



Users' Perceptions and Preferences of Landscape Gardens in a High-Rise Office Building

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Abstract

Amidst today's energy-economic crisis, the introduction of green spaces in a high-rise building is one way of reducing building's cooling load, which at present relies mainly on air conditioning. This paper evaluates users' perceptions and expectations in three different landscape gardens on a 21-storey high-rise office building in Penang, Malaysia. The questionnaire focuses on comfort level, landscape preferences as well as expectations and use of space. The low usage factor was attributed to the unawareness of the gardens' existence, low accessibility and users' preference of staying indoors. The three gardens are significantly different in its overall comfort level, thermal comfort parameters, attractions and number of visits.

Keywords: Users' perceptions; Landscape gardens; Landscape preferences; High-rise.

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1.0 Introduction

Rapid urbanization and population growth leads to the increase of high-rise buildings in cities. This marks in shortage of green spaces in urban areas that causes alarming rate of environmental issues such as Urban Heat Island (UHI) effect. This scenario is becoming a trend in Asian countries such as Singapore, Tokyo and Hong Kong where more buildings are growing vertically in commercial and residential development. Outdoor green spaces are known to contribute to the quality of life in the overpopulated cities. Loss of green areas due to the scarcity of land in urban areas has resulted in development of landscape spaces in high-rise buildings. This paper focuses on the landscape of a high-rise office building, where exposure to nature is limited in an urban setting.

2.0 Theoretical Review

Outdoor green spaces in high-rise buildings allow passive approach of green design such as natural ventilation. These gardens are often designed in the form of sky court, balcony, rooftop, and terrace with paving, seating, and deep layers of substrates for garden landscaping. The use of outdoor spaces are often associate with microclimate condition in particular the tropics. In general, the temperature in Malaysia ranges from 29°C to 35°C during the day while the humidity level from 70% to 90%. The study area, situated in Penang Island; located on the northwest coast of Peninsular Malaysia experiences 1-2°C higher temperatures compared to the mainland. Nikolopoulou and Steemers (2003) concluded that people's perceptions are influenced by microclimate factors; in particular air temperature, humidity, wind speed and radiation fluxes (solar radiation), and by a set of personal parameters, such as physical activity, level of clothing and age, and also psychological factors, namely motivation, individual preferences and cultural aspects. In areas of high-density development, landscape spaces in high-rise office buildings offer a psychological retreat space for occupiers to relax their mind from work stress. Work stress issues are often associated with the condition of the workplace. Office workplace is a setting where a person spends more than 8 hours a day. Research shows that workstation environments that were characterized by extreme heat, dim lighting, and congested work area can be associated to stress at workplace (Sutton and Rafaeli, 1987). A conducive workplace with good exposure to nature gives a restorative effect and improves individual psychology wellbeing at work. Kaplans' study on natural experiences found that everyday places such as gardens and backyards, have a virtually restorative power as nature itself. (Krinke, 2005). Studies have also shown that there is statistically significant relationship between access to a garden at workplace and the number of stress occasions experienced a year. (Stigdotter, 2004a). In addition, a constant access to a view of a verdant garden is important as being able to spend time in a garden a few times a week. Incorporating outdoor green spaces allow occupants on higher floors to reconnect with the natural environment without having to leave the office during working hours. However, past studies have shown that the failure in designing such spaces will result in non-usage and underutilized. Mohamed Ikhwan Nasir and Saruwono (2012) concluded in their study that the synergy between landscape architects and users would make the process of creating public parks a truly holistic approach. The benefits of

public participation allow users to provide feedbacks and ideas to professional designers, whom contribute technical expertise and analytical knowledge in designing a park. This paper will address users' perceptions and their preferences towards landscape design in a high-rise office building.

3.0 Methodology

The study focuses on a high-rise office building situated in an urban area in Penang, Malaysia. The building, known as Suntech, was chosen as a case study as it is the only high-rise office buildings in Penang, Malaysia that showcase different types of landscape gardens: Sky Court Garden, Balcony Garden and Rooftop Garden in a building. A questionnaire survey was carried out in a 21-storey commercial high-rise office building. The gardens vary in size, design, floor level, height of the space; landscape features and facilities provided but are similar in orientation (all locations is facing towards east). The population of this study was drawn from the building occupants of Suntech building. The questionnaire survey involved a study of respondents from 60 companies occupying the office space in the building. The smallest company involved 3 workers while the largest has more than 200 staff. A 10% sample from each company was selected as respondents. A simple random sampling was used to select the respondents from the sampling frame. A total of 102 successful questionnaire interviews were completed yielding a respond rate of 48%. The questionnaire survey covered demographic information, users' perceptions of thermal comfort, and preferences of landscape features in high-rise buildings.

4.0 Results and Discussion

4.1. Level of Usage

The findings indicate moderate usage of gardens. Only 52.6% of respondent have visited the landscape gardens although 96% of the respondents supported the provision of such spaces in high-rise office buildings. A gap seems to exist between respondent awareness and usage of gardens suggesting for a closer analysis of occupant's needs to avoid non-use problem. This relates back to the first principle of landscape planning: open space that do not meet people's need or serve no important function for people are destined to be underutilized and by their use criterion, unsuccessful (Burgess *et al.*, 1988). Based on the literature reviews, low usage of garden was influenced by demographic characteristics, comfort level, distance from landscape gardens to workplace location, and respondent's preference and perception towards landscape gardens.

This study indicated that there is a significant difference in visit of the three gardens ($\chi^2 = 73.64$, $df = 2$, $p < .01$). The findings reveals that the majority of respondents have visited the Sky Court Garden (55.3%) while only 22.4% of respondents have visited the Balcony Garden and the Rooftop Garden respectively. For those who have not visited the Sky Court Garden, 31% responded that they did not know that the garden existed. The same reason was given by majority of those who have not visited the Balcony Garden (83%, $n = 55$). In addition, the

lack of accessibility (10%) was the second most mentioned reason for not visiting the Balcony Garden. For the Rooftop Garden, the lack of knowledge on the existence of the Rooftop Garden was cited by 38% of the respondents as the main reason for not visiting the garden. Poor accessibility was the second most frequent answer (29%) followed by preference for staying indoors (21%). The layout of the building shows that the Sky Court Garden is more accessible and more welcoming compared to the Balcony Garden and Rooftop Garden. The location of the Balcony Garden and Rooftop Garden were secluded and far from the main lift lobby. This is similar with a study conducted in a high-rise residential building in Choa Chu Kang, Singapore by Yuen and Wong (2005). The study found that low usage of park was caused by access and visibility. Unlike the ground level parks, access to the roof garden in the study site is at present through staircases only. This demands a certain level of physical fitness and local knowledge of these locations of the staircases. These findings also supported earlier statement by Alexander *et al.* (1977) that people will visit urban greenery on a regular basis if it is within 3-5min walk of their home/ workplace.

Pattern of usage across demographic characteristics were also analyzed. Variables that were analyzed include age, gender, education background, ethnicity, job description and also location of their workspace in relation to the distance from the gardens. Findings have indicated that none of these demographic characteristics have significant relationship with number of visit. This is similar with findings by Stigdotter and Grahn (2004a) who found access to a garden at work is not associated with gender, age and socioeconomic status. However, this is in contrast with previous studies on demographic factors across usage of gardens for residential users. Oliveira and Andrade (2007) found that a set of psychological differences, depending mostly on ages can be found exists in regards to perception of environmental conditions. This is supported by Kalkstein (1997) who reported that elderly people are in general more susceptible to heat, whereas Penwarden (1973) stated that high wind speeds may be more dangerous to elderly or infirm people than to fit and active ones. However, in this study, majority of the respondents (88.2%) were aged between 21-35 years old. Perceptions of comfort also can be affected by individual background, mainly on places of birth and residences (Nikolopoulou and Stemmers, 2003). In addition, Vigotti *et al.* (2006) have found that people born in warmer areas exhibit higher tolerance to heat. Most of the respondents were predominantly local, Chinese (72%), Indian (17%) and Malay (11%).

Table 2: Distance of location by visits

Location of workplace	Visit	Do not visit
Level 10- 11 th	9.3%	4.1%
Level 12 th - 15 th	49.7%	42.1%
Level 16 th – 20 th	23.0%	46.9%
Level 21 st	18.0%	6.9%

Number of visit was analyzed to see if it is influenced by the distant of workplace to the landscape gardens (Table 2). The findings show that there is significant relationship between location of workplace and number of visits ($\chi^2=24.06$, $df= 3$, $p<. 001$). The visit to landscape

garden are influenced by the distance of the workplace to the gardens. This is supported by findings from Stigdotter and Grahn (2004b) that concludes the farther the park is from home, the fewer and shorter are park visits.

Stigdotter and Grahn (2004b) argued that the more often and longer a person visits urban green spaces, the less likely that the person is to suffer from stress. At the Sky Court Garden, the frequency of visit showed that 35% of respondents have visited at least once in a month while 29.5% of the respondents have visited at least once in a week. This is similar with the Balcony Garden where the majority respondents have visited at least once in a month (28.6%) and once in a week (28.6%). However, at the Rooftop Garden; the majority of the respondents only visited the Rooftop Garden only once in a year (32.6%) and 30.2% of the respondents visit only once in six months. In general, the frequency of visit at the Rooftop Garden is lower compared to the Sky Court Garden and the Balcony Garden. Usage of gardens depends largely on the comfort level of an outdoor space. The overall comfort of the respondents at the three landscape gardens were identified by asking respondents their perception of comfort level. This is based on a 5-point Likert scale ranging from very uncomfortable, uncomfortable, slightly comfortable, comfortable, to very comfortable. Most respondents feel comfortable (53.9%) at the Sky Court Garden, slightly comfortable (16.7%) at the Balcony Garden and comfortable (22.5%) at the Rooftop Garden. In general, most of the respondent perceived the gardens as a comfortable space. Despite the fact that the Rooftop Garden is exposed to direct sunlight, very few of the respondents feel uncomfortable or very uncomfortable.

4.2. User's perceptions and preference towards landscape gardens

The purposes of visiting landscape gardens were examined in order to understand user's preferences towards landscape gardens. The respondents were asked according to 5-point Likert scale ranging from not relevant, least relevant, relevant, very relevant to most relevant. The findings show a similar pattern for the three landscape gardens (Figure 1). At the Sky Court Garden, most respondent use the space to rest (79.5%), to get fresh air (77.3%), to enjoy the company of others (70.4%), to go to the gym (64.8%) and to enjoy the landscape (64.8%). Similarly, at the Balcony Garden, most respondent visit the space to rest (73.5%), to get fresh air (70.6%) and to chat (58.8%). The trend is repeated at the Rooftop Garden, where most respondent visit the space to get fresh air (81.4%), to enjoy the landscape (76.8%), to rest (72.1%) and to enjoy the company of others (69.8%). This can be seen clearly that although the design of the three landscape gardens vary from each other, people still use the gardens for the same purpose. Among the purpose of visiting gardens that have lower votes were *'to do work'* and *'to have meal'*, which are not quite practical due to the comfort level and facilities provided. Another study conducted on a high-rise residential building by Yuen and Wong (2005) found that; respondent who lives away from the gardens roof ranks high on the purpose of visiting a garden: *to find peace and quite*. As for those who lived near the gardens, *'to get some exercise'* presented the main purpose for visiting roof garden. Respondents become attracted to the affordance of opportunities for physical activity and usage of facility provided. In this context, roof garden *is a place to go rather than a place to get away from*. The close proximity of facility makes it convenient for those living near roof

gardens. It is seen as a place for recreation, also a setting for social and physical activity. This emphasized the importance of having gardens that is functional and well equipped with facilities.

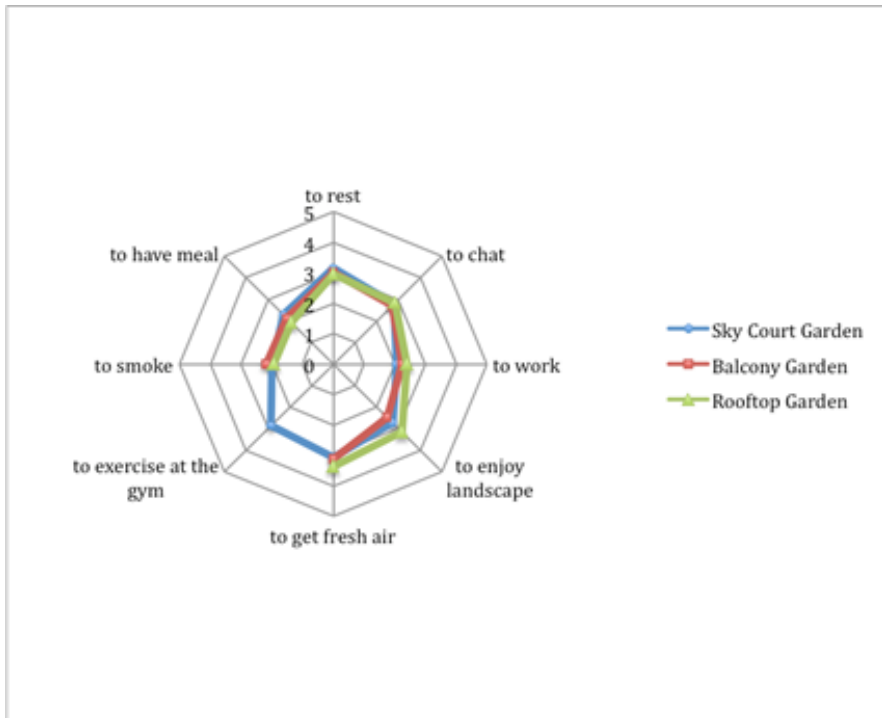


Figure 1: Purpose of visiting landscape gardens

An analysis of general perception of respondents towards the provision of garden in high-rise office shows an overwhelming support from building's occupants. The majority of 96% respondents feel that garden should be incorporated in an office building. User's preference towards landscape gardens were further analyzed based on 7-point Likert scales ranging from "totally agree to totally disagree" (Figure 2). Most respondents agreed that garden in an office building is a space to reduce stress (86.9%). Majority of the respondents also agreed that garden in an office building improves mood for work (78.8%). When respondents were asked if they generate a lot of new and creative ideas while being in the garden, 55.6% of the respondents agreed. It was reported that 65.7% of the respondents feel that garden is a therapeutic place to be in. In addition, 75.8% of the respondents agreed that nature sound of wind breeze/ cascading water/ bird's chirping in an office building give a pleasant feeling. 66.7% of the respondents disagree with garden in an office building is a waste of money as people do not use the space. However, 41.4% of the respondents also feel that garden in an office building involves a lot of maintenance cost.

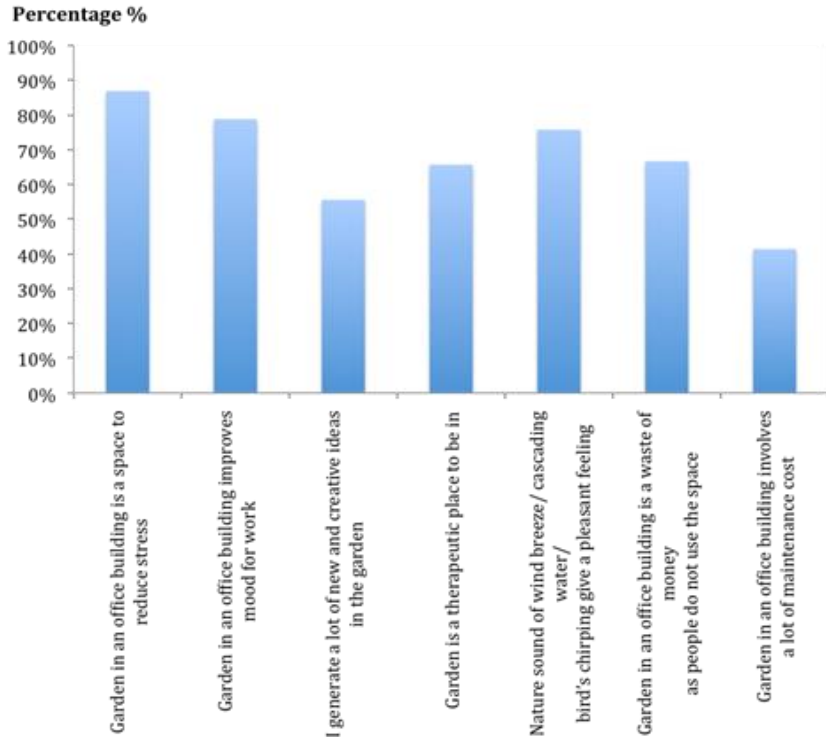


Figure 2: Users' Preferences of landscape gardens

It is important to understand the needs and preference of respondents as to guarantee usage of gardens. A study by Larsen *et al* (1998) agreed that attractive settings positively increased participants' well-being ratings and that the presence of indoor plants increases the comfort and attractiveness of office environments. The respondents were asked to give suggestions and recommendation to improve the garden. The emphasis is on the awareness the existence of gardens and place usage. Fifty percents of the respondents who did not visit the Sky Court Garden recommended that the management to introduce and promote the existing gardens as many do not know of its existence. 25% of the respondents requested that more facilities to be provided such as gym equipments, tables and chairs and vending machines. At the Balcony Garden, 58.3% of the respondents also recommended to put up more signage for promotion purposes. This is followed by 16.7% of the respondents demanded a bigger garden. The size of the Balcony Garden is smaller (67.65 m²) compared to the Sky Court Garden (213.5 m²) and the Rooftop Garden (380 m²). A few respondents also added that the layout could also be improved by proper arrangements of the plantings to allow better viewing. Some also mentioned of the noise from the air conditioning

compressor that they find quite disturbing in the area. At the Rooftop Garden, similar comments were raised by most respondents accounted for 54.5% to promote the garden by distributing flyers and putting up signboard. At least 27% of the respondents suggest more attractions to the gardens. They suggested using the Rooftop Garden for more activities such as coffee area and for exercise routine such as swimming pool. In addition, the respondents also suggest more comfortable seats and tables to replace the current aluminium benches, which may not be practical especially under the hot sun. Some respondents also suggest the seating areas to be covered or shaded to provide comfort for the users.

5.0 Conclusion

This paper describes the results obtained from a questionnaire survey of a high-rise building's occupants on thermal comfort of landscape gardens. The findings show a significant difference between the three landscape gardens; namely the Sky Court Garden, the Balcony Garden and the Rooftop Garden in terms of numbers of visit. Low usage of landscape gardens was due to the lack of awareness of the gardens existence, poor accessibility and the lack of attractions. The number of visits to landscape gardens was not influenced by demographic characteristics of the respondents (age, gender, ethnicity, education level). However, the distance of the respondents' workplaces to landscape gardens has significant relationship with the number of visits. It is critical to understand people's perception of landscape gardens to achieve good design outcome that meet the requirements of users. Although the facilities provided and design of the landscape gardens varies from one another, users still use the space for the same main purpose. The study reveals that usage of gardens are mostly to rest, to get fresh air, to enjoy the company of others as well as to enjoy the landscape provided. This is partly due to the fact that the building has not been fully occupied. A more robust analysis requires a bigger sample size. Secondly, the perception study was conducted during the hottest period of the year (February – March) and therefore generalization can only be made in reference to those periods. The study found an overwhelming preference of garden provision in high-rise office environment. Future studies on evaluating psychological wellbeing should focus on assessing if landscape gardens in such settings help to reduce stress and improve work productivity.

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