

# The Correlation Between Physical Elements and the Level of Wayfinding and Orientation in Cities

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**Abstract**— 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. 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. 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. The purpose of this study was to understand the relationship between physical elements and psychological aspects by identifying the physical elements that can enhance the people's wayfinding and orientation of the Safaieh neighborhood in Yazd city, Iran. The results clarify the importance of physical elements and psychological aspects to improve the legibility of Safaieh neighborhood in the city of Yazd, Iran. Therefore, it is necessary for planners and designers to have more consideration on the physical elements and psychological aspects to create legible neighborhoods around the world. In order to enhance legibility of Safaieh neighborhood, physical elements of the neighborhood should contribute to wayfinding and orientation.

**Index Terms**— urban legibility, wayfinding, orientation, landmark, Safaieh neighborhood

## 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). Since 1960s, relationship of human and environment has been a subject of studies 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). Since then, he 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 recognised 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.

### 1.1 Physical Elements

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 this article is to understand how these five physical elements contribute to peoples' cognition of neighborhood.

### 1.2 Case Study

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.

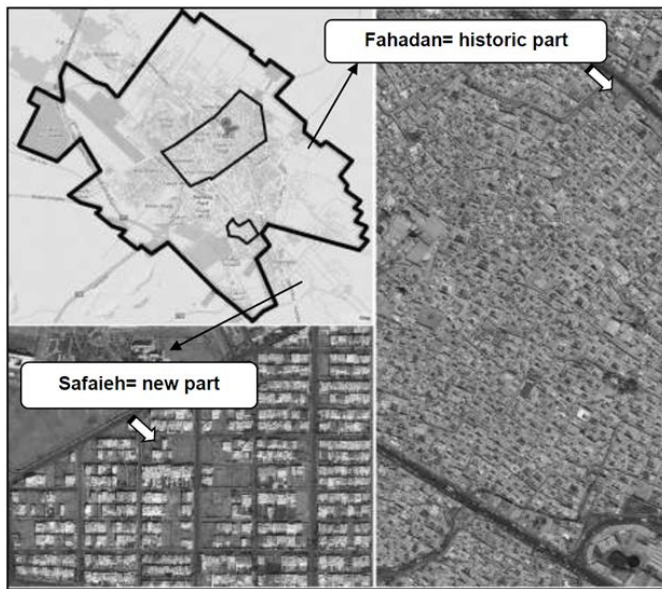


Fig. 1: Safaieh and historic part locations in Yazd city

## 2 Previous Studies

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 are 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 recognized through identifying 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.

According to Lynch (1960) wayfinding is "a consistent use and organization of definite sensory cues from the external environment". In other words, Carpmann et al (2000) illustrated "wayfinding refers to what people see, what they think about, and what they do to find their way from one place to another".

Moreover, they described that it is about "knowing where you are, knowing your destination, knowing and following the best route to your destination, recognizing your destination upon arrival, and finding your way back" (Golledge and Stimson, 1997; Meng and Zhang, 2012). Besides, duration of residency in a neighborhood makes people familiar with the environment, which means people through familiarity can find their ways around easily (Lyu, et al., 2013). The concept of familiarity as it deals with humans connecting to the physical environment (Tuan, 1980; Casakin and Bernardo, 2012), is divided into four groups. Firstly, understanding where a neighborhood is. Secondly, is the ability to recognize a location. The third is recognition of the name of neighborhood, and finally the interactions of using the neighborhood. Therefore, as people stay in a neighborhood for a long time, they will have more confidence to find their way in the neighborhood. Studies have shown different significances of physical elements to determine cognitive maps (refer to Table 1). These are for the evaluation of cognitive maps, which are mental descriptions of the environment, varied from one person to another (Downs and Stea, 1973). Although Kevin Lynch suggested five key physical elements for assessing the individual's cognitive maps, other researchers have emphasized to these elements differently. For example, De Jonge (1962) believed that factor of the district has less important than the others while Gulick (1963) focused on the factor of the district to investigate cognitive maps in 72 workers in three cities, in Emarat. Golkar (2000) and Pourjafar (2010) claimed that among five physical elements, landmarks have a crucial role in shaping people's cognitive map in Iranian cities. However, what is considered now is that the individual's cognitive maps are dependent on human spatial behaviour which are varied from a city to another (Downs and Stea, 1977).

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.

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.

There are different ways to study the relationship between human and environment. According to Barlas (2006), the environment can be categorized into two main parts: behavioral and geographical environments. He mentioned what are truly around us and we can see them is the geographical environment, while, behavioural environments are related to a cognitive image of previous behaviour in the environment which is a base to act in the future. This view stressed that there is a difference between the organization of physical elements, and the environment belonging to psychological and behavioural issues (Eraydin, 2007). However, the studies have shown that physical and psychological aspects of the environment are interdependent. As, if any changes in the physical elements occur within the environment, the psychological aspects will be influenced subsequently (Rapoport, 1977; Lang, 1987). By

way of illustration, in the new part of Yazd city (Safaieh neighborhood), the urban structure and the physical elements were not laid out effectively and it leads to confusion in people’s wayfinding and orientation.

As the definitions imply, the term of wayfinding is generally referred to the action of finding a path to go from an origin to a destination. This action is dependent on two factors: individuals’ ability, and legibility of the environment. Lynch (1960) believed that the process of wayfinding is based on “both of immediate sensation and of the memory of past experience, and it is used to interpret information and to guide action”. Therefore, it is clear that a relationship between people and actual physical environment is crucial to access a real wayfinding. Researchers believe that people must understand their environment under an ordered pattern which is constantly dependent on legibility in their surroundings (Lynch, et al., 1995; Golledge and Stimson, 1997; Gärling, 1998; Casakin and Bernardo, 2012).

After Lynch’s work up to now, there are many studies carried out about wayfinding and determining its key factor. For instance, it is explored that the simplicity of the floor plan configuration is a strong predictor of self-reported wayfinding function (Long, 2007; Yaski, et al., 2012). Moreover, they described four types of environmental information, which are important as perceptual and cognitive points of view. These are signs, numbers, architectural differentiation, perceptual access, and plan configuration (Weisman and Jerry, 1981).

Table 1: The importance of physical elements to form city image in different studies

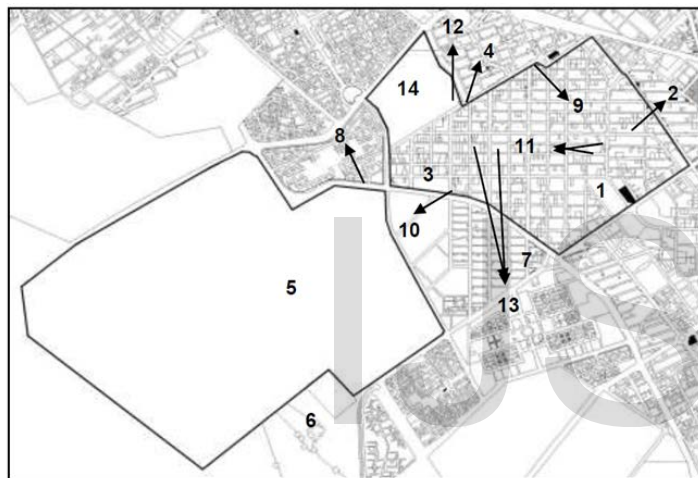
Name/Year	City	Interview Sampling	Important of Elements				
			Landmarks	Nodes	Paths	Edges	Districts
K. Lynch (1960)	Boston, Jersey City, Los Angeles, (US)	60 (Professional, managerial)	•	•	•	○	•
D. de Jonge (1962)	Amsterdam, The Hague, Rotterdam, (Netherlands)	72 (Wives of white-collar workers)	•	•	•		○
J. Gulick (1963)	Tripoli (Lebanon)	35 (students, upper middle class)		○	○		•
H. Klein (1967)	Karlsruhe (Germany)	1118 (Residents)	•	•	○		
T. F. Saarinen (1969)	Chicago (US)	72 (students, workers)	•		•	○	•
D. Appleyard (1969)	Giudad Guayana (Venezuela)	320 (Residents from selected settlements)		○			•
D. Stea and D. Wood (1970)	Mexico City, Puebla, Guanajuato, San Cristobal las Casas (Mexico)	769 (Residents, students)	•	•	•		○
D. Francesto and W. Mebane (1973)	Milan and Rome (Italy)	183 (residents)	•	•	○	•	
X. Yan (1990)	Beijing (China)	432 (residents, professional)	•	○	•	•	•
K. Lynch (1990)	Theoretical arguments			•	•		
A. B. Jacobs (1993)	Theoretical arguments				•		

Notes: ○ Important element • Very important element

### 3 METHODOLOGY

Generally, relevant theories on wayfinding can be divided into two models (Haq, 2001). First model provides a conceptual framework to analyses and compare various cognitive maps. These models can facilitate a good image of spatial environment. Second model has extensive emphasize on ecological perception in which the environment directly acts upon wayfinding behaviour without a cognitive process (Heft, 1983). However, this study is going to investigate wayfinding process through the legibility of the neighborhood that provide cognitive map (Kara, 2013). Thus, first model was selected since it relates to the characteristics of the study area.

This research is a single case study with two correlative objectives (quantitative) and subjective (qualitative) methods (Yin, 2008; Merriam, 2009 and Creswell, 2007) and examining the effect of physical elements on wayfinding and orientation of a place and its impact on legibility based on one case (a neighborhood).



1. Hotel Safaieh	7. Atlasi Square	13. Sidewalks
2. Shopping mall Ilia	8. Pajohesh Intersection	14. Hostel
3. Shopping mall Aria	9. Emam Hasan Square	
4. Bank Sepah	10. Tak Cinema	
5. Yazd University	11. Sign board	
6. Dakhmeh (Tower of Silence)	12. Transit stops	

Fig. 2: Physical Elements in Safaieh neighborhood

After preliminary field observation was conducted, research questions were designed to describe the more suited method to collect the data. This research followed by descriptive method which deals with research questions. The more common method of research applied in descriptive research or quantitative survey methods. Quantitative survey research is sometimes portrayed as being sterile and unimaginative but well suited to providing certain types of actual descriptive information (De Vaus, 2001; Creswell, 2008). In addition to quantitative method, qualitative methods are adopted, which are often regarded as proving data about real life people and situations and being able to make sense of behaviour and to understand behaviour within its wider context (De Vaus, 2001). This kind of study can be conducted in a wide spread population (Sharma, Prasad, & Satyanarayana, 1984). Survey questionnaire method has been chosen because it is a common way of

asking people how they feel about things and what they intended to do (Sharma, Prasad, & Satyanarayana, 1984). Besides, De Vaus (2001) stated the advantages of using questionnaires are that, they grant the participants enough time to think about the questions and answers.

To provide and confirm data about people and environment, semistructured interview and sketch mapping were used. This means, the study begins with a broad survey in order to generalize results to a population and then focuses on second phase, on detailed qualitative, to collect participants' point of view.

In this study, the population is the residents of Safaieh neighborhood, Yazd city whom are selected from people of age 18 years old and above. In order to define the number of participants a sample size of population was needed. Mitra and Lankford (1999) have explained that when the population is too large, sampling error of 5% and less is accepted to determine a sample population. This is to ensure results that can be used to generalize to the population (De Vaus, 2001; Pourjafar, 2010). Therefore, in this study Mitra and Lankford formula was applied to calculate the sampling size. Based on Mitra and Lankford's formula, the calculation of sample size was 100 so 102 participants among the residents were invited for survey questionnaire.

The data collected are field observation, questionnaire survey, and interview (with sketch mapping). In order to design the questionnaire a frame work was required; this conceptual framework was based on theories related to the topic and concerns observed from field observation. The theoretical constructs were identified and variables for measurement were developed to fulfill the objectives of the study. In addition, survey interview and sketch map were applied to clarify and complement the results from the quantitative methods.

#### 4.1 Field observation

Today, the most common tools used by researchers are direct observation and self-reporting, which permit them to better understand the problems. Therefore, this research tried to access the physical elements of Safaieh neighborhood. To this end, researcher used photography technique to identify these five physical elements (landmark, node, district, path, edge) in the neighborhood. The field observation was carried out over a period of one week. Based on the field observation, the following elements highlighted in the study area:

- Yazd University: as the main physical element which is considered a landmark,
- Pajohesh Intersection: as a major node which is used as a major setting of exit to other districts,
- Hostel of Yazd University: as a landmark and also an edge which is close to Teachers Quarter and close to the edge of Safaieh neighborhood,
- Aria shopping mall: as a landmark in the central neighborhood,
- Imam Hassan Square: as a node and also a gaming center in the neighborhood,
- Safaieh Hotel: as a landmark which is considered a tourist attraction,
- Atlasi Square: as a node to connect main street in the

neighborhood and also an important recreation center.

- Ilia Shopping Mall: as a significant landmark in the neighborhood which is considered a mega-store in the city,
- Dakhmeh (Tower of Silence): as a landmark which is considered an important spiritual center,
- Tak Cinema: as a landmark in the neighborhood,
- Main streets: some of important paths such as Daneshjoo Blvd., Dashti Blvd., Sayad Shirazi St, are considered significant paths in the neighborhood.

#### 4.2 Questionnaire survey

The questionnaire was divided into three sections. The first section collects background information of individual respondent. Section two of the questionnaire was on identification of the physical elements in the neighborhood. There is only one question in this section but the list of the physical elements identified in the neighborhood during the observation was provided. A total of fourteen physical elements were listed and respondents were requested to add other elements they consider important to their wayfinding and orientation within the neighborhood. The respondents were therefore requested to indicate their level of agreement on the importance of these elements. The questions on part two are necessary for answering the first objective of the study which is to identify physical elements in Safaieh neighborhood. The third section was designed to collect information about the respondents' wayfinding and orientation in the Safaieh neighborhood. There are a total of eighteen questions in this section. These questions were measured using a Likert Scale with endpoint of "Strongly Disagree" and "Strongly Agree". It comprises of wayfinding and orientation. These sections were designed to gather respondents' opinion on how the physical elements enhance people's wayfinding and orientation in the Safaieh neighborhood.

#### 4.3 Sketch mapping

Sketch mapping was conducted after the questionnaire survey. The respondents were asked to draw and label maps of Safaieh neighborhood by representing significant streets and buildings based on their understanding and experiences in relation to the physical elements. The interviewer has justified interviewees that the purpose of the sketch mapping is as a guide for the visitors to orient themselves and find their way in the neighborhood. Participants have the skill to produce sketches of the neighborhood from what they see; the time it takes may well be worthwhile. Drawings can be extremely useful in final reports because they are highly legible and inexpensive to reproduce.

#### 4.4 Interview

Interview was carried out after the sketch mapping. One of the advantages of this method is that the researcher can obtain a great deal of information about the process and data required. Moreover, through interview researcher is able to provide a better understanding of the process by referring to several options of issues that could be investigated in depth. The semi-structured interviews were conducted by a set of open-ended questions in Persian among residents who are inhabited

in Safaieh neighborhood. The aim was to encourage the interviewees to give more information about the relationship between physical elements and psychological aspects and the process of navigating themselves in the neighborhood.

### 5 RESULTS

Descriptive statistics are used to present a quantitative description in a manageable form as well as providing simple summaries about the data to describe what the data shows. Descriptive statistics include the demography of participants and measurements of the data which evaluate the variables in the study.

The participants of this study had different backgrounds in terms of gender, age, educational level, place of stay, ownership and duration of stay. Table 4-1 shows the result of participants' background. There were 72 males (70.6%) and 30 females (29.4%). The majority of the participants were in the age group of 18 to 25 years old (76.5%), followed by 26 to 46 years old (17.6%), and the age group 44 of 47 to 67 years old (5.9%). In terms of educational level, about 72% of participants went into college, while the rest were in graduate school (21%), and high school (7%), and 2 participants failed to fill in their education level. The participants were not mainly local (54.9%), followed by participants from Yazd city (45.1%). In terms of their place of stay, the participants lived mainly in hostel of Yazd University (51%), followed by other types of ownerships, their own house (34.3%) and rental one (14.7%). With regard to the duration of stay, the data indicated that the majority of participants lived in Safaieh neighborhood more than 10 years (38.6%), followed by less than twelve months (28.7%), one to three years (16.8%), three to five years (11.9%), and five to ten years (4%), while 1 participant did not answer this question.

The results of descriptive analysis of wayfinding and orientation are presented in Table 2. The highest percentage of 'strongly agree' was recorded for 'I never get lost when I am walking' (22%). Also the results revealed high frequency of 'agree' was documented for 'I never get lost when I am walking' (45%), then closely followed by 'confidence level of the sketch map' (42%), closely followed by a maximum value of 'agree' to the questions regarding familiarity, i.e. 'I am familiar with Safaieh neighborhood' (41.2%), after that 'I make use of the physical elements like landmarks to check my orientation' (39%), then 'I always use street names in learning a new area' and 'when planning a trip I make a mental image of the route I will follow' (37.3%). However, 'comfort level of the sketch map' (20.8%) which reflex how easy it was for them to sketch the map received the lowest frequency. The result revealed that the majority of users are familiar with Safaieh neighborhood which can be due to the length of residing period in the neighborhood.

As among physical elements, landmarks and nodes received the highest percentage so people can easily find their way and use landmarks as sign for their orientation. This causes high level of confidence for sketching map. Again these results highlight landmarks and nodes as significant physical elements. However, due to the unclear paths, districts and edges they cannot guide new comers to find their way.

The result of mean analysis shows that the highest mean score

belongs to 'I never get lost when I am walking' (mean=3.62, sd=1.15), then 'I am familiar with Safaieh neighborhood' received high mean score (mean=3.52, sd=1.06) and 'confidence level of the sketch map' (mean=3.46, sd=1.20), while the lowest mean was belonging to 'Ability to guide a newcomer' (mean=1.90, sd=.74).

According to Porjafar (2010) Safaieh is designed recently and the importance of physical elements is not equally considered. Although Safaieh has grid pattern, most of residents especially newcomers cannot find their way around (Myrjani and Pedram, 2011).

In accordance to the results of questionnaire, landmarks and nodes play vital roles in people's wayfinding and orientation. However, edges, paths and districts were not incorporated with people's wayfinding and orientation.

In overall, the descriptive analysis of the data revealed that among physical elements, landmarks and nodes were highly ranked compared with others. As regards to psychological elements of Safaieh neighborhood it is explored that as physical elements rated very low, hence the psychological elements

were not rated highly in Safaieh. Moreover, it can be concluded that physical elements were marked as equally low as psychological elements. Finally, it is understood that physical elements may enhance psychological aspects, which are wayfinding and orientation.

### 6 Discussion and Conclusion

The physical elements affect the people's wayfinding and orientation in Safaieh, Yazd city, Iran. In order to proof the hypothesis, first it is necessary to find out if there is any correlation between physical elements and wayfinding and orientation, then investigate whether physical elements affect the people's wayfinding and orientation positively (enhancement of environment's legibility). Correlation coefficient analysis was carried out to find out the relationship between physical elements and wayfinding and orientation (Table 3). The result of correlation analysis revealed that there is a significant relationship between the variables at the 0.01 level ( $r=0.39$ ).

Table 2: Wayfinding and orientation

Items	strongly disagree	disagree	neutral	agree	strongly agree
I am familiar with Safaieh neighborhood	5.9	9.8	26.5	41.2	16.7
I know the network of streets in my neighborhood	6.9	19.8	41.6	18.8	12.9
Safaieh neighborhood is easily understood from the point of view of a first-time user	16.0	26.0	27.0	26.0	5.0
There are several landmarks in the neighborhood	7.9	23.8	25.7	37.6	5.0
Navigation in the neighborhood is straightforward	9.8	30.4	23.5	31.4	4.9
I make use of the physical elements like landmarks to check my orientation	10.0	26.0	24.0	39.0	1.0
I never get lost when I am walking	5.0	17.0	11.0	45.0	22.0
It is easy for me to stay oriented in a shopping mall	10.1	21.2	25.3	30.3	13.1
I do not know the location of all the major landmarks in my neighborhood	8.1	21.2	32.3	31.3	7.1
I always use street names in learning a new area	5.9	21.6	23.5	37.3	11.8
When planning a trip I make a mental image of the route I will follow	11.8	20.6	19.6	37.3	10.8
Comfort level of the sketch map	20.8	26.7	31.7	15.8	5.0
Confidence level of the sketch map	6.0	22.0	11.0	42.0	19.0
After I take a walk to unfamiliar area I can draw an accurate map	6.1	14.1	45.5	31.3	3.0
I can draw an accurate map of the area around the place I live	2.0	11.8	49.0	27.5	9.8
I have a good mental map of my environment	3.9	26.5	37.3	30.4	2.0
I know the network of street in my neighborhood	5.9	19.6	43.1	19.6	11.8
It is easy for me to think about of road as a map	8.8	26.5	34.3	25.5	4.9
I know the location of all the major landmarks in my neighborhood	4.0	39.4	26.3	29.3	1.0
I have a good memory for the locations of stores or shops in Safaieh	.0	31.6	35.8	32.6	.0

Table 3: Correlation between physical elements and wayfinding and orientation

Item	Wayfinding and orientation
physical elements	0.39
	N
	102
	Sig
	0.0

As the result of the assumption analysis revealed that the data is appropriate to do regression 62 analyses, the multiple regression analysis was carried out. The results revealed that physical elements had significantly positive effect on wayfinding ( $\beta=0.393$ ) at the 0.01 level, and the physical elements predicted almost 15% ( $R^2= .154$ ) of people's wayfinding and orientation (Table 4).

The result of the regression analysis revealed that the hypothesis of the study is accepted. This means that physical elements can enhance psychological aspects which are the people's wayfinding and orientation in Safaieh neighborhood in Yazd city, Iran. This result is supported by Maslow (1943) that highlighted there is a strong relationship between physical aspects of the environment and psychological aspects of human's wayfinding and orientation. Also Lang (1987) pointed out that human's wayfinding and orientation is influenced by human psychological needs. He believes that a person can confidently express a legible space that can meet his/her psychological aspects (wayfinding and orientation) as well as providing clear legible physical elements.

Also in order to determine the level of people's wayfinding and orientation in the neighborhood in Yazd city, the same scale as above was applied. The result showed that 3.9% of people had low level of wayfinding and orientation, whereas 93.1% of people had medium level of wayfinding and orientation and just 2.9% of people had high level of wayfinding and orientation (Table 5). It can be concluded that this result relates to their length of stay in Safaieh. For example, low rate is belonging to newcomers.

result supported the relationship between physical elements

of Safaieh neighborhood and the people's wayfinding and orientation in this neighborhood. As the level of the physical elements is at medium level, the level of people's wayfinding and orientation is also at medium level. This means that physical elements have an effect on people's wayfinding and orientation, so by improving the physical elements the people's wayfinding and orientation can be enhanced. Besides, the results from interview and sketch mapping also confirm that among five physical elements landmarks and nodes were ranked highly.

However, as regards to the analysis of the data form sketch mapping it is revealed that respondents are not enable to draw a clear map of the neighborhood. In addition, this means that they are not able to direct themselves within Safaieh neighborhood.

This result highlights the importance of paths and edges and due to the lack of these two items in the Safaieh people are not able to direct other people. Physical elements are divided into five categories which are landmarks, nodes, districts, edges and paths. It has been pointed out that such elements can enhance psychological aspects. The results from interview and sketch mapping were in line with the results from questionnaire. This means the aggregate of physical elements and psychological aspects will lead to legibility of environment. Therefore, as only two of the physical elements (landmarks and nodes) were highly rated, it could not provide strong psychological aspects consequently and at the end, could not provide the city with higher level of legibility.

Table 4: Effect of physical elements on people's wayfinding and orientation

Item		Wayfinding and orientation
Physical elements	Beta	0.393
	R <sup>2</sup>	0.154

Table5: Frequency of wayfinding with respect to the effect of physical elements

Item		Frequency	Valid Percent
Wayfinding and orientation	Low	4	3.9
	Medium	95	93.1
	High	3	2.9

## 7 END SECTIONS

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