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Perception of Green Roof as a Tool for Urban Regeneration in a Commercial Environment: The Secret Garden, Malaysia

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Abstract

Urban dwellers are receiving benefits from the extensive new development of the commercial environment in the city. However, improper planning and rapid developments often result in the destruction of the natural elements and the loss of green space. Therefore, the combination of greenery element with urban structure such as a green roof become a trend in many developing and developed country to solve the problem. However, study on the perception of green roof for urban regeneration is less been investigated in Malaysian context. Thereby, this study aimed to discuss the topic based on a survey from 104 respondents.

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Keywords: Green roof; commercial area; perception; urban regeration

1. Introduction

Extensive research on the perception of landscape was reported in academic writing. As time moving, landscape is evolving where the application is not only on the ground but also on the building's rooftop that known as a green roof. Green roof is defined as a roof covered with vegetation (Study on Green Roof Application in Hong Kong, 2007; Tan & Sia, 2008; Niekerk et al., 2011; The GRO Green Roof Code, 2011). There are two types of green roof, which are extensive and intensive. Commonly, intensive green roof is recognised as a roof garden. According to Rahman et al., (2013), the number of a roof garden in

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Malaysia is higher than the extensive green roof. The study also stated that most of the roof garden was constructed in the urban residential and commercial area. There are various advantages reported in the previous study of green roof which beneficial towards the environment, economic and social. Among the environmental benefits is urban heat island mitigation (Oberndorfer et. al, 2007), decrease air pollution (Currie & Bass, 2008), increase the quality of air through carbon sequestration (Getter et. al, 2006; Yang et al., 2008), and improve the management and quality of storm water (Stovin, 2010). Meanwhile, the economic benefits are increasing property value through aesthetic element and enhance energy savings through effective thermal conductivity (Wong et al., 2003). In term of social benefits, green roof become a refugee oasis and gathering place for recreational activities for urban society (Dunnett and Kingsbury, 2004). Previous studies posits that urban greening such as parks and gardens, urban agriculture and urban forestry has greater influence in ecological, social and economic. However, green area in the city is getting lesser while the city with new building features is increased due to urban sprawling. Thus, create an option for the professional in the construction industry to plant vegetation on the exterior surface of the building that is the roof and wall facade. Both of these innovative greening options are green roof and green wall. Considering all of the benefits of green roof stated previously, it is undoubted that green roof can contribute for urban regeneration in the city, especially in a commercial area. However, the benefits could not be gained if the citizens are lack in terms of green roof awareness and knowledge. Moreover, the incorporation of green roof into building development is not widely received in Malaysia either by professionals or layman. There are few studies investigate on the perception of green roof as reported by (Cañero et al., 2013). Therefore, study on the perception of green roof in the country must be done to investigate the level of awareness among the dwellers in a commercial environment. Regards to this issue, the study is aimed to investigate the perception of green roof as a tool for urban regeneration in a commercial environment. The objective is to ensure the perceptions of a layman are considered and acknowledged by experts in future assessments

1.1. Theory of perception study

Clearly, different people will have a different perception. Perception allows people to criticize, interpret, differentiate and analyzed their surrounding environment based on their intrinsic values in order to adapt with the environment (Villagra Islas & Gastón Vergara, 2012). The study on perception concentrated in many fields such as psychology, environmental issues, human and sustainable development due to its significant contribution towards these fields. Perception is the process of awareness, alert and identification of the process that happens in the surrounding (Goodey, 1971). In fact, many studies indicated that the way people perceived their environment was affected by their demographic factor (Erickson et al., 2002; Kaltenborn & Bjerke, 2002; Gude et al., 2006; Benjamin et al., 2007; Bauer et al., 2009). While according to Zube et al. (1975), perception in the landscape is also influenced by an individual's memory and experiences, background cultural, beliefs and preference. According to the "Biosphere" theory proposed by Bechtel (1987), human perception is influenced by social value and built environment.

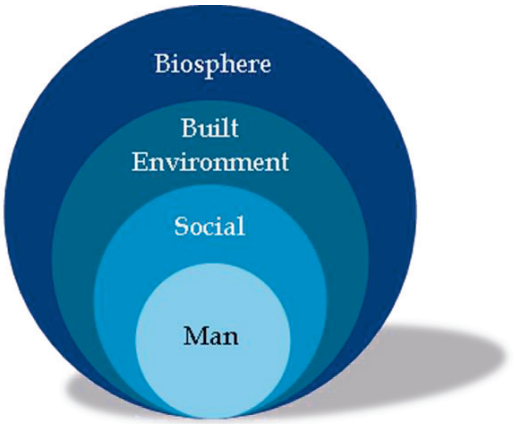

Fig. 1. The relationship between human perception with social value and built environment factor

Sources: Adapted from Bechtel (1987)

In this study, the social value is associated with demographic attributes such as races, age, education, origin and familiarity, culture and attitudes background. Based on the theory, built environment represent the relationship between human and man-made structure. Findings from previous research on perception of landscape indicate that most of the alteration or man-made structures built by human have a strong influence in human perception. In addition, Hernández et al., 2004 posts that alteration also can increase the degree of human preference in landscape.

In the context of 21st century, many alteration works for urbanized development are affecting the loss of space for fundamental landscape design. In addition, the world are facing the degradation of natural elements especially in commercial building development area. Thereby, recent landscape project is designed not only as a place for pleasure and leisure seekers but also to achieve a sustainable development. All of these caused human perceptions towards landscape evolved as well. Therefore, this study is formulated based on the explained theory to identify the perception of green roof among urban dwellers and how does it contribute for urban regeneration in a commercial environment.

1.2. Previous studies on perception of green roof

There is an abundance of published research on perceptions towards the environment (Kaplan, 1987; Kaplan & Herbert, 1987; Kaplan & Kaplan, 1989; Elmendorf et al., 2005; Rosley et al., 2013). The study area is focusing on several types of green environment such as park, rural and urban landscape. While, there are still few numbers of research on perceptions towards environment in details on green roof subject. However, the interest to study on the subject is started to increase recently. Therefore, previous studies done with regards to perception of green roof are review as a reference in this study. Yuen and Wong (2005) reported the residents of a high-rise building in Singapore consumed green roof are gaining demand as the sense of awareness is increasing. Study done by Taib and Abdullah (2012) on user expectations and perceptions of three different sky garden on a 21-storey office building in Penang, Malaysia indicate a similarities on the uses of the garden even the design and facilities provided are different. The findings elaborate that all the three sky gardens are a place to rest and relax. Another study done by Cañero et al. in 2013, investigate public attitudes and preferences of green roof in Southern

Spain. The study revealed that respondents' preferences towards different green roof design are influenced by their background characteristics. While research in Malaysia done by Rahman et al., (2012) and in the north eastern United States by Jeremy et al., (2013) addressed the positive attitudes and aesthetic reactions toward green roof implementation.

1.3. Profiles of study area

Taking into account, one of the shopping complex in Bandar Utama, Kuala Lumpur, Malaysia took their initiative by incorporating a green roof on the building rooftop. Secret Garden is a rooftop garden which located on the seventh level of the building. The name was taken after it was secretly established by a team of renowned botanist lead by Dr. Francis S. P. Ng, five years before it was opened to the public. The roof garden is the South East Asia's largest rooftop garden with 500 species of tropical flora. The size of the rooftop garden is 30,000 sq. ft. and it is located 35 metres above the ground. The shopping complex is the most popular shopping centre in the city.

1.4. Purpose of the study

The purpose of the study is to investigate the sense of awareness on the green roof among the visitors of Secret Garden. There is an enormous body of literature available on public perceptions on environmental issues, strategies and programs; however, little literature is captured on perception's study towards green roof design precisely. Thus, the findings are notable to be discussed as it will show a clear picture of future preference of green roof development in Malaysia commercial area.

2. Method

The findings based on a closed survey of a questionnaire. The survey conducted on 17th June; 14th July and 28th July 2012 as the garden is open to public on every weekend. 104 respondents were approached to answer the questionnaire. Research on the perception is complicated to measure. However, direct approach towards the respondents is one of the valid methods be applied (Shafer, 1969). The aim of the survey is to examine the level of awareness among urbanized societies towards the implication of green roof on the shopping complex. The questionnaire consists of four sections. The first section requires the respondent to fill in their demographic information. The second section is formulated to identify respondent preference for green element in the urbanized area. While the third and four section aimed to investigate the impact of green roof towards the respondents and exposure of green roof in their daily life. The survey questionnaire is limited to a single page; front and back with 13 questions and formatted as multiple choice or open-ended to allow rapid administration (Jungels et al., 2013).

3. Result and Discussion

3.1. Respondents' demographic information

From the survey, most of the respondents are 30 years old and above (35%). Majority of the respondents are female (52%). While most of the respondents are Chinese with 52% of response rate compared to other ethnicities such as Malay (38%), Indian (7 %) and followed by others (4 %). Data of respondents' ethnic is important to acknowledge as different ethnic background has different culture and interpretation value towards nature. From the finding, most of the Chinese respondents are living in the city high rise. Therefore, most of them love to spend their time in the garden as they felt closed with the

nature ambience. Meanwhile, the majority of Malay respondents are living in sub-urban area where they have greenery element closed to them. However, they are aware of the shopping complex because they are working in the city.

Table 1. Respondents' demographic information

Information	Response rate (%)
Age	
15 – 20 years old	30
21 – 25 years old	21
26 – 30 years old	11
30 years old and above	35
Others	4
Gender	
Male	48
Female	52
Ethnic	
Malay	38
Chinese	52
India	7
Others	4

From the survey, only 71% of the respondents stated their educational level. Most of the visitors during the survey was conducted are a degree holder (46%) followed by diploma holder (22 %), and the smallest group of respondent is visitors with UPSR certificate (3%). Information on educational background is important as the researcher could understand their level of understanding and exposure on green roof design. Thus, researcher can detect the level of awareness upon green roof among the respondents.

Table 2. Respondents' level of education

Level of education	Response rate (%)
Ujian Penilaian Sekolah Rendah (UPSR)	3
Penilaian Menengah Rendah (PMR)	10
Sijil Pelajaran Malaysia, SPM	19
Diploma	22
Degree	46

The study analysis showed that majority of the respondents with degree and diploma are familiar about green roof, and they are aware of the benefits and functions of a green roof. The reason might due to some of them are exposed to green roof since their study in an educational institution and also through books and articles reading. While respondents of SPM holder know about green roof and the advantages moderately. This situation is due to unintentional exposure on the green roof through mass media such as television showcase and internet. Majority of the respondents with PMR and UPSR qualification visits

the rooftop garden due to its beauty and peace value without an understanding of green roof environmental and social benefits. The reason behind it is due to their young age and lack of exposure. Moreover, most of the Malaysian green roof projects are for private residential area (Rahman et. al, 2013). From the finding, it is clearly stated that respondents with a higher level of education are more aware on the benefits of green roof rather than the aesthetical value only. However, if the number of green roof design is increase for the public in the future, the understanding and sense of awareness about the system and preference for green element can nurture among the residents in the commercial environment without being affected by the difference in educational background.

3.2. Preference for green element

There are multiple choices of answers in this section. Respondents' intention of visiting a shopping mall is investigated by reorder the answers according to what they feel suit to them. Results of the survey indicate that most of the respondents came to the shopping mall for shopping while at the same time visiting the rooftop garden (47%). The purpose of this question is to allow the researcher to investigate the role of the garden- either it being able to attract for respondents to come to the shopping complex. Researcher also had the opportunity to interview some of the workers of the retail in the shopping complex on their preference to visits the rooftop garden during break and after working hour. There is almost none of the respondents prefer to visit the rooftop garden during break hour due to some identified constraints. The first constraint is due to their short break time. Their activities are pack during that short period such as to lunch and perform prayer for Muslims. Moreover, as the rooftop garden is far from their shop lot it will be a wasteful for them to spend their leisure time within the compound. In addition, their work finishes at exact time with the rooftop garden closing time. In this case, the rooftop garden has a restricted opening and closing time which causes most of the visitors is not able to visit it for the whole day. It is only open to the public on the weekend. Thus, discourage the respondents to choose the rooftop garden as their hang out spot during break and after working hour.

The finding is contra with the studies conducted in the Western countries. Most of the rooftop garden in a commercial area is not being designed purposely as an aesthetical asset nevertheless to be functional as a leisure spot for the workers to spend their time during break hour. The reason might due to the different level in the sense of appreciation influence by the different condition of commercial setting. As in the developed country, urban sprawl is ongoing and getting compacted with structures and lack of greenery. Therefore, the limited access to greenery tend to cause the residents to appreciate more natural element in the city. In fact, many of them are fond to hang out at green roofs regularly as these spaces served as their sanctuary from hustle and bustle of the city.

Table 3. Reason of coming to the shopping complex

Reason	Response rate (%)
For shopping only	25
To visits rooftop garden only	28
For shopping and visiting the rooftop garden	47

In reference to Table 3 above, majority of the respondents visit the rooftop garden for the first time during the day of the survey being conducted (51%). The reason is that they did not notice the existence of the garden as the shopping complex is immense with over five million sq. ft., and the location of Secret Garden is on top of the building. Moreover, the rooftop garden is also not visible from the street level.

Therefore, it is suggested that future green roof design in Malaysia commercial area are visible from street level for promotional purpose and to attract visitors. Based on the findings, most of the respondents agree that visiting the rooftop garden helps in reconciling their mind (28%). While several respondents (4%) visits the garden to relax, hang out with friends, and some are followed by curiosity to know how about the garden.

Table 4. Reason of visiting the rooftop garden

Reason	Response rate (%)
Attracted to its beauty	25
Helps in reconcile mind	28
Feel closed with nature	27
Environmental learning	16
Others	4

3.2. Impact of green roofs towards the respondents

In this section, the findings are consistent with almost all of the respondents (99%) feel calm and relax while strolling at the rooftop garden. 96% of the respondents feel very closed with nature as they spend their leisure time at the rooftop garden. The findings are similar with the previous research done by Ulrich in 1985 where the presence of nature has a positive impact on human behaviour. Moreover, this finding is a supporting evidence of previous studies done by Health Council of The Netherlands in 2004, which demonstrate the restoration from stress and mental fatigue when getting contact with nature.

3.3. Exposure of green roof

In this section, respondents were asked upon their opinion whether they agree if the number of green roofs is increase in Malaysia. From the survey, 95% of the respondent agree. While, 92% of the respondents interested to have their green roof on their house building. The most striking answer is because they found that the green roof is a new dimension of private garden that do not require them to find space on the ground to have their green area. Data from analysis show that most of the respondents believe that they live in a better environment by being closed with greenery even if it is a stimulated green setting. Green roof can be considered as stimulated green setting as the design is a mimicry of a ground garden. The findings linked with biophilia theory introduced by Edward Wilson in 1984 where human needs to be connected with nature on mental, physical and social levels in their life even through a stimulated nature setting to make they feel better. The biophilia theory is relevant to link with the findings even though the time gap is very huge, and the living pattern is changes. The reason is that the theory explained a strong relationship between man and nature. Moreover, as stated in Quran, the relationship of man and nature exist since the first man, Adam and his wife, Eve created. Allah removed Adam and Eve from the paradise after they ate the fruits of the forbidden tree. Then, after they arrived on earth, they using plant leave to cover their naked body. Thus, this evidence prove that it is not surprising if a man felt connected with nature even though they are living in an urbanized area especially in the commercial environment. Meanwhile, most of the negative response linked with an aspect of maintenance. Respondents stated that they were afraid if they do not afford to pay for the maintenance cost. The reason might due to the expensive cost if the installed green roof is not successfully performing. The failure may cause by the improper planning on the technical aspect of green roof installation.

4. Conclusion

This paper presents the data obtained from a survey conducted on the visitors of Secret Garden in the urbanized area of Malaysia capital city, Kuala Lumpur. This study set out to determine the level of awareness on green roof development in Malaysia among the urban resident in the commercial environment. The most prominent finding to emerge from this study is that almost all of the respondents are aware upon the development of green roof in Malaysia. The evidence from this study suggests that having greenery element such as a green roof helps in regenerate and revitalize the commercial setting in urbanized area. Green roof agreed as a retreat place for peace. The implementation of green roof allows urban citizen to gain psychological and health benefits through visual and sensory. Moreover, the visual quality of the city skyline also can be improved with green roof design. Therefore, it is undeniable that green roof is a new platform in the city to enhance urban regeneration. The present study confirms previous findings on the positive benefits of human preference on natural elements for better living environment. This study also contributes additional evidence that suggests increasing number of green roof projects in the commercial environment around the country. However, limitation to this study need to be acknowledged. The findings of this study linked with only one type of commercial building that is shopping complex. The results may vary for another type of commercial building such as office building. With regards to this, future research on the perception of green roof on the other type of commercial building must be intensified. These findings would help to establish a greater degree of accuracy on the effect of green roof towards building occupants, level of understanding and sense of awareness. Hopefully, through this approach the environment of the commercial area in Malaysia is envisioned to be sustained in many years onward.

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