

VERTICAL NEIGHBORHOOD THE EMPOWERMENT OF GREENERY
TOWARDS HEALTHY LIVING FOR M40 GROUP OF JOHOREAN

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DEDICATION

To my beloved parents, siblings, best friends and everyone who has helped me throughout the process with love always and forever.

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ABSTRACT

Growing plants on the vertical surfaces is called vertical greenery systems. These systems have been recognized to mitigate some problems such as air, water and noise pollutions, urban heat island, and consequently global warming. Vertical greenery systems are divided into two categories, i.e., green facades and living walls. In this study, the aim is to design a lively and functionally quality environment vertical neighbourhood through the application of vertical green in the living context. The study leads to understand architecture as a tool for empowering greenery in the living environment. The objectives in this study are to provide environmentally friendly service apartments for M40 group of Johorean, integrating the green element in relation to creating green communities and improving green design strategy that provide sense of place in living context. Hence, the data collected from various source is analysed and synthesised in order to complement the objectives. This study believes that greenery can cultivate a sense of healing in the living environment by implementing the design initiative and achieving a conducive vertical neighbourhood for M40 group of Johorean.

ABSTRAK

Penanaman tumbuh-tumbuhan di permukaan yang menegak dipanggil sistem penghijauan menegak. Sistem ini telah dikenalpasti sebagai cara yang dapat mengatasi pelbagai masalah, seperti pencemaran udara, air dan bunyi, pulau haba bandar, dan secara langsung mengurangkan masalah pemanasan global. Sistem penghijauan menegak dibahagikan kepada dua kategori iaitu fasad hijau dan juga dinding hidup. Dalam kajian ini, tujuan kajian adalah untuk mereka bentuk kejiranan menegak dengan persekitaran yang kondusif dan berkualiti yang berfungsi melalui penerapan hijau menegak dalam konteks kehidupan. Kajian ini juga mendorong ke arah pemahaman senibina sebagai alat memperkasa tumbuh-tumbuhan di persekitaran kehidupan. Objektif dalam kajian ini adalah untuk menyediakan pangsapuri perkhidmatan mesra alam untuk kumpulan M40 rakyat Johor, menghubungkan elemen hijau dengan mewujudkan komuniti hijau dan menambah baik strategi reka bentuk hijau yang memberikan rasa tempat dalam konteks kehidupan. Oleh itu, segala data yang terkumpul melalui pelbagai sumber akan dianalisa agar dapat mencapai objektif tersebut. Kajian ini juga percaya pada kebolehan tumbuh-tumbuhan memupuk sentimen pemulihan dalam konteks penempatan melalui pelaksanaan inisiatif rekabentuk yang diperoleh dan akhir sekali berjaya membentuk suasana kondusif di rumah persaraan untuk kalangan M40 rakyat Johor.

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LIST OF ABBREVIATIONS

UTM - Universiti Teknologi Malaysia

LIST OF SYMBOLS

%	-	Percentage
oC	-	Celcius
oN	-	North
oS	-	South
m/s	-	Metre per second

CHAPTER 1

INTRODUCTION

1.1 Background Study

Green spaces are such an important feature of urban developments, enhancing the quality of life within a community, even from a social point of view – providing residents with a place for stress relief and interaction – and from a disease prevention perspective – achieving better air quality while also encouraging residents to spend longer outside. The significance among those areas within such a settlement grows even more in today's context, where the constant expansion of cities in their surrounding territory, known as "urban sprawl," steadily eradicates natural green areas and agricultural terrains from our landscape. This pattern is having a devastating effect on the environment and also the microclimate of our settlements, which has been characterised in past years by the creation of urban heat island within the constructed. Furthermore, the elimination of natural green spaces leads to a continuous estrangement of residents, particularly young millennia, from fundamental values and complexities. As a result, it is much more essential than ever to ensure that our cities have an adequate percentage of green areas that are evenly distributed throughout the urban tissue. Green belts, urban forests, parks, green squares, and even urban gardens all play roles in the urban green network, each with its own radius of impact and attraction and thus inhabiting a particular location in the urban hierarchy.

1.2 Problem Statement

In relation to past ages, modern life has improved human life style. Cultured life expedites urban sprawl and reaffirms urban areas. This new human life style has resulted in rapid city growth, population growth, and increased vehicle usage. These create new problems, such as air, water, and noise pollution (Van Renterghem and Botteldooren, 2009), which prompt researchers to devise new solutions or reduce their impact on human life.

Numerous solutions have been raised. Noise barriers were suggested to reduce noise pollution, but it does not applicable in all areas especially city centres and suburban areas (Van Renterghem and Botteldooren, 2009). Facade insulation also have been recommended by researchers to reduce noise pollution and although it is a good answer, it is not sufficient (Van Renterghem and Botteldooren, 2009).

Air pollution is a significant issue caused by urbanisation. Because of high levels of toxics in the air, air pollution contributes to a variety of problems, including illnesses (Rita et al., 2012). (Bianchini and Hewage, 2012). The primary source of carbon dioxide emissions is energy production, which probably contributed to warming and, as a result, climatic changes (Miller, 2008). Air-conditioning systems are among the major energy consumers in buildings, leading to the rise in energy consumption. Figure 1.1 represents the direct and indirect consequences of rapid population growth and immigration to cities.

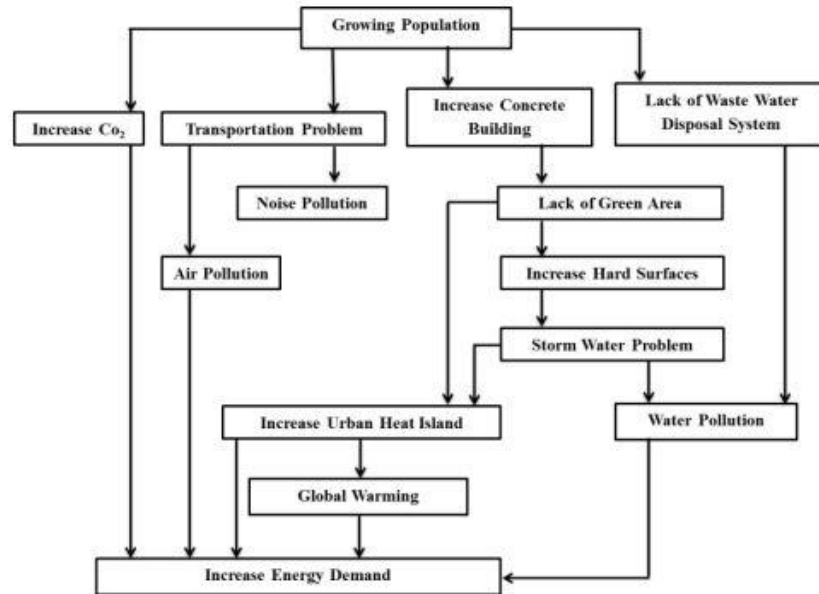


Figure 1 Problems are caused by a rapid urbanisation (Nyambod, 2010)

As described in Fig 1.1, all of the issues mentioned eventually lead to an increase in energy consumption, which is especially noticeable in countries with hot and humid climates including Malaysia. The most severe climatic issues are high air temperature and relative humidity, which affect inside buildings and create an uncomfortable indoor environmental quality. Furthermore, climatic issues, rapid urbanisation, and rapid population growth in Malaysia change people's needs and aesthetic senses, having an impact on architecture and land use (Kubota and Ahmad, 2005). Humans devastate the land in order to find natural resources or to obtain timber by destroying forests. They also convert virgin beaches into tourist resorts (Malaysia, 1992). Rapid urbanisation and its disadvantages contribute to climate change, which has unfavourable effects on the Malaysian economy (Al-Amin et al., 2013). In tropical countries, the primary energy consumer is air-conditioning systems, that also represent the majority of total building energy consumption in commercial buildings (Nyuk Hien Wong, 2009). In Malaysia, energy consumption increased by 34% between 2005 and 2010 (Kwong et al., 2014), and previous studies show that air-conditioning systems have a significant potential to reduce total building energy consumption (Habeebullah, 2007).

According to Ken Yeang (2000), ventilation, heating, and air conditioning consume more than 75% of energy. In office buildings, for example, 57 percent of energy is used for air conditioning demand, which is enormous when compared to other energy users such as lighting (19 percent), lift and pumps (18 percent), and other equipment (6 percent) (Saidur, 2009). Furthermore, the indoor air temperature in many Malaysian office buildings is so low that occupants wear sweaters, despite the fact that the outdoor air temperature is about 40C above the comfort range (Huat and Akasah, 2011). More over economic problems populated cities in Malaysia like Kuala Lumpur, Pulau Pinang and Johor Bahru have different problems such as air pollution, urban heat island, high energy demand and limitation in greenery in urban areas (Rahman et al., 2013). For future developments attention to sustainability is undeniable (Rashid, 2012). Different scholars are investigating the green revolution by using green technology to reduce global warming effect (Rahman et al., 2013). One important step to green revolution is reduction in fossil energy demand. The buildings that can reduce fossil energy dependence are energy-efficient buildings and one example of them in Malaysia is Malaysia Green Technology Corporation office building that known as Malaysia Energy Centre (PTM) (Huat and Akasah, 2011).

This building's design is based on Zero Energy Building (ZEB). Green building is a subset of green technology (Rahman et al., 2013), and green roofs, vertical 4 greenery systems, green balconies, green courtyards, and other examples of combining greenery and buildings in urban approaches to improve green building and develop sustainable green cities are some examples. Climatic elements such as solar radiation, high rates of humidity, and rainfalls are ideal for plant growth and are available in tropical countries with hot and humid climates such as Malaysia. Planting vegetation on unutilized interfaces of buildings, such as roof tops and building walls, in the form of green roofs or vertical greenery systems, can alleviate the scarcity of free land and the high cost of land in densely populated cities. As a result, vertical greenery systems are an important and cost-effective method of protecting buildings and structures from extreme solar radiation and, as a result, lowering the temperature of buildings and cities. It is critical to locate vertical greenery systems on building walls if these systems are to be used for temperature reduction. Greenery systems in inconvenient locations can act as a buffer, trapping air inside buildings. This condition causes the insides of buildings to warm up, causing air temperatures to rise.

1.3 Research Aim

This paper aimed to design a lively and functionally quality environment vertical neighbourhood through the application of vertical green in the living context.

1.4 Research Questions

These are the three main questions of the research:

- i. What is the service apartment needs for M40 group of Johorean?
- ii. How to create green communities in order to creating green communities?
- iii. How sense of place in living context helps in formation of green design strategy?

1.5 Research Objectives

This research aimed to design a lively and functionally quality environment vertical neighbourhood through the application of vertical green in the living context. Moreover, cavity distance is considered as an effective parameter in greenery system efficiency. The research objectives are as below:

- i. To provide environmental-friendly service apartments for M40 group of Johorean.
- ii. To integrate the green element in relation to creating green communities.
- iii. To improve green design strategy that provide sense of place in living context.

1.6 Rationale of the study

This research concentrates on the use of vertical green spaces and their suitability for implementation in the Johorean M40 group's living context. Aside from that, the study used a collective literature review to highlight the importance of green implementation in cultivating a healing environment. As a result, the study intends to serve as a potential guideline to demonstrate a sustainable retirement hub toward better community living experiences in the city center context.

1.7 Research methodology

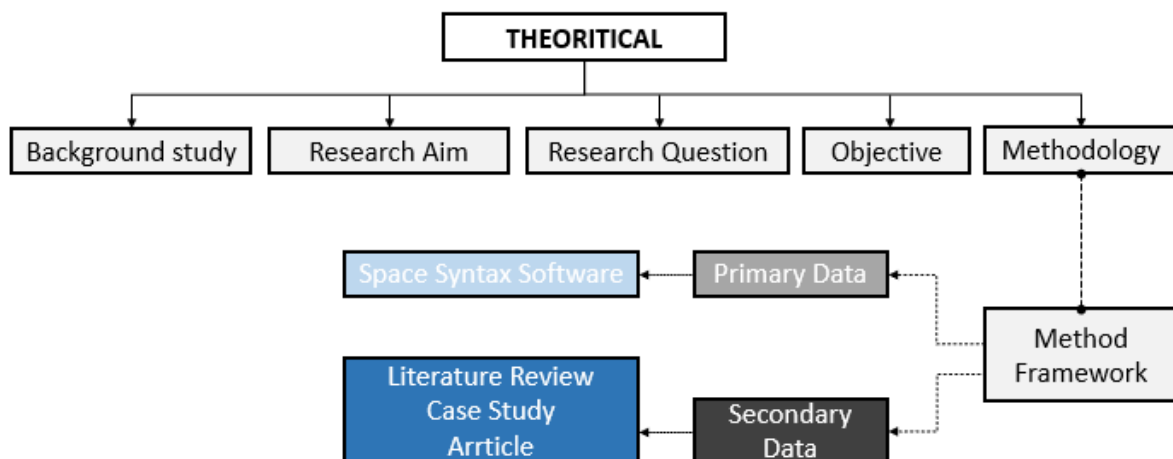


Figure 2 Research framework

To fully understand vertical greeneries application and its implementation for the community, this project will employ Space Syntax analysis software as a primary data gathering method, backed by a secondary qualitative approach through a literature analysis and case studies. An integrated environmental consideration with the completeness of social and economic sustainability will be undertaken utilizing a quantitative method in conjunction with design simulation using. The study objectives as previously indicated will be addressed by the data analysis and synthesis. More details on the methodology's framework are provided in Chapter 3.

1.8 Structure of thesis

1. Chapter 1

This chapter will concentrate on the study's outline, which will include the background study, problem statement, aim, objectives, research questions, rationale of the thesis, introduction to the research methodology, and overall structure of the thesis.

2. Chapter 2

This chapter will go over the study's literature review. The background study of the research topic and the significance of the research will be included in the literature review.

3. Chapter 3

This chapter builds on the introduction in Chapter 1 by further discuss the methodology used in this study, such as the data collection process and the method used to analyses the design simulation. As a result, this chapter provides the research paradigm and procedure, as well as the overall research framework.

4. Chapter 4

This chapter will deal with the collection and analysis of data from selected case studies and questionnaires to support the study. As a result, the data will be presented using illustrations, diagrams, tables, and images. Following that, the data will be thoroughly discussed in relation to case studies in order to extract the theories, strategies, and approaches implied in this study. Last but not least, the analysis data will be further synthesized before being used to propose possible approaches and strategies to achieve the research's objectives.

5. Chapter 5

This chapter will summarize the research and highlight the study's significance. Furthermore, this chapter will discuss the study's limitations as well as its potential for further development.

1.9 Theoretical Framework

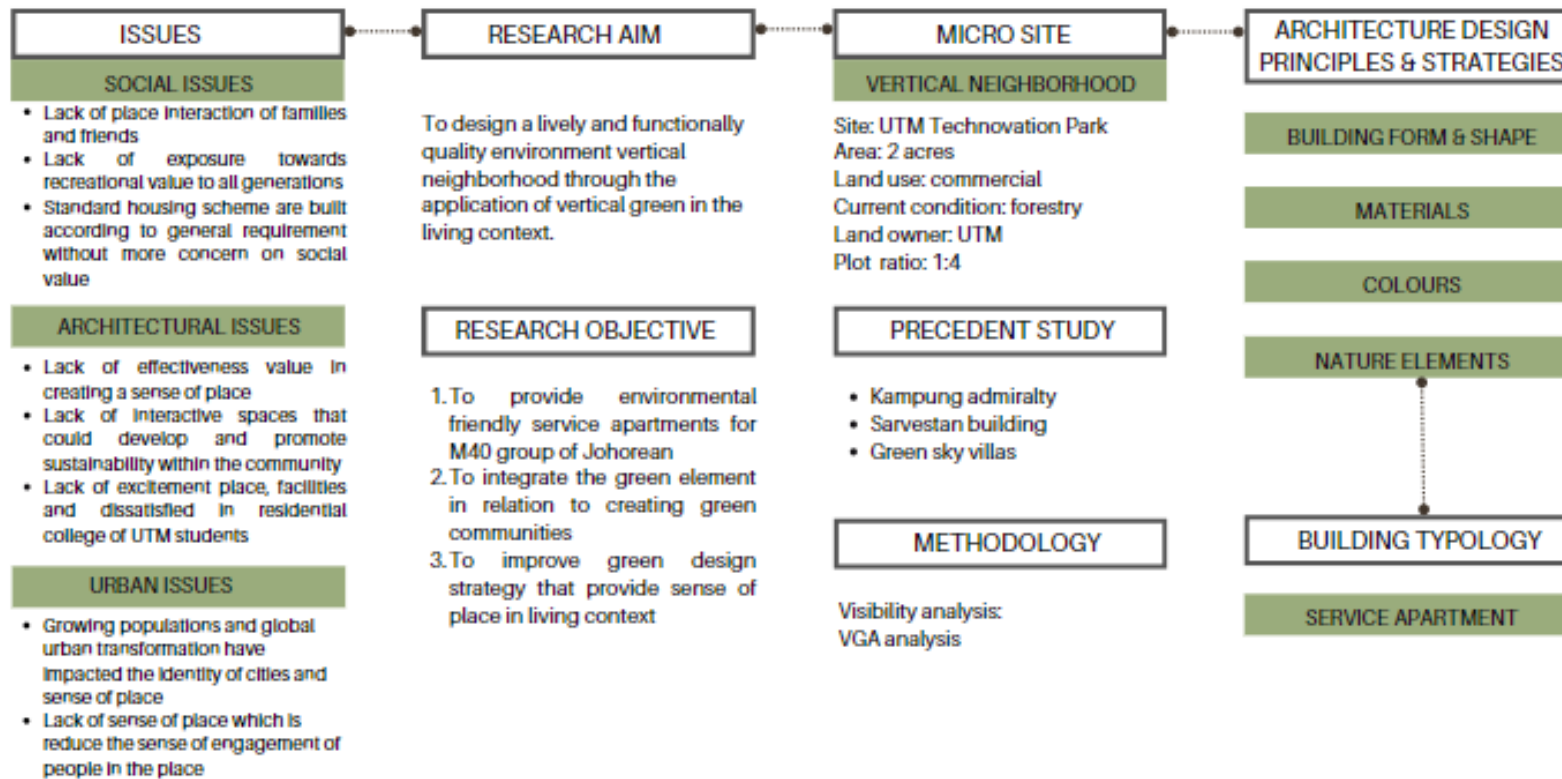


Figure 3 Theoretical Framework

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