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SOCIOECONOMIC AND ENVIRONMENTAL IMPACT OF URBAN AGRICULTURE PRACTICES IN THE KLANG VALLEY, MALAYSIA

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By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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February 2018

Chair: Professor Mad Nasir Shamsudin, PhD
Faculty: Agriculture

Rapid urbanization processes coupled with increased in urban population create social, environmental and economic problems worldwide. In general, it is estimated that 60 to 85% of human beings will be living in urban areas in 2025. The same urbanization process is occurring in Malaysia, where the urban population is predicted to be at 75 percent by 2020.

As a result, greater pressures will be felt by city authorities especially in terms of competition of land for various urban functions, environmental degradation from pollutions as well as food security problems. The two most common unwanted consequences that are stemmed from increases in urban population are in terms of socioeconomic and environmental problems. Socioeconomic problems include urban poverty, food security, competition for land use, and other societal problems. In fact, urbanization process is also correspondingly linked with a wide range of other unwanted consequences in terms of environmental aspects such as resource scarcity, environmental degradation and climatic change and pollutions.

To lessen both socioeconomic and environmental degradation problems, urban agriculture has been identified as one of sustainable tools that could be applied. Although urban agriculture will gain in recognition for its positive impacts on the urban society, its current practices in Malaysia is relatively low as compared to other countries. This could be stemmed from underestimated values of urban agriculture practices. This study is therefore conducted to assess the socioeconomic and environmental impact of urban agriculture practices in the Klang Valley, Malaysia.

The first objective of the study is to identify the influential dimensions that shape perceptions on urban agriculture practices. A total of 875 respondents were interviewed across the Klang Valley areas using random sampling method. Exploratory Factor Analysis (EFA) method was utilized to analyze the data. The study results found that there are six influential dimensions that shape perception towards urban agriculture practices namely (1) social and health impact; (2) quantity and quality; (3) environmental impact; (4) economic impact; (5) diet preferences and (6) land use. Further analyses were conducted to distinguish the study results by category of respondents. The whole sample of the study was divided into two namely urban agriculture practitioners (n=297) and non-urban agriculture practitioners (n=578). In the case of urban agriculture practitioners, their perception towards urban agriculture practices are shaped by seven important factors namely (1) environmental impact; (2) economic impact; (3) social and health impact; (4) diet preferences; (5) food utilization; (6) land utilization; and (7) food safety. Meanwhile, for non-urban agriculture practitioners, eight influential factors were successfully identified. They were (1) social and health impact; (2) food safety; (3) environmental impact; (4) economic impact; (5) food utilization; (6) diet preferences; (7) food access; and (8) land utilization.

To accomplish both second and third objectives of the study, choice experiment (CE) was utilized to estimate socioeconomic and environmental impact of urban agriculture practices. Respondents were asked to evaluate urban agriculture scenarios, which are described in terms of a set of attribute levels. Five most important attributes have been utilized for socioeconomic function namely food bills reductions; land use; knowledge and skills; social interactions; and price. In the case of environmental function, five selected attributes were food safety; landscaping; carbon footprint; waste management; and price. Each attribute comprises of at least two levels, where the lowest level was considered as a base line, while level two or three imply medium or high level of each attribute, respectively.

The multinomial logit models were developed to obtain marginal value and compensating surplus of respondents to both functions. Based on study results, using the lowest attribute levels as dummy variables, all attribute levels obtained positive sign indicate that respondents prefer those levels more as compared to the base status quo used in the study. In the case of socioeconomic function, preferred attribute levels include reduction in food bill; land is fully utilized; exposure on knowledge and skills; and sharing knowledge. Meanwhile, for environmental function, preferred attribute levels include food safety; organic; greenery areas; less carbon footprint; and reuse and recycle. The results of the study also indicated that respondents were willing to pay more for improvements in urban agriculture scenarios as compared to the status quo, regardless whether they are urban agriculture practitioners or non-practitioners. Demographic profiles of respondents also played significant role in determining preferences for urban agriculture scenarios. Some of significant demographic variables include age group; ethnic; type of house; and income group of respondents.

Aggregate values of urban agriculture practices were also calculated to accomplish the fourth objective of the study. In the case of socioeconomic impact, this activity is worth at RM10.15 million, considering 20% involvement from Klang Valley residents at the time. Using the same scenario, the value of environmental impact owing to urban agriculture practices was estimated at RM10.08 million. Due to its ability to contribute to both socioeconomic and environmental aspects, urban agriculture is worth to be promoted extensively in Malaysia. Policy makers should consider a number of approaches, especially in designing the promotional strategies to boost urban agriculture participation in order to make this activity socially, economically and environmentally worthwhile.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

IMPAK SOSIOEKONOMI DAN ALAM SEKITAR TERHADAP AMALAN PERTANIAN BANDAR DI LEMBAH KLANG, MALAYSIA

Oleh

AHMAD HANIS IZANI ABDUL HADI

Februari 2018

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Proses urbanisasi pesat ditambah pula dengan peningkatan penduduk bandar menyebabkan masalah sosial, alam sekitar dan ekonomi di seluruh dunia. Secara umum, dianggarkan 60 hingga 85% manusia akan tinggal di kawasan bandar pada tahun 2025. Proses pembandaran yang sama berlaku di Malaysia, di mana penduduk bandar dianggarkan sebanyak 75 peratus menjelang 2020.

Kesannya, tekanan yang lebih besar akan dirasakan oleh pihak berkuasa di bandar terutamanya dari segi persaingan untuk mendapatkan tanah untuk pelbagai fungsi bandar, kemerosotan alam sekitar daripada pencemaran serta masalah keselamatan makanan. Dua impak biasa yang tidak diingini disebabkan oleh pertambahan populasi di bandar adalah dari segi masalah sosioekonomi dan alam sekitar. Masalah sosioekonomi termasuk kemiskinan bandar, keselamatan makanan, persaingan untuk kegunaan tanah, dan masalah sosial yang lain. Malah, proses urbanisasi juga dikaitkan dengan pelbagai impak lain yang tidak diingini dari segi aspek alam sekitar seperti kekurangan sumber, kemerosotan alam sekitar dan perubahan iklim, dan pencemaran.

Untuk mengurangkan masalah sosioekonomi dan alam sekitar, pertanian bandar telah dikenalpasti sebagai salah satu pendekatan lestari yang boleh dilaksanakan. Walaupun pertanian bandar mendapat pengiktirafan di atas impak positifnya terhadap masyarakat bandar, amalan pertanian bandar semasa di Malaysia agak rendah berbanding dengan negara lain. Hal ini mungkin berpunca daripada penilaian yang rendah dari segi nilai amalan pertanian bandar. Oleh itu, kajian ini dijalankan untuk menilai impak sosioekonomi dan alam sekitar terhadap amalan pertanian bandar di Lembah Klang, Malaysia.

Objektif pertama kajian ini adalah untuk mengenal pasti dimensi yang berpengaruh yang membentuk persepsi terhadap amalan pertanian bandar. Sebanyak 875 responden telah ditemuramah di seluruh kawasan Lembah Klang menggunakan kaedah pensampelan rawak. Kaedah *Exploratory Factor Analysis* (EFA) digunakan untuk menganalisis data. Hasil kajian mendapati terdapat enam dimensi berpengaruh yang membentuk persepsi terhadap amalan pertanian bandar iaitu (1) impak sosial dan kesihatan; (2) kuantiti dan kualiti; (3) impak alam sekitar; (4) impak ekonomi; (5) pilihan diet dan (6) penggunaan tanah. Analisis selanjutnya dijalankan untuk membezakan hasil kajian mengikut kategori responden. Seluruh sampel kajian dibahagikan kepada dua iaitu pengamal pertanian bandar (n = 297) dan bukan pengamal pertanian bandar (n = 578). Dalam kes pengamal pertanian bandar, persepsi mereka terhadap amalan pertanian bandar dibentuk oleh tujuh faktor penting iaitu (1) impak alam sekitar; (2) impak ekonomi; (3) impak sosial dan kesihatan; (4) pilihan makanan; (5) penggunaan makanan; (6) penggunaan tanah; dan (7) keselamatan makanan. Sementara itu, bagi bukan pengamal pertanian bandar, lapan faktor berpengaruh telah berjaya dikenalpasti. Faktor tersebut adalah (1) impak sosial dan kesihatan; (2) keselamatan makanan; (3) impak alam sekitar; (4) impak ekonomi; (5) penggunaan makanan; (6) pilihan makanan; (7) akses makanan; dan (8) penggunaan tanah.

Untuk mencapai objektif kedua dan ketiga kajian ini, *choice modeling* (CE) digunakan untuk menganggarkan impak sosioekonomi dan alam sekitar terhadap amalan pertanian bandar. Responden dimohon menilai senario pertanian bandar, yang digambarkan melalui set tahap atribut. Lima atribut yang penting telah digunakan untuk fungsi sosioekonomi iaitu pengurangan bil makanan; penggunaan tanah; pengetahuan dan kemahiran; interaksi sosial; dan harga. Bagi fungsi alam sekitar, lima atribut terpilih adalah keselamatan makanan; landskap; penjejakan karbon; pengurusan sisa; dan harga. Setiap atribut terdiri daripada sekurang-kurangnya dua tahap, di mana tahap terendah dianggap sebagai tahap semasa, manakala tahap kedua atau ketiga menggambarkan tahap sederhana atau tinggi setiap atribut.

Model *multinomial logit* telah dibangunkan untuk memperoleh nilai marginal dan kompensasi lebihan responden kepada kedua-dua fungsi. Berdasarkan hasil kajian, menggunakan tahap atribut terendah sebagai pembolehubah asas, semua tahap atribut memperoleh tanda positif menunjukkan responden lebih suka tahap tersebut berbanding dengan tahap asas yang digunakan dalam kajian. Bagi fungsi sosioekonomi, tahap atribut yang digemari termasuk pengurangan bil makanan; tanah digunakan sepenuhnya; pendedahan kepada pengetahuan dan kemahiran; dan perkongsian ilmu. Sementara itu, bagi fungsi alam sekitar, tahap atribut pilihan termasuk keselamatan makanan; organik; kawasan hijau; pengurangan jejak karbon; dan penggunaan dan kitar semula. Hasil kajian juga menunjukkan responden bersedia untuk membayar lebih untuk memperbaiki senario pertanian bandar berbanding dengan tahap semasa, tanpa mengambilkira sama ada mereka adalah pengamal pertanian bandar atau bukan pengamal. Profil demografi responden juga memainkan peranan penting dalam menentukan kecenderungan untuk senario pertanian bandar. Beberapa

pembolehubah demografi signifikan termasuk kumpulan umur; etnik; jenis rumah; dan kumpulan pendapatan responden.

Nilai agregat amalan pertanian bandar juga dianggarkan untuk mencapai objektif keempat kajian. Dalam kes impak sosioekonomi, aktiviti ini bernilai RM10.15 juta, dengan penglibatan sebanyak 20% daripada penduduk Lembah Klang pada satu masa. Menggunakan senario yang sama, nilai impak alam sekitar disebabkan oleh amalan pertanian bandar telah dianggarkan sebanyak RM10.08 juta. Oleh kerana keupayaannya dalam menyumbang kepada aspek sosioekonomi dan alam sekitar, pertanian bandar layak untuk dipromosikan secara meluas di Malaysia. Penggubal dasar harus mempertimbangkan beberapa pendekatan, terutamanya dalam merancang strategi promosi untuk meningkatkan penyertaan pertanian bandar agar dapat menjadikan aktiviti ini bernilai dari segi sosial, ekonomi dan alam sekitar.

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I certify that a Thesis Examination Committee has met on 28th February 2018 to conduct the final examination of Ahmad Hanis Izani Abdul Hadi on his thesis entitled "Socioeconomic and Environmental Impact of Urban Agriculture Practices in the Klang Valley, Malaysia" 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 Doctor of Philosophy.

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

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A	Agreed
AD	Anno Domini
AES	Agri-environmental Scheme
AIC	Akaike Information Criterion
AVC	Asymptotic Variance Covariance
Avg.	Average
B40	Bottom 40%
BC	Before Christ
BSS	Bumiputera Sabah and Sarawak
BV	Bequest Value
CE	Choice Experiment
CFA	Confirmatory Factor Analysis
CFP	Carbon Footprint
CLM	Conditional Logit Model
CM	Choice Modeling
Corr.	Correlation
CS	Compensating Surplus
CSA	Community Supported Agriculture
CV	Contingent Valuation
CVM	Contingent Valuation Method
D	Disagreed
DUV	Direct Use Value
DOS	Department of Statistics, Malaysia
EFA	Exploratory Factor Analysis
EV	Existence Value
FAMA	Federal Agricultural Marketing Authority
FAO	Food and Agriculture Organization of the United Nations
FR	Food bills Reduction
FSY	Food Safety
GAP	Good Agricultural Practices
IUV	Indirect Use Value
KMO	Keiser-Meyer-Olkin
KS	Knowledge and Skills
LCM	Latent Class Model
LSC	Landscaping
LU	Land Use
M40	Middle 40%
MNL	Multinomial Logit
MV	Marginal Value
MWTP	Marginal Willingness to Pay
NA	Not available
NUV	Non-use Value
OECD	Organisation for Economic Co-operation and Development
OV	Option Value
PES	Payment for Ecosystem Services
RM	Malaysian Ringgit
RPL	Random Parameter Logit

RUT	Random Utility Theory
SA	Strongly Agreed
SD	Strongly Disagreed
SI	Social Interaction
SSL	Self-sufficiency level
Std. dev.	Standard Deviation
T20	Top 20%
TEV	Total Economic Value
U	Utility
UA	Urban Agriculture
USA	United State of America
UV	Use Value
WMG	Waste Management
WTP	Willingness to Pay
α	Alpha

CHAPTER 1

INTRODUCTION

The first chapter of this study covers eight sections, which are urbanization and its impacts on food system and environment, role of agriculture in the urban areas, current status of urban agriculture practices in Malaysia, problem statement, research questions, objectives of the study, significance of the study, and organization of the study.

1.1 Urbanization and Its Impacts on Food System and Environment

As world's population expands, the urbanization process is moving in tandem, where more people are projected to live in cities. It is estimated that 60 to 85 percent of human beings will be considered as city inhabitants by 2025 (Tilman *et al.*, 2001). It is likewise anticipated that urban population will be increased in Asia, Latin America and Sub-Saharan Africa by three to four percent annually, which is higher than overall average rate of urban population growth (range between 1.5 to 2.5 percent). Consequently, more than half a million of individuals are expected to live in urban spaces (Hubbard and Onumah, 2001).

In Malaysia, a similar trend of population growth is anticipated, where more people are expected to live in the urban areas. Generally, urban can be defined as gazetted areas with their adjoining built-up areas, with a combined population of 10,000 or more; or special development area that can be identified, with at least a population of 10,000 and at least 60% of the population (aged 15 years old and above) are involved in non-agricultural activities (DOS, 2015). The distribution of Malaysian population in year 2000 and 2010, by state and strata is as shown in Table 1.1.

According to the latest population and housing census survey data which was conducted by Malaysian Department of Statistics in 2010, of 28.3 million Malaysian population, about 63% were recorded lived in urban areas in 2010. In terms of proportions of urban population, the highest was recorded in Kuala Lumpur (100%), followed by Selangor (88%) and Penang (81%). In some states, more than half were urban dwellers. These include W.P. Labuan (78%), Melaka (69%), Johor (66%), Perak (61%), Negeri Sembilan (57%), and Terengganu (51%). Based on the data shown in Table 1.1, it can be said that the number of Malaysian populations in 2010 have been increased by 21.4% of its year 2000 population. The total Malaysian urban population is expected to increase over time. In this sense, it is predicted at 75 percent by 2020 (Masron et al., 2012).

Table 1.1: Distribution of Malaysian population by state and strata in 2000 and 2010 (in '000)

State	2000				
	Urban	%	Rural	%	Total
Johor	1,787.5	65.2	953.1	34.8	2,740.6
Kedah	648	39.3	1,001.8	60.7	1,649.8
Kelantan	448.9	34.2	864.1	65.8	1,313
Melaka	427.3	67.2	208.5	32.8	635.8
Negeri Sembilan	459.3	53.4	400.7	46.6	860
Pahang	540.9	42	747.5	58.	1,288.4
Perak	1,203.9	58.7	847.4	41.3	2,051.3
Perlis	70.1	34.3	134.4	65.7	204.5
Penang	1,052.1	80.1	261.4	19.9	1,313.5
Sabah	1,248.7	48	1,354.8	52.	2,603.5
Sarawak	997	48.1	1,074.5	51.9	2,071.5
Selangor[1]	3,667.5	87.6	521.4	12.4	4,188.9
Terengganu	437.5	48.7	461.3	51.3	898.8
W.P. Kuala Lumpur	1,379.3	100	-	-	1,379.3
W.P. Labuan	59.1	77.7	17	22.3	76.1
Malaysia	14,426.9	62	8,847.8	38	23,274.7

Source: Department of Statistics, Malaysia (2016)

Table 1.1: Distribution of Malaysian population by state and strata in 2000 and 2010 (in '000) (continued)

State	2010				
	Urban	%	Rural	%	Total
Johor	2,188.2	66.2	1,117.7	33.8	3,305.9
Kedah	801.8	40.8	1,165	59.2	1,966.9
Kelantan	603.8	36.1	1,066.7	63.9	1,670.5
Melaka	533.9	69.2	237.6	30.8	771.5
Negeri Sembilan	572.4	56.6	439.3	43.4	1,011.7
Pahang	657.9	42.9	876.9	57.1	1,534.8
Perak	1,487.8	60.5	973	39.5	2,460.8
Perlis	85.7	35.7	154.4	64.3	240.1
Penang	1,292.3	80.9	304.6	19.1	1,596.9
Sabah	1,585.8	49.3	1,628.4	50.7	3,214.2
Sarawak	1,251.6	49.9	1,255	50.1	2,506.5
Selangor[1]	4,513.1	88.4	589.4	11.6	5,102.6
Terengganu	538	51.2	512	48.8	1,050.0
W.P. Kuala Lumpur	1,722.5	100	-	-	1,722.5
W.P. Labuan	74.6	78.1	20.8	21.8	95.5
Malaysia	17,909.5	63.4	10,340.9	36.6	28,250.5

Source: Department of Statistics, Malaysia (2016)

An increasing trend with regards to population growth requires a suitable adjustment from any countries especially to the city authorities. This is supported by the fact that most of the populations are expected to live in urban areas due to greater job opportunities and basic amenities. Typically, many cities were unable to cope with such massive population growth, where they have to deal with huge challenges in creating sufficient employment, providing basic amenities, health services and education, proper urban planning as well as developing a sustainable city.

In terms of employment or labor force in Malaysia, it was recorded about 14.9 million were employed in year 2016, as compared to 11.9 million in 2010. The rate of labor participation had also increased from 63.7% to 67.7% in year 2010 and 2016, respectively (Table 1.2).

Table 1.2: Labor force in Malaysia by category, 2010 – 2016 (in '000)

Labor Force	2010	2011	2012	2013	2014	2015	2016
Agriculture, Forestry and Fishing	1,614.9	1,421.7	1,628.2	1,758.9	1,694.2	1,753.9	1,609.9
Mining and Quarrying	57.2	73.5	80.8	87.9	84.7	104.4	96.3
Manufacturing	2,108.5	2,244.0	2,263.7	2,315.8	2,372.5	2,322.7	2,390.6
Electricity, Gas, Steam and Air Conditioning	55.5	51.0	61.9	61.5	65.6	61.7	77.9
Water Supply; Waste Management and Remediation Activities	66.7	71.9	81.0	83.7	81.2	72.1	76.4
Construction	1,082.7	1,151.5	1,174.7	1,292.1	1,277.7	1,309.9	1,251.7
Wholesale and Retail Trade; Repair of Vehicles	1,887.8	2,005.4	2,125.6	2,261.4	2,324.4	2,361.4	2,428.5
Transportation and Storage	554.7	604.0	624.3	626.5	598.2	615.0	630.4
Accommodation and Food Service Activities	856.7	951.1	965.1	1,041.5	1,149.3	1,150.8	1,260.7
Information and Communication	178.9	206.5	208.8	194.1	213.2	214.2	208.7
Financial and Insurance/ Takaful Activities	323.4	319.3	322.1	318.9	329.1	354.4	346.9
Real Estate Activities	58.5	61.2	68.9	72.7	79.7	71.2	82.4
Professional, Scientific and Technical Activities	285.6	328.4	307.3	306.8	328.8	359.3	361.8

Table 1.2: Labor force in Malaysia by category, 2010 – 2016 (in '000) (continued)

Labor Force	2010	2011	2012	2013	2014	2015	2016
Administrative and Support Service Activities	359.2	448.0	532.2	566.9	654.3	634.8	657.0
Public Administration and Defense	787.7	750.2	696.4	761.4	741.7	751.0	748.2
Education	779.3	782.3	784.9	816.6	871.4	899.0	928.7
Human Health and Social Work Activities	280.0	384.1	414.3	490.0	532.9	573.1	570.3
Arts, Entertainment and Recreation	91.6	87.5	84.8	79.4	94.1	81.7	80.9
Other Services Activities	182.9	181.8	190.5	192.4	199.1	233.1	230.8
Activities of Households as Employers	285.4	225.8	202.7	214.8	159.1	142.3	124.7
Total Employment	11,899.5	12,351.5	12,820.5	13,545.4	13,852.6	14,067.7	14,163.7
Unemployment	404.4	389.2	401.2	435.1	411.1	450.3	504.1
Labor Force Participation Rate (%)	63.7	64.5	65.6	67.3	67.6	67.9	67.7

Source: Economic Planning Unit Malaysia (2010, 2011, 2012, 2013, 2015, 2016, 2017)

In terms of involvement, the labor force in Malaysia was dominated by five main industries which was led by "wholesale and retail trade" in 2016, accounted for 17.15% of the total labor force in Malaysia. "Manufacturing" was ranked second in the same year (16.88%), followed by "agriculture, forestry and fishing" (11.37%); "accommodation and food service activities" (8.90%) and "construction" (8.84%), respectively. The contribution of the other industries were recorded at less than seven percent of the total labor force in the same year.

In terms of percentage contribution of agriculture sector to the labor force in Malaysia, it is interesting to note that its contribution was on decreasing trend from 2010 to 2016. Contributed about 13.6% in 2010, the proportion of agriculture sector in the labor force in 2016 was recorded at 11.4% in 2016. This scenario is expected for the developing countries like Malaysia, where increasing competition for land and other resources have been or will be felt over the time. In fact, most of the time, the country resources including land and labor will be devoted to other promising or lucrative sectors, which eventually limit the job

opportunities in agriculture sector. As for manufacturing sector, its contribution to the total labor force from 2010 to 2016 was recorded steadily at a rate of 16 to 18%. A relatively high involvement in this sector as compared to the other sectors might be attributed to the growth of urban populations, as manufacturing companies typically located in the urban areas.

In general, the rate of labor force participation have been improved over the past six years, from 63.7% in 2010 to 67.7% in 2016. Inversely, this scenario gave a good indicator on the unemployment rate in the country. Based on the data provided in Table 1.3, the unemployment rate was on decreasing trend over the past twenty years. Since it was recorded at 4.5% in 1990, the rate of unemployment in Malaysia had reduced by more than 1% over the period of 2000 to 2010 before it reached to 3.4% in 2016.

Table 1.3: Unemployment rate in Malaysia, 1982-2016 (%)

Year	Unemployment Rate (%)	Year	Unemployment Rate (%)	Year	Unemployment Rate (%)
1982	3.4	1994	NA	2006	3.3
1983	3.8	1995	3.1	2007	3.2
1984	5.0	1996	2.5	2008	3.3
1985	5.6	1997	2.4	2009	3.7
1986	7.4	1998	3.2	2010	3.3
1987	7.3	1999	3.4	2011	3.1
1988	7.2	2000	3.0	2012	3.0
1989	5.7	2001	3.5	2013	3.1
1990	4.5	2002	3.5	2014	2.9
1991	NA	2003	3.6	2015	3.1
1992	3.7	2004	3.5	2016	3.4
1993	4.1	2005	3.5		

Note: NA indicates the data is not available
Source: Economic Planning Unit Malaysia (2010, 2011, 2012, 2013, 2015, 2016, 2017)

Theoretically, rapid urbanization process is pulling poverty into urban communities as urban dwellers are typically net food buyers and depend mostly on cash income to access food (Islam and Siwar, 2012). In reality, they are susceptible to food price shocks and always suffer most from higher food prices, especially urban poor (Zezza and Tasciotti, 2010), which eventually could lead them to food security threat.

In Malaysia however, as the unemployment rate at the national level is still at acceptable rate (recorded at 3.4 percent in 2016), it is anticipated that the poverty incidence rate is still under control. Despite the number of urban dwellers have been increased, the rate of poverty incidence also had reduced at both rural and urban areas over the past forty years (Table 1.4). For instance, in 2016, only 0.2% of households in the urban areas were categorized as urban poor as

compared to one percent in the 2012. Likewise, in the case of rural settlements, only 1% of them was included into poverty incidence group in 2016 as compared to 3.4% in 2012. The percentage of hardcore poverty in the urban areas was also lessened over time, and in fact no hardcore poverty incident was documented in 2016 among urban dwellers.

Table 1.4: Incidence of poverty and hardcore poverty in Malaysia, 1970-2016 (% of households)

Year	Incidence of Poverty (% of households)			Incidence of Hardcore Poverty (% of households)		
	Overall	Rural	Urban	Overall	Rural	Urban
1970	49.3	58.6	24.6	NA	NA	NA
1980	37.4	45.8	17.5	NA	NA	NA
1990	16.5	21.1	7.1	3.9	5.2	1.3
1995	8.7	14.9	3.6	2.1	3.6	0.9
1997	6.1	10.9	2.1	1.4	2.5	0.4
1999	7.5	12.4	3.4	1.4	2.4	0.5
2002	5.1	11.4	2.0	1.0	2.3	0.4
2004	5.7	11.9	2.5	1.2	2.9	0.4
2007	3.6	7.1	2.0	0.7	1.4	0.3
2008	3.8	7.7	2.0	0.8	1.8	0.3
2009	3.8	8.4	1.7	0.7	1.8	0.2
2012	1.7	3.4	1.0	0.2	0.6	0.1
2014	0.6	1.6	0.3	0.1	0.2	0
2016	0.4	1.0	0.2	-	-	-

Note: NA indicates the data is not available
Source: Economic Planning Unit Malaysia (2008, 2009, 2010, 2012, 2013, 2015)

To date, urban poverty does not seem to be a major problem to the country. This is however not consistent with the idea suggested by Angel *et al.* (2011), where the authors stated that most urban population growth and urban expansion will affect poor people particularly in the case of developing countries. This statement can be seconded by looking at the proportion of income spent on food. As urban people are net food buyers, in terms of proportion of spending, it is notable that urban residents spend 30% greater than rural population for food. In facts, pressure on urban poor is more, where they spend more than half of their income on food (60-80%) (Hubbard & Onumah, 2001), and not taking into account for other ever increasing living cost expenses.

In Malaysia, the amount spent for food by households was recorded at less than 30%, and the proportion of income spent for food was higher for rural settlements as compared to urban dwellers. The composition of household consumption in

Malaysia in 2016 is as illustrated in Table 1.5, where 25.7% of household income in rural area were spent on food. This is followed by “housing, water, electricity, gas & other fuels” (20.2%); transport (13.6%) and “restaurants and hotels (11.4%). The proportion of rural settlements’ income devoted for the other categories was recorded at than ten percent.

In the case of urban settlements, the amount spent for food was ranked second of the twelve groups measured. About one fourth of urban dwellers income were allocated for “housing, water, electricity, gas & other fuels”, 24.7%. “Food & non-alcoholic beverages” was ranked second (16.7%), followed by transport (13.7%); “restaurants and hotels” (13.7%) and “miscellaneous goods & services” (7.8%). Both indicators, either for urban or rural settlement show that food was one of the most important group to be considered when it comes to households’ expenditure.

Table 1.5: Percentage of household consumption expenditure by strata, Malaysia, 2016

Main Group of Consumption Expenditure	Percentage Expenditure	
	Urban	Rural
Food & non-alcoholic beverages	16.7	25.7
Alcoholic beverages and tobacco	2.3	3.1
Clothing & footwear	3.3	3.7
Housing, water, electricity, gas & other fuels	24.7	20.2
Furnishings, household equipment & routine household maintenance	4.2	3.7
Health	1.8	2.0
Transport	13.7	13.6
Communication	5.1	4.5
Recreation services & culture	5.2	3.7
Education	1.4	1.0
Restaurants and hotels	13.7	11.4
Miscellaneous goods & services	7.8	7.4

Source: Department of Statistics, 2016

Although the percentage of income spent on food was lesser than 30% for urban dwellers in Malaysia, it is also important to note that there was a significant different in terms of consumption expenditure by income group. The consumption expenditure by income group in Malaysia in 2016 is depicted in Table 1.6.

Table 1.6: Composition of food expenditure by income group, Malaysia, 2016

Main Group of Consumption Expenditure	Percentage Expenditure		
	B40	M40	T20
Food & non-alcoholic beverages	25.5	19.0	12.2
Alcoholic beverages and tobacco	2.5	2.6	2.0
Clothing & footwear	3.6	3.4	3.3
Housing, water, electricity, gas & other fuels	24.7	22.8	24.4
Furnishings, household equipment & household maintenance	3.2	3.9	5.1
Health	1.8	1.9	1.9
Transport	11.8	13.8	15.4
Communication	4.0	5.2	5.4
Recreation services & culture	3.5	4.7	6.2
Education	1.0	1.3	1.5
Restaurants and hotels	11.8	13.9	13.8
Miscellaneous goods & services	6.5	7.6	8.8

Note: Mean monthly household consumption for B40, M40 and T20 were RM2,284, RM4,104 and RM7,843 respectively.
Source: Department of Statistics, 2016

The top 20% group (T20) focused more on “housing, water, electricity, gas and other fuels” and “transport” group for their monthly expenditure (24.4%), whereas bottom 40% group (B40) devoted major their income for food and housing expenses (25.5%). By combining information from both Tables 1.5 and 1.6, it can be said that food composes major substantial part of both urban and rural household expenditures, especially for those who are categorized under B40 and M40 groups (about 19% to 25% per household). A high percentage of income spent for food and housing expenditures (more than 40%) could lead to lack of cash income, which can be translated more directly into food shortages and malnutrition.

As stated earlier, the population is not only arising but it also becoming progressively urban. In spite of various advantages of urbanization, this process is however not exempted from creating undesirable consequences. For instance, problems such as food access and shortage, polluted environment, concerns in managing urban wastes as well as preserving greenery spaces in urban areas are anticipated. More pressure on existing resources in urban areas will be experienced, particularly in terms of competition for land with other urban functions.

In the case of food system, urbanization processes create problems on both supply and demand sides. On the supply side, a remarkable obstacle faced by the producers is an upsurge in quantity food demanded, as a result of increased in population. In facts, the quantity of food produced locally was far away from meeting up the quantity required. This is evident by looking at the self-sufficiency

level (SSL) of food commodities as well as the food balance trade performances over the past decades. For examples, apart from few commodities like pork, poultry and eggs, the self-sufficiency levels (SSL) for the other food commodities were less than ninety percent in 2016 (Figure 1.1). The SSL for fruits and vegetables were only recorded at 79.5% and 48.6%, respectively.

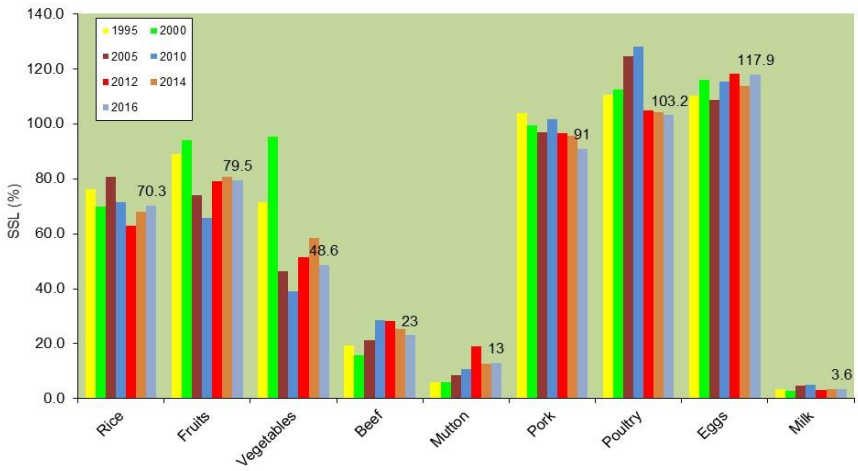

Figure 1.1: Self-sufficiency level of food in Malaysia, 1995-2016 (%)
Source: Ministry of Agriculture and Agro-Based Industry (2016)

The overall trade balance of food products experienced deficits RM1.1 billion in 1990 to RM16.5 billion in 2016 (Figure 1.2). Both import and export of food products have increased over the past twenty years, where the latter improved at a slower rate.

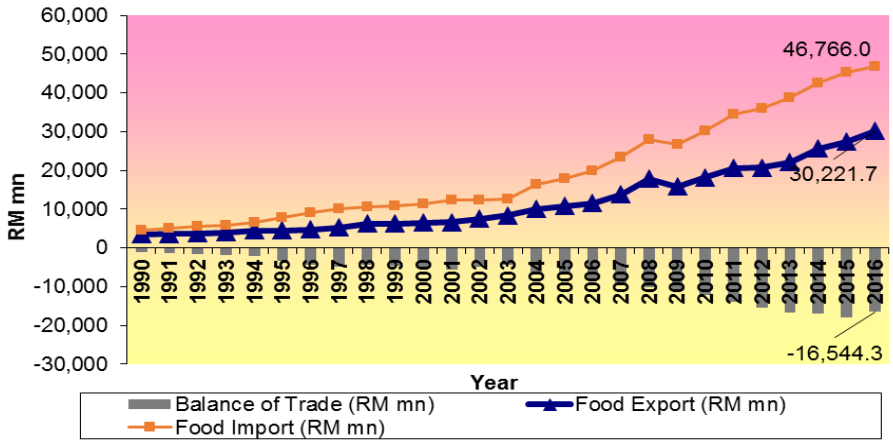

Figure 1.2: Malaysia's food trade balance, 1990-2016 (RM million)
Source: Economic Planning Unit Malaysia (2016)

In the case of fruits and vegetables, Malaysia is also a net importer. The balance of trade of fruits and vegetables from year 1990 to 2016 is illustrated in Figure 1.3. The balance of trade figure showed that Malaysia experienced a deficit to the tune of RM6.1 billion in 2016 due to large importation of both products. Both observations from Figures 1.2 and 1.3 indicated that Malaysia is worryingly depends on import and this might be risky for the nation, particularly concerning the food security issues.

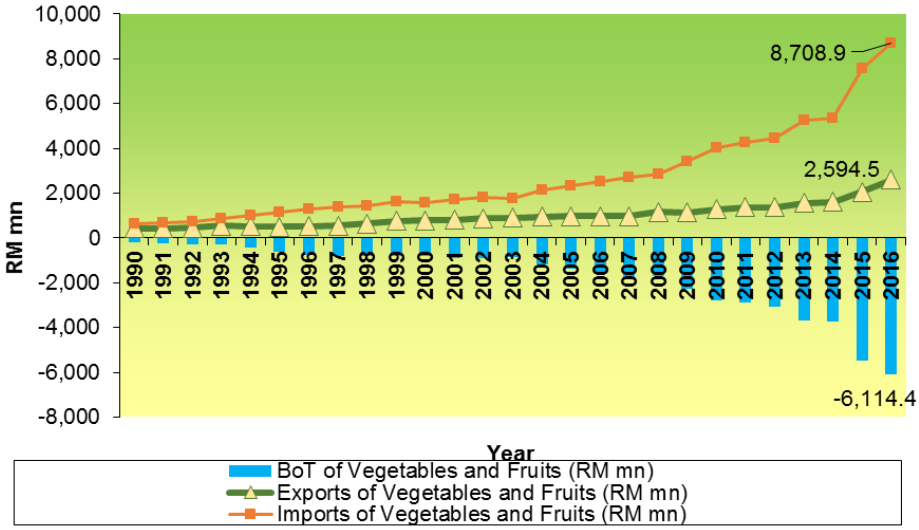

Figure 1.3: Malaysia's fruits and vegetables trade balance, 1990-2016 (RM million)
Source: Economic Planning Unit Malaysia (2016)

The impacts of urbanization processes on the environment are also remarkable. By default, this process fundamentally carries a wide range of unwanted consequences, particularly in terms of ecological degradation such as resource scarcity; environmental degradation and climatic changes (Chen, 2007; Martínez-Zarzoso and Maruotti, 2011); air, water and noise pollutions; as well as urban heat island effect (Dubbeling and Zeeuw, 2011; Zhou et al., 2004; Lamptey, Barron and Pollard, 2005).

Negative impacts of urbanization processes on both food system and environment revealed that urban ecosystems play an important role, as contributors to both problems (Lovell, 2010; OECD, 2001). On the other flip side, urban ecosystems could also be a potential solution through promoting more sustainable urbanization process. This can be done by promoting agriculture practices in the urban areas, and in fact, Peters (2010) indicated that urban agriculture is able to promote sustainable urbanization.

Based on definition by FAO (1999), urban agriculture refers to any agricultural activities which grows, raises, processes and distributes agricultural products regardless of land size and number of human resources within the cities and towns. Meanwhile, Zezza and Tasciotti (2010) regarded urban agriculture as the production of crop and livestock goods within cities and towns, while Webb (2011) defined urban and peri-urban agriculture as the growing of plants and the raising of animals within and around cities. In broader terms, Brown and Jameton (2000) described urban agriculture as a wide range of agricultural ventures within city limits, but it should be limited to gardening endeavors and related industries due to existing regulations in urban areas. In general, urban agriculture contributes in many positive ways to the urban ecosystem, and its role in urban areas will be discussed in the next section.

1.2 Role of Agriculture in Urban Areas

Most of the time, agriculture has been associated with the imaginary of the rural environment. In fact, in order to feed the human populations, it is assumed that relying on rural crop production would be sufficient (Orsini et al., 2013). However, this turned out to be rather incorrect, as it is evident that urban agriculture itself is able to cater food demand for urban population, given it is practiced in proper way (Specht et al., 2013). Rationally, it is more acceptable to say that producing food in the urban areas complements rural production and as such, they provide more foods for people (Smit et al., 2001).

In broader terms, it can be said that urban agriculture is multifunctional (Petrics & Feher, 2008). Multifunctional here refers to an economic activity may have multiple outputs and by virtue of this, may contribute to several societal objectives at once (OECD, 2001). It is also worth to note that historically urban agriculture had actually served many different functions (Table 1.7).

Table 1.7: Different roles of urban agriculture through history

Time period	Uses of urban agriculture
600BC	Private power and social status
1300AD	Innovative agriculture
1700AD	Collective gardens for knowledge
1900AD	Food production
2000AD	Leisure and recreation
2010AD	Health and ecology

Source: van Leeuwen et al. (2010)

Apart from its normal production function, urban agriculture was associated with private power and social status in 600BC. Way back in 1300AD, urban agriculture was used to promote innovative agriculture, before its role changed to be a collective gardens for knowledge in 1700AD. From the year 2000, urban

agriculture plays an important role in recreation and leisure activities, and contributes to health and sustainable urban environment simultaneously.

Due to its versatile roles, agriculture has become increasingly relevant to be applied in the urban areas. For instance, the ability of urban farming in supplying food is undeniably important given the facts that if 200 million city dwellers produce food for urban markets, 15–20 percent of global food production will be catered (Armar-Klemesu, 2000). Although urban agriculture is notably unregulated, unmonitored informal economy with little evidence on its economic value; Mougeot (2000) suggested that urban agriculture should be treated as a complement supplies from rural areas.

Apart from its contribution on the food supply, urban agriculture is also able to act as one of the solutions to climate change problem. This is true as urban agriculture plays a noteworthy role in greening the city and refining the urban climate, and at the same time enhancing the reuse of urban organic waste in its activity as well as reducing the urban energy footprint (Dubbeling & Zeeuw, 2011). As suggested by Lovell (2010), urban agriculture contribution can be seen in various functions, including production, energy conservation, waste management, biodiversity and microclimatic control (Table 1.8). Abundant functions of urban agriculture indicated that this activity provides important values to the cities, which eventually will contribute to the overall quality of urban life (van Leeuwen et al, 2010).

Table 1.8: Functions of urban agriculture

Function	Description and justification
Production	Urban agriculture produces fruits, vegetables, mushrooms, herbs, medicinal plants, meats, milk, cheese, eggs, and other products.
Energy Conservation	Producing food locally reduces the embodied energy resulting from inputs, transport, and packaging.
Waste Management	Organic waste products can be composted and used as a fertility resource for growing food and other products.
Biodiversity	Agricultural systems can support a wide range of species, including some native plants, as crops or associated plants.
Microclimate Control	Urban agriculture can positively alter microclimate through humidity control, wind protection, and shade.
Urban Greening	Community and backyard gardens contribute to the greening of urban areas, improving aesthetics and well-being.
Economic Revitalization	Urban agriculture ventures offer new jobs for neighborhood residents and vitality from improved economics of the community.
Community Socialization	Community members often find gardening and farming to be a social activity through sharing food, knowledge, and labor.
Human Health	In addition to the known benefits of access to green space, urban agriculture offers healthy food and encourages physical activity.
Cultural Heritage	Urban agriculture can provide access to rare ethnic foods that are typically not available in existing markets.
Education	Children and adults learn about foods, nutrition, cooking, environment, economics, and cultures through urban agriculture.

Source: Lovell (2010)

1.3 Current Status of Urban Agriculture in Malaysia

Generally, the rise in cost of living and increased in population, coupled with changes in lifestyle in cities have influenced the urban population to move towards producing their own food (Razak and Roff, 2007). Apart from growing crops, some city dwellers also raise small livestock for their own consumption or even sell them if there is demand.

Having recognized the importance of urban agriculture, the Malaysian government also gave their support towards this initiative. This is evident from the formation of urban agriculture division, under the Department of Agriculture Malaysia in 2010. Four objectives of the formation of urban agriculture division were listed, namely (i) to promote agricultural activities in the city in order to

reduce the cost of living the urban community; (ii) to add extra income for the urban community with surplus agricultural production; (iii) to promote awareness and interest in the importance of agriculture as a direct contributor to the reduction in the cost of living of urban community; and (iv) to ensure quality and food safety of the country (Department of Agriculture Malaysia, 2015).

The main objective of the division's formation is to foster urban community towards practicing agriculture for their well-being. In other words, it is a campaign program by nature. Basically, this is a continuous program stemmed from earlier plans called The Green Book Project (1974) and The Green Earth Campaign (2006). Objectives for both programs were (i) to encourage people to grow their own vegetables for their daily needs and (ii) to encourage people to produce their own food to curb the impact of inflation and the rising cost of food items.

The role of urban agriculture division is to provide extension services to the urban agriculture communities, with the main target is to reduce the cost of living in urban areas. The main functions of this division are (i) to provide advisory services, technical consulting and training appropriate farming in urban areas; (ii) to apply and promote farming methods related in urban areas as well as (iii) to plan, coordinate and monitor the programs and activities of urban farming.

Although there has been growing interest in practicing urban agriculture, the current adoption of it in Malaysia can be said is relatively low. As a comparison, an analysis of data from 15 developing or transition countries found that urban agriculture participation rates ranged from 11% to 69% (Zezza and Tasciotti, 2010). In Malaysia however, as of December 2016, only about 40,000 urban dwellers were recorded participated in urban agriculture programs conducted by Department of Agriculture in Malaysia. The participants were divided into four main groups namely individual; agencies; community and school (Table 1.9).

The number of participants recorded was solely based on program organized by Department of Agriculture, in collaboration with local authorities, government departments and other relevant agencies. However, it is believed that more urban inhabitants were actually involved in urban agriculture, especially those who do it informally, as their data were not captured by the Malaysian Department of Agriculture.

Table 1.9: Number of urban agriculture participant based on programs conducted by Department of Agriculture, Malaysia, 2014-2016

No.	State	Number of Participant (in 2014-2016)				
		Housing area (individual)	Housing area (community)	School	Institution/ private	Total
1.	Perlis	845	541	516	917	2,819
2.	Kedah	1,036	529	604	774	2,943
3.	Penang	693	229	332	237	1,491
4.	Perak	1,983	462	1,235	1,328	5,008
5.	Selangor	1,029	592	2,733	715	5,069
6.	Negeri Sembilan	441	350	599	147	1,537
7.	Melaka	749	121	489	302	1,661
8.	Johor	2,733	780	1,597	546	5,656
9.	Pahang	1,179	360	1,225	385	3,149
10.	Terengganu	970	369	920	556	2,815
11.	Kelantan	920	110	547	311	1,888
12.	W.P. Putrajaya	450	172	370	254	1,246
13.	W.P. Kuala Lumpur	1,445	620	823	556	3,444
14.	W.P Labuan	653	354	223	165	1,395
15.	Sabah	1,047	95	204	120	1,466
16.	Sarawak	69	13	52	44	178
Total		**16,242**	**5,697**	**12,469**	**7,357**	**41,765**

Source: Department of Agriculture Malaysia (2015)

Like in other countries, urban agriculture practices in Malaysia is also seen to be able to contribute to household food security through saving on food expenditure and cash income generation. Urban agriculture practices would also be helpful in mitigating urban environmental problems, given it is practiced in a proper way (Islam and Siwar, 2012).

1.4 Problem Statement

Presently, Klang Valley is the most urbanized and concentrated population area in Malaysia. Its' population is expected to increase partly due to urbanization processes. This demographic shift is notably have profound effects on Klang Valley's environments as greater pressures will be felt by the authorities especially in terms of competition of land for various urban functions, environmental degradation from pollutions as well as food security problems. In general, the two most common unwanted consequences owing to an increase in urban population are socioeconomic and environmental problems.

Socioeconomic problems comprises of various issues including food security, land use and other societal problems. As urban dwellers are typically net food buyers and depends largely on cash income to access food, they are expected to spend higher proportion of their income on food. In Malaysia, it was recorded that urban dwellers spent about 20% of their income on food in 2016 (Department of Statistics, 2016), which makes them vulnerable to food prices. This might led urban residents to food security threat. Urban residents are also unlikely to produce food, not even for their own consumption as agriculture ventures are limited to be conducted in urban spaces due to stiff land competition to be devoted to various urban functions. Urban dwellers also generally spent less time to interact with neighbors as they are constrained by their time and job responsibilities.

Apart from socioeconomic problems, urban expansion is also pulling innumerable of unwanted consequences to the urban environments in tandem. In this case, Klang Valley areas are not exempted. Environmental problems including resource scarcity, environmental degradation and climatic changes; air, water and noise pollutions; and lack of green spaces have been experienced in Klang Valley areas.

Having described issues and problems in the urban setting, it is worth to note that urban agriculture could be one of sustainable tools that could be applied. As agriculture is multifunctional, its ability to alleviate social, economic, and environmental problems in the urban environment, merits its nascent. The values of urban agriculture are well-recognized for economic development, food security, as well as preservation of green space in cities. In addition, urban agriculture complements to the built of healthier and sustainable urban environment.

Although urban agriculture provides positive impacts on the urban society, its current practices in Malaysia, including Klang Valley areas is relatively low as compared to other countries. Perception towards urban agriculture practices among urban dwellers remain unclear. Low participation in this activity could also be stemmed from underestimated of urban agriculture practices values, particularly in terms of its socioeconomic and environmental impacts. More participations in urban agriculture activity would be helpful to alleviate urban socioeconomic and environmental problems.

1.5 Research Questions

Based on the problem statement elaborated in the preceding paragraph, specific research questions were developed. The research questions to be studied are as follows:

i. What are the influential dimensions that shape the urban dwellers' perceptions on urban agriculture practices?
ii. How much the value of socioeconomic impact of urban agriculture practices and is there any significant differences between urban agriculture practitioners and non-practitioners?
iii. How much the value of environmental impact of urban agriculture practices and is there any significant differences between urban agriculture practitioners and non-practitioners? and
iv. How much the marginal willingness to pay for the both socioeconomic and environmental impact of urban agriculture practices?

1.6 Objectives of the Study

The general objective of the study is to assess the socioeconomic and environmental impacts of urban agriculture practices in Klang Valley, Malaysia. The specific objectives are:

i. To determine the influential dimensions that shape perception towards urban agriculture practices;
ii. To estimate socioeconomic impact of urban agriculture practices;
iii. To estimate environmental impact of urban agriculture practices; and
iv. To determine the marginal willingness to pay for socioeconomic and environment impact of urban agriculture practices.

1.7 Significance of the Study

The significance of this study can be seen in two different perspectives; (1) strategies and recommendations to policy makers that are associated with urban agriculture practices; and (2) contribution to the literatures. In the case of policy makers, this study will be able to contribute as follows:

i. By understanding the important dimensions that shape perception towards urban agriculture practices among urban dwellers, this would provide beneficial insights in designing the promotional campaign to be conducted to boost participation in urban agriculture activity;
ii. The estimation of urban agriculture values, especially in terms of socioeconomic and environmental functions would provide good justifications to promote this activity profoundly.

As far as the contribution to the literatures is concerned, the application of choice modeling in valuing the impacts of urban agriculture practices, particularly in Malaysia can be considered as novel. Based on literatures, most of choice experiment studies deal with environmental goods and services valuations. This study is however employs choice modeling technique to measure both

socioeconomic and environmental impacts of urban agriculture practices. It is hoped that the estimations of urban agriculture values based on its impacts on both socioeconomic and environmental functions, will be able to contribute to the body of literatures.

1.8 Organization of the Thesis

The remaining chapters are organized as follows: Chapter 2 reviews literature on urban agriculture practices and potential methodological framework to be used in the study. Chapter 3 is focusing on the methodology, where the theoretical and conceptual frameworks of the study will be explained. Discussion on survey procedures and data collection processes will also be elaborated. Analysis of the study results and discussion are provided in Chapter 4. This chapter answers the research questions drawn in the study. Finally, in Chapter 5, conclusions are drawn and policy implications are inferred based on the study results.

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