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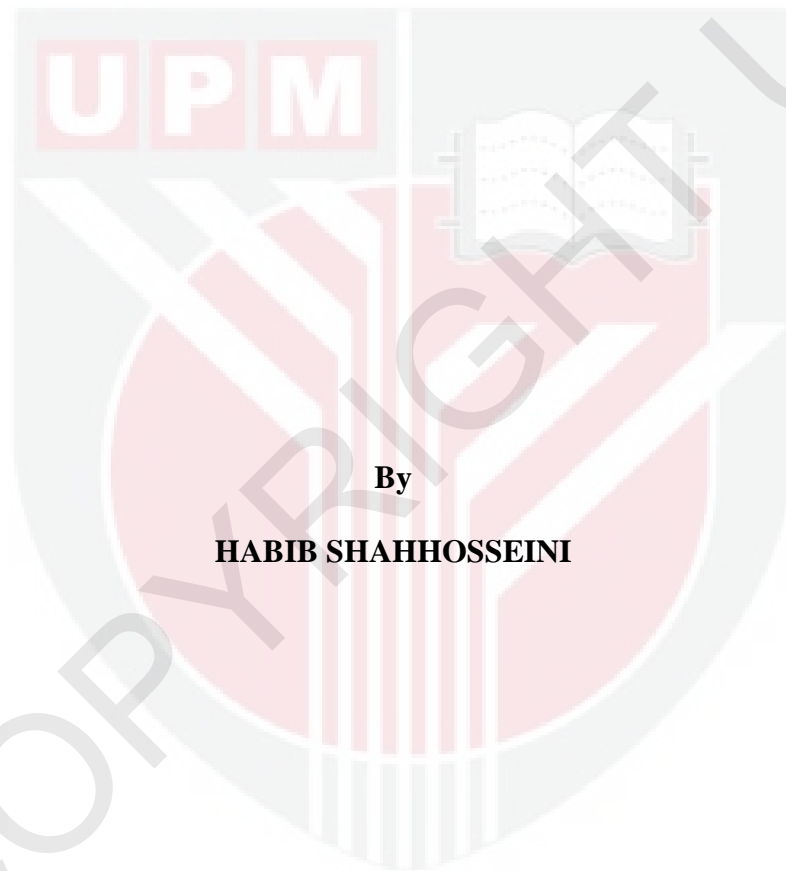
***INFLUENCE OF NON-VISUAL FACTORS ON VISUAL PREFERENCES  
OF VISITORS TO SMALL URBAN PARKS IN TABRIZ, IRAN***

**HABIB SHAHHOSSEINI**

**FRSB 2014 4**



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OF VISITORS TO SMALL URBAN PARKS IN TABRIZ, IRAN**



By  
**HABIB SHAHHOSSEINI**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in  
fulfilment of the Requirements for the Degree of Doctor of Philosophy**

**August 2014**

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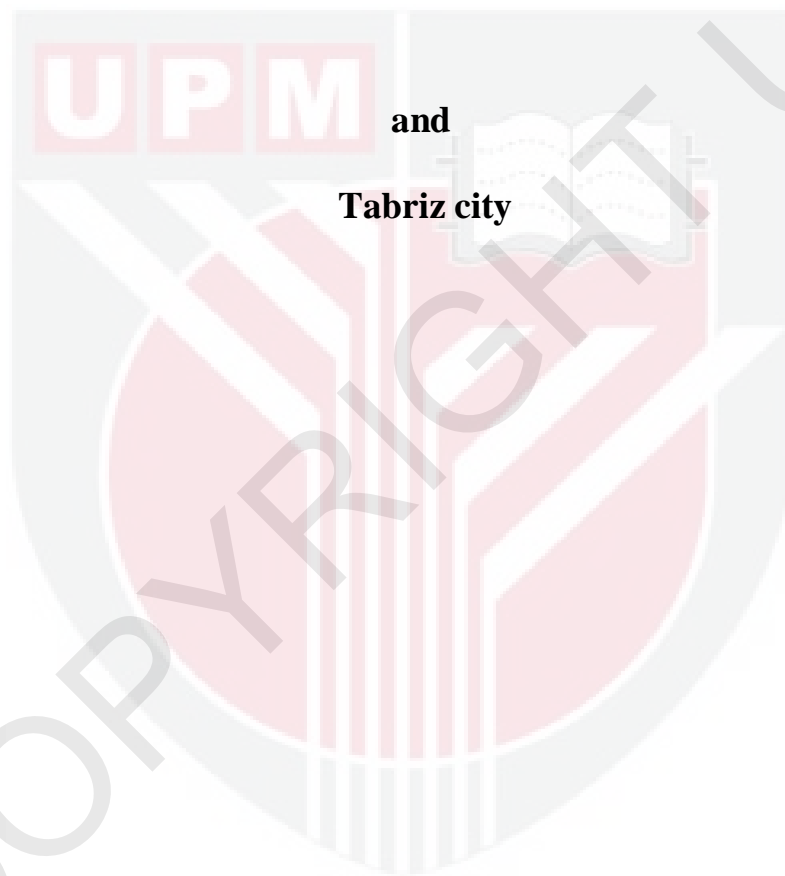


**DEDICATION**

**To**

**My Lovely Parents**

**My Brother and Sister**



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in  
fulfilment of the requirement for the degree of Doctor of Philosophy

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OF VISITORS TO SMALL URBAN PARKS IN TABRIZ, IRAN**

By

**HABIB SHAHHOSSEINI**

**August 2014**

**Chairman: Mustafa Kamal M.S., PhD**  
**Faculty: Design and Architecture**

The small urban parks (SUP) are the urban parks that vary in size from .04 to 2 hectares and are located close to the neighborhood areas in the cities. These parks play important roles in enhancing the urban life quality by providing easy access to green areas for recreation, leisure, and community interactions. Due to their important roles, increasing numbers of these parks are being built all over the world.

The small urban parks provide intimate spaces where the users are more aware of the multidimensional sensory experiences. Unfortunately, most knowledge regarding the design of the parks in general is based on their visual dimensions. This study was an attempt to investigate both visual and non-visual preferences for the small urban parks. The visual factors investigated in this research included the Prospect, Refuge, Mystery, Legibility, Coherence, and Complexity, while the non-visual factors encompassed the sound, smell, and touch. The study was conducted in several selected SUPs in the city of Tabriz, Iran. A total of 394 visitors volunteered to participate in this survey in which photograph surrogate the actual scenes and textual questionnaires were used. A panel of experts advised the researcher in selecting a total of 52 scenes, representing the variables of the visual preferences in 6 categories.

The questionnaire contained 76 items divided into three parts, were categorized as non-visual factors with the help of the nominal group technique (NGT) and based on the literature. The data was analysed using the descriptive and inferential statistics as well as the principle components analysis and the confirmatory factor analysis. Using the descriptive analysis, the public's ranked order preferences were Natural, Spiritual, Human, Instrumental, and Mechanical (for sound), in addition Natural, Human-body, and Environmental related (for smell), and finally Natural and Furniture (for touch). The obtained results indicated that for the visual factors,

Mystery had the highest value, whilst Prospect achieved the lowest public preference. The Structural Equation Modeling (SEM) revealed that the natural stimulus (Natural sound-smell) as well as human related stimulus (Human body sound-smell) exerted significant effects on the visual preferences, while the Instrumental sound, Touch factors and Environmental sound-smell stimulus did not receive any significant values. Meanwhile, the final structural model showed that the Kaplan-Kaplan information-processing theory could be reliable in defining the public's visual preferences in relation to the non-visual factors. However, it is important to note that Legibility and Prospect from the Appleton theory and Coherence constructs were removed from the final structural model due to their high correlations with other variables.

Probably, understanding in which order the non-visual factors influence the visual preferences would be a primary implication of this study. Hence, it could be concluded that consideration of the public multi-sensory experiences shape a robust way in the design approach which challenge the designers and policy makers to improve their attitudes towards designing the small urban parks. Application of the sound levels, sound sources, the amount of smell, attention to Natural and Human body stimulus, and consideration of other types of manmade touch toward the visual preferences would be suggested for future studies.

Abstrak tesis dikemikakan kepada Senat Universiti Putra Malaysia Sebagai memenuhi salah keperluan untuk Ijazah Doktor Falsafah

**PENGARUH FAKTOR BUKAN VISUAL TERHADAP KESUKAAN  
PENGUNJUNG TAMAN BANDAR KECIL DI TABRIZ, IRAN**

Oleh

**HABIB SHAHHOSSEINI**

**August 2014**

**Pengerusi: Mustafa Kamal Bin M.S., PhD**  
**Fakulti: Rekabentuk dan Senibina**

Taman mini di kawasan bandar (SUP) merupakan taman di kawasan bandar yang mempunyai saiz berbeza antara 0.04 dan 2 hektar dan terletak berdekatan dengan kawasan kejiranan di bandar. Taman ini memainkan peranan penting dalam meningkatkan kualiti hidup bandar dengan menyediakan akses yang mudah ke kawasan hijau untuk aktiviti rekreasi, masa lapang, dan interaksi dalam masyarakat.

Memandangkan peranan penting taman ini, berlaku peningkatan dalam jumlah pembinaan taman seperti ini di seluruh dunia. Taman mini kawasan bandar ini menyediakan ruang intim dimana pengguna lebih menyedari pengalaman deria multidimensi. Malangnya, kebanyakan pengetahuan umum tentang reka bentuk taman adalah berdasarkan kepada dimensi visual mereka. Kajian ini merupakan satu usaha bagi mengkaji kedua-dua keutamaan visual dan bukan visual bagi taman mini kawasan bandar. Faktor visual yang dikaji dalam kajian ini termasuk Prospek, Perlindungan, Misteri, Kebolehbacaan, Koheren dan Kerumitan, manakala faktor bukan visual merangkumi bunyi, bau, dan sentuhan. Penyelidikan ini dijalankan di beberapa SUP yang telah dipilih di bandar Tabriz, Iran. Seramai 394 orang pelawat telah menawarkan diri untuk mengambil bahagian dalam penyelidikan ini yang menggunakan borang soal selidik dan gambar-gambar bagi mewakili tempat sebenar.

Satu panel pakar perunding telah menasihati penyelidik dalam pemilihan 52 gambar persekitaran taman yang mewakili pembolehubah keutamaan visual yang terbahagi kepada 6 kategori. Borang soal selidik pula mengandungi 76 item yang dibahagikan kepada tiga bahagian yang dikategorikan sebagai faktor bukan visual dengan bantuan *nominal group technique* (NGT) dan berdasarkan tinjauan penyelidikan lepas. Data dianalisis dengan menggunakan statistik deskriptif dan inferensi serta analisis komponen utama dan analisis pengesahan faktor. Dengan menggunakan analisis deskriptif didapati bahawa keutamaan orang awam mengikut turutan adalah

Semulajadi, Rohani, Kemanusiaan, Instrumental, dan Mekanikal (untuk bunyi), sebagai tambahan berkaitan dengan Semulajadi, kemanusiaan-badan dan Persekitaran (untuk bau) dan akhirnya Semulajadi dan Perabot (untuk sentuhan).

Keputusan yang diperolehi menunjukkan bahawa untuk faktor visual, Misteri mempunyai nilai yang paling tinggi, manakala Prospek mencapai keutamaan orang awam yang terendah. *Structural Equation Modeling* (SEM) menunjukkan bahawa rangsangan Semula jadi (Semula jadi bunyi-bau) dan juga rangsangan berkaitan manusia (badan manusia bunyi-bau) memberikan kesan yang signifikan terhadap keutamaan visual manakala bunyi Instrumental, faktor Sentuhan dan rangsangan bunyi-bau Alam Sekitar tidak mendapat sebarang nilai yang signifikan. Sementara itu, model struktur yang terakhir menunjukkan bahawa teori pemprosesan maklumat Kaplan-Kaplan mempunyai kebolehpercayaan dalam penentuan keutamaan visual orang awam yang berhubung dengan faktor bukan visual. Walaubagaimanapun, adalah penting untuk diambil perhatian bahawa konstruk Kebolehbacaan dan Prospek daripada teori *Appleton* dan Koheren telah dikeluarkan daripada model struktur terakhir kerana korelasi yang tinggi dengan pembolehubah yang lain. Kemungkinan, memahami susunan yang mana faktor bukan visual mempengaruhi keutamaan visual akan menjadi implikasi utama penyelidikan ini.

Oleh itu kesimpulan boleh dibuat yang pertimbangan bagi pengalaman pelbagai deria orang awam membentuk cara yang lebih mantap dalam pendekatan reka bentuk yang kemudiannya mencabar perekabentuk dan pembuat dasar untuk memperbaiki sikap mereka ke terhadap merekabentuk taman mini di kawasan bandar. Aplikasi tahap bunyi, sumber bunyi, jumlah bau, perhatian terhadap Semula jadi dan ransangan Badan Manusia, dan pertimbangan bagi sentuhan yang dilakukan manusia jenis lain terhadap keutamaan visual akan dicadangkan bagi penyelidikan pada masa hadapan.



## ACKNOWLEDGEMENTS

I would like to express my gratefulness to the creator of beauty, for helping me to complete this thesis.

It has been a great honor to have Prof. LAr. Mustafa Kamal Bin Mohd Shariff as my supervisor. I am truly grateful for his leadership, attention and encouragement during my study.

My sincere and deepest thanks to my Co-supervisors Dr. LAr Suhardi Bin Maulan and Dr. Manohar Mariapan for their expert guidance and valued helps.





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

**Mustafa Kamal Bin Mohd Shariff, PhD**

Professor  
Faculty of Design and Architecture  
Universiti Putra Malaysia  
(Chairman)

**Suhardi Bin Maulan, PhD**

Associate Professor  
Faculty of Design and Architecture  
Universiti Putra Malaysia  
(Member)

**Manohar Mariapan, PhD**

Associate Professor  
Department of Recreation and Ecotourism  
Universiti Putra Malaysia  
(Member)

---

**BUJANG BIN KIM HUAT, PhD**

Professor and Dean  
School of Graduate Studies  
Universiti Putra Malaysia

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Signature: \_\_\_\_\_  
Name of  
Chairman of  
Supervisory  
Committee: Mustafa Kamal Bin M.S.

Signature: \_\_\_\_\_  
Name of  
Member of  
Supervisory  
Committee: Suhardi Bin Maulan

Signature: \_\_\_\_\_  
Name of  
Member of  
Supervisory  
Committee: Manohar Mariapan

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## LIST OF ABBREVIATIONS

VP	Visual Preferences
SUP	Small Urban Park
SEM	Structural Equation Modeling
AMOS	The Analysis of Moment Structure
CMIN/df	Chi-square /Degrees of Freedom
NFI	Normed Fit Index
AGFI	Adjusted Goodness-of-Fit Index
RMR	Root Mean Square Residual
TLI	Tucker Lewis index
IFI	Incremental fit Index
CFI	Comparative Fit Index
GFI	Goodness-of- Fit Index
P.M	Past of Midday
A.M	After Midnight
X <sup>2</sup>	Chi-square
ANOVA	Analysis of Variance
Natural SSS	Natural Sound-Smell stimuli
Human- body SSS	Human-body Sound-Smell stimuli
Environmental SSS	Environmental Sound- Smell stimuli
P Value	Standard estimate values
S.E.	Approximate standard error
Estimate	the Estimate of regression error
C.R.	the Critical ratio
RMSEA	The Root Mean Square
CFA	Error of Approximation
PCA	Confirmatory Factor Analysis
NGT	Principal Component Analyses
	Nominal Group Technique

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Parks contribute to green landscape spaces in cities and have been accepted as essential components for quality living in every environment. This is due to the many benefits that they bring ranging from providing ecosystem services to enhancing human physical and psychological health. In a number of studies, the multiple functions of parks in satisfying and uplifting the enjoyment of life have been advocated (Bedimo-Rung, et al., 2005; Ho, et al., 2005).

Small parks as a green place without travelling too far distance are in the center of development (Chapman, 1999). These spaces as a basic infrastructure of any cities can contribute to both the aesthetic and ecological features, giving a sense of pride to the community as well as influencing the public quality of life (Low, et al., 2005). The advantages of these small parks have been explored mostly by environment psychologists and recreation researchers, reporting that a contact with nature, which is provided by these spaces, is one of the fundamental needs for human well-being (Özgüner & Kendle, 2006). In this regard, they can bring new life, new light, and new pleasure to cities (Kelsch, 2006; Seymour & Seymour, 1969).

From one hand, it has been noted that about 87 percent of our understanding about our environment is formed based on visual aspects (Bell, 2004) and still more attention is given to such components which surround the human environment (Arriaza & Ruiz-Aviles, 2004). In this regard, visual stimuli, as a preferable subject in the field of psychology, are considered much more than other senses (Akbar, et al., 2003). Although the vision has been a central part of the human perception and large amount of studies have worked on the aesthetic experience which deals with vision (e.g., Yang, et al., 2010), the other senses play an important role in crystallizing the human perception. In fact, human experience regarding life inherently is cross model (Driver & Noesselt, 2008).

On the other hand, access to information owned by human's mind has formed with all senses. All such structural accessibility is a combination of the objects and events, which it emanates. It has been assumed that the connection between all the events which happen in the environment and the properties of all the involved objects from one point of view, as well as the arrangement of all the sensory input from another side are used by a perceiver to shape the environment properties (Visell, et al., 2009).

Visual and non-visual aspects of the landscape are always interrelated in a complex way and need more consideration in all aspects. Regarding the aesthetic preferences, the examination results of the operation of all five senses have been suggested in order to establish connectivity among human physiological and psychological processes (Jorgensen, 2011). Presentation of an idea regarding the multi-sensory integration as a new concept in the urban area which can influence the spatial configuration of the space has been recognized by numerous researchers (e.g. Amedi, et al., 2002).

In the landscape field, integrating all the senses and their interactions with the cognitive and perception processes could help us to add more knowledge on the human mind in order to evaluate the landscape (Jorgensen, 2011). In fact, perceptual processing in other senses and toward a visual appreciation can lead to forming the environmental mental scape.

By granting more attention on this concept, the result could be involved in the design process as well. By taking this into account, small urban parks as part of the urban space initiative could be improved with the intention of positively contributing to the national commemoration, neighbourhood place-making as well as revitalization efforts, along with enhancing the ecological benefits through sustainable practices. Henceforth, understanding the visual and non-visual preferences and their correlation, as a part of multi-sensory integration in the environmental aesthetics, will lead people to feel attached to the landscape and enhance their quality of life. It is clear that, with gaining more knowledge about the sensory integration, the people's desirability and their experience of the environment could be enhanced.

## **1.2 Statement of the Problem**

Nowadays, due to the densification of the cities (Beatley, 1999) and lack of greenery areas, the interest of the policy makers has returned from constructing big urban parks to making the small green areas such as small urban parks (Nordh, et al., 2012; Nordh, et al., 2009; Nordh & Østby, 2013; Peschardt, et al., 2012). Socializing (Peschardt, et al., 2012), relaxation (Kelsch, 2006) and mental restoration (Nordh, et al., 2011) are enumerated as some of the important reasons why such parks are used by people. Nonetheless, it is clearly noticeable that taking into considerations the quality, variety, and choice of the urban parks, even the small urban parks, could enhance the quality of the urban open space.

Recently, designing the public parks has captured the landscape designers and architects attention (Chiesura, 2004; Oguz, 2000). In this regard, a good design as an essential ingredient of the urban parks has been counted as an important factor, which can influence the park success (Elmendorf, et al., 2005). However, the information relating to the design of the small urban parks is not sufficient (Kelsch, 2006; Nordh & Østby, 2013; Velarde, et al., 2007). In fact, in order to promote the neglected pleasure in these spaces, more attempt is definitely required (Lavie & Tractinsky, 2004; Norman, 2002).

A designer's approach, which mostly depends on the visual techniques, should consider the modality techniques based on the sensory stimuli in the urban and natural areas. In other words, the attractiveness of the landscape shall not be judged merely by looking at the visual elements and structural features; rather, attention must be directed on the non-visual factors as well in order to complete the full sensory dimension (Jessel, 2006).

The number of existing studies which have investigated the cross modal integration between the senses is scarce while they have mostly focused on the visual sense (La Buissonnière-Ariza, et al., 2012). In fact, the interaction between the environmental cues such as the sensory cues, the theoretical cues, and the normative cues has received considerations (Spangenberg, et al., 2005). As it is stressed by Abedi, et al. (2011) the



relationship between the sensory stimuli and the person's perception has been neglected during the design process, which influencing the assessment of perceptual processing.



**Figure 1.1: The Initial Problem Statement**

In terms of design, the importance of the human-based perception value to assess the landscape visual quality has been suggested (Daniel, 2001). A true design not only relies on the physical attributes of the environment, but also on the users' perception which relates to other senses (Abedi, et al., 2011). In line with this, Nohl (1990) and Hunziker (1995) demonstrated that the mere combination of the visual elements cannot illustrate the aesthetic quality of the landscape; alternatively, other interests such as the non-visual factors should be also deliberated. Likewise, Zube (1984) and Uzzell (1989) suggested that integrations of multisensory stimuli can affect the assessment of the landscape aesthetic quality, proposing that the combination of auditory, tactile, and olfactory cues with the visual perception would make a robust contribution to the aesthetic quality assessment. Furthermore, Malnar and Vodvarka (2004) pointed out that a full range of sensory responses could influence a successful design. To achieve such a success, it is acceptable to look at the users' preference rating to provide a frame in the design approach (Van den Berg, et al., 2007).

In fact, knowledge of the features and the relationship between the visual environment and human senses make it possible to plan and design settings that are more appropriate to the users' preferences and activities (Mumcu, et al., 2010) and could give identity to different contents of the urban setting. However, the knowledge gap regarding information about integration between all senses, (particularly 5 senses) and their application in the landscape environment has been remained.

As a summary, it could be said that in the process of successful small urban parks as a part of the urban area, the design plays a substantial role. However, designing such parks has not been under scrutiny as it is required to. Since a new concept (multi-sensory integration) has been considered as an influential factor on the human perception of the environment, its application in terms of engagement of the non-visual factors toward the visual preferences could add some information to human knowledge regarding these small urban spaces.

### 1.3 Research Questions

As a basic structure, this research seeks to determine the existence of information regarding the multi-sensory integration in the context of the small urban parks. Hereby, the following research questions have been established in this research.

- **Main RQ.** How do non-visual factors (auditory, tactile, olfactory cues) influence the visual preferences for small urban parks in Tabriz (Iran)?
- **Sub RQ1.** What are the public's visual preferences for Tabriz small urban parks?
- **Sub RQ2.** What are the public's non-visual (sound, touch and smell) preferences for Tabriz small urban parks?
- **Subsub RQ2.1.** Which materials do the public prefer to touch in Tabriz small urban parks?
- **Sub RQ3.** What are the relationships between public non-visual (auditory, tactile and olfactory cues) factors and their visual preferences for Tabriz small urban parks?
- **Sub RQ4.** What are the recommendations for designers and policy makers regarding public preferences at Tabriz small urban parks?

### 1.4 The Research Aim and Objectives

In order to add further knowledge for designing small urban parks, the aim of this research is to determine the public visual and non-visual preferences and to identify the public's multi-sensory integration in the small urban parks. Based on the aim of current research, the following research objectives are formulated to direct the research.

**Objective 1:** To determine visual stimuli influencing preferences for small urban parks;

**Objective 2:** To determine non-visual factors (sound, touch and smell) influencing preferences of small urban parks;

**Objective 2.1:** To identify the public's most and least preferable materials regarding the sense of touch preferences in small urban parks;

**Objective 3:** To determine the relationships between non-visual factors and visual preference of small urban parks; this examination proposes four different models regarding the influence of the non-visual factors (separately and their integration) toward the public's visual preferences;

**Objective 4:** To make recommendations to designers and policy makers for improving public preferences for small urban parks to achieve their success;

## 1.5 Scope and Limitation of the Research

Focus of this research has been narrowed to the subject of the multi-sensory integration (particularly sound, smell, touch and vision), and research stresses on the importance of small urban parks to enhance their success. In this research, some inclusions and exclusion criteria will be addressed according to the objectives. Hence, the research will have the following limitations:

1. The result of current research is restricted only to 16 small urban parks in Tabriz, Iran (daily users during the summer). People from different cultures could have different preferences (Zube, 1984); however, here the population of Tabriz was selected as the sample of study.
2. Participants with art background because of their expertise (Wohlwill & Kohn, 1976) and the ones below 18 years old for having different preferences (Lyons, 1983) were excluded from the questionnaire survey.
3. The applied criteria for selecting the small urban parks were established on the basis of the Marcus and Francis (1997)'s and Kelsch (2006)'s requirements in terms of the parks' features and their sizes, respectively. Furthermore, the locations of the parks were chosen according to their vicinity to the neighborhood area.
4. Only the olfactory, auditory, and tactile factors and the relationships among them with the visual preferences were investigated through this study while applying the other related factors and senses such as taste were not considered.
5. In terms of the visual preferences, only the spatial configuration of the spaces was considered while the other important factors were taken into considerations.
6. In order to address the research objectives, this study made use of a five-point Likert scale and photo questionnaire approaches; however, using the open ended questions method as well as applying the eye tracking approach or photo taking done by the public (as exploratory method) could improve the research findings.
7. The sample of the photos and their selection procedure (based on the expert panels) for the final survey could be varied; however, it could yield important information benefiting the bigger picture of designing the small urban parks.
8. In order to obtain more accurate results it would be more helpful to reconsider the calculation of the sample size, type of parks and applying the NGT (Nominal Group Technique) with more respondents and other types of parks.

## 1.6 Significance of the Study

The knowledge of the most and least preferable spatial configurations, which relates to the users' psychological aspects and the public's non-visual preferences, which relate to the multisensory integration in the urban area could provide the designers with useful information to be applied in their design approaches.

Meanwhile, it could be argued that few studies have investigated the Iranians' preferences in the urban areas (Bahrainy & Aminzadeh, 2007) and the existing guidelines regarding the parks design have generally been created without much public input. Therefore, the findings of the present research will add some information about the public's psychological understanding of their environment. Furthermore, the results obtained through this study could be involved in the design process and add some knowledge about the public's multi-sensory integration concept, helping the designers in picturing their products. The final results of this research could offer some insight into the design elements. Indeed, the extracted information could help the designers and policy makers to propose applicable and appropriate combination of the elements in the small parks to establish a more successful park.

## 1.7 Thesis Structure

This research is divided into 6 chapters which are explained as follows:

The **First chapter** mainly elaborated on the statement of the problem along with proposing 4 main objectives.

**Chapter 2** comprehensively reviews the literature as regards the small urban park, availability of the theory in terms of the visual and environmental preferences, the influence of the non-visual senses on the human life as well as the relationship among all those senses.

**Chapter 3** describes the research design and the process of obtaining the results for the current study. In this chapter, sample of the study, the sampling method, the data collection procedure, and the applied methodology will be explained.

**Chapter 4** encompasses the results and discussions of the study regarding objectives 1 and 2, which relate to the public visual and non-visual preferences in small urban parks in Tabriz city.

**Chapter 5** comprises the extracted result from the SEM and its related discussions regarding objective 3, which explains the relationship between the visual and non-visual factors in Tabriz small urban parks.

**Chapter 6** initially summarizes all the extracted information from the research objectives. Furthermore, future implications and recommendation for further study would be explained

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