The Framework of Urban Farming towards Enhancing Quality of Life in Malaysia

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Abstract— This study aims to explore urban farming activities that could improve the quality life of B40 groups in Malaysia. At the end of the study, a framework of the quality life example (i.e social, economic, lifestyle and health) will be developed. This study has applied a mix method by combining three approaches including structured literature reviews, interviews and surveys. In first phase, a systematic literature has been done followed by the development and validating the research framework. Respondents for this study are among Malaysian citizens from B40 group that been selected on a voluntary basis. The framework was evaluated and validated by five experts and analyzed using Cohen's Kappa Coefficient formula. The framework consists of (i) individual factors which comprise the aspect of intention, capital, knowledge and skill; (ii) internal factors which comprise the aspect of farm, ecosystem, technology, methods and techniques; as well as (iii) external factors which comprise market, government support, resources and funding in terms of enhancing quality of life. The framework is expected to bring a paradigm shift in exposing Malaysians to improve their standard of living while promoting the development of agricultural innovations standing with developed countries.

Keywords- *Framework; quality life; urban farming; B40*

1. Introduction

A study by [1] revealed that by year 2030 more than 60% of the world population will live in urban areas. The growth of this population will put enormous pressure on sustainable planning and management of urban regions [2] which lead to few issues such as loss of greenfield, increase of energy usage associated with commuter traffic [3], reduction of fertile lands to deforestation, water pollution, and the creation of peri-urban areas [4]. These issues contribute to the weakening quality of life though cities served as social progress and national economic growth engine [5]. While cities swarm with environmental problems, it is important to make the city environment resilient, sustainable and a happy place to live in. The city resilience depends on the city system's capability to conserve social and ecological functions [6] which includes providing areas for rest and recreation, clean water and clean air [7], healthy and locally grown fruits and vegetables [8]. The motivation towards urban farming varies greatly across the globe. In Malaysia, government and urban citizens have touted the potential of urban farming that help to buffer income, create jobs and serve as a sink for urban waste. However, the research that specifically discuss the relationship between urban farming activities in improving the well-being of urban citizens still remain unexplored. Motivated by the paucity of research explaining this relationship, this study will investigate and propose a framework that shows how urban farming activities can elevate the well-being of urban citizen. The process of examining this relationship will be done through a mixed method which includes observations, interviews and surveys. This research will be used as a guidance in improving the economic status of B40 group through urban farming activities.

2. Methodology

Due to the nature of research objectives and scope of the research, this research will utilize a mixed method approach which include strucutred literature reviews and surveys at different urban sites in Malaysia. Further discussion on the methodology of the research will be provided in this section. In the first phase of the study, a systematic literature review is conducted to investigate the most topic that has been discussed in urban farming research area especially that lead to quality life discussion. The process of searching has been narrowed down into few subject matters including urban farming system activities, technology application and their use in the urban farms and smallholder farming activities in Southeast Asia. The keyword used for search is "urban farming in Southeast Asia".

This excludes any urban farming activities that not related to Southeast Asia such as those found in China, Japan, Taiwan, Korea and other countries. We also limit our scope to the English literature but consider all studies in exploring activities towards enhancing quality of life through urban farming activities in Southeast Asia. Three digital databases were explored to search the target articles. These three databases sufficiently cover the urban

farming studies especially activities happened in Southeast Asia.

The process of selection involves the search for the literature sources, followed by three iterations of screening and filtering. The first iteration process excluded the duplicate papers between the three databases. The second iteration process is screening the titles and abstracts papers and excluded unrelated articles. The last iteration is the process of thorough reading of the full-text articles. The search was conducted in March 2018 using the search boxes of Science Direct, Web of Science database and Scopus. A mix of keywords that contained "smart farming", "home farming", "town farming", "city farming") on different variation and combined with the "OR" and "AND" operators followed by Southeast Asia countries (Malaysia OR Brunei OR Cambodia OR Indonesia OR Laos OR Myanmar OR Philippines OR Singapore OR Thailand OR Vietnam OR "Southeast Asia").

The exact query text is shown at Figure 1 below. The process of analysing were done using Microsoft Word and Excel formats. Further, the final set of articles was categorized in detail using taxonomy. This taxonomy is classified into several classes and subclasses. The text is categorized according to the preferred author style together with the collected data and related information are saved in Word and Excel files. All articles are analysed from a variety of sources in depth to give readers a comprehensive look at the subject. Second phase of the study will use the subjective approach through qualitative research methods to generate in-depth and detailed description on urban farming activities which include the input, process and output.

The feasibility study is an important process in identifying real phenomena in a study, particularly in planning the methodology and developing the framework. In practice, the feasibility study was conducted with observation, survey and interview method. The observation was conducted on several urban farming sites in Perak, Selangor and Johor because these three states were actively involved in urban farming [9]. The data collected is in the form of video recordings, pictures and interviews with site owners. The survey was conducted via online survey. The survey aims to gain in-depth data on factors affecting urban farming and its relation to the quality of life. Forty people volunteered to participate in this survey. After the improvement has been done according to the systematic literature review, feasibility study and survey, all of the data are collected and analysed by triangulation and descriptive analysis to develop the final framework. The third phase of the study is conducted to validate the framework that has been identified in previous phases.

Five academic experts in the field of agriculture were recruited as evaluators to evaluate the validity of the framework. Cohen's Kappa Coefficient formula was used to validate the result. This analysis was crucial in determining whether or not the expert evaluators agree with the validity of the framework, so that the framework can achieve its intended objective.

3. FINDINGS

Phase 1: Systematic Literature Review

The keyword in the scope of this study is "Quality of Life through Urban Farming Activities in Southeast Asia". The initial query resulted in 851 papers: 17 from the Web of Science database, 378 from Science Direct, and 456 from Scopus. The filtered articles published until 2017 were adopted in this research and divided into three categories. In the three databases, the papers are filtered in three parts; the first part, 2 papers were duplicated from the total number of 851, the second part after reading the titles and abstract, 761 were excluded from the number of 849, the result become 130, in the second part of filtering process, 42 papers were excluded from the number of 130, the final included 88 papers as shown in Figure 1.

Studies that provide the discussion on urban farming benefits are immersed. For example, from the systematic literature reviews, there are several past studies discussed on the benefits of urban farming especially in elevating the quality life of city dwellers. Thus, this section will provide the review of urban farming activities. Despite numerous benefits acquired from the urban farming activities, there are also discussion from the past studies on the challenges and disabilities facing from urban farming activities. For example, the excessive use of animal fertilizers would affect the properties of the soil. It is difficult to see how animal fertilizer is considered a valuable source of crop nutrients. Some fertilizer is not a soil nutrient and this has caused damage to agricultural crops [10].

Some fertilizers also contain harmful properties that will lead to many adverse effects on the environment and the characteristics of the soil on the farm and production efficiency as well as on the crop itself [11],[12]. The excessive use of pesticide has led to the failure of pre-harvest agricultural soils in many urban farms in Southeast Asia. Pesticide residues affect consumers' and farmers' health, environmental pollution and restricted trading opportunities. Farms which are close to railways, car roads and industrial zones can be contaminated with heavy metals such as lead, sulphur and nitrate. These toxic materials will be transported to farms and cause a lot of diseases [13].

Some organic waste is harmful and bring effects on urban

agriculture because it may cause crop and vegetable to be damaged and render crops inedible [14], [15]. In Southeast Asia, some plantations in urban areas use a large proportion of nitrate fertilizers to increase the productivity of vegetables. Vegetables and water may contain higher concentrations of nitrates and may cause a serious threat to human health [13].

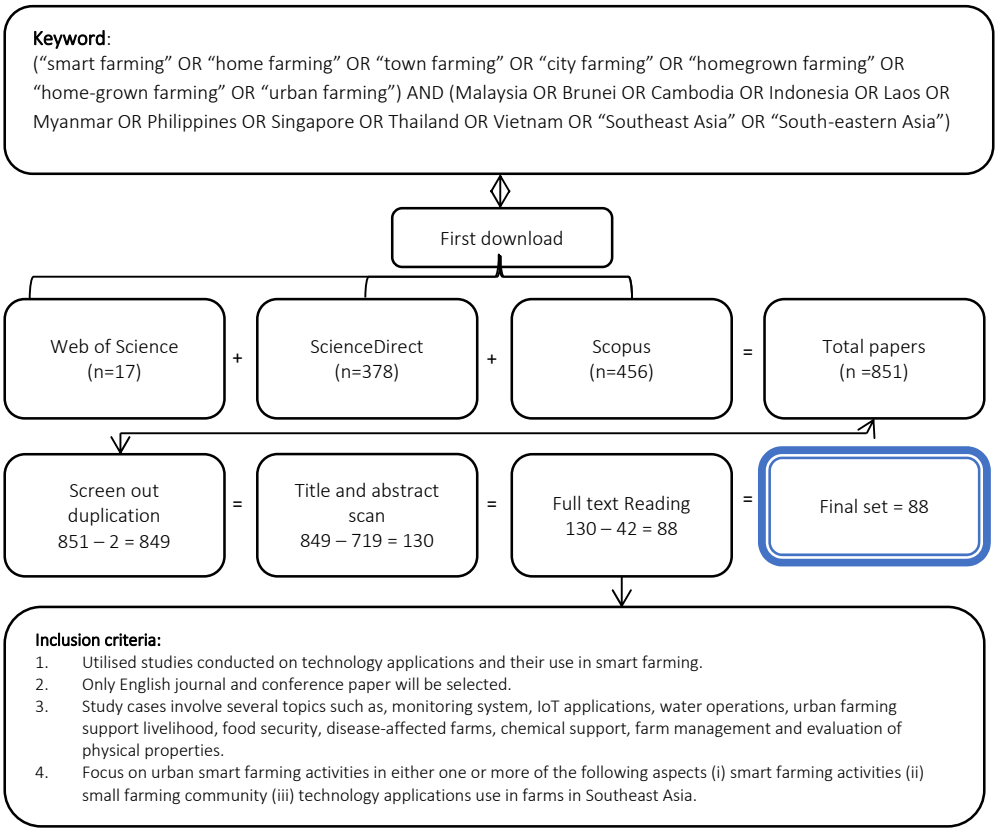

Figure 1. Flow chart of study selection for systematic literature reviews

Despite the poor management of small farms in many areas of Southeast Asia, there are few recommendations that have been discussed in past studies. For example, it is recommended that the local authority to establish a close cooperation with the government to draft a protective laws and regulations for open spaces farming. Such cooperation contributes to the success of small farms, for example: climate reporting, waste management, grain and fertilizer supply and water management. This effort will facilitate the successful uptake of gardening programmes [16]. encourage small-scale urban agriculture in buildings leading to a sustainable economy [18]. In another study, it also recommended that attention to be given in developing and increasing the spread of small farms, advocacy training and gardening and address issues that could hinder the success of the home gardening inside the urban cites in Philippines. A comprehensive policy is also required for joint management in city authorities as cities become larger, more ethnically diverse and with larger numbers of the population [14].

Phase 2: Development of Framework

The construct of the framework is based on a library and feasibility study that applied observation methods on the site, interviews with site's owners as well as surveys of urban farming practitioners through an online survey. The data collected then analyzed using data triangulation method. The results of the data analysis are thematically categorized as shown in Table 1.

Table 1. The construct of urban farming framework as a guide in elevating urban farming activities among B40 group.

Construct	Items	Description
Individual factors	Intention	Intention refers to factors that drive and motivate practitioners to start urban farming. Survey's finding shows that majority of the participants state that the idea of urban farming was triggered by hobbies (70%), passion (63%) and for a healthy source of food (55%).
	Capital	Capital refers to the initial source of capital which they are willing to invest in urban farming activity. Survey's finding shows that majority of the participants state that they use their own savings to start planting (70%). This is supported by interview data from a respondent "*I have allocated RM 1000 to start planting by purchasing seeds, soil, fertilizers and planting tools. This capital is sufficient because of the small area and I only grow vegetables that do not require intensive care*".
	Knowledge and skill	Knowledge refers to basic knowledge in cultivation while skill refers to competence in plant management. Based on survey, experience gained from parents (65%), resource search through reading (70%), educational background like pursuing agricultural subjects in high school (41%) as well as support from support group on social media (i.e: https://www.facebook.com/groups/jomtanamsendiri/) (35%)
Internal factor	Type of plant	Type of plant refers to a plant that is often grown by practitioners. Generally, the most commonly grown crops are vegetables (88%), herbs (53%), flowers (50%) and fruits (20%). One respondent stated that "*I prefer to plant plants that can be used in cooking because they are organic and are guaranteed hygiene*". 
	Ecosystem	Ecosystem refers to farm structure, planting requirements and planting space. Majority of the survey respondents conducted planting in open areas such as at the backyard and balcony (90%). This area was chosen because of its balanced ecosystem in terms of lighting and ventilation needed by the plant.  
	Technology	Technology refers to the use of alternative tools and innovations to assist cultivation. Based on the survey data, the majority of respondents still used the traditional planting tools (88%). Some respondents used hydroponic (9%) because of their narrow space. However, they are aware that there are some technologies that are mainly used for open space and for use in markets such as vertical farming and aquaponic.
	Methods and technique	Methods and technique refer to how the practitioners handle their crops. Through the survey data, the majority use weeding methods (70%), fertigation (65%) aeroponics (60%) and nutripot (45%). Regular monitoring is carried out to prevent pests or diseases that can damage the crops.
External factor	Market	Market refers to where this crop will be distributed. The majority of respondents stated that the crop is for their own use, most commonly used in cooking (93%). They will give or sell it to neighbours and grocery stores nearby if they produce too much.

	Resource and funding	Resource and funding refers to NGO or government bodies that contribute to the growth of urban farming. In an interview with the owner of the plant, "*I have received funds to expand my crop from the Department of Agriculture. I use the fund to buy better fertilizers and equipment*. "One lecturer said "*I got a grant from an university after winning a competition in the agricultural innovation category*".
	Government support	Government support refers to financial incentives, special training organized by government agencies such as FRIM, and urban agriculture program by the Department of Agriculture (i.e http://www.agricmelaka .gov.my/program-pertanian-bandar/). Survey data show that the majority of respondents know about the government's incentives (64%) and they are committed to all forms of encouragement.
Quality of life	Health	Respondents stated that their health status was increasing (85%) because they had an organic source of food that was free of toxic chemicals. With proper care, the nutrition of the crop is twice as good as that sold in supermarkets. Consumers can enjoy vegetables that are free from harmful chemicals and poisons, have a good source of organic food and be guaranteed good care and enjoy their own crops while minimizing the impact on their health.
	Social	Respondents stated that their social status was better (75%). As a multi-ethnic country, the urban farming is also important as it promotes the spirit of unity and neighbourhoods among the pluralistic society in Malaysia and contributes to the well-being of the people and the nation. Urban farming with family members around the home can also foster closer relationships with family members when gardening activities are held together.
	Life style	Respondents said their lifestyle changes were better than before (77%) when they practice urban farming as a hobby. Indirectly, farming activities can replace their exercise routine. This activity also educates the community to adopt a good lifestyle, especially in environmental protection of the use of natural resources.
	Economy	Respondents stated that urban farming was particularly helpful to the B40 group in improving their family economy (84%). This is because they can save money from buying groceries from outside as well as they can supply and sell their product to grocery stores or supermarkets. These activities can also generate additional income for others and support the local economy with local products.

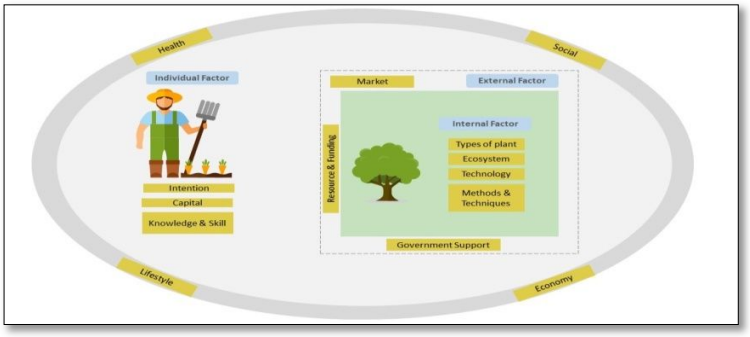

Figure 2. The proposed urban farming framework as a guide in elevating urban farming activities among B40 group.

These constructs are then integrated and formulated into a framework such as Figure 2. Individual factors comprising farmers' intention to undertake urban farming supported by capital ability as well as the support of knowledge and skills in carrying out urban farming are the key drivers for urban farming activities. Furthermore, internal factors comprising type of farm, ecosystem, technology, methods and techniques which are technical aspects of urban farming need to be complemented by external factors comprising market potential, government support in the form of training and programmes as well as resources and funding in the form of financial and tools to help farmers carry on more serious urban farming activities. As a result, urban farming can have an impact on the quality of life, especially in terms of health, lifestyle, social and economy.

Phase 3: Validation of the Framework

The validity of the frameworks have been validated by five academics experts in the field of agriculture using a checklist. The finding shows that two evaluators stated that the framework shows strong relationships and relevant constructs. Besides, it is easy to interpret by the general public. Two evaluators have stated that the framework is at a good level and suggest that the quality of life needs to be studied comprehensively. Only one evaluator stated that the framework was at a moderate level. The evaluator suggests that items in each construct should be appropriate in the Malaysian context and more specific. The mean value of each evaluator for this framework is shown in Table 2.

Table 2. The result of Cohen's Kappa Coefficient on the Validity of Framework

Expert Evaluator	Kappa Value (κ)	Agreement Scale
Expert Evaluator 1	.85	Excellent
Expert Evaluator 2	.75	Good
Expert Evaluator 3	.77	Good
Expert Evaluator 4	.58	Moderate
Expert Evaluator 5	.83	Excellent

4. Conclusions

Urban farming is an important medium for maintaining sustainability in urban areas. As the population of the world grows, the process of urbanization progresses as more people are expected to live in cities. By 2025, it is estimated that 60% to 85% of the world's population will be considered urban dwellers. In Malaysia, urban population is expected to increase to 75% by 2020. Urban farming activities can enhance the quality of life in terms of health, economy, lifestyle and social status. This is because gardening activities create an attractive and healthy green environment. The findings from this study show that urban farming can contribute to the availability of fresh and nutritious food, reduced spending on food bills, and direct access to a wide variety of food products. The Malaysian government is fully supportive of this activity. This can be seen from the formation of the urban agriculture division under the Department of Agriculture Malaysia in 2010 to encourage urban agriculture activities to reduce the cost of living of the urban population. Given that urban farming has the potential to gain momentum in Malaysia, it is important to implement appropriate strategies to ensure the availability and affordability of safe and healthy food, promoting such food production in urban areas as well as enhancing the quality of life. The contribution of the city to the availability of healthy food and nutrition for the citizens is one of the most important assets while providing a source of income and income for the practitioners especially for B40 group.

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