



UNIVERSITI PUTRA MALAYSIA

***PREFERRED VISUAL CHARACTERISTICS OF
PEDESTRIAN BRIDGES IN TEHRAN, IRAN***

NASIM SAHRAEI NEJAD

FRSB 2014 19



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DOCTOR OF PHILOSOPHY

UNIVERSITI PUTRA MALAYSIA

2014



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TEHRAN, IRAN**

By

NASIM SAHRAEI NEJAD

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

October 2014

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DEDICATION

To

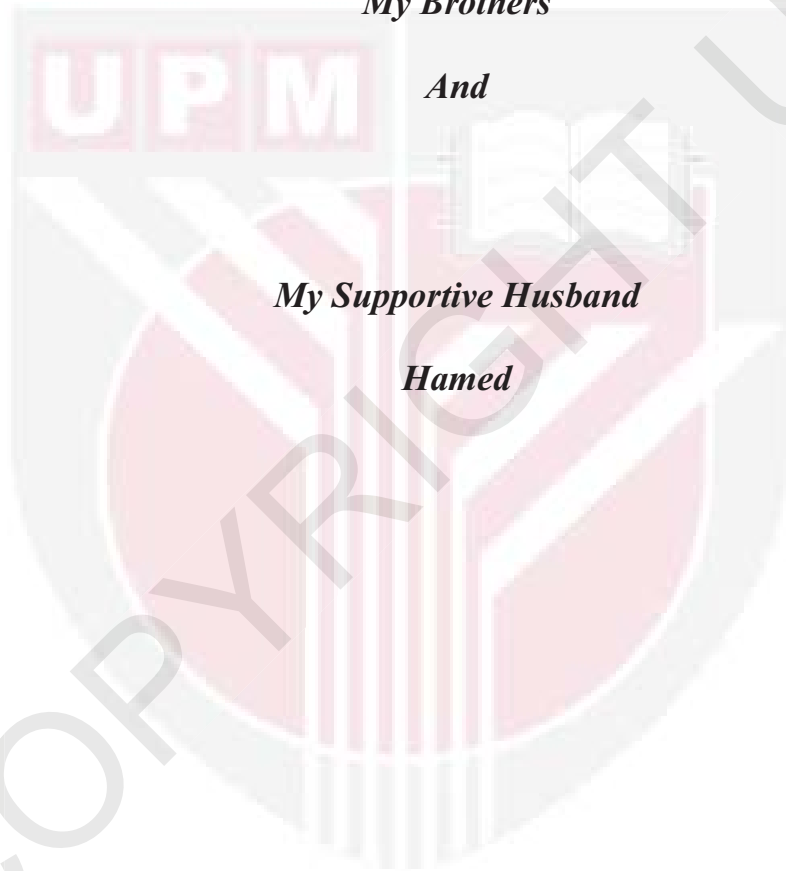
My Lovely Parents

My Brothers

And

My Supportive Husband

Hamed



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

**PREFERRED VISUAL CHARACTERISTICS OF PEDESTRIAN BRIDGES IN
TEHRAN, IRAN**

By

NASIM SAHRAEI NEJAD

October 2014

Chairman: Suhardi Bin Maulan, PhD
Faculty Design and Architecture

Due to rapid urban development, the presence of facilities for adapting to new situations has increased. Pedestrian bridges are such facilities in modern urban areas that provide such a linkage with a high level of safety for both pedestrian and cyclists and are as urban elements that can play an important role in create a new modern visual image for a city. However, the first and basic function of pedestrian bridges as an urban element has been their role in providing safety for the transportation system in urban areas, other roles have been attributed them during the time such as social and cultural roles. They thus have become an important part of a city's public environment and one of their outstanding roles is their potential to beautify the urban areas. In fact, they could play a determinant role in depicting the aesthetic qualities of the urban landscape, especially when they meet certain critical principles. According to the literature, one of the most important factors that can play a determinant role in determining the aesthetic qualities of pedestrian bridges relates to the setting where these bridges are located. In fact, the most successful bridges should be designed in accordance with their surrounding environment. Therefore to help urban designers, bridge engineers, and planners improve the aesthetic qualities of pedestrian bridges in the urban landscape, base line data is needed regarding people's perceptions of similar forms of pedestrian bridges in different urban landscape settings. Since urban environments are generally shaped by people's preferences, perceptions, and attitudes toward their environment over time and also through studying their perceptions, people can indeed indicate what is important to them and what they need in this situation. Therefore such study can provide new insight into what these environments should be and help society better understand the ongoing relationship between human needs and the new urban areas. This input from people is essential to make the best decision for planning or design for the urban areas that serve the people. As such, this study attempts to provide new insights into how people view pedestrian bridges in an urban landscape and further reveal new details and information on people's reactions to similar form of pedestrian bridges in these different urban

landscapes. In summary, this study conducted a preference survey with 384 respondents in Tehran and entered the data into SPSS and then analyzed it through factor analysis and a content identifying method (CIM) and then a regression analysis. The results provide useful information first for considering the visual characteristics of the urban landscape where the pedestrian bridges are located; second, determining the potential factors that influence the aesthetic values of pedestrian bridges and the best predictors for public preferences, such as color, vegetation and natural features and finally provide implications for improving the visual aesthetic qualities of pedestrian bridges in urban areas of Tehran.



Abstrak tesis ini dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KEPENTINGAN VISUAL ESTETIK TERHADAP JAMBATAN PEJALAN KAKI DI TEHRAN

Oleh

NASIM SAHRAEI NEJAD

Oktober 2014

Pengerusi: Suhardi Bin Maulana, PhD
Fakulti: Rekabentuk dan Senibina

Pembangunan bandar yang pesat, meningkatkan lagi keperluan kemudahan untuk menyesuaikan diri dengan situasi baru. Jambatan pejalan kaki di kawasan bandar moden sangat penting dalam hubungan tahap keselamatan yang tinggi bagi kedua-dua pengguna iaitu pejalan kaki dan kenderaan bermotor, reka bentuk ini merupakan unsur yang boleh memainkan peranan penting dalam mewujudkan satu imej visual moden baru bagi bandar. Walau bagaimanapun, fungsi utama dan asas bagi jambatan pejalan kaki di bandar ialah keselamatan untuk sistem pengangkutan. Kemudian peranan lain telah dikaitkan, termasuk fungsi sosial dan budaya. Hal ini telah menjadi bahagian yang penting dalam persekitaran awam bandar dan salah satu peranan yang terserlah ialah potensi jambatan pejalan kaki mencantikkan kawasan bandar. Malah, jambatan pejalan kaki dapat memainkan peranan dalam menggambarkan kualiti estetik landskap bandar, terutama apabila pembinaan jambatan pejalan kaki menghadapi prinsip-prinsip tertentu yang kritikal. Menurut kesusasteraan, salah satu faktor penting yang boleh memainkan peranan menentukan kualiti estetik jambatan pejalan kaki ialah berkaitan dengan persekitaran tempat jambatan pejalan kaki itu dibina. Malah, jambatan pejalan kaki yang paling menarik perhatian perlu direka selaras dengan persekitaran. Oleh itu untuk membantu pereka bandar, jurutera jambatan, dan perancang meningkatkan kualiti estetik jambatan pejalan kaki bagi landskap bandar, data garis asas diperlukan berhubung dengan persepsi masyarakat selaras dengan bentuk jambatan pejalan kaki yang berlainan bagi landskap persekitaran bandar yang berbeza. Disebabkan oleh persekitaran bandar secara umum dibentuk hasil daripada pandangan masyarakat, persepsi, dan sikap terhadap persekitaran mereka dari masa ke semasa dan juga melalui kajian persepsi mereka, masyarakat boleh menunjukkan perkara yang penting bagi mereka dan menentukan perkara yang perlu dalam situasi ini. Kajian ini dapat memberi gambaran tentang perkara baru terhadap persekitaran dan membantu masyarakat lebih memahami hubungan berterusan antara keperluan manusia dan kawasan bandar baru. Input daripada masyarakat adalah penting untuk membuat keputusan yang terbaik bagi merancang atau membuat reka bentuk untuk kawasan-kawasan bandar dan memberikan

kepuasan kepada masyarakat . Kajian ini juga bertujuan untuk memberikan maklumat baru kepada masyarakat untuk melihat jambatan pejalan kaki dalam landskap bandar dan seterusnya mendedahkan butiran baru dan maklumat mengenai reaksi masyarakat kepada bentuk jambatan pejalan kaki dalam landskap bandar yang berbeza. Secara ringkasnya , kajian ini menjalankan *preference survey* terhadap 384 responden di Tehran dan data kajian diproses menggunakan SPSS untuk *Factor analysis* dan *content identifying method* (CIM) dan *regression analysis*. Hasil kajian didapati boleh memberikan maklumat yang berguna , pertama untuk mempertimbangkan ciri-ciri visual landskap bandar tempat jambatan pejalan kaki dibina , kedua, menentukan faktor-faktor yang berpotensi dan mempengaruhi nilai estetik jambatan pejalan kaki dan yang terbaik untuk penilaian awam, seperti warna, pemilihan tumbuh-tumbuhan dan ciri-ciri semula jadi dan, ketiga memberikan implikasi untuk meningkatkan kualiti visual estetik jambatan pejalan kaki di kawasan bandar Tehran.

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I certify that a Thesis Examination Committee has met on 13 October 2014 to conduct the final examination of Nasim Sahraei Nejad on her thesis entitled "Preferred Visual Characteristics of Pedestrian Bridges in Tehran, 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 Doctor of Philosophy.

Members of the Thesis Examination Committee were as follows:

Kamariah binti Dola, PhD

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

Noorizan binti Mohamed, PhD

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

Manohar a/l Mariapan, PhD

Associate Professor
Faculty of Forestry
Universiti Putra Malaysia
(Internal Examiner)

Konstadinos Goulias, PhD

Professor
University of California
United States
(External Examiner)



NORITAH OMAR, PhD

Associate Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 23 October 2014

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Doctor of Philosophy.

The members of the Supervisory Committee were as follows:

LAr. SUHARDI MAULAN, PhD
Senior Lecturer
Faculty of Design and Architecture
Universiti Putra Malaysia
(Chairman)

MUSTAFA KAMAL MOHD SHARIFF, PhD
PROFESSOR
Faculty of Design and Architecture
Universiti Putra Malaysia
(Member)

MADYA DR NORSIDAH UJANG, PhD
ASSOCIATE PROFESSOR
Faculty of Design and Architecture
Universiti Putra Malaysia
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LIST OF ABBREVIATION

CIM	Content Identifying Method
CSS	Context Sensitive Solution
CSD	Context Sensitive Design
EIR	Environmental Impact Report
ANOVA	Analysis of Variance
PB	Pedestrian Bridge
BCH	Bridges Characteristics
Ph.C	Physical Contents
UE	Urban Elements
APh.C	Arrangement of Physical Contents
SC	Spatial Configuration
Veg.	Vegetation
NF	Natural Feature
RC	Respondents' Comments
DOT	Department Of Transportation
WSDOT	Washington State Department Of Transportation
TXDOT	Texas Department of Transportation
CALTRANS	California Department of Transportation
USDA	United State Department of Agriculture
FHWA	Federal Highway Administration
AASHTO	American Association of State Highway and Transportation Officials

CHAPTER 1

INTRODUCTION

Pedestrian bridges in urban areas in Tehran are the main elements that during this study evaluated for their visual aesthetics. In this chapter after discussing the background of pedestrian bridges in urban areas specifically in Tehran, Iran, the main issue and then the problem regarding the pedestrian bridges in urban areas in Tehran, that this study attempt to respond would be pointed out. The main objectives for the study would be outlined and then it would be referred to the significance and importance of the study and finally as the last section the organization of the current research would be defined.

1.1 Background

After the Second World War, the widespread use of cars has resulted in new urban planning approaches to give priorities to the motor vehicles rather than pedestrians. This planning attitude makes planners to be more concerned about the safety of the pedestrians by providing appropriate spaces for them. The primary example of the space in urban areas is the pedestrian bridge. As a matter of fact, the pedestrian bridges are over-pass elements which have been designed to facilitate the both motor vehicles and the pedestrians in urban areas. The bridges' design varies greatly in style but mostly reflect the engineering innovation showing higher attention to the functions rather than the aesthetic values that related to the characters of the place which can be considered to consequently enhance the visual qualities of any region. Therefore, they may be considered to be more than mere elements in a transportation system in urban areas but rather "Signature Bridge" which means a bridge with the highest efficiency, economy and elegance (Billington & Gottemoeller, 2000).

According to a survey carried out by the United States Federal Highway Administration in 2001, the public interest on the appearances of the bridges is likely to increase and they want their bridges to show a positive feature of their cities. The results showed that citizens are concerned about the bridges that are sensitive to their local communities especially in their visual appeal. The sentiments probably due to the facts that most of the bridges could be seen in many different angle of views due to their specific spatial position rather than the other urban elements and they have a great potentiality in promoting the aesthetic values for areas; and therefore, they should be designed as a structural art and finally as a "signature bridge".

One of the main problems concerning the visual quality of bridges all over the world is the breaking up approaches in design between engineering and architecture in which the engineering approach is intended to consider the structural format only due to this fact that it is independent from its surrounding context. However, the architectural approach considers its appearance and as an integrated element into its surrounding context. It argues that a successful bridge design must consider both the structural form and the aesthetic values especially on its integration with the surrounding context in order to have a bridge with highest level of aesthetic qualities which is important for an alive urban area. (Fig 1.1)

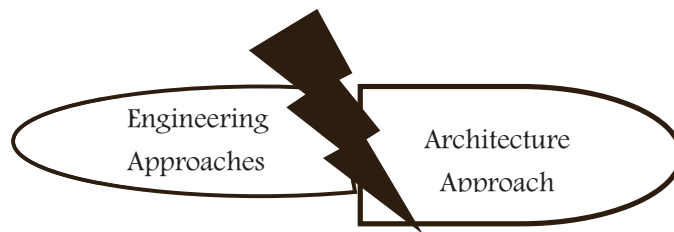


Figure 1.1 Current Situation of Bridge's Design in Urban Areas

1.2 Pedestrian Bridges in Iran, Tehran

Iran is featured to have a long history tradition in designing and constructing bridges. Throughout the country, there are many old and traditional bridges constructed during different civilization eras in different parts of Iran. During the ancient time in Iran, some cities were located beside a river; since, the bridges were built to link some important areas in the city with each other in order to pass the pedestrians into different part of the city. In general, the bridges of Iran at those times were too simple and comprising piers, container arches and a level crossing. However, over the time, as a result of development process in engineering and architecture, some changes in bridge's structural form, dimension and functions were appeared (Golabchi, 2005).

For case of Tehran, which was established during Zandieh Dynasty as a small city with few residential houses, markets and districts with many farms and gardens, the bridges were built from stone and mortar and in arcade forms. After selecting Tehran as the capital city of Iran during Qajar Dynasty in the ninetieth 19th century, due to industrial evolution and transformation of social, economic and political structures, the physical characteristics of Tehran started to be changed from a traditional archaic city to a modern and vibrant city.

Modernization of Tehran comes along with the construction of highways in order to improve public and private transportation system. Consequently, the policymakers of Tehran decided to increase the numbers of passing routes as well as the pedestrian bridges in order to provide safety for pedestrians and also to reduce traffic congestion in urban areas. Today, Tehran has about 650 pedestrian bridges all over the city. Therefore, the initial ideas of the pedestrian bridges in Tehran are just to ease the traffic congestion and increase the safety for city dwellers without any specific consideration to their visual appearance.

1.3 Issue Concerning the Pedestrian Bridges in Tehran

Rapid development and modernization of a city like Tehran, demanding city and people adaptation to a new situation. One of the adaptation strategies is to facilitate the urban transportation and road systems with pedestrian bridges for the safety of pedestrians. After a while, it was believed that these pedestrian bridges are more than elements for transportation system but play important roles for socio-cultural values (Moon & Sie-Young, 2005) because the pedestrian bridges became an important part of a city's public

spaces and visual elements. Therefore, one of most outstanding roles that the pedestrian bridges play is their attributes for visual quality in urban areas (Gottemoeller, 2004).

Based on the census by the Beautification Organization of Tehran (2010), Tehran's region as a metropolis has about 8.5 million populations and about 650 pedestrian bridges all over the city. However, according to Golabchi (2005), Ahmadi (1992) and Nikoomaram, Vazifedoost & Khani (2008), most of the pedestrian bridges in Tehran have less than 50% functional efficiency¹. According to Golabchi (2005) and Nikoomaram et al. (2008) this problem is related to inappropriate location of bridges, lack of legal instruments (or enforcement law to use the pedestrian bridges), lack of a strong culture for using the pedestrian bridges in urban areas, insufficient sense of safety regarding the bridges, lack of thermal comfort when passing the bridges, not paying attention to the future development causing bridges to lose their functionality through the time and finally neglecting the aesthetic or visual qualities of the bridges. Therefore, we can conclude that one of the factors which potentially influences on functional efficiency of the pedestrian bridges in Tehran is contributed to the visual appearance of these kinds of bridges or their aesthetic qualities.

1.4 Statement of the Problem

Based on the findings by Golabchi (2005), it is presumed that visual qualities of pedestrian bridges can influence the bridge usability but the visual quality has not been taken into account in designing any specific bridge. It is not surprising because Tehran suffers from lack of appropriate guidelines and programs for physical developments which can cause in basic deficiencies and disability to afford the needs of its citizens in relation to physical and psychological aspects of the city as well (Navabakhsh, 2005). In Tehran, there are disharmonious qualities between different elements of the city and hence the city has been studied insufficiently. According to the literature regarding the bridge aesthetics, one of the pressing issues related to bridge design is to create harmony between the bridge and its surrounding environment (Federal Highway Administration, 2002; Gottemoeller, 2004; Grob, 2001; Leonhardt, 1991; Reich, 1993, Tang, 1991; Zuk, 1990), in which today, this issue rarely considered in the design or management processes, especially in Tehran. In fact, considering the harmonious integration of bridges with their surrounding environment (context-sensitive design) is probably one of the major approaches in order to consider their aesthetic qualities.

The focused problem here is that most of the pedestrian bridges in Tehran (650 bridge altogether) have similar structures known as truss bridges² and based on one or two standard design everywhere (Beautification Organization of Tehran, 2009; 2010). In fact, there is no specific consideration to their context and therefore, the bridge designers and constructors do not try to match the bridges with their surrounding through a context sensitive approach to highlight their aesthetic qualities within the urban landscape where

¹The functional efficiency of the pedestrian bridges can be calculated through dividing the rate of people using a pedestrian bridge in one hour by the rates of the passengers around 50 meters of the same place who don't use pedestrian bridge during the same time.

²A truss bridge is economical to construct owing to its efficient use of materials

they are located. Therefore, pedestrian bridges, as a key urban element in Tehran should be designed wisely to create harmonious urban areas but the question is that how should we design the pedestrian bridges having harmony with the surrounding context? Furthermore, what are the user's preferences for the current pedestrian bridges? Are the preferences compatible with the surrounding contexts?

Based on the problems and questions, this study attempts to examine the users' perceptions for the visual qualities of the pedestrian bridges in Tehran, and specifically it deals with identification of the role of surrounding context on the visual preferences for the pedestrian bridges and finally to enhance the functional efficiency of the bridges and improve the aesthetic qualities in urban areas. In summary, the following diagram (Fig. 1.2) explains the relationship between issues and research problems:

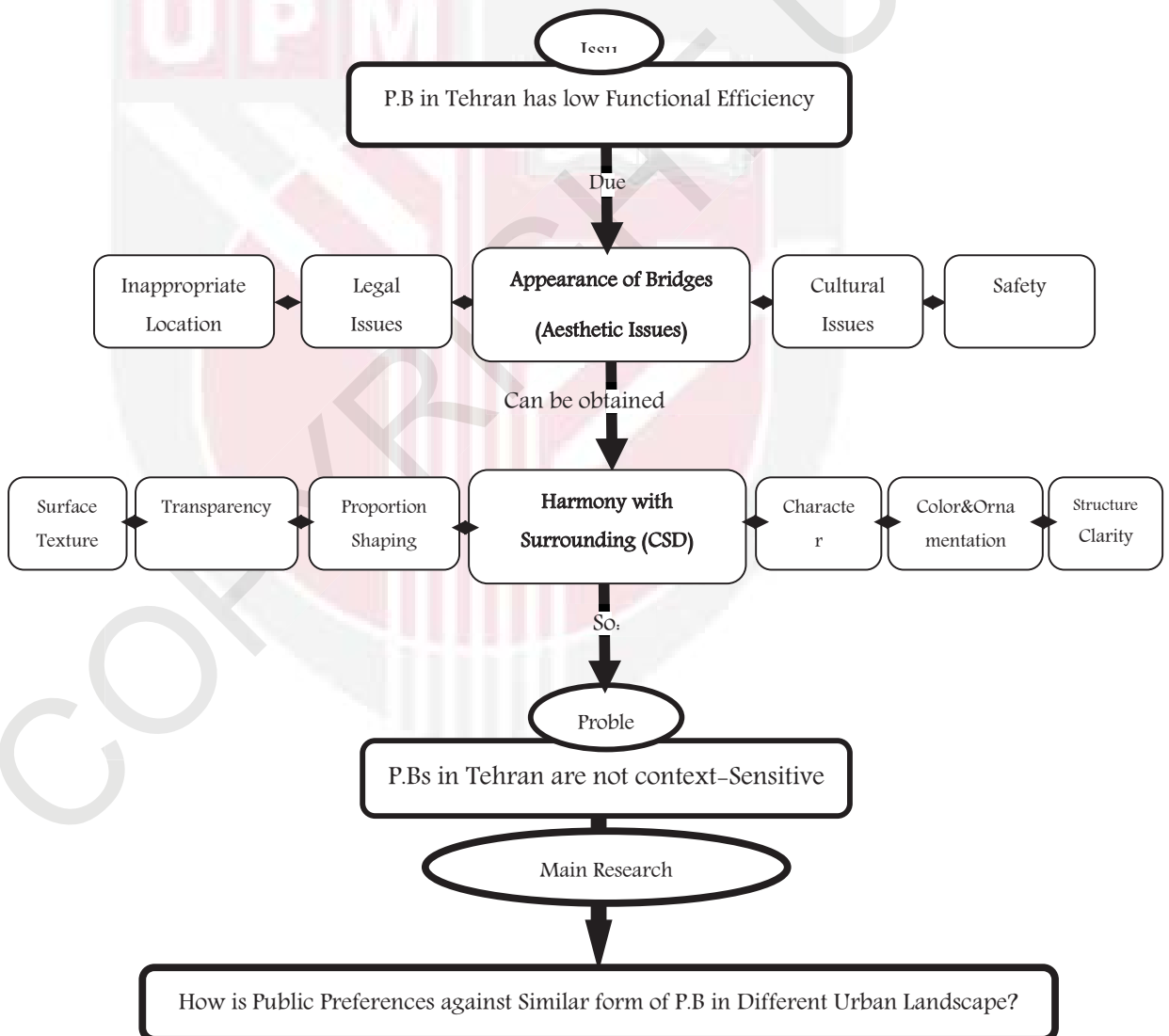


Figure 1.2 Flow of research issue and problem

1.5 The Goal and Objective of the Study

The main goal of this study is to obtain the information on the user's preferences for the pedestrian bridges in different urban landscapes and the factors contributed to their preferences. Specifically, this study tries to examine if the surrounding context of the settings in which the pedestrian bridges are located play important roles in people's preferences for the pedestrian bridges in urban landscape of Tehran. In this regard, the two following objectives have been outlined:

1. Identify the public preferences for pedestrian bridges located in urban areas.
2. Identify the factors that affect these public preferences for the aesthetics of pedestrian bridges in urban areas

1.6 The Significance of Study

As it mentioned previously, due to rapid urban development, presence of facilities to adapt new urban living situation has been increased. In this study, the pedestrian bridges are considered to be among the new facilities which have been provided to tackle pedestrian safety issues due to ever-expanded inner city highways. At the same time, the pedestrian bridges provide linkages from one place to another. After a while pedestrian bridges ingrained into the socio-cultural functions. They became important elements of any city's public environments and spaces that one of their outstanding socio-cultural roles is enhancement of the visual quality in urban areas.

Therefore, in order to help urban designers, bridges' engineers and planners to improve the aesthetic qualities for the pedestrian bridges in urban landscape, baseline data is needed on people's perception for the pedestrian bridges in different settings of urban landscape. Since, urban environments are generally shaped by people's preferences, perceptions and attitudes toward them over the time and also through studying their perception, they can indicate what is important to them and what do they need in this regard; therefore it can provide sufficient insight into what these environments should be and it obviously will help us to understand the relationship between human needs and the new urban area. So, the input from people is essential to make decision for planning or designing the urban areas for them. As such, this study tries to provide insights on how people view the pedestrian bridges in urban landscape and also to reveal information on people's reactions to the pedestrian bridges in different urban landscapes.

In summary, this study through a preference study will provide useful information firstly on the importance of considering the visual characteristics of urban landscape where the pedestrian bridges are located, secondly, it determines the potential factors influencing the aesthetic values of the pedestrian bridges and then it will identify the best predictors for public preferences toward the pedestrian bridges in urban areas.

On the other hand, most of the researches regarding the pedestrian bridges which have been done to present primarily studied the bridges from the functional perspective and there are a few studies examining the aesthetic values of the pedestrian bridges in urban landscape especially in Tehran-Iran. Furthermore, there are very few attempts to deal specifically with the people's preferences and perceptions of the visual aesthetics of the

pedestrian bridges in urban areas. Finally, this study through the suggestions for improving the visual qualities of the pedestrian bridges in urban areas can enhance the functional efficiency of the bridges on one hand and add to the aesthetic values of urban areas, on the other hand. Therefore, it will be valuable for a research study to reveal the preference of Tehran's residents against the aesthetic values of the pedestrian bridges in urban landscapes with logic functional efficiency and also to preserve and enhance the qualities of the urban areas with high level of aesthetic qualities and to improve their livability and then promote their quality of life.

1.7 Organization of this Dissertation

This dissertation will be organized into six chapters. The first chapter explained the background and objective of the study as well as the significance and need for this study to improve visual quality of the pedestrian bridges in Tehran, Iran.

The second chapter is about the review of literature by providing a theoretical and methodological basis of landscape assessments and preferences, in specific related studies to aesthetic quality of the pedestrian bridges.

The third chapter is devoted to the research methodology for the study in order to answer the research questions; as a result, the study objectives could be achieved. Specifically, this chapter discusses the methods used, instrument designed and data analysis as well.

Chapter four and five describes all of the results and findings from data analysis including analysis of the most and least preferred scenes, analysis of preference dimension, content analysis of respondents' verbal descriptions of the scenes, analysis of variance and also the multiple regression analysis.

Chapter six discusses the results and then argue the significant findings of the research and concludes the implications of the findings for designing the pedestrian bridges with visual aesthetic values in urban areas. Finally, due to the research limitation the potential recommendations for future studies are also made.

REFERENCES

- Abello, R. P., & Bernaldez, F. G. (1986a). Landscape preference and personality. *Landscape and urban planning*, 13, 19-28.
- Abello, R. P., Bernaldez, F. G., & Galiano, E. F. (1986b). Consensus and contrast components in landscape preference. *Environmental Behavior*, 18(2), 155-178.
- Ahmadi, H. (1992). Evaluation of Physical design Criteria. Proceedings of the 1st International Urban Physical Planning Conference, Mashhad, Iran, Nov. 2-5, 1991. Payam Noor University, Tehran, Iran.
- Anderson, L. M., & Schroeder, H. W. (1983). Application of wildland scenic assessment methods to the urban landscape. *Landscape Planning*, 10, 219-237.
- Antrop, M. (2000). Background concepts for integrated landscape analysis. *Agriculture Ecosystem Environment*, 77, 17-28.
- Alexander, C. (1964). *Notes on the Synthesis of Form*. Cambridge, Massachusetts: Harvard University Press.
- Alexander, C. (1966). A city is not a tree. *Journal of Design*, 206, 44-55.
- Alexander, C. (1979). *The timeless way of building*. New York: Oxford University Press.
- Alexander, C. (1981). *The linz café*. New York: Oxford University Press.
- Alexander, C. (1988). *A new theory of urban design*. New York: Oxford University Press.
- Alexander, C. (2002-2005). *The nature of order*. Berkeley: Center for Environmental Structure.
- Alexander, C. (2007). Empirical findings from *the nature of order*, *Environmental and Architectural Phenomenology*, 18(1), 11-19.
- Appleton, J. (1975). *The Experience of Landscape*. New York: John Wiley & Sons Ltd.
- Appleton, J. (1988). Prospects and refuges revisited. In Nasar, J. L. (Ed.). *Environmental Aesthetics: Theory, Research and Applications* (pp. 27-44). Cambridge: Cambridge University Press.
- Appleton, J. (1996). *The Experience of Landscape* (Revised edition). New York: John Wiley & Sons Ltd.
- Arriaza, M, Canas–Ortega, J. F., Canas–Madueno, J. A., & Ruiz–Aviles, P. (2004). Assessing the visual quality of rural landscapes, *Landscape and Urban Planning*, 69, 115-125.

- Arthur, L. M., Daniel, T. C., & Boster, R. S. (1977). Scenic Assessment: An Overview. *Landscape Planning*, 4, 109-129.
- Balling, J., & Falk, J. (1982). Development of visual Preference for Natural Landscape. *Environment and Behavior*, 14, 5-28.
- Beautification Organization of Tehran, Urban Furniture Department. *Design of Pedestrian Bridges in urban areas of Tehran*; Beautification Organization of Tehran: Tehran, Iran, 2009.
- Beautification Organization of Tehran, Urban Furniture Department. *List of Pedestrian Bridges in 22 district of Tehran*; Beautification Organization of Tehran: Tehran, Iran, 2010.
- Bell, S. (2004). *Elements of Visual Design in the Landscape*. London: Spon Press.
- Bernaldez, F.G., Ruiz, J.P., Benayas, J., & Abello, R.P. (1988). Real landscapes versus photographed landscapes: preference dimensions. *Landscape Resources*, 13, 10-11.
- Berlyn, D. E. (1960). *Conflict, Arousal and Curiosity*. New York: McGraw-Hill.
- Bernasconia, C., Strager, M. P., Maskey, V., & Hasenmyer, M. (2009). Assessing public preferences for design and environmental attributes of an urban automated transportation system. *Landscape and Urban Planning*, 90, 155–167.
- Beza, B. (2010). The aesthetic value of a mountain landscape: A study of the Mt. Everest Trek. *Landscape and Urban Planning*, 97, 306-317.
- Billington, D., & Gottemoeller, F. (2000). Bridge Engineering Handbook. In Wai-Fah Chen & Lian Duan(Eds.), *Bridge Aesthetics: Structural Art* (pp.162-182). Boca Raton: CRC Press.
- Bishop, I. D. (1997). Testing perceived landscape colour difference *using the Internet*. *Landscape and Urban Planning*, 37, 187–196.
- Bonaiuto, M., Carrus, G., Martorella, H., & Bonnes, M. (2002). Local identity processes and environmental attitudes in land use changes: The case of natural protected areas. *Journal of Economic Psychology*, 23, 631–653.
- Bourassa, S. C. (1988). Toward a Theory of Landscape Aesthetics. *Landscape and Urban Planning*, 15, 241-252.
- Briggs, D. J., & France, J. (1980). Landscape Evaluation: A comparative study. *Journal of Environmental Management*, 10, 263-275.
- Brown, T. C., & Daniel, T. C. (1986). Predicting Scenic Beauty of Timber Stands. *Forest Science*, 32, 417-487.

- Brower, S., Dockett, K., & Taylor, R. B. (1983). Residents' Perceptions of Territorial Features and Perceived Local Threat. *Environment and Behavior*, 15(4), 419-437.
- Buhyoff, G. J., Wellman, J. D., Koch, N. E., Gauthier, L. J., & Hultman, S. (1983). Landscape Preference Metrics: An International Comparison. *Journal of Environmental Management* 16, 181-190.
- Buhyoff, G. J., Gauthier, L. J., & Wellman, J. D. (1984). Predicting scenic quality for urban forests using vegetation measurements. *Forest Science*, 30(1), 71-82.
- Buhyoff, G. J., Miller, P. A., Roach, J. W., Zhou, D., & Fuller, L. G. (1994). An AI methodology for landscape visual assessments. *AI Appl.*, 8, 1-13.
- Brunson, M. W., & Shelby, B. (1992). Assessing recreational and scenic quality: How does "New Forestry" rate? *Journal of Forestry*, 90(7), 37-41.
- Calatrava, J., & Sayadi, S. (2001). Análisis funcionales de los sistemas agrarios para el desarrollo rural sostenible. Madrid: Serie estudios, Ministerio de Agricultura y Pesca y Alimentación.
- Cañas, I., Ayuga, E., & Ayuga, F. (2009). A contribution to the assessment of scenic quality of landscapes based on preferences expressed by the public. *Land Use Policy*, 26, 1173-1181.
- Carlson, A. (2002). *Aesthetic and the environment, the appreciation of nature, art and architecture*. New York: Routledge Press.
- Cook, W. L. (1972). An evaluation of aesthetic qualities of forest trees. *Journal of Leisure Research*, 4, 293-302.
- Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis* (2nd Ed.). Hillsdale, NJ: Erlbaum.
- Costonis, J. J. (1982). Law and aesthetics: a critique and a reformulation of the dilemma. *Michigan Law Review*, 80(3), 355-461.
- Craik, K. H. (1983). The psychology of the large-scale environment. In N. R. Feimer & E. S. Geller, (Eds.), *Environmental Psychology: Directions and Perspectives* (pp.67-105). New York: Praeger.
- Crofts, R. S., & Cooke, R. U. (1974). *Landscape evaluation: A comparison of techniques*. Occasional Papers, 25, Department of Geography: University College London.
- Crofts, R. S. (1975). The landscape component approach to landscape evaluation. *Transactions of the Institute of British Geographers*, 66, 124-129.

- Cullen, G. (1961). *Townscape*. London: Architectural Press.
- Daniel, T. C. (1990). Measuring the quality of the human environment: a psychophysical approach. *American Psychologist*, 45, 633-637.
- Daniel, T. C., (2001). Whither scenic beauty? visual landscape quality assessment in the 21st century. *Landscape Urban Planning*, 25, 267–281.
- Daniel, T. C., & Boster, R. S. (1976). Measuring landscape aesthetics: the scenic beauty estimation method. *USDA Forest Service*, 167, 66-69.
- Daniel T. C., Brown T. C., King, D. A., Richards, M. T., & Stewart, W. P. (1989). Perceived Scenic Beauty and Contingent Valuation of Forest Campgrounds. *Forest Science*, 33(1), 76-90.
- Daniel, T. C., & Vining, J. (1983). Methodological issues in the assessment of landscape quality. In Altman, I., & Wohwill, J. F. (Eds.), *Behaviour and the Natural Environment* (pp. 39–83.). New York: Plenum Press.
- Daniel, T. C., Wheeler, L., Boster, R.S., & Best, P. R. (1973). Quantitative evaluation of landscapes: an application of signal detection analysis to forest management alternatives. *Management Environmental System*, 35, 330-344.
- Darwin, C. (1958). *The origin of species*. Amherst, New York: Prometheus.
- Dearden, P. (1980). A statistical technique for the evaluation of the visual quality of the landscape for land-use planning purposes. *Journal of Environmental Management*, 10, 51–68.
- Dearden, P. (1984). Factors Influence Landscape Preferences: An Empirical Investigation. *Landscape Planning*, 11, 293-306.
- Dewey, J. (1958). *Experience and nature*. London: Dover Publications.
- Dunn, M. C. (1976). Landscape with photographs: testing the preference approach to landscape evaluation. *Journal of Environmental Management*, 4, 15-26.
- Dytoc, B. (2002). *An initial study on bridge aesthetic*. Unpublished paper, College of Architecture, University of the Philippines.
- Eben Saleh, M. A. (2001). Environmental cognition in the vernacular landscape: assessing the aesthetic quality of Al-Alkhalaf village, Southwestern Saudi Arabia. *Building and Environment*, 36(8), 965–979.
- Elliott, A. L. (1983). Esthetic Development of California's Bridges. *Journal of Structural Engineering*, 109(9), 2159-2174.

- Espanol, I. (1995). *Impacto Ambiental (Environmental Impact)*. Canales y Puertos, Madrid: E.T.S.I. Caminos.
- Evans, R. H., & Houghton-Evans, W. (1964). Form and structure in engineering. *Proceedings of the Institution of Civil Engineers*, 27, 263-290.
- Federal Highway Administration, U.S. Department of Transportation (2002). *Context Sensitive Design and Thinking Beyond the Pavement*. Washington, DC.
- Federal Highway Administration, U.S. Department of Transportation, Retrieved February 17, 2012, from http://contextsensitivesolutions.org/network/one?party_id=7053
- Figg, L. (2008). *Concrete Construction Engineering Handbook*. In Edward G. N., R. E., C.Eng (Eds.), *Aesthetics in the Construction and Design of Long-Span Prestressed Concrete Bridges* (pp. 291- 324).
- Figg, L. (2011). *Sustainable Bridges that Capture Community Spirit*. Paper presented at the meeting of the Bridge Engineering, University of Buffalo, the State University of New York.
- Fines, K. D. (1968). Landscape evaluation: A research project in East Sussex. *Regional Studies*, 2, 41-55.
- Galindo, M. P. G., & Corraliza, J. A. (2000). Environmental Aesthetic and psychological Well-being: Relationship between Preference Judgment for Urban Landscape and other Relevant Affective Responses. *Psychology in Spain*, 4, 13-27.
- Gan, J., Koloinson, S. H., & Miller, J. H. (2000). Public Preferences for Non-timber Benefits of Loblolly Pine (*Pinus taeda*) Stands Regenerated by Different Site Preparation Methods. *Southern Journal of Applied Forestry*, 24(3), 145-149.
- García, J. M., & Cañas, I. (2001). Landscape assessment. In F., Ayuga Téllez (Ed.), *Sustainable Management of Rural Landscapes, Techniques and Engineering* (pp. 164-189). Madrid: Mundi-Prensa.
- García, M. L., Hernández, B. J., & Ayuga, F. (2006). Analysis of the exterior colour of agroindustrial buildings: a computer aided approach to landscape integration. *Journal of Environmental Management*, 69, 93-104.
- Gibson, J. J. (1979). *The Ecological Approach to Visual Perception*. Boston, MA: Houghton-Mifflin.
- Gimblett, H. R., Fitzgibbon, J. E., Bechard, K. P., Wightman, J. A., & Itami, R. M. (1987). Procedures for assessing visual quality for landscape planning and management. *Environmental Management*, 11, 359-367.

- Glomb, J. (1991). Bridge aesthetic around the world. *Aesthetic Aspects of Contemporary Bridge Design* (pp. 95-104). Washington DC., USA: Transportation Research Board, National Research Council.
- Golabchi, M. (2005). *Design Pedestrian Bridges of Tehran: In five selected areas*. Beautification Organization of Tehran: Tehran, Iran.
- Gold, J. R. (1980). *An Introduction to Behavioral Geography*. Oxford: University Press.
- Gottmoeller, F. (2004). *Bridgescape: The Art of Designing Bridge*. New Jersey: John Wiley & Sons, Inc.
- Grabow, S. (1983). *Christopher Alexander and the Search for a New Paradigm in Architecture*. Stocks field: Oriell Press.
- Groat, L. (1984). Public opinions of contextual fit. *Architecture*, 11, 72–75.
- Grob, J. (2001). *Design Principles and Guidelines for Transportation Project; Getting Projects Built*. USA: American Society of Highway Engineers, SCANNER Newsletter.
- Hair, J. E., Anderson, R. E., Tatham, R. L., & Black W. C. (1998). *Multivariate data analysis*. (5th Ed.). Upper Saddle River, NJ: Prentice-Hall.
- Haghighi, E. (2010, June 8). Tehran is experiencing visual disturbances. *MehrNews*, pp. 10.
- Hammit. W. E. (1978). *Visual and User Preference for a Bog Environment*. Ph.D. dissertation, University of Michigan, Ann Arbor, 15%
- Hammit, W. E., Patterson, M. E., & Noe, F. P. (1994). Identifying and predicting visual preference of southern Appalachian forest recreation vistas. *Landscape and Urban Planning*, 29, 171–183.
- Herzog, T. R. (1984). A cognitive analysis for field and forest environment. *Landscape Research*, 9, 10-16.
- Herzog, T. R. (1985). A cognitive analysis of preferences for waterscapes. *Journal of Environmental Psychology*, 5, 225-241.
- Herzog, T. R. (1987). A cognitive analysis of preference for natural environment: mountains, canyons and deserts. *Landscape Journal*, 6, 140-152.
- Herzog, T. R. (1989). A cognitive analysis of preference for urban nature. *Journal of Environmental Psychology*, 9, 27-43.
- Herzog, T., R., & Gale, T. (1996). Preference for urban buildings as a function of age and nature context. *Environment and Behavior*, 28(1), 44-72.

- Howell, A., Robertson, J. F., Albano, J. Q., Aschermannova, A., Mauriac, L., Kleeberg, U. R., ... & Morris, C. (2002). Fulvestrant, formerly ICI 182,780, is as effective as anastrozole in postmenopausal women with advanced breast cancer progressing after prior endocrine treatment. *Journal of Clinical Oncology*, *20*(16), 3396-3403.
- Hull, R. B., Buhyoff, G. J., & Daniel, T. C. (1984). Measurement of Scenic Beauty: the Law of Comparative Judgment and Scenic Beauty Estimation Procedures. *Forest Science*, *30*(4), 1084-1096.
- Hull, R. B., & Harvey, A. (1989). Explaining the emotion people experience in suburban parks. *Environment and behavior*, *21*(3), 323-345.
- Hull, R. B., & McCarthy, M. M. (1988). Change in the Landscape. *Landscape Urban Planning*, *15*, 265-278.
- Hull, R. B., & Revell, G. R. (1988). Cross-cultural comparison of landscape scenic beauty evaluations: a case study in Bali. *Journal of Environmental Psychology*, *9*, 177-191.
- Hull, R.B., & Stewart, W.P. (1992). Validity of photo-based scenic beauty judgments. *Journal of Environmental Psychology*, *12*, 101–114.
- Im, S. (1984). Visual Preferences in Enclosed Urban Spaces: An Exploration of a Scientific Approach to Environmental Design. *Environment and Behavior*, *16*, 235-262.
- Iran Statistical Yearbook (2010). Management and Planning Organization: Tehran, Statistical Centre of Iran.
- Jim, C. Y., & Shan, Xizhang (2012). Socioeconomic effect on perception of urban green spaces in Guangzhou, China. *Cities*, *31*, 121-131.
- Jung, C. G. (1959). *The archetypes and the collective unconscious*. New York: Pantheon.
- Kaltenborn, B. P., & Bjerke, T. (2002). Associations between environmental value orientations and landscape preferences. *Landscape and Urban Planning*, *59*, 1–11.
- Kane, P. S. (1976). *Assessing Landscape Attractiveness: A Comparative Test of Two New Methods*. USA: California State University, Northridge.
- Kaplan, R. (1977). Preference and everyday nature: method and application. In: Stokols, D. (Ed.), *Perspectives on Environmental Behavior -Theory, Research and Applications* (pp. 235-250). New York: Plenum Press.

- Kaplan, R. (1983). The role of nature in the urban context. In I. Altman & J. F. Wohwill (Eds.), *Behavior and Natural Environment* (pp. 127-162). New York: Plenum Press.
- Kaplan, R., & Herbert, E. J. (1987). Cultural and sub-cultural comparisons in preferences for natural settings. *Landscape and Urban Planning*, 14, 281-293.
- Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. New York: Cambridge University Press.
- Kaplan, R., Kaplan, S., & Ryan, R. L. (1998). *With people in mind: design and management of everyday nature*. Washington, DC: Island Press.
- Kaplan, R., Kaplan, S., & Wendt, J. S. (1972). Rated preference and complexity for natural and urban Material. *Perception Psychophysics*, 12(4), 354-356.
- Kaplan, R., & Talbot, J. F. (1988). Ethnicity and preference for natural settings: A review and recent findings. *Landscape Urban Planning*, 15, 107-117.
- Kaplan, S. (1979). *Perception and landscape: conceptions and misconceptions*. Paper presented at the Our National Landscape Conferences, Berkeley, CA.
- Kaplan, S. (1987). Aesthetics, affect and cognition: environment preference from an evolutionary Perspective. *Environmental Behavior*, 19(1), 3-32.
- Kaplan, S., & Kaplan, R. (1982). *Cognition and environment: Functioning in an uncertain World*. New York: Praeger.
- Kawaguchi, D. (2008). Self-employment rents: evidence from job. *Hitotsubashi Journal of Economics*, 49(1), 35-45.
- Kellert, S. R. (1978). *Perceptions of animals in American society*. In Proceedings of 41st North American Wildlife Conference, 533-546.s
- Kenner, B., McCool, S.F. (1985). *Thinning and scenic attractiveness in second growth forests: A preliminary assessment*. Research Note No. 22. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Missoula, MT.
- Kido, & Ewa, M. (2005). Aesthetic aspects of railway station in Japan and Europe, As a part of context-sensitive for design for railways. *Journal of the Eastern Asia Society for Transportation Studies*, 6, 4381-4396.
- Kuo, F.E., Bacaicoa, M., & Sullivan, W.C. (1998). Transforming inner-city landscapes: trees, sense of safety and preference. *Environmetal Behavior*, 30(1), 28-59.
- Kreimer, A. (1977). Environmental preferences: A critical analysis of some research methodologies. *Journal of Leisure Research*, 9, 88-97.

- Krejcie, R.V., & Morgan, D.W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30, 607-610.
- Kyle, G., Graefe A., Manning, R., & Bacon, J. (2004). Effects of place attachment on users' perceptions of social and environmental conditions in a natural setting. *Journal of Environmental Psychology* 24(2), 213–225.
- Langer, S. K. (1953). *Feeling and Form, a Theory of Art Developed from Philosophy in a New Key*. London: Routledge and Kegan Paul.
- Laurie, I. C. (1975). Aesthetic Factor in Visual Evaluation. In E. H. Zube (Ed.), *Landscape Assessment: Values, Perceptions and Resources* (pp. 102-117). Stroudsburg, PA: Dowden, Hutchinson and Ross.
- Law, C. S., & Zube, E. H. (1983). Effects of photographic composition on landscape perception. *Landscape Resources*, 8, 22–23.
- Lekagul, A. (2002). *A preference study of the traditional Thai Market Place: A management and preservation tool for vernacular environments*. Unpublished Doctoral Dissertation, Virginia Polytechnic Institute and State University, Blacksburg.
- Leonhardt, F. (1984). *Bridges: Aesthetics and Design*. Cambridge: The M.I.T. Press.
- Leonhardt, F. (1991). Bridge aesthetic around the world. *Developing Guidelines for Aesthetic Design* (pp.32-57). Washington DC., USA: Transportation Research Board, National Research Council.
- Leonhardt, F. (2000). Bridge Engineering Handbook. In Wai-Fah Chen, & Lian Duan (Eds), *Bridge Aesthetics Basics* (chapter 2). Boca Raton: CRC Press.
- Lesnikowski, W. G. (1982). *Rationalism and Romanticism in Architecture*. New York: McGraw-Hill.
- Li, Y. H., Rudis, V. A., & Herrick, T. A. (2004). A psychological model of scenic beauty by silvicultural treatment two growing seasons after harvest. In *Proceedings of the Ouachita and Ozark Mountains Symposium: Ecosystem Management Research* (pp. 130-150).
- Liebenberg, A. C. (1991). Bridge aesthetic around the world. *Aesthetic evaluation of bridge* (pp. 1-9). Washington DC, USA: Transportation Research Board, National Research Council.
- Lien, J. N., & Buhyoff, G. J. (1986). Extension of visual quality models for urban forests. *Journal of Environmental Management*, 22, 245–254.

- Listavich, S. T. (1995). *The development of aesthetic guidelines for short and medium span Texas bridge systems*. Unpublished Master's thesis, The University of Texas at Austin.
- Litton, R. B. (1968). *Forest landscapes description and inventories: A basis for land planning and design (PSW-49)*. Berkeley, CA: U.S. Forest Service and University of California Berkeley.
- Lothian, A. (1999). Landscape and the philosophy of aesthetics: is landscape quality inherent in the landscape or in the eye of the beholder?. *Landscape and Urban Planning*, 44, 177-198.
- Lynch, K. (2002). *Theory of good city form*. New York: Van Nostrand Reinhold.
- Lyons, E. (1983). Demographic correlates of landscape preference. *Environmental Behavior*, 15, 487-511.
- Macia, A. (1979). Visual perception of landscape: sex and personality differences. In G.H. Elsner and R.C. Smardon (Eds.), *Our National Landscape* (pp. 279-285). Berkeley: Pacific Southwest Forest and Range Experiment Station.
- Magill, A. W., & Litton, R. B. J. (1986). A color measuring system for landscape assessment. *Landscape Journal*, 5(1), 45-54.
- Manning, R. E., Lime, D. W., Freimund, W. A., & Pitt, D. G. (1996). Crowding norms at front-country sites: a visual approach to setting standards of quality. *Leisure Sciences*, 18, 39-59.
- Maryland Department of Transportation, State Highway Administration, Office of Bridge Development (1993). *Aesthetic Bridges Users Guide*; Baltimore, Maryland.
- Menn, C. (1986). *Prestressed Concrete Bridges*. Wien: Springer-Verlag.
- Menn, C. (1991). Bridge aesthetic around the world. *Aesthetic in bridge design* (pp. 88-177). Washington Dc. USA: Transportation Research Board, National Research Council.
- Melaragno, M. G. (1998). *Preliminary design of bridges for architecture and engineers*. New York: Marcel Dekker, Inc.
- Minnesota Department of Transportation. Office of Technical Support, Site Development Unit (1995). *Architectural and Visual Quality Design Recommendations, for the T.H. 610 Transportation Corridors*.

- Miller, P. A. (1984). Visual Preference and Implications for Coastal Management: A Perceptual Study of the British Columbia Shoreline. Unpublished Doctoral Dissertation, University of Michigan, Ann Arbor.
- Mitra, A., & Lankford, S. (1999). Research methods in park, recreation, and leisure services. Champaign, IL: Sagamore.
- Mok, Jeong-Hun, Landphair, H. C., & Naderi, J. R. (2006). Landscape improvement impacts on roadside safety in Texas. *Landscape and Urban Planning*, 78, 263–274.
- Moon, Sie-Young. (2005). Aesthetic Approach on Bridge Pier Design. Retrieved from <http://www.iasdr2009.org/ap/navigation/byappearance.html>.
- Nasar, J. L. (1997). *The Evaluative Image of the City*. Thousand Oaks, CA: Sage.
- Nasar, J. L. (2000). The Evaluative Image of Places. In Walsh, W. Bruce, Craik, K.H., Price, R.H. (Eds.), *Person–Environment Psychology: New Directions and Perspectives* (PP. 117–168). Mahwah, NJ: L. Erlbaum.
- Nasar, J. L. (2008). Assessing perceptions of environments for active living. *American Journal of Preventive Medicine*, 34(4), 357–363.
- Nasar, J. L., & Hong, X. (1999). Visual preferences in urban signscapes. *Environment and Behavior*, 31, 671- 691.
- Nasar, J. L., & Kang, J. (1999). House style preference and meanings across taste cultures. *Landscape and Urban Planning* 44, 33-42.
- Nasar, J. L., & Li, M. (2004). Landscape Mirror: the attractiveness of reflecting water. *Landscape and Urban Planning*, 66(4) 233–238.
- Navabakhsh, M. (2005). Transition stages from a traditional city to an industrial city: Social and cultural environment of Tehran. *International Journal of Environment*, 2, 175-179.
- Nikoomaram, H., Vazifedoost, H., & Khani, S. (2008). Evaluation of functional efficiency of pedestrian bridges in urban areas of Tehran. *City Identity*, 2, 3-12.
- Oku, H., & Fukamachi, K. (2006). The differences in scenic perception of forest visitors through their attributes and recreational activity. *Landscape and Urban Planning*, 75(1-2), 34-42.
- Orland, B. (1988). Aesthetic preference for rural landscapes: some resident and visitor differences. In Nassar, J. L. (Ed.), *Environmental Aesthetics, Theory, Research and Applications* (pp. 364–378). Cambridge: Cambridge University Press.

- Palmer, J. F. (1983). Visual quality and visual impact assessment. In K., Finsterbusch, L. G., Llewellyn, & C. P., Wolf (Eds.), *Social Impact Assessment Methods* (pp. 268–283). London: Sage Publications.
- Penning-Rowsell, E. C. (1981). Fluctuating Fortunes in Gauging Landscape. *Progress in Human Geography*, 5, 35-41.
- Penning-Rowsell, E. C. (1982). A public preference evaluation of landscape quality. *Regional Studies*, 16, 97-112.
- Pepper, S. C. (1970). Autobiography of An Aesthetics. *The Journal of Aesthetics and Art Criticism*, 28(3), 275-286.
- Pérez, J.G. (2002). Ascertaining landscape perceptions and preferences with pair-wise photographs: planning rural tourism in Extremadura, Spain. *Landscape Research*, 27, 297-308.
- Pitt, D. G. (1989). The attractiveness and use of aquatic environments as outdoor recreation places. In Altman, I, Zube, E.H. (Eds.), *Public Places and Spaces* (pp. 217–254). New York: Plenum Press.
- Pitt, D., G., & Zube, E. H. (1987). Management of Natural Environments. In Stokols, D., Altman, D. (Eds.), *Handbook of Environmental Psychology* (pp.1009-1042). New York: Wiley.
- Purcell, A. T. (1992). Abstract and specific physical attributes and the experience of landscape. *Journal of Environmental Management*, 34, 159-177.
- Purcell, A. T., Lamb, R. J., Mainardi Peron, E., & Falchero, S. (1994). Preference or preferences for landscape?. *Journal of environmental psychology*, 14(3), 195-209.
- Rapaport, A. (1990). *The Meaning of the Built Environment*. Tucson, USA: University of Arizona Press.
- Real, E., Arce, C., & Sabucedo, J. (2000). Classification of landscapes using quantitative and categorical data, and prediction of their scenic beauty in North-Western Spain. *Journal of Environmental Psychology*, 20, 355–373.
- Regan, C. L., & Horn, S. A. (2005). To nature or not to nature: Associations between environmental preferences, mood states and demographic factors. *Journal of Environmental Psychology*, 25, 57–66.
- Reese, R. C. (1976). Aesthetic is a do it yourself project. *Methods of Structural Analysis, (ASCE)*, 1, 33-38.
- Reich, Y. (1993). A model of aesthetic judgment in design. *Artificial and Intelligence Engineering*, 8, 141-153.

- Ribe, R.G. (2002). Is scenic beauty a proxy for acceptable management? The influence of environmental attitudes on landscape perceptions. *Environment and Behavior*, 34, 757-780.
- Ribe, R. G. (2005). Aesthetic perceptions of green-tree retention harvests in vista views (The interaction of cut level, retention pattern and harvest shape). *Landscape and Urban Planning* 73(4), 277–293.
- Ritner, J. (1985). *Bridges Produced by an Architectural Engineering Team*. Washington DC: Transportation Research Board.
- Roberts, J. E. (1992). Aesthetic design philosophy utilized for California state bridges. *Journal of urban planning and development*, 118(4), 138-162.
- Rowntree, R. A. (1981). Diversity in the street trees of Syracuse, New York. *Urban Ecology*, 5, 33-43.
- Ryan, R. L. (1998). Local perceptions and values for Midwestern river corridor. *Landscape and Urban Planning*, 42(2), 225-237.
- Sarmad, Z., Bazargan, A. & Hejazi, E. (2000). *Research methods in behavioral science*. Tehran. Iran: Agah Press.
- Sayadi, S., González-Roa, M. C., & Calatrava-Requena, J. (2009). Public preferences for landscape features: the case of agricultural landscape in mountainous Mediterranean areas. *Land Use Policy*, 26(2), 334–344.
- Schroeder, H. W. (1986). Estimating park trees densities to maximize landscape aesthetics. *Journal of Environmental Management*, 23(4), 325-333.
- Schroeder, H. W., & Anderson, L. M. (1984). Perception of personal safety in urban recreation site. *Journal of Leisure Research*, 16, 178-194.
- Schroeder, H. W., Buhyoff, G. J., & Cannon, W. N. (1986). Cross-validation of predictive models for esthetic quality of residential streets. *Journal of Environmental Management*, 23, 309-316.
- Schroeder, H. W., & Cannon, W. (1983). The aesthetic contribution of trees to residential streets in Ohio towns. *Journal of Arboriculture*, 9, 237-243.
- Scott, A. (2002). Assessing public perception of landscape: the LANDMAP experience. *Landscape Research*, 27(3), 271-295.
- Shuttleworth, S., (1980). The use of photographs as an environmental presentation medium in landscape studies. *Journal of Environmental Management*, 11, 61–76.
- Shafer, E. L. (1969). Perception of natural environment. *Environment and Behavior*, 1, 71-82.

- Shafer, G. S., & Anderson, L. M. (1985). Perception of the security and attractiveness of urban parking lots. *Journal of Environmental Psychology*, 5(4), 311-323.
- Shafer, E. L., & Brush, R. O. (1977). How to measure preferences for photographs of natural landscapes. *Landscape Planning*, 4, 237-256.
- Sheets, V. L., & Manzer, C. D. (1991). Affect, cognition, and urban vegetation some effects of adding trees along city streets. *Environment and Behavior*, 23(3), 285-304.
- Sheppard, S., Picard, P. (2006). Visual-quality impacts of forest pest activity at the landscape level: A synthesis of published knowledge and research needs. *Landscape and Urban Planning*, 77(4), 321-342.
- Shijin, Y., & Dongzhou, H. (1997). Aesthetic consideration for urban pedestrian bridge design. *Journal of Architectural Engineering*, 3, 3-8.
- Smardon, R. C. (1988). Perception and aesthetics of the urban environment: Review of the role of vegetation. *Landscape and Urban Planning*, 15(1), 85-106.
- Smith, P.F. (1977). *The Syntax of Cities*. London: Hutchinson.
- Sommer, R., & Sommer, B. B. (1992). *A practical guide to behavioral research*. Oxford University Press.
- Stamps, A. E. (1999). Demographic effects in environmental aesthetics: A meta-analysis. *Journal of Planning Literature*, 14, 155-175.
- Stamps, A. E., & Miller, S. D. (1993). Advocacy membership, design guidelines, and predicting preferences for residential infill designs. *Environment and Behavior*, 25(3), 367-409.
- Stern, R. C., Dietz, T., & Yaloff, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behavior*, 25(3), 322-348.
- Stewart, T. R., Middleton, P., Downton, M., Ely, D. (1984). Judgments of photographs vs. field observations in studies of perception and judgment of the visual environment. *Journal of Environmental Psychology*, 4, 283-302.
- Strumse, E. (1996). Demographic differences in the visual preferences for agrarian landscapes in western Norway. *Journal of Environmental Psychology*, 16(1), 17-31.
- Suhardi, Maulan. (2006). *A Perceptual Study of Wetlands: Implications for Wetland Restoration in the Urban Areas in Malaysia*. Unpublished Doctoral Dissertation, Virginia Polytechnic Institute and State University, Blacksburg.

- Sullivan, W. C, Lovell, S. T. (2006). Improving the visual quality of commercial development at the rural–urban fringe. *Landscape Urban Planning*, 77(1-2), 152-166.
- Svobodova, K., Sklenicka, P., Molnarova, K., & Salek, M. (2012). Visual preferences for physical attributes of mining and post-mining landscapes with respect to the socio-demographic characteristics of respondents. *Ecological Engineering*, 43, 34-44.
- Tandy, C. (1971). Landscape evaluation technique. Working Paper, Croydon, Land Use Consultants, Madrid.
- Tang, H. C. (1991). Bridge aesthetic around the world. *Philosophical basis for Chinese bridges aesthetic* (pp.167-177). Washington DC, USA: Transportation Research Board, National Research Council.
- Tips, W. E. J., & Savasdisara, T. (1986a). The influence of the environmental background of subjects on their landscape preference evaluation. *Landscape Urban Planning*, 13, 125 -133.
- Tips, W. E. J., & Savasdisara, T., (1986b). The influence of social- economic background of subjects on their landscape preference evaluation. *Landscape Urban Planning*, 13, 225- 230.
- Torres-Sibille, A. D. C., Cloquell-Ballester, V. A., & Artacho Ramírez, M. Á. (2009a). Aesthetic impact assessment of solar power plants: An objective and a subjective approach. *Renewable and Sustainable Energy Reviews*, 13(5), 986–999.
- Torres-Sibille, A. D. C., Cloquell-Ballester, V. A., & Darton, R. (2009b). Development and validation of a multi-criteria indicator for the assessment of objective aesthetic impact of wind farms. *Renewable and Sustainable Energy Reviews*, 13(1), 40-66.
- Transportation Research Board, Subcommittee on Bridge Aesthetics. *Bridge aesthetics sourcebook: Practical Ideas for Short and Medium Span Bridges*; American Association of State Highway and Transportation Officials: Washington, DC, 2010.
- Tuan, Y. F. (1977). *Topophilia: A study of environmental perception, attitudes and values*. Englewoods Cliffs, NJ.: Prentice Hall.
- United Nations Population Division (2002). *World urbanization prospects: The 1999 revision*. New York: United Nations Population Division.
- USDA Forest Service (1974). *National forest landscape management*. Washington DC: Governmental Printing Office.

- Wang, M. C., Manlai, Y., & Lee, C. F. (2002). Environmental aesthetics: philosophic foundations and methodological perspectives. Unpublished Doctoral Dissertation, National Yunlin University of Science and Technology, College of Design.
- Wherrett, J. R. (2000). Creating landscape preference models using the internet as a medium for surveys. *Landscape Resources*, 25, 79–96.
- Whyte, W. H. (1980). *The social life of small urban spaces*. Washington, DC: The Conservation foundation.
- Winkel, G., Malek, R., & Thiel, P. (1970). *A study of human response to selected roadside environments*. In Proceedings of 1st EDRA Conference (pp. 224-240).
- Wohlwill, J. F., & Kohn, I. (1976). The environment as experienced by the migrants: an adaption level view. *Representative Research in Social psychology*, 4, 35-164.
- Woods, J. D. (1995). Environmental factors that influence preference and price perceptions of commercial landscapes and storefronts. Unpublished Doctoral Dissertation, Virginia Tech, Blacksburg.
- Yu, K. (1995). Cultural variations in landscape preference: comparisons among Chinese sub-groups and Western design experts. *Landscape and Urban Planning*, 32, 107–126.
- Zube, E. H. (1974). Cross-disciplinary and intermode agreement on the description and evaluation of landscape resources. *Environmental Behavior*, 6, 69–89.
- Zube, E. H., Sell, J. L., & Taylor, J. G. (1982). Landscape perception: Research, application and theory. *Landscape Planning*, 9, 1–33.
- Zube, E. H., Pitt, D. G. & Evans, G. W. (1983). A lifespan developmental study of landscape assessment. *Environmental Psychology*, 3, 115-128.
- of British Geographers, New Series, 12, 43–56. *Journal of Environmental Psychology*, 3, 115–128.
- Zuk, W. (1973). *Public response to bridge colors*. Department of Highways and the University of Virginia, Virginia Highway Research Council: Charlottesville, VA.
- Zuk, W. (1990). *An expert system for the esthetic rating of bridges*. Department of Transportation and the University of Virginia, Virginia Highway Research Council: Charlottesville, VA.