



***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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By

NEDA JAFARI

**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

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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 kemampunan 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, kebudayaan, rekreasi dan keseimbangan 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 rekabentuk pertanian menegak bagi memperkenalkan pertanian bandar di taman atas bumbung.

ACKNOWLEDGEMENTS

Foremost, I would like to express my sincere gratitude to my advisor Dr. Mohd Yazid Bin Mohd Yunos (Chairman) the continuous support of my Master study and research, for his patience, motivation, enthusiasm, and immense knowledge. His guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better advisor and mentor for my Master study

I would like to acknowledge and deeply appreciate the contribution of the supervisory committee members for their guidance in the preparation of thesis. These include Associate Professor Dr.Osman Bin Mohd Tahir.

My appreciation goes to the Dean of Faculty of Design and Architecture, Universiti Putra Malaysia and those who have assisted me in gathering the research materials.

Last but not the least, I would like to thank my family: my dear great parents , for giving birth to me at the first place and supporting me spiritually throughout my life as well as, to thank my the best sister and my darling little brother.

I certify that a Thesis Examination Committee has met on 19 May 2015 to conduct the final examination of Neda Jafari on her thesis entitled "Residents' Preference of Rooftop Garden as Alternative Space for Promoting Urban Agriculture in High-Rise Buildings" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

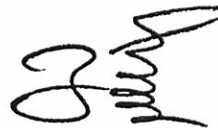
Members of the Thesis Examination Committee were as follows:

Suhardi bin Maulan, PhD, LAr
Senior Lecturer
Faculty of Design and Architecture
Universiti Putra Malaysia
(Chairman)

Nordin bin Abd Rahman, PhD, LAr
Associate Professor
Faculty of Design and Architecture
Universiti Putra Malaysia
(Internal Examiner)

Nangkula Utaberta, PhD
Associate Professor Ir.
Faculty of Design and Architecture
Universiti Putra Malaysia
(Internal Examiner)

Mohd Ramzi Mohd Hussain, PhD
Associate Professor
International Islamic University Malaysia
Malaysia
(External Examiner)



ZULKARNAIN ZAINAL, PhD
Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 17 June 2015

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

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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's 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 mid 1970s. 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).

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 focus of serious professional planning interest (Bohn and Viljoen, 2011). Furthermore, urban agriculture should be regarded as a part of urban activities with several objectives, namely food security, socio-economic 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

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 in order to promote rooftop garden and awareness about 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.

REFERENCES

- Adl, S., Iron, D., & Kolokolnikov, T. (2011). A threshold area ratio of organic to conventional agriculture causes recurrent pathogen outbreaks in organic agriculture. *Science of the Total Environment*, 409(11), 2192-2197.
- Ahmad, N. A., & Abdul-Ghani, A. A. (2011). Towards Sustainable Development in Malaysia: In the Perspective of Energy Security for Buildings. *Procedia Engineering*, 20, 222-229.
- Akram-Lodhi, A. H. (2009). World Food Security: A History since 1945. *Canadian Journal of Development Studies/Revue canadienne d'études du développement*, 28(3-4), 605-608.
- Ali, M. M., & Moon, K. S. (2007). Structural developments in tall buildings: current trends and future prospects. *Architectural Science Review*, 50(3), 205-223.
- Angus, A., Burgess, P. J., Morris, J., & Lingard, J. (2009). Agriculture and land use: demand for and supply of agricultural commodities, characteristics of the farming and food industries, and implications for land use in the UK. *Land Use Policy*, 26, S230-S242.
- Applanaidu, S. D., & Baharudin, A. H. (2014). An Econometric Analysis of Food Security and Related Macroeconomic Variables in Malaysia: A Vector Autoregressive Approach (VAR). *UMK Procedia*, 1, 93-102.
- Archambault, S. (2004). Ecological modernization of the agriculture industry in southern Sweden: reducing emissions to the Baltic Sea. *Journal of Cleaner Production*, 12(5), 491-503.
- Arpels, M., S. Chrisman, H. Sommerfield, J. Towers, E. Berkowitz, G. Brainard, L. Hickey (Eds.). (2005). Building Case Studies. p. 24-102 In Earthpledge. Green roofs: Ecological design and construction. Schiffer Books, Atglen, Pa. USA.
- Ashebir, D., Pasquini, M., & Bihon, W. (2007). Urban agriculture in Mekelle, Tigray state, Ethiopia: Principal characteristics, opportunities and constraints for further research and development. *Cities*, 24(3), 218-228.
- Aubry, C., Ramamonjisoa, J., Dabat, M. H., Rakotoarisoa, J., Rakotondraibe, J., & Rabeharisoa, L. (2012). Urban agriculture and land use in cities: An approach with the multi-functionality and sustainability concepts in the case of Antananarivo (Madagascar). *Land Use Policy*, 29(2), 429-439.
- Aulia, B. U., Rahmawati, D., & Ariastita, P. G. (2014). Land Suitability for High Rise Building based on Land Developers' Preference and Soil Vulnerability Index. *Procedia-Social and Behavioral Sciences*, 135, 147-151.

- Banting, D., Doshi, H., Li, J., Missios, P., Au, A., Currie, B. A., & Verrati, M. (2005). *Report on the environmental benefits and costs of green roof technology for the city of Toronto.*
- Bass, B., Krayenhoff, E. S., Martilli, A., Stull, R. B., & Auld, H. (2003). The impact of green roofs on Toronto's urban heat island. *Proceedings of Greening Rooftops for Sustainable Communities.*, Chicago, IL.
- Berndtsson, J. C., Bengtsson, L., & Jinno, K. (2009). Runoff water quality from intensive and extensive vegetated roofs. *Ecological Engineering*, 35(3), 369-380.
- Bianchini, F., & Hewage, K. (2012). How "green" are the green roofs? Lifecycle analysis of green roof materials. *Building and Environment*, 48, 57-65.
- Bianchini, F., & Hewage, K. (2012). Probabilistic social cost-benefit analysis for green roofs: A lifecycle approach. *Building and Environment*, 58, 152-162.
- Bohn, K., & Viljoen, A. (2011). The edible city: Envisioning the continuous productive urban landscape (CPUL). *FIELD*, 4(1), 149-161.
- Bonny, S. (1998). Prospects for Western agriculture during a period of crisis, changing demand, and scientific progress: a case study of France. *Technology in Society*, 20(2), 113-130.
- Brenneisen, S. (2006). Space for urban wildlife: designing green roofs as habitats in Switzerland. *Urban Habitats*, 4(1), 27-36.
- Brown, K. H., & Bailkey, M. (2002). *Urban agriculture and community food security in the United States: Farming from the city center to the urban fringe*: Urban Agriculture Committee of the Community Food Security Coalition.
- Burgess, P. J., & Morris, J. (2009). Agricultural technology and land use futures: The UK case. *Land Use Policy*, 26, S222-S229.
- Cañas, I., Ayuga, E., & Ayuga, F. (2009). A contribution to the assessment of scenic quality of landscapes based on preferences expressed by the public. *Land Use Policy*, 26(4), 1173-1181.
- Creswell, J. W. (2008). *Educational research: planning, conducting, and evaluating quantitative and qualitative research*. United State: Kevin M. Davis.
- Creswell, J.W. (1994), *Research Design: Qualitative and Quantitative Approaches*, Sage, London.
- Czemieli Berndtsson, J. (2010). Green roof performance towards management of runoff water quantity and quality: A review. *Ecological Engineering*, 36(4), 351-360.

- De Kimpe, C. R., & MacDonald, K. B. (1998). Making the link between science and policy: controlling N losses from agriculture in Canada. *Environmental Pollution*, 102(1), 763-769.
- De Ponti, T., Rijk, B., & Van Ittersum, M. K. (2012). The crop yield gap between organic and conventional agriculture. *Agricultural Systems*, 108, 1-9.
- Dewey, J. (1958). *Experience and Nature* (1925). New York City: Dover.
- Dunnett, N., Gedge, D., Little, J., & Snodgrass, E. C. (2011). *Small green roofs: Low-Tech options for greener living*: Timber Press.
- Dunnett, N., & Kingsbury, N. (2004). *Planting green roofs and living walls* (Vol. 254): Timber Press Portland, OR.
- Dvorak, B., & Volder, A. (2010). Green roof vegetation for North American ecoregions: a literature review. *Landscape and urban planning*, 96(4), 197-213.
- Ellis, E. C., & Wang, S. M. (1997). Sustainable traditional agriculture in the Tai Lake Region of China. *Agriculture, Ecosystems & Environment*, 61(2), 177-193.
- Enete, A. A., & Achike, A. I. (2008). Urban agriculture and urban food insecurity/poverty in Nigeria The case of Ohafia, south-east Nigeria. *Outlook on agriculture*, 37(2), 131-134.
- Fernandez-Cañero, R., Emilsson, T., Fernandez-Barba, C., & Herrera Machuca, M. Á. (2013). Green roof systems: A study of public attitudes and preferences in southern Spain. *Journal of environmental management*, 128, 106-115.
- FLL (2002). *Guideline for the Planning, Execution and Upkeep of Green-roof Sites*(Englished.). Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau: Germany. Retrieved November 08 2013 from <http://www.greenroofsouth.co.uk/FLL%20Guidelines.pdf>
- Gasparatos, A., Stromberg, P., & Takeuchi, K. (2011). Biofuels, ecosystem services and human wellbeing: Putting biofuels in the ecosystem services narrative. *Agriculture, Ecosystems & Environment*, 142(3), 111-128.
- Getter, K. L., Bradley Rowe, D., & Cregg, B. M. (2009). Solar radiation intensity influences extensive green roof plant communities. *Urban Forestry & Urban Greening*, 8(4), 269-281.
- Getter, K. L., Rowe, D. B., Andresen, J. A., & Wichman, I. S. (2011). Seasonal heat flux properties of an extensive green roof in a Midwestern US climate. *Energy and Buildings*, 43(12), 3548-3557.
- Getter, K. L., & Rowe, D. B. (2006). The role of extensive green roofs in sustainable development. *HortScience*, 41(5), 1276-1285.

- Giller, K. E., Beare, M. H., Lavelle, P., Izac, A., & Swift, M. J. (1997). Agricultural intensification, soil biodiversity and agroecosystem function. *Applied soil ecology*, 6(1), 3-16.
- Goldberger, J. R. (2011). Conventionalization, civic engagement, and the sustainability of organic agriculture. *Journal of Rural Studies*, 27(3), 288-296.
- Gómez-Limón, J., & Fernández, J. V. D. L. (1999). Changes in use and landscape preferences on the agricultural-livestock landscapes of the central Iberian Peninsula (Madrid, Spain). *Landscape and Urban Planning*, 44(4), 165-175.
- Graefe, S., Schlecht, E., & Buerkert, A. (2008). Opportunities and challenges of urban and peri-urban agriculture in Niamey, Niger. *Outlook on agriculture*, 37(1), 47-56.
- Grammatikopoulou, I., Pouta, E., Salmiovirta, M., & Soini, K. (2012). Heterogeneous preferences for agricultural landscape improvements in southern Finland. *Landscape and Urban Planning*, 107(2),
- Hine, R., Pretty, J. (2008). Organic Agriculture and Food Security in Africa. Geneva and New York, United Nations Conference on Trade and Development (UNCTAD) and United Nations Environment Programme (UNEP).
- Hochman, Z., Carberry, P. S., Robertson, M. J., Gaydon, D. S., Bell, L. W., & McIntosh, P. C. (2013). Prospects for ecological intensification of Australian agriculture. *European Journal of Agronomy*, 44, 109-123.
- Hui, S. C. (2011). *Green roof urban farming for buildings in high-density urban cities*. Paper presented at the Hainan China World Green Roof Conference, Hainan China World Green Roof, Hainan, China.
- Hui, S. C., & Chan, M. K. (2011). *Biodiversity assessment of green roofs for green building design*. Paper presented at the Proceedings of Joint Symposium.
- Hussain, N. H. M., & Byrd, H. (2012). Towards a compatible landscape in Malaysia: An idea, challenge and imperatives. *Procedia-Social and Behavioral Sciences*, 35, 275-283.
- Hussin, K., & Raid, M. M. (2013). The Assessment of Rooftop Garden in Green Building Index (GBI). In 4th International Conference on Business and Economic Research (4th icber 2013) Proceeding. Bandung, Indonesia.
- Indraprahasta, G. S. (2013). The potential of urban agriculture development in Jakarta. *Procedia Environmental Sciences*, 17, 11-19.
- Islam, R., & Siwar, C. (2012). The analysis of urban agriculture development in Malaysia. *Advances in Environmental Biology*, 6(3), 1068-1078.

- Ismail, A., Samad, M. H., & Rahman, A. M. (2010). Potted plants on flat roof as a strategy to reduce indoor temperature in Malaysian climate. *American Journal of Engineering and Applied Sciences*, 3(3), 534-539.
- Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia Kementerian Perumahan dan Kerajaan Tempatan (2012). Retrieved July 20 2013 from [http://www.mpsns.gov.my/nsm_mps_theme/pdf/Garis%20Panduan%20\(2\)/GPP%20Taman%20Atas%20Bumbang.pdf](http://www.mpsns.gov.my/nsm_mps_theme/pdf/Garis%20Panduan%20(2)/GPP%20Taman%20Atas%20Bumbang.pdf)
- Jalali, M. (2005). Nitrates leaching from agricultural land in Hamadan, western Iran. *Agriculture, ecosystems & environment*, 110(3), 210-218.
- Jim, C. Y., & Shan, X. (2013). Socioeconomic effect on perception of urban green spaces in Guangzhou, China. *Cities*, 31, 123-131.
- Johnson, J. M. F., Reicosky, D. C., Allmaras, R. R., Sauer, T. J., Venterea, R. T., & Dell, C. J. (2005). Greenhouse gas contributions and mitigation potential of agriculture in the central USA. *Soil and Tillage Research*, 83(1), 73-94.
- Kaltenborn, B. P., & Bjerke, T. (2002). Associations between environmental value orientations and landscape preferences. *Landscape and urban planning*, 59(1), 1-11.
- Kaplan, S. (1988). Perception and landscape: conceptions and misconceptions. *Environmental aesthetics: Theory, research, and application*, 45-55.
- Karim, H. A. (1997). The elderly in Malaysia: demographic trends. *Medical Journal of Malaysia*, 52, 206-212
- Kellett, J. (2011). More than a roof over our head: can planning safeguard rooftop resources?. *Urban Policy and Research*, 29(01), 23-36.
- Keynes, R. J. (1987). Schwann cells during neural development and regeneration: Leaders or followers? *Trends Neurosci*, 10, 137-39.
- Köhler, M. (2003). *Plant survival research and biodiversity: Lessons from Europe*. Paper presented at the First Annual Greening Rooftops for Sustainable Communities Conference, Awards and Trade Show.
- Kolb, J. (2008). *Systems in timber engineering: loadbearing structures and component layers*: Walter de Gruyter.
- Kortright, R. (2001). Evaluating the potential of green roof agriculture. *City Farmer. Report on MSc Thesis available at <http://www.cityfarmer.org/greenpotential.html>*.
- Kosareo, L., & Ries, R. (2007). Comparative environmental life cycle assessment of green roofs. *Building and environment*, 42(7), 2606-2613.

- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and psychological measurement*, 30(3), 607-610.
- Kulak, M., Graves, A., & Chatterton, J. (2013). Reducing greenhouse gas emissions with urban agriculture: a life cycle assessment perspective. *Landscape and urban planning*, 111, 68-78.
- Lachimpadi, S. K., Pereira, J. J., Taha, M. R., & Mokhtar, M. (2012). Construction waste minimisation comparing conventional and precast construction (Mixed System and IBS) methods in high-rise buildings: A Malaysia case study. *Resources, Conservation and Recycling*, 68, 96-103.
- Lane, S. J., Azuma, A., & Higuchi, H. (1998). Wildfowl damage to agriculture in Japan. *Agriculture, ecosystems & environment*, 70(1), 69-77.
- Lee, K. E., Williams, K. J., Sargent, L. D., Farrell, C., & Williams, N. S. (2014). Living roof preference is influenced by plant characteristics and diversity. *Landscape and Urban Planning*, 122, 152-159.
- Liu, K. (2004). Sustainable Building Envelope–Garden Roof System Performance. In *RCI Building Envelope Symposium, New Orleans, Louisiana*.
- Liu, J., & Cho, W. K. (2014). Determination of Fire Load and Heat Release Rate for High-rise Residential Buildings. *Procedia Engineering*, 84, 491-497.
- Lotfabadi, P. (2014). High-rise buildings and environmental factors. *Renewable and Sustainable Energy Reviews*, 38, 285-295.
- Mafauzy, M. (2000). The problems and challenges of the aging population of Malaysia. *The Malaysian journal of medical sciences: MJMS*, 7(1), 1.
- Matos, R. S., & Batista, D. S. (2013). Urban Agriculture: The Allotment Gardens as Structures of Urban Sustainability
- Midmore, D. J., Jansen, H. G., & Dumsday, R. G. (1996). Soil erosion and environmental impact of vegetable production in the Cameron Highlands, Malaysia. *Agriculture, ecosystems & environment*, 60(1), 29-46.
- Ng, W. P. Q., Lam, H. L., Ng, F. Y., Kamal, M., & Lim, J. H. E. (2012). Waste-to-wealth: green potential from palm biomass in Malaysia. *Journal of Cleaner Production*, 34, 57-65.
- Noorhosseini-Niyaki, S. A., & Allahyari, M. S. (2012). Logistic Regression Analysis on Factors Affecting Adoption of Rice-Fish Farming in North Iran. *Rice Science*, 19(2), 153-160.
- Nugent, R. (2000). The impact of urban agriculture on the household and local economies. *Growing cities, growing food. Urban agriculture on the policy agenda*, 67-98.

- Oberndorfer, E., Lundholm, J., Bass, B., Coffman, R. R., Doshi, H., Dunnett, N. & Rowe, B. (2007). Green roofs as urban ecosystems: ecological structures, functions, and services. *Bioscience*, 57(10), 823-833.
- Ode, Å., Fry, G., Tveit, M. S., Messenger, P., & Miller, D. (2009). Indicators of perceived naturalness as drivers of landscape preference. *Journal of Environmental Management*, 90(1), 375-383.
- Osmundson, T. (1999). *Roof gardens: history, design, and construction*: WW Norton & Company.
- Patil, S., Reidsma, P., Shah, P., Purushothaman, S., & Wolf, J. (2014). Comparing conventional and organic agriculture in Karnataka, India: Where and when can organic farming be sustainable?. *Land Use Policy*, 37, 40-51.
- Pazhouhanfar, M. (2014). Effect of predictors of visual preference as characteristics of urban natural landscapes in increasing perceived restorative potential. *Urban Forestry & Urban Greening*, 13(1), 145-151.
- Pérez, G., Vila, A., Rincón, L., Solé, C., & Cabeza, L. F. (2012). Use of rubber crumbs as drainage layer in green roofs as potential energy improvement material. *Applied Energy*, 97, 347-354.
- Pretty, J. (2008). Agricultural sustainability: concepts, principles and evidence. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 363(1491), 447-465.
- Rahman, S. R. A., Ahmad, H., & Rosley, M. S. F. (2013). Green Roof: Its Awareness Among Professionals and Potential in Malaysian Market. *Procedia-Social and Behavioral Sciences*, 85, 443-453.
- Rowe, D. B., & Getter, K. L. (2010). Green roofs and garden roofs. *Urban Ecosystem Ecology*, (urbanecosysteme), 391-412.
- Rowe, D. B., Getter, K. L., & Durhman, A. K. (2012). Effect of green roof media depth on Crassulacean plant succession over seven years. *Landscape and Urban Planning*, 104(3), 310-319.
- Rydberg, T., & Haden, A. C. (2006). Emergy evaluations of Denmark and Danish agriculture: Assessing the influence of changing resource availability on the organization of agriculture and society. *Agriculture, ecosystems & environment*, 117(2), 145-158.
- Sailor, D. J. (2008). A green roof model for building energy simulation programs. *Energy and buildings*, 40(8), 1466-1478.
- Sandhu, H. S., Wratten, S. D., & Cullen, R. (2010). Organic agriculture and ecosystem services. *Environmental science & policy*, 13(1), 1-7.

- Shamsudin, M. N., Rezai, G., & Kit Teng, P. (2014). Public Attitude Toward Urban Agriculture in Malaysia: Study on Values and Knowledge in Klang Valley. *Journal of Food Products Marketing*, 20(sup1), 35-48.
- Skinner, C. J. (2006). Urban density, meteorology and rooftops. *Urban Policy and Research*, 24(3), 355-367.
- Shariful Islam, K. (2002). *Rooftop gardening as a strategy of urban agriculture for food security: the case of Dhaka City, Bangladesh*. Paper presented at the International Conference on Urban Horticulture 643.
- Smit, J., Ratta, A., & Nasr, J. (1996). Urban agriculture: food, jobs and sustainable cities. *Urban agriculture: food, jobs and sustainable cities*.
- Suntharalingam, S. (2013). Potential Effects of Modern Agricultural Biotechnology on Biodiversity in Malaysia. Retrieved 05 February 2013 from <http://blog.sustainability.colostate.edu/?q=content/biodiversity-in-malaysia>
- Takebayashi, H., & Moriyama, M. (2007). Surface heat budget on green roof and high reflection roof for mitigation of urban heat island. *Building and Environment*, 42(8), 2971-2979.
- Tan, P. Y., & Sia, A. (2005). *A pilot green roof research project in Singapore*. Paper presented at the Proceedings of Third Annual Greening Rooftops for Sustainable Communities Conference, Awards and Trade Show, Washington, DC.
- Taylor, J. R., & Lovell, S. T. (2012). Mapping public and private spaces of urban agriculture in Chicago through the analysis of high-resolution aerial images in Google Earth. *Landscape and Urban Planning*, 108(1), 57-70.
- Theodosiou, T. G. (2003). Summer period analysis of the performance of a planted roof as a passive cooling technique. *Energy and Buildings*, 35(9), 909-917.
- Thomson, A. M., Izaurralde, R. C., Rosenberg, N. J., & He, X. (2006). Climate change impacts on agriculture and soil carbon sequestration potential in the Huang-Hai Plain of China. *Agriculture, ecosystems & environment*, 114(2), 195-209.
- Tian, Y., & Jim, C. Y. (2011). Factors influencing the spatial pattern of sky gardens in the compact city of Hong Kong. *Landscape and Urban Planning*, 101(4), 299-309.
- Tilman, D., Cassman, K. G., Matson, P. A., Naylor, R., & Polasky, S. (2002). Agricultural sustainability and intensive production practices. *Nature*, 418(6898), 671-677.
- Tscharntke, T., Clough, Y., Wanger, T. C., Jackson, L., Motzke, I., Perfecto, I., ... & Whitbread, A. (2012). Global food security, biodiversity conservation and the future of agricultural intensification. *Biological Conservation*, 151(1), 53-59.

- Vagneron, I. (2007). Economic appraisal of profitability and sustainability of peri-urban agriculture in Bangkok. *Ecological Economics*, 61, 516-529.
- Van Renterghem, T., & Botteldooren, D. (2009). Reducing the acoustical façade load from road traffic with green roofs. *Building and Environment*, 44(5), 1081-1087.
- Williams, N. S., Rayner, J. P., & Raynor, K. J. (2010). Green roofs for a wide brown land: Opportunities and barriers for rooftop greening in Australia. *Urban Forestry & Urban Greening*, 9(3), 245-251.
- Wong, N. H., Chen, Y., Ong, C. L., & Sia, A. (2003). Investigation of thermal benefits of rooftop garden in the tropical environment. *Building and environment*, 38(2), 261-270.
- Wong, N. H., Tay, S. F., Wong, R., Ong, C. L., & Sia, A. (2003). Life cycle cost analysis of rooftop gardens in Singapore. *Building and Environment*, 38(3), 499-509.
- Yang, Z., Cai, J., & Sliuzas, R. (2010). Agro-tourism enterprises as a form of multi-functional urban agriculture for peri-urban development in China. *Habitat International*, 34(4), 374-385.
- Yuen, B., & Nyuk Hien, W. (2005). Resident perceptions and expectations of rooftop gardens in Singapore. *Landscape and Urban Planning*, 73(4), 263-276.
- Zeza, A., & Tasciotti, L. (2010). Urban agriculture, poverty, and food security: empirical evidence from a sample of developing countries. *Food Policy*, 35(4), 265-273.
- Zhang, X., Shen, L., Tam, V. W., & Lee, W. W. Y. (2012). Barriers to implement extensive green roof systems: a Hong Kong study. *Renewable and Sustainable Energy Reviews*, 16(1), 314-319.
- Zube, E. H., Sell, J. L., & Taylor, J. G. (1982). Landscape perception: research, application and theory. *Landscape planning*, 9(1), 1-33.

BIODATA OF STUDENT

Neda Jafari was born in 1986 in Roodsar, Iran. She completed undergraduate degree in Landscape Architecture at “Chaloos Azad University” in 2009. Her final project was "transplanting invasive shrubs on Non-invasive shrubs" .In order to increasing plant diversity and enhance the beauty of landscape. Currently, the sought degree is Master of Science in Landscape Study in the Faculty of Design and Architecture at Universiti Putra Malaysia.



LIST OF PUBLICATIONS

Scopus Index Conference Proceedings

- Jafari, N., Yunus, 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).
- Neda Jafari, Mohd Yazid Mohd Yunus and Osman Mohd Tahir., Residents' Preference Towards Rooftop Garden: A Case of The Heritage Condominium, Selangor. *Adv. Environ. Biol.*, 9(4), 79-81, 2015
- Neda Jafari, Yazid Mohd Yunus, Utaberta, Nor Atiah Ismail, Ismail, Nastaran Jafari., The Preference of High- Rise Buildings' Residents Toward Rooftop Garden to Promote Urban Agriculture: A Case Study of Malaysia. *Adv. Environ. Biol.*, 9(5), 400-403, 2015
- Jafari, N., Utaberta, N. & Jafari, N. (2014, JANUARY). Evaluation of Impressive Factors for Development of Malaysian Community Centers. *Architecture and Design for People & Society Conference (ADPS 2014)*, Malaysia



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