FACTORS AFFECTING ROOF GARDEN DESIGN IN THE PLANNING AND DESIGN OF HOSPITAL BUILDING

BY

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ABSTRACT

This research focuses the factors affecting the implementation of roof gardens in the processes of planning and design of hospital building that would contribute to the quality improvement of future design of roof gardens. The premise of study is to review, identify and establish the significant relationships between the roof gardens and the healing environment in hospital buildings. At the outset, an overview of hospital development, principles of design and ways to achieve hospital roof gardens design that would enhance healing in hospital patients were reviewed. The physical factors affecting the planning and design of roof gardens in creating a healing environment of hospital buildings were identified and classified into three categories: design, climate and construction. The impacts and significance of roof gardens on the environment, economics, and humans (staff and patients) in hospital buildings were also discussed. The methodology employed in this study includes both qualitative and quantitative approaches. A questionnaire survey was developed and distributed to 86 respondents (patients and medical staff) randomly selected from Serdang Hospital to measure the visibility, accessibility, availability, and satisfaction of hospital roof gardens and its relation to the healing process. Field observations were also conducted in the study. The study successfully identified the key factors to be addressed and considered to enhance the design and planning for future hospital roof gardens that include (1) location, accessibility and visibility, (2) comfortability and familiarity, (3) safety and security, (4) senses stimulation, and (5) service and maintenance. The preliminary findings conclude that there is a significant positive relationship between hospital roof gardens and the patients' healing process. The study highlighted that the need for future healthcare designers to collaborate with multi-disciplinary teams in the integration of roof gardens in the planning and design of hospital building in order to improve the quality of healing environment.

خلاصة البحث

يركز هذا البحث على العوامل التي تؤثر على تنفيذ حدائق الأسقف في عمليات تخطيط وتصميم مبنى المستشفى والتي من شأنها أن تسهم في تحسين جودة التصميم المستقبلي للحدائق على الأسطح. إن أساس الدراسة هو مراجعة وتحديد وإقامة العلاقات الهامة بين حدائق السطح والبيئة العلاجية في المستشفيات. في البداية، تم استعراض لمحة عامة عن تطوير المستشفى، ومبادئ التصميم وطرق تحقيق تصميم حدائق الأسقف التي من شأنها تعزيز الشفاء للمرضى في المستشفيات. تم تحديد العوامل التي تؤثر على تخطيط وتصميم حدائق الأسقف في خلق بيئة علاجية في المستشفيات وتصنيفها إلى ثلاث فئات: التصميم والمناخ والبناء. كما تمت مناقشة تأثير وأهمية حدائق الأسقف على البيئة والاقتصاد والبشر (الموظفين والمرضى) في المستشفيات. المنهجية المستخدمة في هذه الدراسة تشمل كلا النهج النوعي والكمي. تم إعداد استبيان تم توزيعه على 86 مستجيب (مرضى وموظفين طبيين) تم اختيارهم عشوائياً من مستشفى سيردانغ لقياس إمكانية الرؤية، وإمكانية الوصول، والتوافر، ورضاء لحدائق السطح بالمشفى محل الدراسة وعلاقتها بعملية الشفاء. وقد أجريت أيضا ملاحظات ميدانية في الدراسة. وقد نجحت الدراسة في تحديد العوامل الرئيسية التي ينبغي معالجتها والنظر فيها لتعزيز تصميم وتخطيط حدائق أسقف المستشفيات المستقبلية التي تشمل (1) الموقع وإمكانية الوصول والرؤية، (2) سهولة الاستخدام، (3) السلامة والأمن، (4) يستشعر التحفيز، و (5) الخدمة والصيانة. وتخلص النتائج الأولية إلى وجود علاقة إيجابية كبيرة بين حدائق أسطح المستشفيات وعملية الشفاء لدى المرضى. وأبرزت الدراسة أن الحاجة إلى مصممي الرعاية الصحية في المستقبل للتعاون مع فرق متعددة التخصصات في دمج حدائق السطح في تخطيط وتصميم مبنى المستشفى من أجل تحسين نوعية بيئة الشفاء.

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Science (Built Environment)

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DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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Firstly, it is my utmost pleasure to dedicate this work to my dear parents and my family, who granted me the gift of their unwavering belief in my ability to accomplish this goal: thank you for your support and patience.

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INTRODUCTION

1.1 INTRODUCTION

The quality of the buildings, in terms of physical planning and design, has significant influence, contributing to the quality of human life and well-being (Madanipour, 2010). Historically, gardens were recognized as meditation spots and healing hubs. Being around plants, in a garden has been intrinsically recognized to have good effect to human well-being (Barmelgy, 2013). With the ever-growing demand of population in the cities, a decline in green areas has been visible leading to negative effects on the environment. As a result, the benefits of being around the gardens and green areas are undeniable.

Gardens and paradises are often described as sacred and beautiful places in the teachings of many religions. From the Islamic perspective, running water, shade and exquisite greenery are mentioned in the Holy Quran as the main elements for physical and spiritual refreshment. In the Holy Quran, the word garden is referred to paradise as Jannat. Janata Firdaus is mentioned more than 120 times in the Holy Quran as an indication of relaxing, blissful and everlasting place also; it is viewed as a retreat, a refuge or a comfortable sanctuary for khalwa (Clark, 2011). In the Quran, a phrase that translates to “a garden with running rivers flowing underneath it” or jannatun Tajiri men tahtiha Aalanihar was used in the Holy Quran several times. On a deeper level, it symbolizes the purification of the soul with ever-flowing “waters” of the spirit. The use of water as a symbol of purification is used in several sacred traditions (Gilli, 2002).

An architectural example of that is the use of water in Alhambra palaces in Spain (Bennis, 2006). Built during the Islamic Andalusian era, the architecture responsible for designing the palace, used water to represent the gardens of paradise by building the Palace in a manner that would allow it to be reflected in the water fountain positioned opposite of it to symbolize the eternal hereafter. This palace is considered to be one of the most prominent representations of the gardens of paradise in the world.

The design and planning of hospital buildings dating to the Islamic civilizations had been contributed greatly to promote the concept of healing in healthcare facilities. The Islamic civilization stands out with its concern for the wellbeing of ones' body and soul. Both aspects of humans are considered equally important. The well-being of the body was viewed as necessary to elevate ones' quality of life. Prophet Mohammad, (peace be upon him) says in a hadith; "Your body has a right on you" (Bukhari, n.d.). In Islam, Muslims are required to fight the spread of disease and are urged to seek medical help when needed. Furthermore, the health system in the Islamic civilization is built on strong foundations (Ali, 2013).

Nowadays, approaches in research methodologies are being directed to the findings on health and the well-being of individuals. Researches in the field of built environment have been focusing on the impacts of gardens on human health and well-being. Therefore, there is growing research documenting the health benefits associated with gardens. These include reducing stress and improved health outcomes by having access to the garden or even having a view of the garden. Most researches in the field of healing environment have agreed that gardens and horticultural therapy are viable factors for healing (Schweitzer, Gilpin, & Frampton, 2004). Healing landscapes have become increasingly viable fields of research. Gardens in hospital designs appear tobe

an appropriate strategy to achieve healing environments for patients, staff and visitors. Roof garden is considered as one of the practical ways for the implementation of gardens in hospital.

Thus, this study tends to focus on the integrations of roof garden design in the design and planning of hospital buildings in Malaysian context. What would be the factors affecting the integrations of roof gardens in the development of hospital buildings in Malaysia.

1.2 RESEARCH BACKGROUND

In the past, gardens used to be considered as an integral part of the healthcare facility. The gardens are used as a place for meditation and healing (Barmelgy, 2013). However, due to economic constraints, having gardens in the design of hospital buildings during the early 20th Century, were given less priority resulting the inability of patients to experience the benefits of being close to nature (Nedu & Krklješ, 2010). Until mid of the 20th-century researchers in quantifying, tried to understand and document the health effects of plants and highlighted the natural health service became especially important around healthcare and considered outdoor spaces as part of the healing facilities (Relf, 2005).

The integrated and developed design and planning of healthcare buildings are now more focused on patients' needs and satisfactions concerning the effects of the built environment, treatments and services on their health outcomes (Petros, 2011). This would shift the focus of hospital design and planning from a sterile to an environment that promotes healing. As a result, creating a healing environment should be the aim in the design and planning of hospital building with the attention providing the end-users (patients, staff and visitors) access to gardens. That is a paradigm shift

ofattitudes towards a comprehensive approach of patients' health and well-being resulted in a considerable rise in interest of facilities (Nizarudin, 2012).

Hospitals are considered as a complex integral part of the healthcare industry. This complexity due to the variation of services that the hospital provides for its users, where patients seek out medical treatment and staff deliver continuous support (Aripin, 2006). Quality interventions have given new insight and scope for improvements, not only the services of the hospitals but also to make the great structure. Most healthcare designers accept the fact that hospital design is a complex task: functional and psychological alike (Hussain & Babalghith, 2014).

Thus, the aspects of healing environment in hospital design are primarily important and relevant within the context of sustainability in healthcare facilities to conceive the link and benefit of sustainability in contributing to the patients' health outcomes. The physical aspects such as daylighting, window design, and thermal conditions and etcetera, should be cleverly designed to achieve the balance and the principles of economic, social and ecological sustainability without compromising the functionality of hospital building so as to make the patient and employee friendly (Aripin, 2007).

Now with the cites becoming bigger and green areas have been eroding, most hospital share limited land areas which opens the door for the healthcare designer creativity to obtain the best usability for the area design (El Barmelgy, 2013). As a result, designing rooftops garden to be as part of hospitals facilities and to have a therapeutic function to give awareness of the positive influences of outdoor environment on patients' healing process have been presented in hospital design (Said, 2003a).

However, the application of green roofs in Malaysia is still infrequent whereby only a few buildings in Malaysia have adopted green roofs. Malaysian construction industry has realized that besides being aesthetically pleasing, application of green roofs provides numerous environmental, technical and owner benefits (Zahir, Raman, Mohamed, Jamiland, & Nopiah, 2014). For instance, green roofs mitigate Urban Heat Island by cooling and humidifying the surrounding air, creating a microclimate which has beneficial effects within the immediate area (Ismail, Aziz, Nasir, & Taib, 2012). For the technical benefit, green roofs also reduce stormwater run, improve the thermal resistance of the roof throughout the year and reduce noise levels especially for buildings near airports, factories or busy freeways (Hashemi, Mahmud, & Ashraf, 2015).

1.3 STATEMENT OF THE PROBLEM

The research problem identified in this research remains in the scarce of applying the roof gardens in hospital building in Malaysia. The preliminary finding indicates that there is a limited roof garden being adopted in the design and planning of hospital buildings in Malaysia.

As noted by Anna, Heylighen, Susanna and Marie (2017), Architecture to promote health and well-being is now considered as an important part of creating a health service of high quality. Developments in methodology put high demands on the design quality of care environments (Bromley, 2012) coupled with increasing expectations and demands from patients and staff that the environments should be person centered, welcoming, and accessible while also supporting privacy and security (Vischer, 2008; Volker, Lauche, Heintz, and de Jonge, 2008).

In addition, there are demands that decisions about the design of the hospital building be based on the best available information from credible research and evaluations of existing building projects (Ulrich, Berry, Quan, and Parish, 2010). Evidence-based design is now an established concept as an approach for quality improvements in the design process of new hospital building (Anna, Heylighen, Susanna and Marie, 2017). Consequently, it is essential to develop a clear conceptual framework to enable communication and operationalization of what good design stands for and how it can contribute to results in hospital, rather than relying solely on subjective values about quality. Hence, the concept of design quality has never been so important to emphasize as today. In this study, the concept of design quality in relation to hospital building was explored. Also, this study presents a taxonomy based on a scoping review that illustrates the wide range of terms used in connection with design qualityof hospital environments.

Previous research has implicitly indicated what good design is and how it can be measured. High-quality physical environments can be a therapeutic resource for promoting health and well-being (Gesler, Bell, Curtis, Hubbard, and Francis, 2004) and as support for the care and treatment of patients (Bromley, 2012; Huisman, Morales, van Hoof, and Kort, 2012; Janssen et al., 2014). A well-designed environment with a higher degree of exposure to daylight was found to reduce depression and the treatment time for depressed patients (Benedetti, Colombo, Barbini, Campori, & Smeraldi, 2001). Patients visually exposed to actual or simulated nature may experience relief from pain and have a lower intake of pain-reducing drugs (Malenbaum, Keefe, Williams, Ulrich, and Somers, 2008).

Currently, the physical environment is also considered as an integral part of person- centered care defined as thermal comfort, acoustic comfort, and visual