



© Universiti Tun Hussein Onn Malaysia Publisher's Office

IJSCET<http://publisher.uthm.edu.my/ojs/index.php/ijscet>

ISSN : 2180-3242 e-ISSN : 2600-7959

International
Journal of
Sustainable
Construction
Engineering and
Technology

Structured Literature Reviews (SLR) of Urban Farming for Improving Economic Status of Urban Residents

Siti Aisyah Salim^{1*}, Siti Hajar Salim², Fadhlina Mohd Razali³

¹Faculty of Technology Management and Business,
Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, 86400, MALAYSIA.

²Malaysia-Japan International Institute of Technology,
Universiti Teknologi Malaysia, Jalan Sultan Yahya Petra, Kampung Datuk Keramat, 54100, Kuala Lumpur,
MALAYSIA

³Faculty of Art, Computing and Industry Creative,
Universiti Pendidikan Sultan Idris, Tanjung Malim, 35900, Perak, MALAYSIA

*Corresponding Author

DOI: <https://doi.org/10.30880/ijscet.2021.12.05.027>

Received 26 October 2021; Accepted 05 November 2021; Available online 31 December 2021

Abstract: The increasing of urban population demands the development of new technologies that provide sustainable living. This issue might debilitate the quality life of urban residents though city life always associated with national economic growth engine and social progress. Many initiatives have been commenced in elevating the economic status of urban residents including urban farming activities. In Malaysia, several stakeholders have pushed the potential of urban farming activities that help to create job, increase income, and serve as an urban garbage sink. Nonetheless, research that investigated urban farming activities could improve the economic status of urban residents still very lacking. Thus, this research aims to explore potential urban farming activities through structured literature reviews (SLR). It searched all the selected databases and found 851 papers: 378 from ScienceDirect, 17 from Web of Science and 456 from Scopus. These databases comprised comprehensive literature that concentrate on urban farming activities in Southeast Asia. Subsequently, the process of filtering was achieved based on intelligent processes. The process consists of three iterations of filtering, excluding duplicate articles, filtering titles and abstracts and reading full text articles. About 90 articles has been derived for the final classification of urban farming sub-topics. The details of the key features of topics will be discussed in the research which include the following aspects: the motivation towards urban farming activities, the advantages of urban farming especially for increasing the economic status of urban residents. The finding from this research could be used for future researchers to understand several sub-topics that related with urban farming urban residents that remain unexplored.

Keywords: Urban farming, Structured Literature Reviews (SLR)

1. Introduction

Urban farming is a process of cultivation of plants around city areas with the aim to give food to the local population or generate extra income (Salim & Sa'don, 2021; Yusoff et al., 2017). Different terminologies exist to describe the concept of urban farming including small community gardens (Cabalda et al., 2011), peri-urban farming (Mintorogo et al., 2017), city gardens small farming, greenhouse or building of vertical farming (Taufani, 2017). All these terminologies

provide the same purpose which is to be part of a community with independence of the food system and food safety (Ibharim and Salim, 2020). Urban farming has the potential to achieve more sustainable and productive agricultural production in city areas. This activity could also contribute to food safety, food security and improve the quality of life as well as the environment by greening the country, especially the urban areas (Salim et al., 2019). Urban farming focuses on providing food security for urban citizens and economic divergence. Further, the concept of urban farming encourages city residents to use their unproductive land and start to have small gardens in their house using the spatial characteristics. This has created the agricultural community and led to environmental awareness in city areas (Prasetyo et al., 2016). Urban farming activities are very important as they meet the needs of a constant evolution of city life.

Research on urban farming has been largely discussed (e.g., Battersby and Marshak, 2013; McPhearson et al., 2014; Orsini et al., 2013; Portney, 2013; Vitiello and Wolf-Powers, 2014; Walker, 2016). However, a few studies have specifically mentioned the relationship between urban farming activities and human well-being. For example, McClintock (2010) has used the metabolic rift framework to discuss the interrelated and interdependent ecological, social and individual dimensions in urban agriculture. In another study by Kutiwa and colleagues (2010), has suggested that urban agriculture can be operated as an economic, environmental, social, and political system which acts as a safety net for low-income city households. Such discussion has examined the elements of quality of life in general without focusing on specific activities of urban farming that could improve the economic status of Malaysian households.

This study aims to give insights to future researchers in understanding the state of art of urban farming activities especially in Southeast Asia. This study will also produce the taxonomy that would determine various topics that characterize urban farming research. The rest of the paper is organized as follows, background of the research, method used for systematic review, result, and statistical analysis gained from the systematic literature reviews. It continues with the motivation of the research and advantages of urban farming. The last section provides the conclusion of the paper.

2. Research Background

More than half of the world's population lives in cities (Brenner and Schmid, 2014) and the number expected to increase (Lederer, 2016). The growth of this population will create enormous pressure on sustainable planning and management of urban regions (Djordjević et al., 2011) and perhaps weakening the quality of life though cities traditionally served as social progress and national economic growth engine (Portney, 2013). Quality of life is a general well-being of an individual that outlines the positive and negative things of life. Several aspects can be categorized under quality of life which includes health conditions, environmental and social aspects, and the economic status. Further, the quality of life should not always be measured on monetary value but more important, the happiness that everyone has achieved. Few studies have discussed the relationship between urban farming and the quality of life. A study by Walker (2016) has described that having farms inside the city could utilize the unused space that is always underutilized. The use of unused space not only creates part-time jobs, but it will also increase the access to fresh foods and provide environmental education to the city residents. However, the study by Walker does not scientifically discuss factors that lead to a better quality of life. Another study by Vitiello and Powers (2014) have argued that urban farming activities contribute to economic development and become an effective form of social enterprise for supplemental income generation. However, this study just compares urban farming activities in six United States cities without relating how these activities can contribute to the enhancement of the quality of life. Few other studies have also discussed the benefits of urban farming towards improving the quality of life (Battersby and Marshak, 2013; Orsini et al., 2013; Potter and LeBuhn, 2015); however, to the best of our knowledge, none of these studies have thoroughly reviewed studies that related with urban farming activities in Southeast Asia and its relationship with quality of life.

3. Methods

In doing the structured literature reviews (SLR), finding the suitable keywords is essential. This paper has used "quality of life through urban farming activities" as the keywords. The use of these keywords has excluded a few elements such as: urban farming activities that do not happen in Southeast Asia, determinants or activities that are not related with improving the quality of life through urban farming. The search of the paper also limits to only English past studies. Three digital databases were used to search the target articles which includes Web of Science, ScienceDirect and Scopus. Each of these databases has their own strength, for example Web of Science database covers cross-disciplinary research that include agriculture, engineering, life sciences, medical physical and chemical, biological sciences and medical papers. ScienceDirect and Scopus are used since both databases provide the largest scholarly research database which have the most reliable and wide range of topics. These three databases are already enough to cover urban farming activities in Southeast Asia. The process of reviewing starts with selecting three databases, followed by screening and filtering with three iterations. These three iterations provide different purposes. For example, in the first iteration, it includes the process of excluding the duplicate papers between the three databases. While in the second iteration, the process of screening the paper titles and abstract. In this screening, the author will exclude unrelated articles. The last iteration will be done by thorough reading of the full-text articles. The search of all these articles was done in January 2019 using the proper query in the search boxes of the three databases namely, ScienceDirect, Web of Science and Scopus. The keywords used for structured literature reviews are a mix of ("urban farming", "town farming", "home-based farming", "home-grown farming", "home farming", "precision livestock farming", "PLF", "smart farming", "homegrown farming", "city farming") on different distinction and combined with "OR" and "AND" operators together with Southeast Asia countries (Malaysia OR Vietnam OR Indonesia OR Singapore OR Thailand OR Brunei OR

Cambodia OR Laos OR Myanmar OR Philippines OR “Southeast Asia”). With the advanced search options in the database, the author chose conferences and journals papers without considering other selections such as books, book chapters, short communication, and letters. Figure 1 illustrates the final query that was used in this research including selection, exclusion, and inclusion criteria.

From the full reading, all important points from the selected papers will be extracted and put in the Microsoft Word or Excel format. Excel and Word were used to save important information and summary details of all articles. Based on the analysis, the final set of the papers will be categorized in detail using taxonomy. This taxonomy means the classes and subclasses of the papers. From the summary, the author will describe and tabulate the findings. The process of categorization of each article depends on the style that has been set by the author.

4. Result

After searching all the selected databases, we found 851 papers: 378 from ScienceDirect, 17 from Web of Science and 456 from Scopus. The articles selected for this research were published until January 2019 and were divided into main categories which are: urban farming technology applications, urban farming activities and small farming systems. Further, from these 851 papers, three filtering processes were done. In the first part of the filtering process, 2 papers were taken out as duplicates. In the second filtering process, the abstract and title of the paper were read carefully, and 719 papers were removed. In the last filtering process, 40 papers have been excluded and this makes only 90 papers remained for final process.

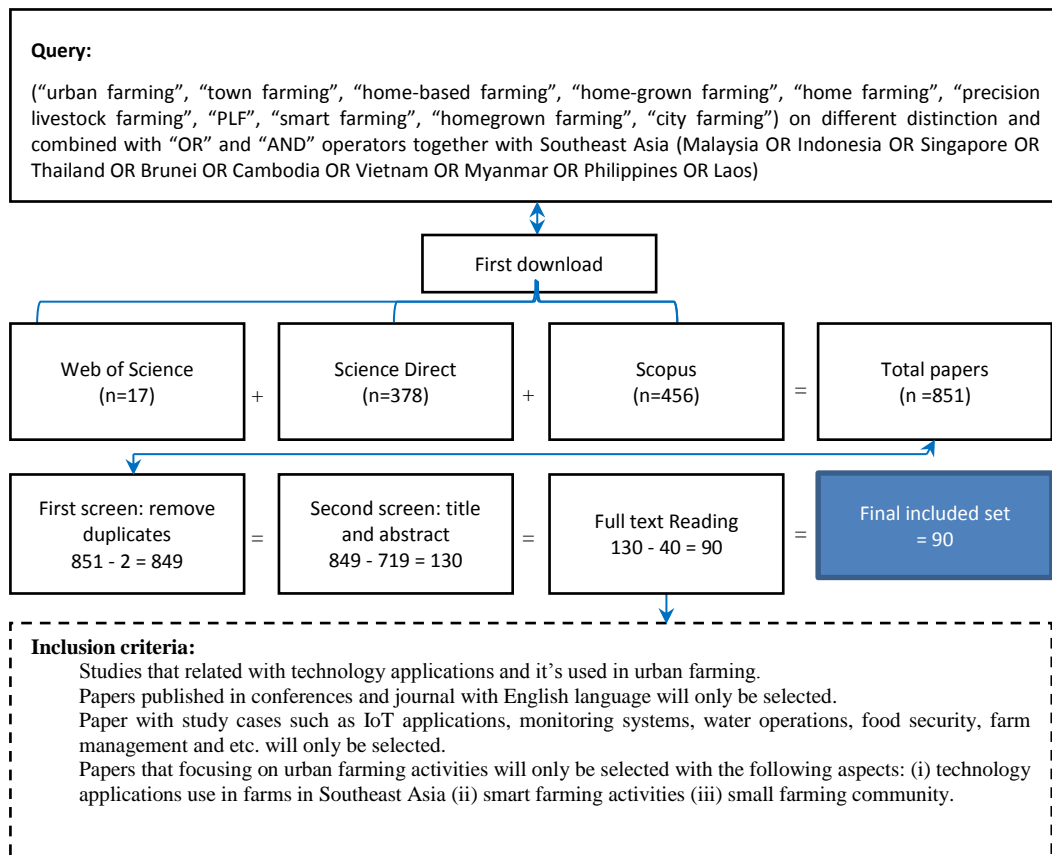


Fig. 1 - The flowchart of study selection and filtering process

5. Discussion

From the reviews process, this study has come out with several categorizations of urban farming topics focusing on urban farming activities and quality of life. Figure 2 provides the classification of topics from thorough systematic reviews. The classification starts with three main topics which are urban farming articles related with technology applications, urban farming activities and small farming systems. Each of these main topics is further elaborated into more specific topics which will be discussed further in the following sections.

5.1 Smart Farming Technology Applications

This study reviews the applications of technology in the agricultural field and type of technology used to facilitate the development of agricultural fields and activities. It will start with discussion on different types of technologies used to evaluate urban farming such as, paddy fields using electrical conductivity sensors (Aimrun et al., 2007). Further, this

study has also discussed the use of sensors to measure the plant nutrients for paddy fields in Malaysia as well as the chemical properties. In another study by Mastura et al. (2011), it has discussed the use of sensors that could give quick information for measuring the chemical properties of the paddy soil from different spatial locations. A study by Pobkrut and Kerdcharoen (2014) have explained the use of Microflex-C sensor technology in the farm to measure crop evapotranspiration in the paddy fields. The use of organic material on agricultural soils could increase the quality and productivity of the soil (Pobkrut and Kerdcharoen, 2014). Smart farming has been contributed by automated machine-like robots. A study by Chieochan et al (2017) has justified the use of robots to increase the efficiency of farming, thus decreasing the cost of human power. Recent applications like Internet of Things (IoT) have been used widely to measure and monitor the humidity of soil especially for plantations that require lots of water like mushrooms (Chieochan et al., 2017). In another study by Sureephong et al. (2017) present the prototyping of IoT technology for wetting front detectors (IoT-WFD). This technology provides the ability to measure the water level in precision farming as well as monitor the soil properties.

5.2 Urban Farming Activities

This section will provide reviews on urban farming activities and their importance in the service of Malaysian society in general (Leh et al., 2011). In this study, the benefits of urban and peri-urban agriculture are provided in relation to Thai society's food security, income, employment and improvement of the urban environment (Vagneron, 2007). This study also provides the discussion on the use of soil cover to protect the soil from weeds and prevents the drying of the soil from the water (Mohammed et al., 2016). This study was conducted to identify the suitability and the needs of Urban agricultural activities in the city of Ipoh, Malaysia (Abdullah et al., 2011). This study aims to create new techniques in general to increase the quality and potential of agriculture and the potential for improving the number of seedlings in Malaysia and reduce transplanting shock (Bashar et al., 2015). Another study by Tablada and Zhao (2016) discusses the importance of sunlight energy to support urban farming activities. Differences in climate cause many problems in agriculture, affect soil fertility, and differences in agricultural and staple food techniques (Susilastuti, 2017).

5.3 Small Farming Systems

This section will discuss a few systems that have been used to support urban farming activities. Few studies that related to this sub-topic will be presented to elaborate the small farming systems. The discussion started with a study by Taufani (2017) where the authors presented a virtual building model to support the green buildings in Selman city, Indonesia. There are four easy cultivation stages: green facades, green roof, green balcony and green wall (Taufani, 2017). This study also demonstrates some of the main functions of agriculture in home gardens in Southeast Asia, which have a main role in the nutritional enhancement of the community (Weinberger, 2013). A study by Hill (2011) describes the changes in livelihoods and food from small farms in agricultural areas and family relations between women and men, especially in the city of Ghana in the Philippines. In this study, the benefits of agriculture in urban buildings are generally explained in terms of food provision and contribute to the reduction of temperatures in urban buildings (Mintorogo et al., 2017). This study presents the activities of peri-urban farming activities in the Southeast countries. In many peri-urban areas in Southeast Asia, turning the land use of rice-based systems to more profitable systems based on growing vegetables in order to meet growing market demand (Khai et al., 2007). In this study the benefits of home gardening are illustrated in Philippine society. This small agriculture can address the nutritional deficiency of many families in urban cities. This is therefore considered as a means of improving the quality of the diet (Cabalda et al., 2011). There are more studies discussed on the small farming systems. However, due to limited space provided in this journal, only activities that significantly improve the quality of life are presented. Further elaboration on each of the subtopic as shown Figure 2 will not be discussed in this section.

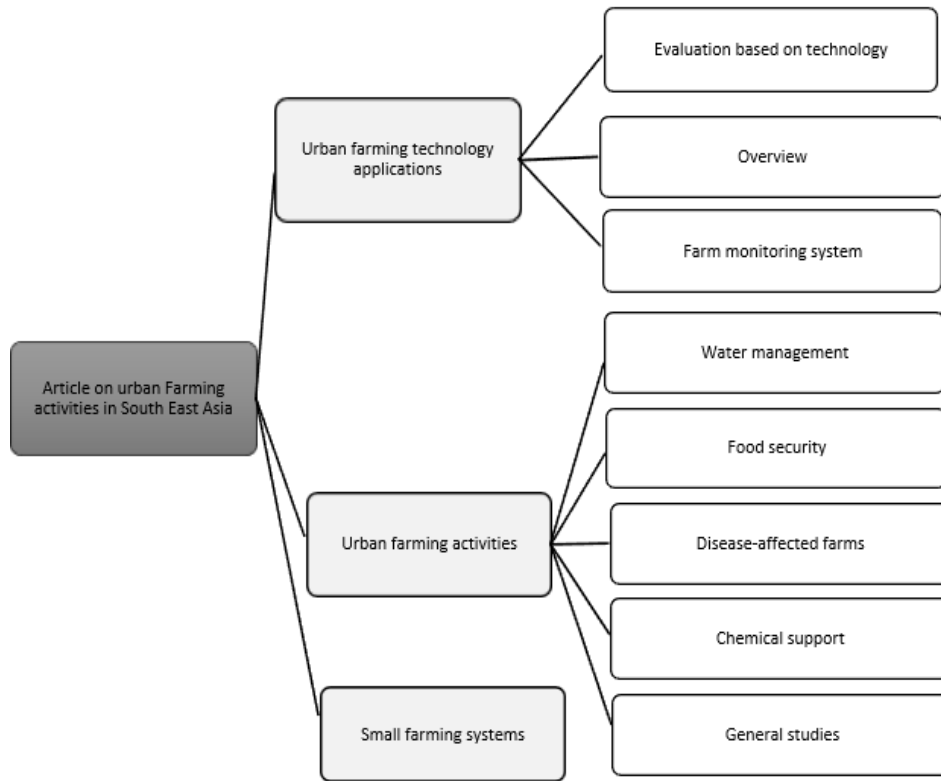


Fig. 2 - The taxonomy of urban farming activities in Southeast Asia

6. Motivations

Articles selected under this category will discuss the state-of-the-art of urban farming in Southeast Asia with the aim to highlight the research trends. For presenting the classification, a taxonomy will be used that has been illustrated in Figure 2. The taxonomy of relevant literature helps to classify these activities into manageable, meaningful, and cost-effective planning research topics. With this classification, it is hoped could benefit the readers and future researchers who are interested in this research area. For a new researcher, it could be confusing without any kind of structure and arrangement and may fail to get an overview in this area. This study hopefully could help the researcher to find the general overview about the latest topics on quality of life through urban farming activities in Southeast Asia.

Further, the mapping topic of the taxonomy related with urban farming in Southeast Asia could highlight the weaknesses and good features in terms of research coverage. From the analysis of the taxonomy and the papers, three aspects of literary content are identified, namely the motivation behind the development of urban farming activities, the benefits of urban farming activities and recommendations and conclusion to these activities. The benefits of urban agriculture activities in Southeast Asia are presented in detail below. The sections below present the advantages mentioned in previous studies that are grouped into different categories on similar benefits.

7. Urban Farming Advantages

The activity of urban farming could help city residents getting fresh fruits and vegetables, reduce global warming, improve the city's aesthetic and provide food security for the townspeople (Widaryanto et al., 2017). Home gardens are considered urban farming and it play an important role in food systems in Southeast Asia. Home gardens are small-scale, privately and managed by families and non-commercial gardening. This system provides food self-sufficiency within urban cities such as fruits, vegetables, and beans. This system has a significant role in enhancing the social and economic sustainability goals in the urban cities. The garden system can improve the environmental impact, where they can insulate homes against extreme temperatures, thus reducing energy use. The amount of food consumed in the city increases as the urban garden activity increases. This led farmers to move to urban areas to contribute work to these farms (Weinberger, 2013). Further, the new design of urban agriculture building in the vertical building's facade includes the urban farming construction on the roof, wall, and balcony, is one of the major activities contributing to support the food supply to the population in Indonesia (Taufani, 2017). It can also reduce the excessive use of water and the elimination of runoff, use very little fertilizer, low transport costs and be easy to sell to the population (Nguyen and Weiss, 2008).

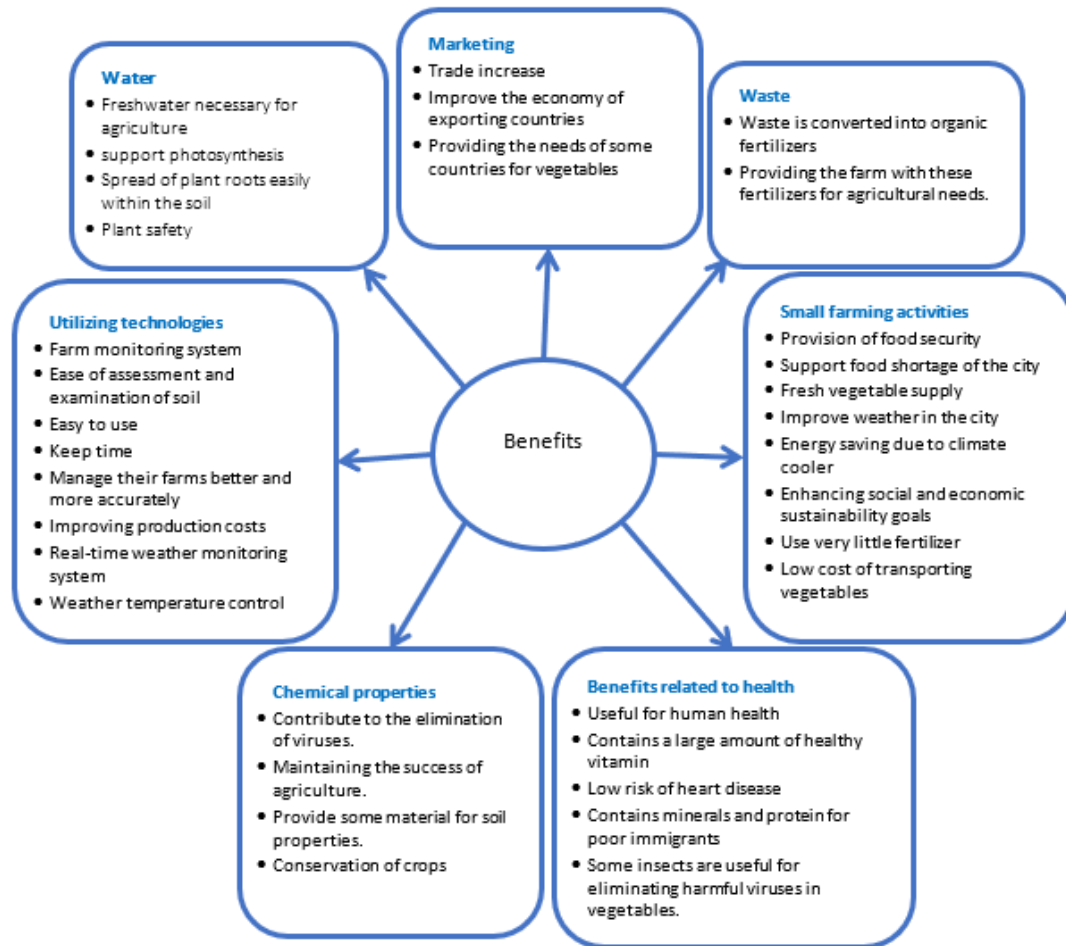


Fig. 3 - Advantages of urban farming activities

One of the benefits of urban farming in private buildings is the provision of nutritional support to the inhabitants of the building. In Indonesia for example, farming on rooftop surfaces exposed to solar radiation tends to have surface temperature 27 to 50°C (Mintorogo et al., 2017). Urban agriculture can be a solution to make the vacant land useful with a flexible solution for people who are financially deficient. The existence of urban agriculture avoids transport costs from rural farms and the ease of transportation to the population within the city. These urban plantations seek to achieve sustainable agricultural production, economic sustainability and food supply of urban communities (Cahya, 2016). In this research, the process of participation in the small-scale process, especially women, has enabled them to increase their skills and significant contributions to household income (Weinberger, 2013). This study reviews the tasks of women in agricultural life in the Philippines, and the activities of women in paid work on small farms are an important source of family income (Angeles and Hill, 2009). The continuing increase in the construction of peri-urban farming in the demand for vegetables in the urban areas of Southeast Asia, especially in Vietnam, is very important because of their nutritional needs (Khai et al., 2007). Despite the ever-increasing urban demand for vegetables in Asia traditionally supplied by peri-urban areas, there are several benefits of increased financial resources, such as easily transferring vegetables to urban cities (Midmore and Jansen, 2003).

8. Conclusion

Urban farming is very important especially in city areas as it meets the needs of the population for supplying fresh vegetables, facilitating the transport process, helping to cool the city weather, improve the city’s aesthetic and provide food security for the townspeople (Widaryanto et al., 2017). Home gardens are a farming system that plays an important role in food systems in Southeast Asia. Home gardens are small-scale, privately and managed by families and non-commercial gardening. This system provides food self-sufficiency within urban cities such as fruits, vegetables and beans. The increase of urban gardens has helped city residents with fresh food supplies. This has also encouraged farmers to move from rural to urban areas to contribute towards these initiatives (Weinberger, 2013). The continuous increases of peri-urban farming are important inline with the demand for fresh vegetables in urban areas (Khai et al., 2007). In conclusion, this research has shown 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. Thus, 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.

Acknowledgment

This research is fully funded by Universiti Tun Hussein Onn Malaysia (UTHM) through Tier-1 Research Grant (code: H272).

References

- Abdullah, I. C., et al. (2011). *Evaluating the suitability of urban farming programme case study: Ipoh City*. Paper presented at the Humanities, Science and Engineering (CHUSER), 2011 IEEE Colloquium on
- Aimrun, W., et al. (2007). Spatial variability of bulk soil electrical conductivity in a Malaysian paddy field: key to soil management. *Paddy and Water Environment*, 5(2), 113-121
- Aimrun, W., et al. (2011). Paddy field zone characterization using apparent electrical conductivity for rice precision farming. *Int. J. Agric. Res.*, 6, 10-28
- Angeles, L. C., & Hill, K. (2009). The gender dimension of the agrarian transition: women, men and livelihood diversification in two peri-urban farming communities in the Philippines. *Gender, Place and Culture*, 16(5), 609-629
- Bashar, Z. U., et al. (2015). Single Seedling Nursery Tray: An Innovative Breakthrough to Quality Seedling Raising Technique for SRI Transplanting Machine. *Research Journal of Applied Sciences, Engineering and Technology*, 10(11), 1258-1265
- Cabalda, A. B., et al. (2011). Home gardening is associated with Filipino preschool children's dietary diversity. *Journal of the American Dietetic Association*, 111(5), 711-715
- Cahya, D. L. (2016). Analysis of urban agriculture sustainability in Metropolitan Jakarta (case study: urban agriculture in Duri Kosambi). *Procedia-Social and Behavioral Sciences*, 227, 95-100
- Chieochan, O., et al. (2017). *IOT for smart farm: A case study of the Lingzhi mushroom farm at Maejo University*. Paper presented at the Computer Science and Software Engineering (JCSSE), 2017 14th International Joint Conference on
- Hill, K. (2011). "Male Providers" and "Responsible Mothers" Gender and Livelihood Politics in the Rural Philippines. *Gender, Technology and Development*, 15(2), 223-247
- Ibharim, L. F. M., & Salim, S. A. (2020). The Framework of Urban Farming towards Enhancing Quality of Life in Malaysia. *Int. J. Sup. Chain. Mgt Vol*, 9(1), 520
- Khai, N. M., et al. (2007). Nutrient flows in small-scale peri-urban vegetable farming systems in Southeast Asia—a case study in Hanoi. *Agriculture, Ecosystems & Environment*, 122(2), 192-202
- Leh, O. L. H., et al. (2011). *Urban farming: Utilisation of infrastructure or utility reserved lands*. Paper presented at the Business, Engineering and Industrial Applications (ISBEIA), 2011 IEEE Symposium on
- Mastura, M., et al. (2011). Characterization of paddy soil compaction based on soil apparent electrical conductivity zones. *African Journal of Agricultural Research*, 6(11), 2506-2515
- Midmore, D. J., & Jansen, H. G. (2003). Supplying vegetables to Asian cities: is there a case for peri-urban production? *Food Policy*, 28(1), 13-27
- Mintorogo, D. S., et al. (2017). Remarkable 3-in-1 Pakis-Stem Green Roofs for Saving Thermal Flat Rooftop. *Advanced Science Letters*, 23(7), 6173-6178
- Mohammed, U., et al. (2016). Influence of soil cover on moisture content and weed suppression under system of rice intensification (SRI). *Paddy and Water Environment*, 14(1), 159-167
- Nguyen, P. H., & Weiss, S. (2008). *1.4. 1 Mixed- Occupancy Vertical Urban Farm Systems*. Paper presented at the INCOSE International Symposium

- Pobkrut, T., & Kerdcharoen, T. (2014). *Soil sensing survey robots based on electronic nose*. Paper presented at the Control, Automation and Systems (ICCAS), 2014 14th International Conference on
- Salim, S. A., Alaa, M., Yusof, Z. M., Ibharim, L. F. M., Salim, S. H., & Hashim, F. (2019). Urban Farming Activities in Southeast Asia: A Review and Future Research Direction. Paper presented at the MATEC Web of Conferences
- Salim, S. A., & Sa'don, N. S. (2021). The Adoption of Internet of Things in Urban Farming. *Research in Management of Technology and Business*, 2(2), 146-162
- Sureephong, P., et al. (2017). *The comparison of soil sensors for integrated creation of IOT-based Wetting front detector (WFD) with an efficient irrigation system to support precision farming*. Paper presented at the Digital Arts, Media and Technology (ICDAMT), International Conference on
- Susilastuti, D. (2017). Poverty Reduction Models: Indonesian Agricultural Economic Approach. *European Research Studies*, 20(3A), 164
- Tablada, A., & Zhao, X. (2016). Sunlight availability and potential food and energy self-sufficiency in tropical generic residential districts. *Solar Energy*, 139, 757-769
- Taufani, B. (2017). Urban Farming Construction Model on the Vertical Building Envelope to Support the Green Buildings Development in Sleman, Indonesia. *Procedia engineering*, 171, 258-264
- Vagneron, I. (2007). Economic appraisal of profitability and sustainability of peri-urban agriculture in Bangkok. *Ecological economics*, 61(2-3), 516-529
- Weinberger, K. (2013). Home and community gardens in Southeast Asia: potential and opportunities for contributing to nutrition-sensitive food systems. *Food security*, 5(6), 847-856
- Widaryanto, E., et al. (2017). *Effect of water deficit and planting materials on growth and yield of watercress (Nasturtium officinale) in urban farming system* (Vol. 14)
- Yusoff, N. H., et al. (2017). Roles of community towards urban farming activities. *Planning Malaysia*, 15(1)