural features, enhanced lighting and widening of corridors (Malkin, 1992).

3.1.3. Entrances and Exits

The main entrance of the hospital should be legible to the users from different angles since there may be other entrances. The legibility of the main entrance can be enhanced by architectural elements such as projecting or recessing the entrance with respect to the building, including a gate to control the approach angle, creating a canopy to draw attention to the entrance or using symmetry or asymmetry of the façade to differentiate the entry (International Health Facility Guidelines, 2016).

In most cases the entrances of a hospital are also the exits of a hospital. Points of exits should be legible from the main circulations or decision points. The process of finding the entrance in the hospital is considered as one of most important issues of wayfinding. Visitors who are unfamiliar with the hospital should firstly find the entrance, whereas, the exit in most settings will require a simple return to the entrance. If people are able to specify the path that leads to the entrance, they will only need simple environmental information in order to find the exit (Passini, 1984).

Although entrances and exits are considered as the same architectural elements from the user's point of view, they are certainly not seen in the same way. The perception of the entrances and exits are often limited to the actual doors and most of the time they are seen only at short range. In the design of the entrances and exits, each entrance that leads to a specific place inside the hospital must be clearly identified, the emergency signs that are placed in each room must be lighten and glass doors must be added, accompanied by clear signs or other visible means to prevent confusion with other features that are present inside the hospital (Passini, 1984). A different architectural language can be utilized to help differentiate the main entrance and exit doors from all the other doors in the hospital especially if the main door is situated along a corridor with many other doors (International Health Facility Guidelines, 2016).

3.2. Graphic Components in Hospitals

The graphical components in the hospital can be considered as signage, maps and color coding.

3.2.1. Signage

Signage, as one of the significant wayfinding elements, can be in the form of graphics such as arrows, symbols or images or text for providing information for the

users (Passini, 1984). “Signage refers to one of the many design-related elements that can affect that behaviour” (Carpman & Grant, 1993, p.275). Signage is commonly used in hospitals in order to improve the ease of wayfinding and simulate the environmental information because they inform the patient or visitor about the place, their location and the possibility of occurrence of an event and even how it occurs (O’ Neill, 1991; Passini, 1984).

A good signage system can provide clear information about the destinations of the users. Signs can be classified as:

- Informational: indicating the place of assistance or hours of operation.
- Directional: providing directions in the hospital
- Identification: identifying the departments, functions, rooms and floors of the hospital
- Regulatory (radiation in use) (Heulat, 2007):

Signs guarantee the users that they are on the right direction. The placement of the signs is important. Rousek and Hallbeck (2011) indicated that signs at eye level can attract the users’ attention more, resulting in fewer incidences of missing signs. In addition to signs at eye level, lines on the floor that define the routes can also help wayfinding. While deciding on the locations of the signs in hospitals, Carpman and Grant (1993) recommended that:

- Place signs at major decision points along the path. Decision points are places along the corridor where the individual must decide whether to continue in the same direction or turn or where a single environmental cue or a series of such cues indicates that the individual is moving into a new area.
- Consider placing reassurance signs between 45 and 75 meters after major decision points when another decision point is not nearby.
- Locate information consistently so that people learn to look for different types of signs certain places (p.80; cited in Design Guidelines for Non-clinical Areas in Hospitals, n.d.).

According to Carpman and Grant (1993), signs deliver messages to the users; however, in hospitals, the medical terminology while naming the departments can make the users confused about the spaces and functions. While attributing names to the spaces, there should be consistency in the names of the departments and the attributed signage. Carpman and Grant (1993) stated the following recommendations:

- Decide what terminology will be used for naming each department or service and base decisions on patients' and visitors' comprehension.
- Use consistent terminology on signs and in written and verbal
- Use consistent terminology on signs throughout the facility. For instance, avoid using X- ray on sign and Radiology on another.
- Whenever possible, state the message in positive terms.
- Avoid using words and phrases on signs that are beyond a sixth-grade reading level (p.76; cited in Design Guidelines for Non-clinical Areas in Hospitals, n.d.)

Signage can ease wayfinding if they are properly designed. They should be legible, color contrast and proper illumination should be provided, text size should be appropriate and should not contain too little or too much information. They should be perceived without glare or obstructions and should be placed at appropriate height for all users of the hospitals.

3.2.2. Maps

Maps, especially YAH maps (you are here) are widely used by patients and visitors to orientate themselves. Maps should include the name of the facility, major locations, an arrow that shows which direction is north, and a 'you are here' identifier (Huelat, 2007). Maps can cause confusion and frustration if they are poorly designed. However, they are useful when a staff member has to review the map with the visitor and trace an appropriate path for him or her. They give the opportunity of planning the route of travel in advance. Maps should be located at entrances, elevator

and staircase lobbies, and at transitions between buildings. Directional signage supports the map's directions at all major intersections (Huelat, 2007).

Levine (1982; cited in Carpman & Grant, 1993) indicated that consistent terminology should be used on map labels , maps should be placed accordingly so that forward is up and should be aligned with the building's layout. The YAH arrow of the YAH map should indicate the direction and the spot the viewer is facing while looking at the map. Landmarks should be incorporated into the map design. Likewise, Klippel, Freska and Winter (2006) indicated the placement of maps should be at an asymmetrical part of the environment. This way people can have more clues for location.

Furthermore, Carpman and Grant (1993) indicated that the maps should be simple and should show public corridors and destinations. A key map should be indicated on the map to show the relation of the mapped portion to the rest of the hospital; and perspective view of YAH maps are more preferred than the plan view maps (Carpman & Grant, 1993).

3.2.3. Color Coding

Color can be used as lines on the floor to direct patients and visitors to a destination during wayfinding. However, Carpman and Grant (1993) stated that this method is not efficient in large scaled hospitals because it can result in "a multicoloured spaghetti of lines on the floor or on the wall" (p.83) since the hospital has many destinations. This system can be used to refer to one or two main destinations.

A small number of colors should be used, and these should be in contrast with the surrounding in order to make them easily distinguishable to patients and visitors (Paul, 2013). Contrasting colors or intensities will help patients and visitors navigate the hospital (Paul, 2013). Malkin (1992) stressed that color should also be used for orientation and not just for aesthetic purposes because "whether artwork, employee

recognition boards, suggestion boxes or signage, simply too much is competing for the wayfinder's attention" (p.457).

4. CASE STUDY

4.1. Aim of the Study

The ease of wayfinding in a complex environment can be understood by the users of the environment. Wayfinding in a hospital can be problematic for the first time users. The aim of this study is to analyze the existing wayfinding system of a university based tertiary care hospital from the user's point of views. In other words, to understand the usability of the wayfinding system within the university based tertiary care hospital and to understand whether or not the users find the wayfinding system sufficient.

4.2. Participants

The sample group consisted of patients and visitors in the İbni-Sina hospital. One hundred and eighty-one participants were chosen randomly between the months of July and August 2016. There were 97 (53.6%) male and 84 (46.4%) female participants whose age range was from 18 to 102. The mean age was 41.61 and the standard deviation was 17.32. The majority of the participants had a high school degree (30.9%) followed by participants who had a university degree (26.0%; see Table 1).

Table 1. Percentages for the education levels of the participants

Education Level	No. of Participants	Percentage
None	3	1.7%
Primary School	36	19.9%
Middle School	26	14.4%
High School	56	30.9%
University	47	26.0%
Master	13	7.2%

4.3. Description of the Site

İbni-Sina Hospital, which is a part of Ankara University School of Medicine and a university based tertiary care hospital, is located in the Altındağ region of Ankara, Turkey (see Figure 4.1). İbni-Sina Hospital was established in March 13, 1985 with 1286 inpatients beds and 22 clinics. Today, the number of beds have been reduced to 902 beds in order to keep the patients in a more comfortable environment. In 2004, the academic campus of the hospital, which is a separate building, was opened and it was connected to the main hospital by a tunnel.

İbni-Sina Hospital consists of 16 storeys with 4 blocks (see Figure 4.2.) and a separate block consisting of the polyclinics. The polyclinic block consists of 3 floors as basement, ground and first floors, and with a café. There are four entrances in the İbni-Sina Hospital that are the main entrance, café entrance, polyclinic entrance and emergency entrance (see Figure 4.3).

The vertical circulation in the hospital is facilitated by six elevators and a staircase, and in the polyclinic block there are two elevators and two staircases for vertical circulation that are usable by the patients and visitors (see Figure 4.4). The elevators are located at a central location and are visible. The hospital and the polyclinic block are connected to each other by corridors at the basement and ground floor levels. There are two information desks on the ground floors of the hospital and polyclinic

blocks (see Figure 4.5); and three information desks on the basement floor in which the hospital and the polyclinic blocks are connected.

Figure 4.1. Location of İbni-Sina Hospital

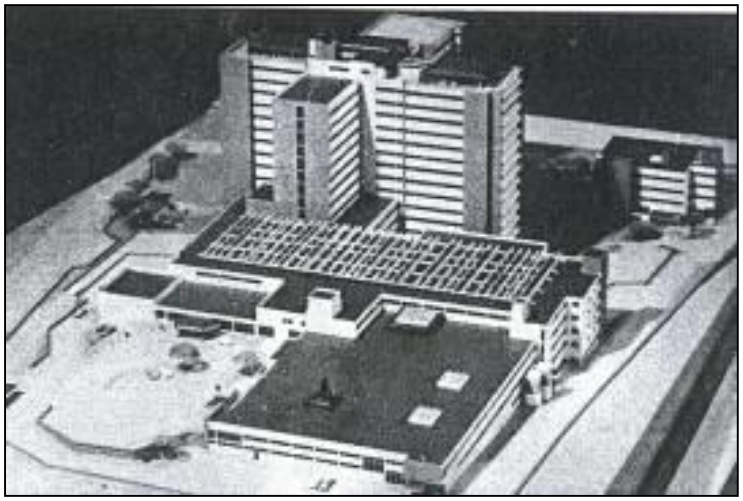

Figure 4.2. Model of İbni-Sina Hospital (Başkaya, Yıldırım, & Muslu, 2005).

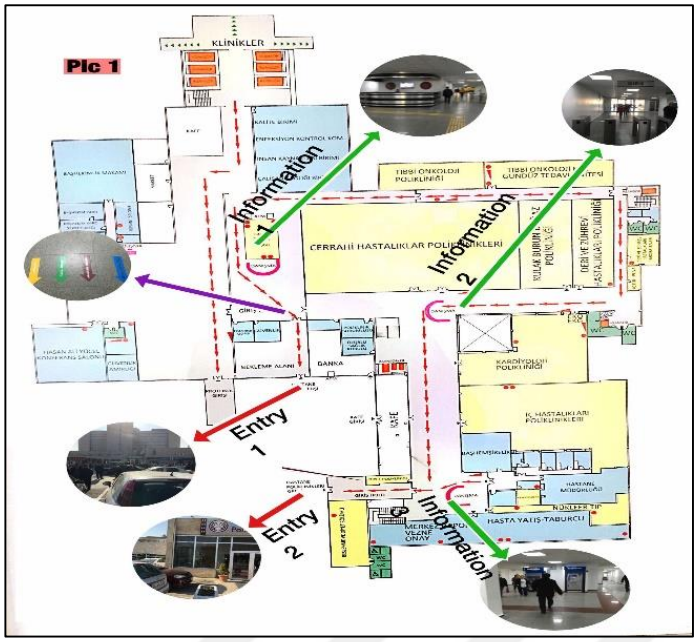

Figure 4.3. Map of İbni-Sina Hospital showing the location of the entrances and information desks

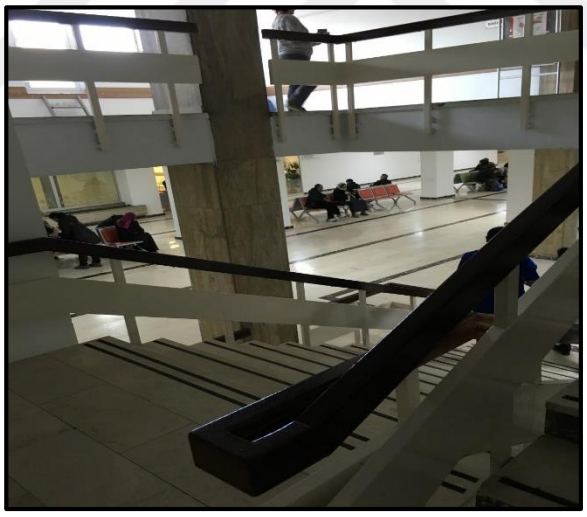

Figure 4.4. An interior view of the staircase in the polyclinic block

Figure 4.5. The information desk at the main entrance

4.4. Procedure

A questionnaire consisting of 15 questions were administered to the patients and visitors during the months of July and August 2017 (see Appendix A). Questions related to the demographic background of the participants, reason and frequency of visit, usage of the entrance doors, ease of access inside the hospital, feeling of lost, means of wayfinding, availability, sufficiency and legibility of informative signs, level of difficulty in finding various locations inside the hospital were asked to the participants.

4.5. Results and Discussion

According to the results of the questionnaire, the main reason of visiting the hospital was that the participants had an illness (38.6%) in which they needed treatment. Being a visitor of the patient was the second reason for visiting the hospital (31.5%; see Table 2).

Table 2. Percentages for the reason of visit to the İbni-Sina Hospital

Purpose of visit	No. of Participants	Percentage
Illness/patient	68	38.6%
Relative of Patient	51	28.2%
Visitor	57	31.5%
Missing values	5	2.8%

One hundred and forty participants (77.3%) indicated that they had come to İbni-Sina Hospital before and only 35 participants (19.3%) were new to the hospital. Six participants refused to explain if they had visited the hospital before. Participants who came to the İbni-Sina Hospital either visited the hospital once in a week or more than once in week (38.1% for both cases; Table 3).

Table 3. Frequency of visit to the İbni-Sina Hospital

Frequency of Visit	No. of Participants	Percentage
Less than once in a week	35	19.3%
Once in a week	69	38.1%
More than once in a week	69	38.1%
Missing values	8	4.4%

İbni-Sina Hospital has four entrances that are the main entrance, café entrance, polyclinic entrance and emergency entrance. Eighty-eight participants (48.6%) indicated that they used the main entrance followed by 44 participants (24.3%) who indicated that they used the polyclinic entrance (Table 4).

Table 4. Percentages for the usage of the entrance types in İbni-Sina Hospital

Entrance type	No. of Participants	Percentage
Main entrance	88	48.6%
Café entrance	22	12.2%
Polyclinic entrance	44	24.3%
Emergency entrance	27	14.9%

Although the main entrance of the hospital is not enhanced by an architectural element such as projecting or recessing the entrance or a canopy (International Health Facility Guidelines, 2016), the main entrance is differentiated by a signage indicating that it is the main entrance (Figure 4.6). The sign is legible to the users from different angles.

Figure 4.6. The main entrance of İbni-Sina Hospital

In most cases the entrances of a hospital are also the exits of a hospital. Visitors who are unfamiliar with the hospital should firstly find the entrance, whereas, the exit in most settings will require a simple return to the entrance. One hundred and forty-five participants (80.1%) indicated that they left the hospital from the same door that they entered from, whereas 36 participants (19.9%) were not able to exit from the same door that they entered. This indicates that the majority of the participants were familiar with the hospital. One hundred and forty-seven participants (81.2%) indicated that they could find the desired places in the hospital, whereas 31 participants (17.1%) indicated that they could not find the desired places. The participants who could not exit from the same door that they entered and could not find the desired places in the hospital could consist of people who came to the hospital less than once in a week and were visitors.

Spatial familiarity, which is a factor that can affect wayfinding, can be gained by experiencing it directly or indirectly. Since the participants visited the hospital either

once in a week or more than once in week their familiarity with the environment increased. As Prestopnik and Ewoldsen (2000) asserted, the length of time living in an environment is important for developing a sense of familiarity. As a result the participants were able to find their way.

Signage is commonly used in hospitals to ease wayfinding and simulate the environmental information because it informs the patient or visitor about the place, their location and the possibility of occurrence of an event and even how it occurs (O' Neill, 1991; Passini, 1984). The majority of the participants (74%) indicated that there were informative signs in İbni-Sina Hospital (see Table 5). However, 66 participants indicated that the informative signs were not sufficient in the İbni-Sina Hospital (see Table 6).

Table 5. Percentages for the availability of informative signs in İbni-Sina Hospital

Availability of informative signs	**No. of Participants**	**Percentage**
Yes	134	74.0%
No	45	24.9%

Table 6. Percentages for the sufficiency of informative signs in İbni-Sina Hospital

Sufficiency of informative signs	**No. of Participants**	**Percentage**
Yes	99	54.7%
No	66	36.5%

Fifty-four participants indicated that they felt lost inside the hospital (29.8%), whereas 127 participants did not feel lost inside the hospital (70.2%). The participants who felt lost could consist of people who came to the hospital less than once in a week, were unfamiliar with the hospital and were visitors. Chebat et al. (2005) claimed that people familiar with the environment used more information stored in their long-term memories and did not become lost and unfamiliar people used external sources more, such as maps, signs, and other people. They also

claimed that people who were familiar asked less help for wayfinding and used fewer maps than people who were unfamiliar with the environment.

In order to find their way inside the hospital, 67 participants out of 180 used the informative signs (37.0%) inside the hospital (see Table 7). An example of floor signage can be seen in Figure 4.7. In addition, they either asked for help from the information desk or from the hospital personnel or asked other people in the hospital.

Table 7. Percentages for the means of wayfinding inside İbni-Sina Hospital

Means of wayfinding	No. of Participants	Percentage
I look at the informative signs	67	37.0%
I ask for help from the information desk	56	30.9%
I ask for help from the hospital personnel	40	22.1%
I ask other people	18	9.9%

Figure 4.7. Signage on the floor

One hundred and thirty-four participants indicated that they did not have difficulty in reading the informative signs in the İbni-Sina Hospital (74%), whereas 47 participants indicated that they had difficulty. They indicated their difficulties as being illerate, not being able to understand the hospital layout and the informative signs either being too small or too complicated or having no color.

The circulation system is the key organizing element of a building. The corridors, elevators, staircases and information desks should be visible and legible from the entrance point for the users who are unfamiliar and familiar with the setting (Malkin, 1992; Passini, 1984). One hundred and fifty-seven participants indicated that they found the elevators inside İbni-Sina Hospital either very easy or easy (see Table 8). Likewise, one hundred and fifty participants indicated that they found the stairs inside İbni-Sina Hospital either very easy or easy (see Table 9). One hundred and fifty-seven participants indicated that they found the main entrance inside İbni-Sina Hospital either very easy or easy (see Table 10). One hundred and thirty-nine participants indicated that they found the departments inside İbni-Sina Hospital either very easy or easy (see Table 11). One hundred and fifty-two participants indicated that they found the information desks inside İbni-Sina Hospital either very easy or easy (see Table 12). One hundred and ten participants indicated that they found the doctors' rooms inside İbni-Sina Hospital either very easy or easy (see Table 13). Only 35 participants indicated that they found the academic campus of İbni-Sina Hospital either very easy or easy (see Table 14).

Table 8. Difficulty level in finding the elevators inside İbni-Sina Hospital

Difficulty Level	**No. of Participants**	**Percentage**
Very easy	133	73.5%
Easy	24	13.3%
Medium	14	7.7%
Difficult	6	3.3%
Very difficult	2	1.1%

Table 9. Difficulty level in finding the stairs inside İbni-Sina Hospital

Difficulty Level	**No. of Participants**	**Percentage**
Very easy	126	69.6%
Easy	24	13.3%
Medium	25	13.8%
Difficult	3	1.7%
Very difficult	1	6%

Table 10. Difficulty level in finding the main entrance inside İbni-Sina Hospital

Difficulty Level	No. of Participants	Percentage
Very easy	152	84.0%
Easy	5	2.8%
Medium	16	8.8%
Difficult	5	2.8%
Very difficult	1	6%

Table 11. Difficulty level in finding the departments inside İbni-Sina Hospital

Difficulty Level	No. of Participants	Percentage
Very easy	102	56.4%
Easy	37	20.4%
Medium	27	14.9%
Difficult	15	8.3%

Table 12. Difficulty level in finding the information desk inside İbni-Sina Hospital

Difficulty Level	No. of Participants	Percentage
Very easy	113	62.4%
Easy	39	21.5%
Medium	21	11.6%
Difficult	5	2.8%
Very difficult	1	6%

Table 13. Difficulty level in finding the doctors' room in İbni-Sina Hospital

Difficulty Level	No. of Participants	Percentage
Very easy	72	49.8%
Easy	38	21.0%
Medium	42	23.2%
Difficult	26	14.4%
Very difficult	1	0.6%

Table 14. Difficulty level in finding the academic campus of İbni-Sina Hospital

Difficulty Level	No. of Participants	Percentage
Very easy	25	13.8%
Easy	10	5.5%
Medium	28	15.5%
Difficult	46	25.4%
Very difficult	67	37.0%

It can be stated that the elevators, staircases, main entrance, departments, information desks, doctors' rooms are visible and legible to the participants since they were able to find them easily; however, finding the academic campus was difficult and caused problems for the participants. In order to reach the academic campus, participants had to go through a tunnel; it was planned as a separate block and was not considered as part of the hospital spatial layout. As Malkin (1992) indicated, corridors and tunnels should be legible from the entrance point; however, the tunnel that lead to the academic campus was not legible from the entrance point and the signage that indicated the academic campus was not sufficient. The entrance of the tunnel is at the end of the polyclinic block. Although the majority of the participants visited the hospital once in a week or more than once in week and were familiar with the hospital, finding the academic campus of the hospital was either difficult or very difficult.

5. CONCLUSION

Wayfinding, as a spatial problem solving activity in which humans face every day, can be challenging and frustrating especially in large built environments, such as hospitals, transportation centers, shopping malls or university buildings for humans. Wayfinding in a complex built environment can be problematic when the person has little or no prior knowledge about the environment resulting in a feeling of disorientation.

Hospitals, as one of the public facilities, can become disorienting environments due to the complexity of their functions and programs, and architectural configuration. Wayfinding in a hospital becomes a problem when patients and visitors in a hospital have to find their ways from the parking garage, to the main entrance, and to their appointment (Paul, 2013). In hospitals, wayfinding is important since patients who are likely to be stressed, may have to navigate to various locations within the hospital (Arthur & Passini, 1992).

This thesis focused on the wayfinding system of a university based tertiary care hospital located in Ankara, Turkey. The aim of the study was to analyze the existing wayfinding system of the university based tertiary care hospital from the users' point of views and to understand the usability of the wayfinding system within the hospital. The study focused on the wayfinding system from a user perspective. The university based tertiary care hospital building has a complex spatial layout in which the hospital block is connected to the polyclinic block and from the polyclinic block, the patients and visitors can go to the academic campus, which connected by a tunnel. The majority of the participants who were familiar with the hospital evaluated the wayfinding system sufficient. Spatial familiarity with the hospital decreased the possibility of getting lost inside the hospital. Although the spatial layout of the hospital is complex, the participants were able to find the elevators,

staircases, main entrance, departments, information desks, doctors' rooms easily. However, finding the academic campus was difficult. This indicates that the architectural layout of the hospital should be planned carefully from the beginning, allowing the possibility of expansion and the circulation system must be able to accommodate the renovation and expansion according to the changes and technological progresses. This study points out that an expansion at a different floor level and from a different location that is not visible from the entrance and circulation system can be problematic; as a result, additional signage and a YAH map can be integrated into the wayfinding system of the hospital.

The results of this study can be useful for interior architects and hospital owners who aim to reduce stress caused by wayfinding, since this study analyzes the wayfinding system from the users' perspective. For further studies, gender differences can be investigated with respect to the usage of the wayfinding system.

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APPENDIX A

QUESTIONNAIRE

Age: ..... Gender: Female □ Male □

1. Education level:
None □ Primary School □ Middle School □
High School □ University □ Masters □

2. What is your purpose of visit to İbni-Sina hospital?
Illness/Patient □ Relative of patient □ Visitor □

3. Did you come to İbni-Sina hospital before? Yes □ No □

4. How often do you come to İbni-Sina hospital?
Once a week □ Once in a month □ Once in 6 months □
Once in a year □

5. Which entrance of İbni-Sina hospital do you use?
Main entrance □ Cafe entrance □ Polyclinic entrance □
Emergency entrance □ Other……

6. Can you leave from the door you entered the hospital? Yes □ No □
If no, please explain…….....

7. Can you easily access the desired places inside İbni-Sina hospital?
Yes □ No □
If no, please explain…….....

8. How do you find the place you are looking in the İbni-Sina hospital?
a. I look at informative signs
b. I ask help from the information desk
c. I ask help from the hospital personnel
d. Other (please indicate) .....

9. Do you feel lost in İbni-Sina Hospital? Yes □ No □
If yes, please choose one or more reasons for getting lost
a. Not enough informative signs
b. Not enough information desks
c. No color-coded informative signs
d. The informative signs are not legible
e. The informative signs are not visible
f. Too many corridors
g. I can't see the outside (no connection with the exterior)

10. In İbni-Sina Hospital are there informative signs for patients and visitors?
Yes □ No □

11. Do you find the informative signs sufficient? Yes □ No □
If no, where should the informative signs be more?
Please indicate the locations

a. At the entrance doors
b. At the hallways
c. At the elevator hallways
d. At the staircase hallways
e. At the beginning and end of corridors
f. Other.....

12. Do you find difficulty in reading the informative signs? Yes □ No □

13. What is your reason for not being able to read the informative signs?
Please indicate one/more reasons that are appropriate for you.

a. Very small
b. Very complex
c. I'm illiterate
d. No color
e. Can not understand the hospital plan configuration/floor plans
f. Other.....

14. Please rate your difficulty level in finding:

	Very Easy				Very Difficult
Elevators	1	2	3	4	5
Stairs	1	2	3	4	5
Main Entrance	1	2	3	4	5
Departments	1	2	3	4	5
Information Desk	1	2	3	4	5
Doctor's Room	1	2	3	4	5
Academic Campuse	1	2	3	4	5

15. In your opinion, what would be helpful for wayfinding in İbni-Sina hospital?
.....
.....

Thank you

Saat & Gün: **Anket No:**

Anketin Amacı: *Bu anket çalışması Çankaya Üniversitesi, İç Mimarlık Yüksek Lisans Programı tez çalışması kapsamında uygulanmaktadır. Anketin amacı, İbni-Sina Hastanesi'nde kullanılan yönlendirici işaretlerinin analizidir. Anket sonuçları sadece bilimsel amaçlı kullanılacaktır.*

Yaşınız: ..... Cinsiyetiniz: Kadın □ Erkek □

1. Anketi yanıtlayan kişinin en son bitirdiği okul:
   Yok □ İlkokul □ Ortaokul □
   Lise ve dengi okul □ Üniversite / Yüksekokul □ Yüksek lisans □

2. İbni-Sina Hastanesine gelme amacınız nedir?
   Rahatsızlık □ Hasta Yakını/Refakatçı □ Ziyaretçi □

3. Daha önce İbni-Sina Hastanesi'ne geldiniz mi?
   Evet □ Hayır □

4. Ne sıklıkla İbni-Sina Hastanesi'ne geliyorsunuz?
   Haftada 1 kere □ Ayda 1 kere □ 6 ayda 1 kere □ Yılda 1 kere □

5. İbni-Sina Hastanesi'nin hangi kapısından giriş yapıyorsunuz?
   Ana giriş □ Cafe girişi □ Poliklinikler girişi □ Acil girişi □
   Diğer……

6. Hastaneye girdiğiniz kapıdan çıkabiliyor musunuz?
   Evet □ Hayır □
   Hayırsa, lütfen sebebini belirtiniz…….....

7. İbni-Sina Hastanesi'nde istediğiniz yere kolayca ulaşabiliyor musunuz?
   Evet □ Hayır □
   Hayırsa, lütfen sebebini belirtiniz …….....

8. İbni-Sina Hastanesi içinde gideceğiniz yeri nasıl buluyorsunuz?
   a. Yönlendirici işaretlere bakarım
   b. Danışmaya sorarım
   c. Hastane çalışanlarına sorarım
   d. Diğer (lütfen belirtiniz) .....

9. İbni-Sina Hastanesi içinde kaybolmuş hissediyor musunuz?
   Evet □ Hayır □

   Evetse, size uygun olan aşağıdaki seçeneklerden bir veya daha fazlasını lütfen işaretleyiniz

a. Yeterli sayıda yönlendirici işaretinin olmaması
b. Yeterli sayıda danışmanın olmaması
c. Renkli yönlendirici işaretinin olmaması
d. Yönlendirici işaretinin okunaklı olmaması
e. Yönlendirici işaretinin görünür bir yerde olmaması
f. Çok fazla koridorunun olması
g. Dışarıyı göremiyor olmam

10. İbni-Sina Hastanesi'nin içinde hastalar ve ziyaretçiler için yönlendirici işaretler var mı? Evet □ Hayır □

11. Sizce yönlendirici işaretler yeterli mi? Evet □ Hayır □
Hayırsa, sizce yönlendirici işaretler hastane içinde nerelerde daha fazla olmalı?
Size uygun olan aşağıdaki seçeneklerden bir veya daha fazlasını lütfen işaretleyiniz.
a. Giriş kapılarında
b. Kat hollerinde
c. Asansör hollerinde
d. Merdiven hollerinde
e. Koridorların başında ve sonunda
f. Diğer.....

12. Yönlendirici işaretleri okumada zorluk çekiyor musunuz? Evet □Hayır □

13. Yönlendirici işaretleri okumada zorluk çekmenizin sebebini nedir?
Size uygun olan aşağıdaki seçeneklerden bir veya daha fazlasını lütfen işaretleyiniz.
a. Çok küçük olması
b. Çok karışık olması
c. Okur yazarlığım yok
d. Renksiz olması
e. Hastane şemasını/kat planlarını anlamıyorum
f. Diğer.....

14. Lütfen, aşağıda belirtilen öğeleri bulmaktaki zorluk derecesini belirtiniz:

	Çok Kolay				Çok Zor
Asansörler	1	2	3	4	5
Merdivenler	1	2	3	4	5
Ana Giriş	1	2	3	4	5
Bölümler	1	2	3	4	5
Danışma	1	2	3	4	5
Doktor Odası	1	2	3	4	5
Akademik Yerleşke	1	2	3	4	5

15. Sizce, İbni-Sina Hastanesi içinde yolunuzu bulmak için neler yardımcı olabilir? .....

Teşekkür ederim

APPENDIX B

CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: Layas, Hetham

Date and Place of Birth: 24 July 1981, DERNA

Marital Status: Married

Phone: +905349609411

Email: hl_adam@yahoo.com

EDUCATION

Degree	Institution	Year of Graduation
M.Sc.	Çankaya Univ., Interior Architecture	2017
B.Sc.	Omeralmoktar Univ., Architectural Engineering	2003
High School	Osta Omer	1998

WORK EXPERIENCE

Year	Place	Enrollment
2003- Present	Employee in the Ministry of Higher Education and Scientific Research	Teacher

FOREIGN LANGUAGES

Advanced English, Beginner Turkish