IF YOU COULD KNOW, WHAT USERS THINK:
Urban Design and Preference of the Visual Attributes to Design Sustainable Urban Open Spaces

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ABSTRACT
What are the visual attributes of successfully designed urban open spaces that play significant roles in the creation of sustainable livable cities? Public spaces are mostly designed for social interaction and communication. The aesthetic and morphological dimensions of public spaces are among the essential visual and physical characteristics that need to be understood for successful social use. This paper reports on a study that was exploratory and qualitative in nature and sets out to explore the different physical characteristics of designed urban open spaces as being aesthetically and socially important from the users’ point of view. By using photo simulation techniques, a set of 24 photographs of urban plazas, squares, and pedestrian malls were used as surrogates for the physical environment. The study identified some salient attributes of designed urban open spaces in order to create sustainable urban planning, with six sub-categories considered to be important. Based on detailed participant responses, a list of the attributes of preferred physical environment to design sustainable urban open space has been developed. The findings can be implemented to create sustainable urban planning as well as to design successful urban plazas, squares, and other public open spaces according to user preferences in the future.

Indexing terms/Keywords
Aesthetic response, public spaces, physical features, sustainable urban planning, social use, urban plaza, visual attributes.

Academic Discipline And Sub-Disciplines
Aesthetic Studies, Environmental Studies, Visual Art, Architecture, Urban Design, Sustainable Planning

SUBJECT CLASSIFICATION
E.g., Environmental Subject Classification

TYPE (METHOD/APPROACH)
Literary Analysis; Survey/Interview, Qualitative Analysis
1. INTRODUCTION

The role of public space is essential for the well-being of communities and societies. Outdoor spaces, like parks, plazas, and other public open spaces, provide a vital connection with nature and improve the quality of life. In urban environments, plazas and other designed open spaces serve as successful social spaces. However, besides the multidimensional factors of the urban environment, aesthetic and visual qualities are essential to creating successful urban space and sustainable livable cities. The design of public space can create a positive impact on the use of urban space, and from this viewpoint the designers of public space have a special responsibility to understand and serve the public good, which is also a matter of aesthetics.

In research literature, a wide range of definitions and classifications are used to define Urban Open Space. In this research Urban Open Space is defined as publicly accessible, mostly hard-surface, outdoor open spaces, which are designed and built for human activities and enjoyment (Figure 1). The three most popular types of designed urban open spaces, pedestrian malls, squares, and plazas are considered in this study for detail analysis.

Fig 1: Classification of designed urban public spaces

In the world’s developed cities, rapid urbanization and commercialization are leaving few urban breathing spaces for society. Different research identifies visual aesthetic dimensions of urban space as the most important characteristics that enhance the qualities of public space. However, a gap in the literature exists concerning the precise nature of the aesthetic characteristics of the architectural elements that enhance the social use of urban open spaces. Very little is known about the effects of these perceptual and physical dimensions of the urban environment on the social use of public spaces. The purpose of this paper is to identify the architectural and physical characteristics of the built environment of urban plazas and designed public open spaces that contribute to aesthetic responses and social use. The outcome of this study can be used to categorize the important visual attributes in order to create sustainable urban planning as well as to design successful urban plazas and squares.

1.1 The Public Urban Open Space and Social Use

Social Use is the use of space that occur spontaneously as a direct consequence of people moving about and being in the same spaces together. The Latin word public refers to people, therefore public space is interpreted as a space open to all people. According to the various definition of public space, it can generally be defined as a “space that is not controlled by private individuals or organizations and is open to the general public. This space is characterized by the possibility of allowing different groups of people, regardless of their class, ethnicity, gender and age to intermingle.” Carmona et al. argued that successful public spaces can be characterised by the presence of people that provide for economic, social, and cultural transactions and besides imageability, accessibility, use, and activity, “sociability” is one of the key attributes of successful public places. From the mid 1970s on, several behavioral studies of plazas have been published, the focus of which has been upon the social use of Western city plazas. Different studies on urban plazas indicate that both natural and man-made elements, i.e. fountains, sculptures, trees, seating, pavement, and so on, in a comparatively small sized, enclosed urban space with a high proportion of couples and women, along with food facilities, significantly affect peoples’ perception and use of urban space.
From the above, the need for urban open space as public place is obvious for a livable community. The aesthetics of the built environment represent another important factor that, to some extent, depends on the visual attributes of the architectural characteristics. Thus, it seems imperative to explore the relationship between environmental aesthetic qualities and social interaction of designed urban plazas and open spaces given that these urban spaces serve as a form of urban relief for city dwellers.

1.2 Physical and Visual Dimensions of the Environment

This current research hypothesized that there is a strong relationship between the built environment, aesthetic dimensions, and the social use of urban space. According to different literature, among several physical characteristics the following visual attributes play significant roles in order to design sustainable urban open space as well as for successful social use.

The enclosure is one of the prerequisites of any urban open space. The important characteristics that may influence the quality of enclosure in any designed urban open space are the treatment of corners, the nature of enclosing buildings, height, roofline, trees, vegetation, street furniture, and overall size and shape of the space in relation to the surroundings. Sitte argued that the most delightful intimate squares may be as small as 15-21 m (50-70 ft) and can create small cosy social spaces for any social use. In contrast, “modern gigantic plazas” can create a pernicious influence and people may feel lost in them. Height is another important criterion that can influence aesthetic response and social interaction of urban open space. Certain desirable proportions of the vertical elements and horizontal surfaces define a sense of enclosure where the height of the surrounding enclosure is one of the vertical elements. The proportion of building height to width, walls and any other types of vertical boundary or edge elements can surround urban open space to create an enclosed appearance.

The natural dimension has repeatedly emerged in different research literature and that literature consistently demonstrates nature as a content variable with a restorative and aesthetic value. Extensive empirical research has documented preferences for nature or natural elements over artificial or built elements that provide a higher level of restoration from stress. According to Kuo (1998), who undertook a photo simulation study, participants feel safer and more comfortable with a higher density of tree planting over urban elements.

The existence of water features as a part of life is inevitable and in any urban open space they are provided for the enjoyment, recreational, business, and retail life of the users. According to Moughtin, four types of water features usually structure the city’s form and these include water point or fountain, pool, linear watercourse, and the coast that is associated with the edge of a city. When designing any space, urban designers should consider enhancing these sensual qualities. As water has also been found to enhance scenic qualities, in many cities public access to water-front areas has been increased by developing different types of water features and fountains.

Monuments or sculptures are another important landscaping elements of urban design. The size, type, and position of monuments can vary according to their surroundings and locality. In each city, and in each public place, the arrangement of monuments is entirely different and needs to be harmonized with the surroundings. Usually sculptures or monuments are located at the focal point or in the most attractive part of an open space and often become the center of a range of social activities and gatherings (like sitting, chatting, reading, playing, gossiping, and relaxing).

Sitting space has been recognized as one of the most important characteristics to support social behavior. Studies of plazas in Vancouver and New York City found that the choice of sitting spaces in the form of benches, chairs, ledges, height walls, and even stairs and extended steps were the most important factors to keep people in public space. The combination of food with social activities usually encourages people to stay longer in any urban open space and prolongs their socializing.

1.3 Gaps in Knowledge

Over the last few decades, environment behavior studies have proven to be an effective way of discerning the interrelationship between the characteristics of physical elements of urban open space and human responses. Most of the research has focused on neighborhoods and public streets, while other studies have investigated residential streets and community spaces. In previous studies some affective variables as well as cognitive judgements are included to measure the aesthetic response. Research in aesthetic response has been limited to different aspects of the landscape, building style, streetscape, city image, facade color, urban environment, and individual urban plazas. A gap in the literature exists in terms of studies that focus on the effect of aesthetic response on social use or the interrelationship between the perceptual qualities and social use. By focusing on the architectural and landscape architectural characteristics of urban open spaces, this paper will reveal the physical characteristics of designed urban open spaces that make the users’ aesthetic experience both interesting and soothing and their social use comfortable, lively, and interactive.

2. METHODOLOGY

According to Lincoln and Guba, naturalistic inquiry is always carried out in natural settings and uses the methods that are appropriate to humanly implemented inquiry such as interviews, observations, document analyses, and so on. A plethora of literature exists in different research domains using naturalistic qualitative approaches to obtain subjective depth in the studies, as these are acceptable ways to obtain human responses. Dobbins stated that people are at the core of successful urban places and play an active role in guiding the design, development decisions, and priorities that make places look good, feel comfortable, and meet their functional expectations. Therefore, this research employs a qualitative approach through focus interviews and multiple sorting tasks. Photo simulations were used as data collection
tools. A pilot test was conducted in two phases, the aim being to evaluate the questionnaire and to finalize the visual stimuli and duration of the evaluations. Several changes were made to the interview techniques and to the number of visual stimuli to render it more simplified, understandable, and legible to the respondents.

2.1 Participants

The survey was conducted in four different multipurpose public urban spaces in Sydney, Australia, during favourable outdoor conditions (morning and late afternoon in spring and fall). The participant group or the sample for this study included people who were present in, and actively using, the above spaces at the time of the survey. A convenient sample size for this study was 50; to achieve this sample size, 75 people were approached. Diversification of the sample was based on people being of different ages and equal proportion of male and female.

2.2 Visual Stimuli

One of the research instruments for this study was photo simulation, where color photographs of different urban plazas, squares, and pedestrian malls from different parts of the world were used as visual stimuli. Although these images can capture a vast amount of visual information to represent the existing environment, it is acknowledged that using two-dimensional images are not exact substitutes for the physical environment. Particularly in the EBS (Environment, Behavior, and Society) domain, photographs or slides have been used extensively as a substitute for the physical environment.

A group of scholars from the EBS research group, in the Faculty of Architecture at the University of Sydney, selected 24 photographs to use as visual stimuli from a series of 42 different photographs of urban open spaces. The selection of open spaces was based on two different criteria. First, participants were asked to sort the images into three piles: urban plazas, urban squares and pedestrian malls. Second, the photographs had to represent the diversity of types of scenes according to the visual qualities of surroundings.

2.3 Measuring Instruments

Focused interviews, probes, and the multiple sorting task, particularly the Q-sorting technique, were applied to investigate and understand users’ subjective experiences regarding aesthetic response and social use pattern of the selected urban spaces.38, 39 For the multiple sorting tasks in this study, each person sorted out eight photographs in each session; fifty people evaluated all 24 photographs in 50 different sessions. The total evaluation of all photographs in 50 different sessions was 400 (50X8).

2.4 Procedure

Participants were first directed to sort the photographs or visual stimuli into piles or groups according to their “likes” and “dislikes”. From the pilot study, it was evident that eight was the optimum number to sort. After sorting the photographs into desired groups, a face-to-face semi-structured focused interview was conducted, with participant permission to make audio recording. The aim of the interview was to provide in-depth information and to understand users’ feelings, perceptions, and responses towards the photographs that they had already sorted.

3. DATA ANALYSIS AND RESULTS

Physical characteristics of the built environment are one of the most interesting criteria for urban designers and architects.12 With the increasing volume of literature in urban design, physical characteristics are considered to be the most important in determining the visual qualities of the built environment and, by extension, its use. Respondents from the study indicated some of the most important “liked” physical features of urban plazas, squares, and pedestrian malls that influence their aesthetic response and social use (Figure 2 & 3). Apropos of the notion of aesthetic response and social use, these are the highest rated physical features and other research corroborates these findings.4, 12, 13, 22, 40

![Most "Liked" Physical Features for Aesthetic Response](image)

**Fig 2:** Most important and frequently mentioned urban design characteristics for aesthetic response
After sorting the data into different groups, similar responses were classified under the “same” category. However, this research includes only those physical attributes for the further study that were frequently mentioned by at least 35 of the 50 respondents. The findings suggest some important urban design characteristics, i.e., architectural and landscape architectural elements for future sustainable urban planning and design of successful public space.

4. DISCUSSION

4.1 A Good Sense of Enclosure

This study revealed that sense of enclosure is one of the most important physical attributes and most people preferred “partially enclosed” public spaces rather than “completely open”. Urban open spaces that are surrounded by buildings, trees, or other physical elements can create a comfortable environment for users. Open spaces surrounded by physical elements to form a partially enclosed environment are the most desirable settings for the users. According to this study, for both aesthetic response and social use, partially enclosed spaces are most preferable. For aesthetic response the respondents prefer partially-enclosed spaces (87%) rather than the comparatively open (57%) or completely-enclosed space (70%). Similarly, for social use, most of the respondents mentioned partially enclosed spaces (83%) and comparatively open spaces (67%) as their highest and second highest preferences.

4.2 Height of the Surrounding Enclosure

According to the study, people prefer those spaces where the height of the surrounding enclosure varies from three to five storeys high (11m to 18m). In order to achieve a harmonious proportion, the height of buildings and the width of public spaces should be within a ratio of at least 1:3 to 1:6. Respondents of the study preferred medium height enclosures (80%) in preference to spaces with an extremely high enclosure (40%). On the other hand, for social use the user group preferred low height enclosures (83%) in preference to those of medium (70%) or high (60%) height. Their choice of height differences could be influenced by the fact that some people are concerned more about privacy when socializing. However, in terms of aesthetic response, visibility of the surrounding enclosure is more desirable.

4.3 A Good Coverage of Vegetation, Greenery and Naturalness

Both for aesthetic response and social use of designed urban open spaces, the outcomes of this study corroborate the research literature and participants prefer those plazas that have a comparatively higher density of trees. A high percentage of participants (87%) also stated that it is very important for both aesthetic response and social use that the space looks more natural with a comparatively higher density of trees, vegetation, and greenery. Therefore, the use of vegetation and greenery to complement any urban open space is highly desirable.

4.4 The Inclusion of Water Features and Fountains

Lynch suggested that any natural features, like a water body or vegetation, reinforce the image and strengthen the imageability of any object to make it more memorable to the viewers. The outcome of this study supports Lynch’s notion. People usually prefer those spaces that include water features, e.g. fountains, tranquil lake, pool, cascade, waterfall, water wall, or any kind of flowing water body as a part of the landscape. “Water features” and “fountains” attracted high percentages of response (87% and 77%). In fact water features are one of the highest ranked design elements and almost every successful urban open space incorporates a water body or fountain as an obvious part of design.
4.5 Presence of Monuments or Sculptures

Lynch found the landmark to be one of the important elements by which a city is recognized and understood to give a strong image. To achieve a strong imageability, a landmark or any monumental structure is equally important as a path, node, edge, and district.\textsuperscript{45, 46} The findings of this study also support the literature and the participants preferred those spaces that had a monumental structure or sculpture as a central social gathering point. Both for aesthetic response and social use, respondents identified the presence of monuments or sculptures (74\% and 64\% respectively) as one of the most important “liked” physical features.

4.6 Availability of Seating Spaces

Findings of this study also corroborate that the availability of seating spaces is one of the most desirable settings for social interaction and diversified social use. From this research, it can be summarized that benches and seats are an important design element for social get-togethers in urban plazas, squares, or pedestrian malls. Sitting spaces and benches are the most highly mentioned physical characteristics as recognized by the respondents (90\% and 80\% respectively) for social use, but not for aesthetic response.

5. CONCLUSION

5.1 Key Findings

This research is an empirical enquiry that sought to determine different physical characteristics of designed urban plazas and public open spaces for environmental aesthetic response and social use. Most urban design literature hardly combines the components of the physical characteristics of public space with aesthetic dimensions and the social use pattern. By integrating these approaches, this study set out to understand and address the pattern of the relationships between the above components. This paper highlights the qualitative aspects of the research and the focus is solely upon the participant’s response to physical and architectural characteristics of designed urban open space. The most important physical characteristics of designed urban plazas and public open space for aesthetic response and social use are as follows:

- a. A good sense of enclosure
- b. Height of the surrounding enclosure
- c. A good coverage of vegetation, greenery and naturalness
- d. The inclusion of water features and fountains
- e. Presence of monuments or sculptures
- f. Availability of seating spaces

According to the findings, physically well-designed urban plazas and open spaces usually comprises of: medium height enclosure that provides a partially enclosed space, with plentiful vegetation, water features, monuments or sculptural works, and adequate seating spaces. These most fundamental, visual, and functional dimensions act as vital architectural, landscape, and physical elements in the designing of sustainable urban plazas, squares, and pedestrian malls in order to create sustainable urban planning for the future.

5.2 Implications to the Future Study

The meanings and definitions of the term aesthetic response vary not only between the research domains in which it appears, but it also varies within them. In addition, it is fully acknowledged that both aesthetic response and social use are subjective features that may vary over time with diverse situations, life cycle, seasonal changes, and the changing nature of values and attitude with an interaction with socio-economic-environmental factors. Caution needs to be exercised about the implications of this study, as the sample group was relatively small. However, the research findings corroborated the previous literature by incorporating active users’ responses and these outcomes could be generalizable to different settings and socio-cultural contexts. The evaluative image of the built environment of designed urban open space is one of the essential visual characteristics of the urban environment. The role of architects, urban designers, and other city design-related authorities is to create aesthetically appealing design solutions for users.\textsuperscript{45, 46} This research took an in-depth look at the architectural and physical features of designed urban plazas and public open spaces for aesthetic response and social use. In response, a model of aesthetic response and social use is proposed that illustrates the interaction between architectural, landscape characteristics and preferences for various physical attributes of sustainable urban spaces.
Fig 4: Proposed model showing the relationship between aesthetic response and social use to designed urban open spaces (please note: AR represents the contraction of aesthetic response and SU is the short form of social use)

This model of environmental evaluation allows for individual differences as well as other factors, such as physical characteristics that may affect the social use and aesthetic response to the built environment (Figure 4). The model predicts that architectural and landscape characteristics of urban open spaces in interaction with socio-demographic characteristics of users will be related to peoples’ aesthetic response to and social uses of designed urban open spaces. This interactive model may be used as a design protocol to evaluate and design future urban plazas and public open spaces.

According to Nasar, future research should explore the evaluative images of urban space for different groups and subcultures as well as look at different places and scales of places around the world. The present research will help to make changes to design sustainable urban planning as well as to make the visual form more relevant to the many peoples who inhabit the worlds’ diverse and distinctive spaces.

REFERENCES


AUTO BIOGRAPHICAL

Farhana Ferdous is a lecturer at the School of Architecture, Design and Planning, the University of Kansas, USA. Her doctoral research is focused on the Environment Behavioral Study (EBS) and urban morphology of Dhaka, which she finished in 2012 from the University of Sydney at Australia. Prior to joining KU she was Assistant Professor at the Department of Architecture, Bangladesh University of Engineering and Technology (BUET). She has been awarded by many prestigious awards, scholarships and prizes such as American Association of University Women (AAUW) International Fellowship, GIA (Grant makers in Aging) Fellowship, Endeavour Post Graduate Award (EPA) in Australia, Post Graduate Research Support Scheme (PRSS) at Sydney University, and Fulbright Bangladesh Government Scholarship. For the last several years, Dr. Farhana’s work has focused on the relationships among spatial configuration, environment behaviour and morphology of the built environment. Her current scholarly activities have focused on the nexus between health care design, neighbourhood walkability and spatial configuration, with a specialty in the area of environmental design for the elderly. Her recent publications appeared in or forthcoming in Urban Design International (UDI), American Journal of Alzheimer’s Disease and Other Dementias, Sage Open Journal, Environmental Design Research Association (EDRA), Architectural Research Center Consortium (ARCC) and Journal of the Asiatic Society (Humanities).