

RESIDENTS' PREFERENCE OF ROOFTOP GARDEN AS ALTERNATIVE SPACE FOR PROMOTING URBAN AGRICULTURE IN HIGH-RISE BUILDINGS

NEDA JAFARI

FRSB 2015 17



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Thesis submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

May 2015

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DEDICATION

In the name of God, who sees this thought. I dedicate this work to the people who help others at the top of their live and their aim is always to help others as well as all those who have a special place in my heart and sincere to beautiful: My merciful parents, my dear sibling and my nice friends. Abstract of thesis presented to the Senate of University Putra Malaysia in fulfillment of the requirement for the degree of Master of Science



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

RESIDENTS' PREFERENCE OF ROOFTOP GARDEN AS ALTERNATIVE SPACE FOR PROMOTING URBAN AGRICULTURE IN HIGH-RISE BUILDINGS

By

NEDA JAFARI

May 2015

Chairman: Mohd Yazid Bin Mohd Yunos, PhD Faculty: Design and Architecture

Nowadays, many cities in many countries are trying to enhance sustainability and increasing agriculture in urban area. Urban agriculture growing up to develop environmentally friendly construction and are often built on previously unused lots, increasing the beauty and value of the neighborhood. Urban agriculture is also fundamental on including ecological, cultural, recreational and aesthetic concerns, related to the landscape. Lack of appropriate land for urban agricultural is a main argument for promoting agricultural intensification at high-rise building. Rooftop garden on high-rise buildings are potential space to promote urban agriculture. The objective of this research is to investigate possibility for rooftop garden as an alternative space for promoting urban agriculture in high-rise building. The quantitative method of survey with questionnaire of resident's condominium opinions has been selected for this study and the research has focused two case study which, include of (1) The Heritage condominium on Selangor and (2) Sri Putramas 2 condominium in Kuala Lumpur in Malaysia. Furthermore, the survey results have shown lead towards recognition to promoting the usage of urban agriculture at the rooftop garden in residential high-rise building. In addition, results illustrate that the majority of respondents were strongly agree with use of urban agriculture at roof of their condominium. The study has finalized that the results can further expand to promote urban agriculture on the rooftop. In conclusion, the study has contributed that use of urban agriculture encourages people to use rooftop garden which promotes sustainability of the buildings. Finally, urban agriculture space following residential space, are brought to vertical style introducing urban agriculture at rooftop gardens.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

KEUTAMAAN PENDUDUK DARI TAMAN ATAS BUMBUNG SEBAGAI RUANG ALTERNATIF UNTUK MENGGALAKKAN SEKTOR PERTANIAN BANDAR DI BANGUNAN TINGGI

Oleh

NEDA JAFARI

Mei 2015

Pengerusi: Mohd Yazid Bin Mohd Yunos, PhD Fakulti: Rekabentuk dan Senibina

Pada masa kini, kebanyakan bandar di luar negara cuba untuk meningkatkan kemampanan dan meningkatkan pertanian di kawasan bandar. Pertanian bandar meningkat untuk sebagai pembangunan mesra alam, kerap dilaksanakan di lot tanah terbiar, meningkatkan nilai estetika dan memberi nilai tinggi kepada kawasan kejiranan. Pertanian bandar juga menjadi asas kepada ekologi, ke budayaan, rekreasi dan kebimbangan estetik, yang berkaitan dengan landskap. Kekurangan ruang yang sesuai untuk pertanian bandar adalah justifikasi penting bagi menggalakkan intensifikasi pertanian di bangunan tinggi. Taman atas bumbung di bangunan tinggi adalah berpotensi untuk menggalakkan pertanian bandar. Objektif segera kajian ini adalah untuk menyiasat kemungkinan untuk taman atas bumbung sebagai ruang alternatif untuk menggalakkan sektor pertanian bandar di bangunan tinggi. Kaedah kuantitatif kajian soal selidik dengan pendapat kondominium menetap telah dipilih untuk kajian ini dan kajian ini telah memberi tumpuan dua kagian kes iaitu (1)The Heritage kondominium di Selangor dan (2) Sri Putramas 2 kondominium di Kuala Lumpur di Malaysia. Tambahan pula, hasil kajian telah menunjukkan membawa ke arah pengiktirafan untuk mempromosikan bangunan mampan dan untuk menggalakkan penggunaan pertanian bandar di taman atas bumbung di kediaman bangunan tinggi. Di samping itu, hasilnya menunjukkan bahawa majoriti responden sangat setuju dengan penggunaan pertanian bandar di bumbung kondominium mereka. Oleh itu, kajian ini boleh membantu mengembangkan pertanian bandar di bumbung kondominium. Kesimpulannya, kajian ini telah memberi sumbangan bahawa penggunaan pertanian bandar menggalakkan orang ramai menggunakan taman atas bumbung untuk menggalakkan pengekalan bangunan. Selain itu, pertanian bandar di taman atas bumbung akan memberi kesan yang positif terhadap alam sekitar dan sektor ekonomi. Akhirnya, ruang pertanian bandar di kawasan kediaman, dipengaruhi rekabetuk pertanian menegak bagi memperkenalkan pertanian bandar di taman atas bumbung.



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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

Mohd Yazid bin Mohd Yunos, PhD

Senior Lecture Faculty of Design and Architecture Universiti Putra Malaysia (Chairman)

Osman bin Mohd Tahir, PhD

Associate Professor Faculty of Design and Architecture Universiti Putra Malaysia (Member)

BUJANG KIM HUAT, PhD Professor and Dean School of Graduate Studies Universiti Putra Malaysia

Date:

Declaration by Members of Supervisory Committee

This is to confirm that:

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- the research conducted and the writing of this thesis was under our supervision;
- Supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

Signature: Name of Chairman of Supervisory Committee:	Signature: Name of Member of Supervisory Committee:

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LIST OF ABBREVIATIONS

CIDB:	Construction Industry Development Board
UA:	Urban Agriculture
GHG:	Green House Gas
USA:	United States of America
UK:	United Kingdom
LEED:	Leadership in Energy and Environmental Design
CASBEE:	Comprehensive Assessment System for Built Environmental Efficiency
BREEAM:	Building Research Establishment Environmental Assessment Methodology
HK-BEAM:	Hong Kong-Building Environmental Assessment Method
FLL:	First Lego League
SHW:	Solar Hot Water
SPV:	Solar Photo Voltaic
FAO:	Food Agriculture Organization
UPM:	Universiti Putra Malaysia
HK:	Hong Kong
UNITEN:	University Tenaga Nasional

CHAPTER 1

INTRODUCTION

1.1 Background Study

Urbanization is increasing worldwide, particularly in developing countries, with an annual urban growth rate of 3.6% between 1950 and 2005, versus only 1.4% in industrialized countries(Aubry et al., 2012).Since the world' population is growing, therefore, production of sufficient food, climate change and natural resources constraints are major problems for the future. In addition, urban agriculture and use of land have risen suddenly due to increase in food demands in many cities. Urbanization has been swiftly and continually expanding worldwide over the last few years (Kulak et al., 2013). Also, support for growing food in cities has experienced predictable resurgence. The federal government provides funding for a wide range of urban agriculture related programs and passes zoning ordinances and other policies intend to foster urban food production for recreation, subsistence or profit in a number of cities (Taylor and Taylor Lovell, 2012).

Generally, urban agriculture refers to the security of food and fuel that grow within a city or urban areas directly produced for the market and household use. The definition is particularly based on the experiences in the countries where it is part of the livelihood strategies of the urban and every poor urban and where many food production activities are still based on relatively small scale farming practices by relatively low income farmers (Yang et al., 2010). Urban agriculture is vital in order to maintain an adequate and sustainable food supply (Yang et al., 2010). In addition, access to an open place, including different forms of extensive agriculture is recognized as a valuable feature of urban areas with great quality (Yang et al., 2010). Because of some reasons and commercial goals urban agriculture is trying to supplement family consumption when income is low (Ashebir et al., 2007).

At present, Malaysian urban agriculture is a way to sustainable development with the potential of supplying food or relevant services in urban areas (Islam and Siwar, 2012). Urbanization and the globalization of the food system are causing a number of social, environmental, economic and political problems globally, which run contrary to the desperate need for sustainability (Islam and Siwar, 2012). Urbanization is related to increasing greenhouse gas emissions from raised energy expenditures in rapidly expanding cities (Islam and Siwar, 2012).

The concept of food security was originated in the mid1970s. Since then, the term of food security has been introduced, evolved, developed, and diversified by the academic community and politics. Food security is a situation that in which all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Applanaidu and Baharudin, 2014).

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Food is a sustainable and enduring necessity. Yet among the basic essentials for life including air, water, shelter, and food, only food has been absent over the years as a professional planning interest focus of serious (Bohn and Vilioen. 2011).Furthermore, urban agriculture should be regarded as a part of urban activities several objectives, namely food security, socio-economic with activity, environmental protection, education, etc. (Indraprahasta, 2013). In the 21st century's urban world, the concept and strategy of food security will both pressure and enable urban communities to get involved in food production and processing. New indicators are being created and used by researchers in the fields of nutrition, health. city planning, and agriculture to measure food security and define enabling and hindering policies and programs .Global food security will be predictably and largely the result of increasing agricultural yields per unit of space (Smit et al., 1996).

The concern about the positive impact of urban agriculture has led to the development of policies that seek to encourage Malaysians to get involved in this activity (Shamsudin et al., 2014).

1.2 Research Problem

By the year of 2020, urban population growth will reach 75% of the total population of Malaysia compared to 65.4% in peninsular Malaysia. Urban agriculture is bound to become increasingly important in addressing urban poverty and food scarcity problems in Malaysia in the coming years (Zezza and Tasciotti, 2010).

The other expected feature on the demographic changes in the aged population is related to urbanization (Mafauzy, 2000). Malaysia population has changed tremendously as a result of historical and socio-economic events. Malaysia population has almost tripled over the past four decades, growing from 7.4 million in 1957 to 20.7 million in 1995 (Karim, 1997). The elderly in Malaysia: demographic trends. Medical Journal of Malaysia, 52, 206-212 .The more population, the more food insecure in Malaysia (Applanaidu and Baharudin, 2014).

Development in Malaysia has grown during the past 3 decades and spectacular landmarks, and many more have been established admirably throughout the country. Building sector in Malaysia has been expanded since 1970s. Also, many high-rise buildings were built in Malaysian that has helped to cater the demand on housing for people and has influenced the housing sectors to be increasingly prosperous for the local population in Malaysia (Ahmad and Abdul-Ghani, 2011).

The limitation of the needed land for agriculture; implementation of short food supply chains; subsequent reduction of air emissions; maximization of energy efficiency; production throughout the year; elimination of crop losses caused by unfavorable weather conditions; organic farming without using herbicides; plant protection; products or fertilizers; re-naturalization of farmland allowing ecological benefits (Smit et al., 1996; Bohn and Viljoen, 2011). There is lack of roof spaces for farming and perceiving agriculture as a decaying industry (Hui, 2011). Hochman et al, in, 2013 concluded that by 2050 the amount of arable land will expand by less than 5%. Consequently, 90% of the growth in crop production will need

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to come from higher yields per hectare and increased cropping intensity (from 84% in 2000 to 92% in 2050). Also, the lack of suitable land for agricultural expansion is an important argument for agricultural intensification (Hochman, et al., 2013). In addition to other factors, the ability to access land is an important factor in determining who farms in urban environments (Islam and Siwar, 2012).

Generally, urban agriculture begins at residential and used by its community. The residential community should use urban agriculture in their extra land such as terrace housing. Apartment is also good place for expanding of urban agriculture. However, apartments are potential place for applying urban agriculture in Malaysia but often facing problems of limitation green space for that purpose. Though, it's an urgent to study residents' of apartment for their preference towards proposing urban agriculture at rooftop garden.

1.3 Research Question

With respect to the problem of the lack of space/ green space for high-rise building for urban farming in Malaysia, it is necessary to conduct a special survey. First, the problem needs to be identified and the questions regarding perception of agriculture on rooftop garden should be answered. Indeed, understanding the possible related question and the problem can result in better development and policy forming.

1.3.1 Main Research Question:

The main research question is as follows:

What are possibilities for rooftop garden as an alternative space for promoting urban agriculture in high-rise buildings in Malaysia?

Sub Research Question 1:

What is the awareness level of high-rise buildings' residents about urban agriculture and rooftop garden?

Sub Research Question 2:

What are the preferences of high- rise buildings' residents toward rooftop garden to promote urban agriculture?

1.3.2 Main Goal and Research Objective

To investigate possibility for rooftop garden as an alternative space for promoting urban agriculture in high-rise building.

This study has two objectives as follows:

Objective 1:

To examine the awareness level of high- rise buildings' residents about urban agriculture and rooftop garden.

Objective 2:

To examine the preference of high- rise buildings' residents toward rooftop garden to promote urban agriculture.

1.4 Significance of Study

Urban agriculture has an important function in generating an income for Malaysian households. Also, this can have an important pattern in the provision of food, employment and market for parts of the economy (Islam and Siwar, 2012) and moreover, it is recognized that the inequitable distribution and consumption of resources extends beyond energy usage, i.e. to raw materials, desirable land, water and food (Bohnand Viljoen, 2011).

Urban agriculture can help to supply food to undernourished population in cities as an alternative to an increased import of products. In discussing the benefits of this implementation, intra-urban and peri-urban areas will be examined. During 100 years population densities will be concentrated in urban areas. Urban agriculture will look very different by then (Akram, 2009).

Finding this study contribute to residential of two selected case study (The heritage condo located in Serdang and Sri Putramas2 in Kuala Lumpur) to engage urban agriculture in their roof of condo. These residences also can impact on condo managers' decision to increase urban agriculture. Hence, all residences can benefit from agriculture directly by using these product in their condominium. It is vital for Malaysian landscape planners to understand urban agriculture and its pros and cons to provide suitable infrastructure for improving of roof garden.

Finally, the results of this research can contribute to a number of people, those who are living in a big and tall building where they usually do not possess enough space for agriculture, but they want the feature of urban agriculture for securing food. Also, this research is significant to the government of Malaysia and landscape architecture to increase urban agriculture at rooftop garden that has good effect on ecosystem, because this technology is harmless to the nature.

1.5 Research Methodology

This research process was conducted through the background of the study via the recognition of the issued and maintained the study goal and objectives based on the theories on literature review and issues relevant to the study. Seminar papers, journal publications and international and local literature were used as the method of

description documentation study. The sample size for this study was consisted of 351 people. The number of population of the Heritage and Sri Putramas 2 was different. It also subtracted the number of units divided by the total number and we obtain the answer through multiplying by 351 (sample size). The number of the answers is equal to the number of respondents who are living in the Heritage (99 residents). Finally, the number of samples subtracted by the number of respondents who live in Sri Putramas 2 is 252. The questionnaire is derived into five parts which are included two parts related to awareness of rooftop garden and awareness of urban agriculture, one part about residents preference of function of rooftop garden and one part related to resident's preference of urban agriculture at rooftop garden, as well as the last part belongs to participants demographic. In this methodology design, quantitative data are gathered for analysis. Quantitative data require aggregation and sorting in order to make meanings clear. In this study, the keywords were identified as indicators of the constructed theme. The descriptive analysis was generated from SPSS Version 21 and presented in the form of tables and figures by using Microsoft Word and Excel. Checklist and matrix format were used to sort the data.

1.6 The Scope of Research

This study examines the expectations of the people who live in buildings with a green space in the heights (roof). This investigation is also necessary for the development of the technology and space for the urban agriculture driven economy. In addition, this study examines residents' preference regarding the integration of urban agriculture and a rooftop garden on the building in which they live. The scope of this research includes the residents' criteria about the roof garden with urban agriculture. The independent variable for this study is: Residents preference of urban agriculture and rooftop garden. The dependent variable for this study is: Using rooftop garden as an attractive space for promoting urban agriculture in high-rise building.

1.7 Limitation of Study

Some of the limiting factors as experienced in this research are as follows;

One of the important limitations was the management of Sri Putramas 2 in Kuala Lumpur that sometimes did not allow for the survey questionnaire in the condominium. Therefore, a lot of time needed to be spent in data collection. In addition, some residents did not like to answer to the questionnaire in Sri Putramas 2. Moreover, this condominium has some strong security, due to which the level of cooperation was not appropriate for the management of the building.

Some residents have not considered the importance of questionnaire and did not like to spend their time filling out the questionnaire.

1.8 Thesis Structure

a) Chapter one: Presents an overview of the background of the study, problem statement, significance of the study, research question and research objective.

b) Chapter two: In this chapter, a discussion is provided regarding the reviews of the literature on the urban agriculture and its types, benefits of urban agriculture, its history and includes the discussion about roof garden and its types, benefits of roof garden, advantages of urban agriculture at the rooftop garden, and types of roof for rooftop garden.

c) Chapter three: Elaborates the methods being used for the purpose of this study.

d) Chapter four: Provides the data analysis and the relationship between all variables of this study.

e) Chapter five: Explains the finding of this research about the variables, the potentials of this research, limitations, recommendations, and conclusion.

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LIST OF PUBLICATIONS

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- Jafari, N., Yunos, M., Yazid, M., Mydin, M. A. O., & Mohd Tahir, O. (2015, May). Assessing the Residents' Preference of Awareness Regarding Urban Agriculture at Rooftop Garden. In Applied Mechanics and Materials (Vol. 747, pp. 180-183).
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