UNIVERSITI PUTRA MALAYSIA

LEGIBILITY OF SAFAIEH NEIGHBORHOOD IN THE CITY OF YAZD, IRAN

MASOMEH ROUSTAEI SADRABADI

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By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Master of Science

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

LEGIBILITY OF SAFAIEH NEIGHBORHOOD IN THE CITY OF YAZD, IRAN

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MASOMEH ROUSTAEI SADRABADI

February 2014

Chairman: Norsidah Ujang, PhD
Faculty: Design and Architecture

Today, cities are developed to simplify human activities and well-being. Facilitating human activities is depending on the structures and characteristics of the physical elements of cities. In the context of Iranian cities, it is observed that in the majority of new urban areas such as Safaieh neighborhood, most of residents are facing challenges to find their way around. This is due to the fact that the physical elements are unable to cooperate with psychological aspects to enhance legibility of the environment. In this respect, different scholars and researchers in environmental design and environmental psychology fields argued that there is a strong relationship between arrangements of the physical elements and legibility of the city. In this regard, Lynch's notable work which described the concept of legibility based on physical elements which refers to the ease with which type characters can be read has been fundamental basis for the analysis in the urban design and planning. In order to enhance legibility of Safaieh neighborhood, this study aims to identify physical elements and psychological aspects of the urban environment to enrich people's wayfinding and orientation in a new area (Safaieh neighborhood) of Yazd City-Iran. Based on mental mapping technique and interviews, Lynch identified five physical elements that influence how people structure a city. The elements are landmarks, paths, nodes, edges and districts. The study extended the investigation by examining the effects of these physical elements on the psychological aspects which are human wayfinding and orientation. It is argued that one's wayfinding and orientation are dependent on the physical elements in the city. The study adopted both qualitative and quantitative methods to identify physical elements in the new area of Yazd city in Safaieh neighborhood and to examine the effect of physical elements on people's wayfinding and orientation in Safaieh neighborhood. Field observation was conducted to understand the structure of the city and elements defining the city while structured questionnaire surveys were used to gauge the respondents' opinions and knowledge about the physical elements that affect wayfinding and orientation. The questionnaire survey was conducted with 102 participants of Safaieh neighborhood residents to identify the legible elements within the city. Then, the semi-structured interviews were conducted with 100 respondents using a set of open-ended questions together with sketch mapping to capture their mental images of the

physical elements and to gather information on issues related to the city and characteristics associated with wayfinding and orientation. The study found that from the perspectives of the respondents, the physical elements are not legible enough to provide clear image for residents to have a good perception of environmental information and thereby reduces their wayfinding and orientation ability. The findings of the study assist urban planners to understand the effect of physical elements on wayfinding and orientation and to plan for a strategy to enhance the legibility of urban setting. Therefore the outcome could be used to improve wayfinding and orientation ability of residents in different neighborhoods in Iranian cities.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

KEBOLEHBACAAN KEJIRANAN SAFAIEH DI BANDAR YAZD, IRAN

Oleh

MASOMEH ROUSTAEI SADRABADI

Februari 2014

Pengerusi: Norsidah Ujang, PhD
Fakulti: Rekabentuk dan Senibina

Di masa sekarang, bandar dibangunkan untuk memudahkan aktiviti seharian dan kesejahteraan sejagat manusia. Penggalakan aktiviti manusia bergantung kepada struktur dan ciri-ciri elemen fizikal bandar. Dalam konteks bandar di Iran, melalui pengamatan kebanyakan kawasan bandar yang baru dibangunkan seperti kawasan kejiranan Safaieh, tidak dapat menghasilkan elemen fizikal yang jelas. Isu ini masih lagi menjadi perdebatan antara penyelidik dan cendiakawan dalam bidang reka bentuk persekitaran dan psikologi persekitaran, yang menyangkal bahawa terdapat hubungan yang kuat antara susun atur elemen fizikal dan kebolehbacaan bandar. Namun, hasil kajian Lynch yang terkemuka menggambarkan konsep kebolehbacaan berdasarkan elemen fizikal yakni cara yang mudah untuk mengenal karakter bandar telah menjadi asas utama untuk menganalisis reka bentuk bandar dan perancangannya. Kajian ini bertujuan untuk mengenal pasti elemen fizikal dan gambaran aspek psikologi kognitif persekitaran bandar untuk meningkatkan kebolehbacaan kawasan kejiranan Safieh di bandar Yazd. Berdasarkan teknik pemetaan mental dan temubual separa berstruktur, Lynch mengenal pasti lima elemen fizikal yang mempengaruhi perancangan sesebuah bandar. Lima elemen tersebut ialah mercu tanda, laluan, nodus, susur dan kawasan. Selain itu, kajian ini juga bertujuan untuk mengkaji kesan elemen fizikal ini dari segi psikologi iaitu orientasi manusia dan arah jalan *(wayfinding).* Orientasi dan arah jalan (*wayfinding)* seseorang bergantung kepada kebolehbacaan elemen fizikal bandaraya tersebut. kajian ini telah menggunapakai kedua-dua kaedah kuantitatif dan kualitatif untuk mengenal pasti elemen fizikal di kawasan kejiranan Safaieh, bandar Yazd. Elemen tersebut masih diperdebatkan di mana ianya boleh membantu orientasi dan arah jalan (wayfinding) seseorang. Pegamatan di lapangan dijalankan untuk memahami struktur bandar dan elemen yang membentuk bandar tersebut. Manakala borang kaji selidik berstruktur digunakan untuk mengukur pendapat dan pengetahuan responden tentang elemen fizikal yang menjejaskan orientasi dan arah jalan (wayfinding) mereka. Seramai 102 orang responden yang terlibat terdiri daripada penduduk kawasan kejiranan Safaieh bagi mengenal pasti kebolehbacaan elemen bandar tersebut. Temubual separa berstruktur juga dijalankan terhadap 100 orang responden dengan menggunakan satu set soalan dan lakaran peta untuk merekod imej mental terhadap elemen bandaraya yang dilakarkan oleh responden. Temubual ini juga bertujuan untuk mengumpul maklumat tentang

isu yang berkaitan dengan bandar berkenaan dan ciri yang berkaitan dengan orientasi dan arah jalan (wayfinding). Kajian mendapati bahawa elemen fizikal di kawasan kejiranan Safaieh tidak mempunyai imej yang jelas kepada penduduk yang menyebabkan kekurangan tahap arah jalan (wayfinding) dan keupayaan orientasi mereka. Dapatan kajian ini boleh membantu perancang bandar memahami kesan kebolehbacaan penunjuk jalan (wayfinding) dan merancang strategi untuk meningkatkan kebolehbacaan persekitaran bandar serta meningkatkan penunjuk jalan (wayfinding) dan keupayaan orientasi penduduk di kawasan kejiranan lain di bandar dalam negara Iran.

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I certify that a Thesis Examination Committee has met on 6 February 2014 to conduct the final examination of Maasomeh Roustae Sadrabadi on her thesis entitled " Legibility of Safaieh Neighborhood in the City Of Yazd, Iran" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

Members of the Thesis Examination Committee were as follows:

Mohamad Fakri Zaky Bin Ja'afar, PhD
Associate Professor
Faculty of Design and Architecture
Universiti Putra Malaysia
(Chairman)

Osman Bin Mohd Tahir, PhD, Lar.
Professor
Faculty of Design and Architecture
Universiti Putra Malaysia
(Internal Examiner)

Suhardi Bin Maulan, PhD, Lar.
Associate Professordee
Faculty of Design and Architecture
Universiti Putra Malaysia
(Internal Examiner)

Julaihi Wahid, PhD
Professor
Faculty of Housing building and planning
Universiti Sains Malaysia
(External Examiner)

NORITAH OMAR, PhD
Associate Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 21 April 2014

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

Norsidah binti Ujang, PhD
Associate Professor
Faculty of Design and Architecture
Universiti Putra Malaysia
(Chairman)

Kamariah binti Dola, PhD
Associate Professor
Faculty of Design and Architecture
Universiti Putra Malaysia
(Member)

BUJANG BIN KIM HUAT, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

Declaration by graduate student

I hereby confirm that:

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This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
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Signature: _____
Name of Chairman of Supervisory Committee: **Norsidah binti Ujang, PhD**

Signature: _____
Name of Member of Supervisory Committee: **Kamariah binti Dola, PhD**

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In recent years, discussions on the urban environment have increasingly focused on the wayfinding, orientation and urban legibility (Tang, 2011; Yaski, et al., 2012). It is due to this reason that a city is defined as an object that can bring changes on human psychology to understand or perceive physical environment (Long, 2007). Human orientation and wayfinding refers to where person is and how to get where a person is going (Lynch, 1960). According to Lynch, people's ability for wayfinding and orientation is extremely essential to connect to his or her survival and sanity. On the other hand, urban environment can simplify or limit the person's wayfinding and orientation (Rapoport, 1977; Lynch, 1981; Devlin, 2001).

Today, urban environment has increasingly faced with rapidly developing urban areas, particularly, in the developing countries like Iran (Habitat, 2001; Zanganeh Shahraki, et al., 2011). Rapid urbanization has affected wayfinding, orientation and urban legibility in the city. In this respect, some researchers opined that a legible environment is as key factor in improving wayfinding and orientation (Battle and McCarthy, 2001; Ewing, et al., 2005; Yaski, et al., 2012). Besides, a legible environment can limit and facilitate human behaviour through a cognitive map. In fact, the term cognitive map refers to a cognitive process that includes the acquisition, representation, and processing of information in regards to actual physical settings (Downs and Stea, 1973; Moore, 1979; Evans, et al., 1980; Golledge and Stimson, 1997; Long and Baran, 2012). Also, Yun and Kim (2007) investigated the interrelationship between spatial cognition and configuration, and the effects of turns in path (depth) and metric distance in forming spatial cognition by using Space Syntax in Istanbul, Turkey. They found that there is a strong interrelationship between the syntactic properties and spatial cognition as indicated in the cognitive map (Yun and Kim, 2007). However, this study focuses on legibility on city streets in Safaieh neighborhood in Yazd. Yazd is located at the eastern part of Isfahan and to the south of Kavir-e-Loot in the central part of Iran (Bonine, 1980). Since thousands of years ago, Yazd is the center of heritage, culture and art. It includes many unique architectural sites and urban structures. It is claimed that a legible neighborhood should be easily identifiable based on physical elements and psychological aspects (Kelly and Kelly, 2001).

1.2 Background of the study

Since 1960s, relationship of human and environment has been a subject of study and theorizing in urban planning. The planners have argued that they can increasingly act on the legibility of the environment by designing its key elements. Although various scholars and researchers (Howard, 1965; Olmsted Jr and Kimball, 1970; Collins, et al., 2006) initiated preliminary discussions about city beautification movement, but application based on Kevin Lynch's (1960) theory was a turning point in this area. He focused on urban physical elements which play a vital role on perceptual interaction between human and environment (Palone, 2013).

In 1960s, the concept of urban image was introduced to react to the modern manipulation of space, the destructive impacts of modernism and the loss of the human dimension in cities. Kevin Lynch, who focused on architectural review and urban experience, defended the townscape movement. "The phenomenological view of the city was espoused ultimately by Lynch (1990) and Jacobs (1993). It identified a whole new vocabulary of urban form –one that depends on sights, sounds, feels, materials, textures, facades" (Akit, 2004).

In the book "The Image of the City", Kevin Lynch describes the legibility of a city as the ease with which its parts may be recognized and can be organized into a coherent pattern…" In this point, Lynch has pointed a cognitive map into the human mind (Lynch, 1960). In fact, he implied that a structure by which a person constitutes an internal representation of an environment. This structure will help residents of an area when they navigate to a destination (Ingram and Benford, 1995; Carlson, et al., 2010). However, the role of physical elements in improving the people's wayfinding and orientation through the identification of their cognitive map is not adequately discussed.

Lynch in his notable book, "The Image of the City", collected the experiments in a number of main US cities (Boston, Jersey City, and Los Angeles) in which illustrated how the cognitive map was made up over time by the experiences of these cities. Moreover, the experiments had acquired from long standing dwellers of the cities. He identified five main elements of urban landscapes that influenced how the residents structure the cities. The five main elements identified were landmarks, nodes, districts, paths and edges.

These elements represent an evaluation of the environment subjectively. In fact, objective description of them is exceedingly difficult. Moreover, it is hard to formulate their features because cognitive systems are different from one person to another (Long, 2007). Several researchers tried to examine the effects of these elements in the process of cognition. For example, Appleyard (1970) suggested the size of building as a major feature for landmarks while Evans (1980) represented the role of color (Long, 2007). However, the main focus of the thesis is to understand how these five physical elements contribute to peoples' cognition of neighborhood.

Physical elements are usually necessary to recognize the qualities of a legible city. Such elements influence visual recognition, wayfinding and orientation. On

the other hand, psychological aspects of an urban environment are on the other side of the coin in the human's cognitive systems. However, studies carried out by Cullen (1995), Long (2007), Lynch (1960) have emphasized merely on the physical elements or confined to the psychological aspects (orientation and wayfinding) of the cities. According to Maslow (1943), there is a strong relationship between physical elements of the environment and the psychological aspects which is translated in the people's image ability of the setting. According to him, human's cognitive system is influenced by human psychological needs (Lang, 1987). He believes that a person can identify with a legible space or place that can meet his/her belonging, safety, aesthetic and cognitive needs.

The context of the study is Yazd which is divided in two parts, historical (Fahadan) and new parts (Safaieh) (Montazerolhojjah, et al., 2012). According to the studies carried out in the historic city of Yazd, the physical elements could contribute to maintain the historic area as a legible city (Golkar, 2000; Pourjafar, 2010; Montazerolhojjah, 2012). On the other hand, new area of Yazd city (Safaieh) is found to have fewer physical elements to make a legible neighborhood (Pourjafar, 2010; Montazerolhojjah, 2012). Hence, it is assumed that psychological aspects (wayfinding and orientation) do not meet the subject of legibility of Safaieh neighborhood. Therefore it is important to understand how the physical elements affect the people's wayfinding and orientation in the case where the new city structure was introduced to support human activities. It is argued that the historical area is more legible than the newer area due to the presence of recognizable elements which cannot be found in the new and monotonous part of the city.

1.3 Problem statement

As a result of rapid development, traditional urban environment is constantly facing challenges by modern structures and images (Ujang, 2008). Today, legibility of places raised by the physical and visual images has mainly emphasized by numerous urban design studies. In recent years, design of the urban environment was influenced by Lynch's notable pilot work. One of the main areas is the planning and design of legible environment. Many planners, designers, and researchers have been trying to apply Lynch's concept of legibility to their works (Lang, 1987; Kim, 2001; Penn, 2003). It is argued that Lynch had mainly focused on the physical elements, while has not investigated the importance of psychological elements to enhance legibility and relationship between physical elements and psychological aspects (Jiang, 1998; Kim, 2001; Penn, 2003; Long, 2007). However, these relationships that reflected in human's minds have a main root to contribute for recognizing an urban environment and a prerequisite for human's cognitive maps (Long, 2007). Moreover, researchers such as Kim and Penn (2003) have illustrated that design of the urban environment according to Lynch's work let to disaggregation of human's cognitive maps. This matter is caused by the lack of ability to form a strong image of the city in the human's minds. However, recent studies indicated that human's cognition can be recognised through recognizing the relationships between the

physical elements and the psychological aspects. This study seeks to understand this relationship by identifying cognitive representations of the urban environment to enrich people's wayfinding and orientation that results in enhancement of Safaieh neighborhood's legibility.

In last decades, the historic city of Yazd has faced a difficult challenge on the urban design (Shamsollahi, et al., 2012). The rate of urbanization in Yazd has increased from 75.8 to 81.4 between 2009 and 2011 (ISC, 2012), while the increase in urban population has contributed to the decrease in the quality of life of urban dwellers (Kalali, et al., 2012). However, the rapid urban development has resulted in uncontrolled transformation of traditional and historic urban texture and rapid urban development in the modern areas with lacking in visual and physical coherence (Montazerolhojjah, et al., 2012; Shamsollahi, et al., 2012).

Studies have shown that traditional part of Yazd has many historic landmarks which maintain the principal of spatial configuration in shaping the strong legibility of the urban environment (Pourjafar, 2010; Montazerolhojjah, et al., 2012). However, according to Yazd Municipality (2010) Safaieh is facing legibility issue. This problem becomes severe when new residents prefer to settle in the new area of the city. A study has shown that new generation is more interested to live and settle in the Safaieh neighborhood (Pourjafar, 2010). Although studies by Golkar (2000) and Pourjafar et al, Montazerolhojjah (2012) and Shamsollahi, et al. (2012), attempted to provide some guidelines in shaping legibility in the historic area of Yazd, there is no study to enhance legibility in the new area (Safaieh) in Yazd. This research seeks to answer that the question on how to enhance people's wayfinding and orientation in Safaieh neighborhood, Yazd city, Iran. It is assumed that the physical elements could not provide a good image and sense of direction for residents' wayfinding and orientation within the neighborhood.

According to Golkar (2000), physical elements of Safaieh in Yazd city could not provide a meaningful relationship between people and the neighborhood (Golkar, 2000). This is the reason for people facing challenges in wayfinding and orientation within Safaieh neighborhood. However, urban legibility as the combination of physical elements and psychological aspects has been a challenging issue in the research studies in Yazd city (Golkar, 2000; Pourjafar et al 2010; Montazerolhojjah, 2012; Shamsollahi et al, 2012). Hence, this study aims to identify physical elements in Safaieh neighborhood and to examine the effect of physical elements on people's wayfinding and orientation in Safaieh neighborhood, the new area of Yazd city, Iran.

Research question

The study seeks to answer the following questions:

Main research question:

How to enhance people's wayfinding and orientation in Safaieh neighborhood, Yazd city?

Sub research questions:

a) What are the current physical elements of Safaieh neighborhood?
b) Can the physical elements affect the wayfinding and orientation in the Safaieh neighborhood?

1.4 Research objectives

This study will focus on examining the physical elements and the psychological aspects of the urban environment to enhance legibility of the new area (Safaieh neighborhood) in Yazd, Iran. The objectives of the study are as follows:

a) To identify physical elements in Safaieh neighborhood, the new area of Yazd city, Iran.
b) To examine the effect of physical elements on people's wayfinding and orientation in Safaieh neighborhood.
c) To identify the level of people wayfinding and orientation at Safaieh neighborhood.
d) To propose suggestion or implication for the improvement of wayfindings in Safaieh neighborhood.

1.5 Research hypothesis

In this study, it is understood that a legible city possesses qualities generated by the physical elements (landmarks, nodes, districts, path, and edges) and psychological aspects (wayfinding, orientation). It is hypothesized that the physical elements affect the wayfinding and orientation of the Safaieh neighborhood.

1.6 The study area

Safaieh neighborhood has been chosen as the case study. The neighborhood is one of the famous neighborhoods in the city of Yazd. Yazd is located at the eastern part of Isfahan and to the south of Kavir-e-Loot in the central part of Iran (Bonine, 1980). Yazd is the center of heritage, culture, art, and creativity since years ago and includes many architectural sites and urban structures.

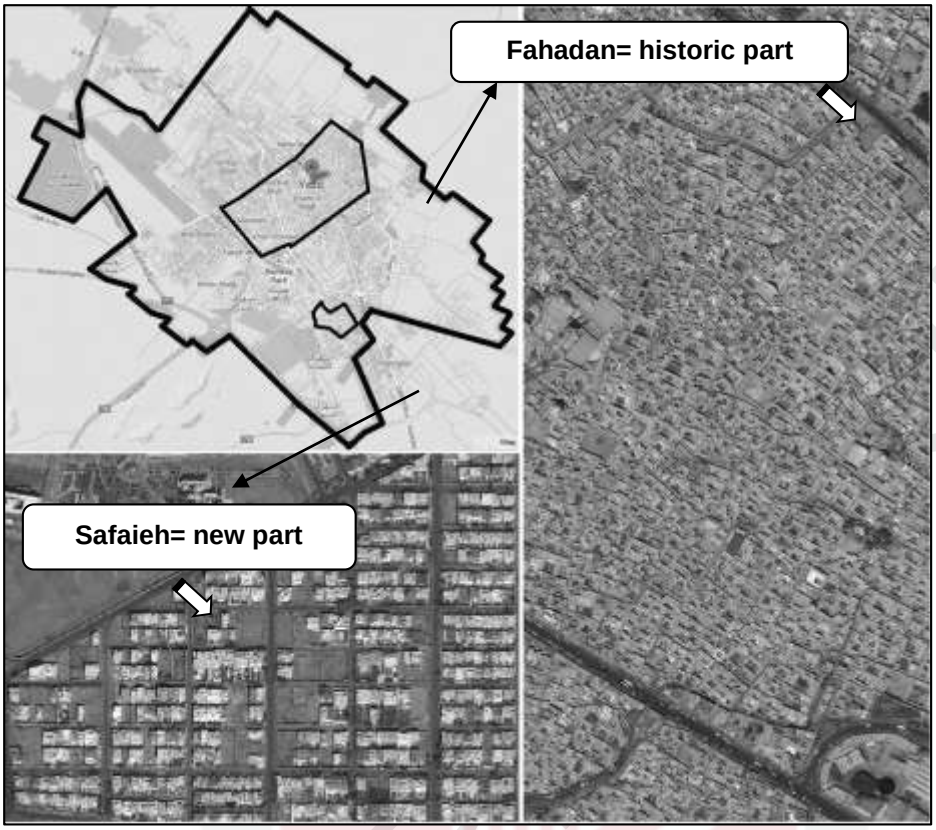

Figure 1-1 Safaieh and historic part locations in Yazd city
Source: Yazd Municipality (2010)

1.7 Significance of study

This study is set up to provide the conceptual framework of legibility in the urban environment particularly in the new urban area of Yazd (Safaieh). In fact, investigating urban environment and its effect on dwellers' spatial cognition is a subtopic under Environment and Behavioral studies. Moreover, this recognition helps to contribute to residents' quality of life and well-being (Lynch, 1984; Palone, 2013).

The significance of the study can be divided into two parts; first, from a view of theoretical aspect, discussion of spatial configuration in urban environments is the initial root to shape human cognitive (Long, 2007). The study tries to provide appropriate empirical evidence to support the discussion in the new case. Second, in practice, the application of the study can inform planners and designers to consider different elements that will influence the urban legibility in Yazd city, Iran.

1.8 Scope and limitation of the research

This study is confined to investigate physical and psychological aspects of legibility of new area in Yazd city. In fact, Lynch described legibility as "the ease with which the physical elements of the urban environment can be recognized and can be organized into a coherent pattern" (Lynch, 1960). He classified the dwellers' images of three American cities (Boston, Jersey City, and Los Angeles) into five physical elements: landmarks, nodes, districts, paths, and edges. Also, there are three components that are valuable in a legible city: orientation, wayfinding, and formal aesthetic (Long, 2007). However, this study has selected these five physical elements, wayfinding and orientation to examine the legibility in Safaieh, Yazd. Although the five physical elements are essential for good urban environments (Lynch, 1960; Palone, 2013), the psychological aspects of the place have been emphasized by many researchers (Cullen, 1995; Koseoglu and Onder, 2011; Long and Baran, 2012; Palone, 2013).

According to the studies carried out in the historic city of Yazd, physical elements could contribute in maintaining the historic area as a legible city (Golkar, 2000; Pourjafar, 2010; Montazerolhojjah, 2012), while new area of Yazd city (Safaieh) has fewer physical elements to contribute to a good legible city. Hence, wayfinding and orientation as psychological aspects of legible environment have not been achieved (Pourjafar, 2010). Therefore, this study sets up to investigate the physical elements and the psychological aspects of legibility in the new area of Yazd city (Safaieh).

This study was conducted at the selected neighborhood (Safaieh) in Yazd city to find out how physical elements can enhance people's wayfinding and orientation, which will contribute towards the legibility of the area. In this study field observation was applied to identify the physical elements in Safaieh neighborhood, and structured questionnaires was carried out within one month among 102 residents of the neighborhood to find out what are the effects of physical elements on people's wayfinding and orientation. Also, semi-structured interviews and sketch mapping were conducted among other 100 participants to support and confirm the results from the questionnaires. Participants were residents who living in the vicinity and they consisted of inhabitants above 18 years. Nevertheless, there are certain limitations in this study and these include:

i. This study focused on finding out the influence of the physical elements on people's wayfinding and orientation only.
ii. The other parts of Yazd city, as an old part and other vicinities of Yazd city were excluded in this study.
iii. The study was conducted only at Safaieh neighborhood in Yazd city. Therefore, the results of the study could not be generalized to old parts of the Yazd city in Iran.

1.9 Research organization

This thesis comprises of five chapters. The first chapter provides an introduction of the study, which includes the background of the study, statement of the problem, research questions, goal and objectives, hypothesis, the study area, the significant of the study, as well as the organization of the thesis. The second chapter provides a review of the literature, while the third discusses about the method used in this study. The third chapter also describes the planning involved in the study in detail, how it was conducted and the techniques used to analyze the data. Chapter four describes the findings of the study, the discussion of the results and the summary of its major findings. The final chapter (Chapter 5) discusses the significant findings of the study, their implications and the suggestions to improve the people's wayfinding and orientation of Safaieh neighborhood and enhancement of neighborhood's legibility, as well as a discussion on the findings, in relation to the results of the previous studies and the theoretical framework. Prior to the conclusion, a critical evaluation on the methods used in present research and the recommendations for future research are presented.

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