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PROCEEDING FOR
INTERNATIONAL COLLOQUIUM ON
NEXTGEN CONSTRUCTION
2025

Future-Ready Construction and Facility Management:
Driving Research and Innovation for a Smart Built Environment

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INTERNATIONAL COLLOQUIUM ON
NEXTGEN CONSTRUCTION
2025

Organiser:
Universitas Pamulang (UNPAM)

Co-organiser:
Department of Built Environment Studies and Technology,
Faculty of Built Environment,
UiTM Perak Branch

Faculty of Built Environment, UiTM Sarawak Branch

Colloquium Date:
6 May 2025

Unit Penerbitan UiTM Perak, 2025

Perpustakaan Negara Malaysia Cataloging in Publication Data

No e- ISBN: 978-967-2776-60-4

Cover Design : Nur'Ain Ismail
Typesetting : Nur'Ain Ismail

Proceeding for International Colloquium on NextGen Construction 2025
Future-Ready Construction and Facility Management:
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e-ISBN : 978-967-2776-60-4

IDENTIFICATION OF URBAN FARMING CATEGORIES IN MALAYSIA

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Abstract
Urban farming has gained prominence as a strategy to enhance food security and promote sustainability in urbanized regions of Malaysia. With increasing concerns over food scarcity and the economic constraints faced by low-income communities, urban farming presents a viable alternative for self-sufficiency and economic empowerment. However, the classification of urban farming practices remains inconsistent, hindering the development of comprehensive policies and support mechanisms. This paper aims to identify and categorize urban farming practices in Malaysia, establishing a structured framework that aligns with sustainability, economic viability, and community engagement. This was done through a systematic review of the existing literature on urban farming practices in Malaysia in order to identify primary urban farming categories in Malaysia. Using a qualitative content analysis approach, results were synthesized from peer-reviewed journal articles, government reports, and policy documents, selected systematically from Scopus, and Google Scholar databases. From the findings, the growing role of smart urban farming techniques, such as hydroponics, aquaponics, and vertical farming, in improving yield efficiency is highlighted. This review provides valuable insights for policymakers, urban planners, and agricultural stakeholders, offering a comprehensive classification framework that supports sustainable urban agriculture in Malaysia.

Keywords: Urban Farming, Food Security, Malaysia, Smart Urban Farming

1. INTRODUCTION

Urbanization has significantly transformed the economic and social landscape of Malaysia, leading to both opportunities and challenges for low-income communities. As urban areas expand, issues such as food insecurity, rising living costs, and limited access to fresh produce become more pronounced, particularly among the low-income group. Food security ensures that everyone receives sufficient nutritious food, resulting in zero hunger, particularly in urban areas. Urban farming has gained global recognition as a sustainable approach to enhancing food security, reducing dependency on external food sources, and promoting environmental sustainability. In Malaysia, rapid urbanization has led to challenges in land availability and food accessibility, particularly for low-income communities. Thus, the aim of this research is to identify the urban farming categories in Malaysia based on a review of the literature.

2. LITERATURE REVIEW

The urban farming concept has been growing in the Malaysian community. The Urban Agriculture Program that started in 2014 is a purposeful campaign by the Department of Agriculture to help ease the cost of living of households in the city through production of the necessary food ingredients by themselves. The project was implemented to

e-ISBN : 978-967-2776-60-4

support the National Agrofood Policy (NAP) to guarantee food safety and reduce imports of agricultural products from foreign countries (Jabatan Pertanian Malaysia, 2021). In the year 2020, there were 688 project locations developed with the involvement of 16,572 people throughout the country and a crop production of 200 metric tons. According to Jabatan Pertanian Malaysia (2021), there are several categories of urban farming which are individual-based, community-based, school-based, and institutional-based urban farming. These categories can be done indoors or outdoors. Xi et al. (2022) mentioned that urban farms can be found both indoors and outdoors. A few instances include farming in vertical spaces, greenhouses, containers, rooftops, sparing fields, and warehouses. Indoor farming is described as planting the plant in an indoor area. It relies on artificial lighting, such as light-emitting diodes (LEDs) rather than natural sunshine (Oh & Lu, 2023). Outdoor farming is described as a practice that is conducted in an open environment and relies more on natural resources such as soil, water and sunlight. There are two techniques of urban farming, which are conventional urban farming and smart urban farming. Conventional urban farming consists of on the ground farming and container farming while smart urban farming consists of hydroponics, aquaponics, aeroponics and fertigation.

2.1 Conventional Urban Farming

Examples of Conventional Urban Farming	Description
I. On the ground farming Source: (Hopwood et al., 2021)	This method is used to directly plant the crops or plant on the ground. Tillage farming and no-till farming are two types of on the ground farming techniques.
II. Container Farming Source: (Department of Agriculture, n.d.)	Container gardening is a type of micro farming in which a home or family grows fruits and vegetables in designated containers. It can use polybags of all shapes and sizes, glazed ceramic pots, porcelain pots, and plastic pots.

2.2 Smart Urban Farming

Examples of Smart Urban Farming	Description
I. Hydroponics Source: (Cheah, 2022)	Hydroponic is the process of growing plants, either with or without the aid of artificial media, in a liquid nutrition solution. Expanded clay, coir, perlite, vermiculite, brick fragments, polystyrene packing peanuts, and wood fibre are examples of frequently used media.
II. Aquaponics Source: (Go Green Aquaponics, 2024)	According to Zhao et al. (2024), aquaponics is a hybrid of a recirculating aquaculture system (RAS) and a hydroponic system (HPS) in which plants grow independently of natural water and soil and may produce high-protein meat and fresh vegetables all year.
III. Aeroponics	Aeroponics is a subset of hydroponics in which the plant grows without the need of a growing medium and is misted with nutrient-rich water. In this technique, plant roots are suspended in a dark container and periodically

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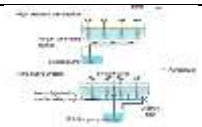 Source: (Eldridge et al., 2020)	sprayed with nutrient-dense fluid.
IV. Fertigation  Source: Sulaiman, (2021)	In the fertilization process known as "fertigation," chemical fertilizers are completely dissolved and mixed with irrigation water before being applied to the land (Chen et al., 2025).

3. METHODOLOGY

Data was primarily obtained from secondary sources, including government publications, academic journals, peer-reviewed articles, conference papers, technical reports, and NGO publications related to urban farming. A total of eight primary sources were analyzed, covering the period of 2021 to 2024, ensuring both recency and relevance to current practices in Malaysia. These documents were identified using keyword searches such as *"urban farming Malaysia," "smart agriculture," "rooftop farming,"* and *"hydroponics in Malaysia"*. The search was conducted via academic databases and official ministry websites.

4. FINDING AND DISCUSSION

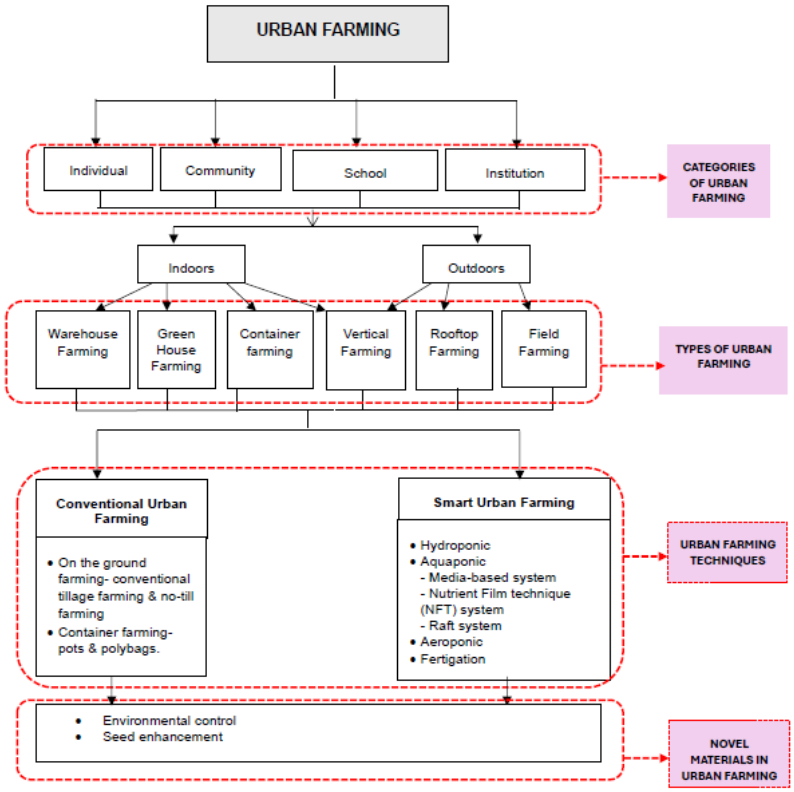

Figure 4.1 Urban Farming classification
Source: Categories of urban farming: Jabatan Pertanian Malaysia (2021); Source: Types of urban farming: Xi et al. (2022); Source: Urban farming techniques: Zhao et al. (2024); Saarani et al. (2024); Salim et al. (2024); Saarani et al. (2023); Hopwood et al. (2021); and Department of Agriculture (n.d.); Source: Novel materials in urban farming: Xi et al. (2022)

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4.1 Categories of urban farming in Malaysia

Malaysian urban agricultural activities are divided into four categories: individual, community, school, and institutional farming (Jabatan Pertanian Malaysia, 2021). These groups represent different players in urban agriculture, each with their own objectives and resources. This multi-level categorization stresses the inclusive and decentralized nature of urban farming in Malaysia, allowing for participation across socioeconomic and organizational lines.

4.2 Types of urban farming in Malaysia

Urban farming is defined as indoor or outdoor based on spatial orientation and structural deployment (Xi et al., 2022). Indoor farming includes Warehouse Farming, which uses vertical and hydroponic systems in controlled settings. Greenhouse farming provides semi-controlled conditions with solar supplementation, whereas Container farming is highly movable and adaptable, making it appropriate for restricted urban settings. Vertical farming maximizes land efficiency and is typically combined with smart agricultural technologies. Outdoor farming includes rooftop farming, which involves growing food on underused building rooftops while reducing urban heat. Field farming is found in peri-urban or open urban areas and is more traditional in practice. This spatial typology focuses on Malaysia's urban adaption of contemporary and traditional farming practices. Urban farming is conducted in Malaysia using both conventional and smart techniques (Zhao et al., 2024; Saarani et al., 2023, 2024; Salim et al., 2024; Hopwood et al., 2021; Department of Agriculture, n.d.). The advent of smart urban farming represents Malaysia's transition to technology-driven agriculture, which is being driven by urbanization pressures. In addition to structural innovation, urban farming in Malaysia is increasingly incorporating new materials like seed enhancement and environmental control. These developments enable increased production in restricted locations which helps with sustainability and food security.

5. CONCLUSION

The literature review has revealed that Malaysia's urban farming is becoming more complex and diverse. According to Jabatan Pertanian Malaysia (2021), there were 688 urban farming project locations with over 16,572 participants across the country. These urban farming initiatives can be classified into four main categories: individual-based urban farming, community-based urban farming, school-based urban farming, and institutional-based urban farming. Each category plays a unique role in addressing food security, economic sustainability, and environmental conservation. However, despite significant participation in urban farming, standardized classifications and financial models remain underdeveloped. The framework proposed in Section 4 aids strategic planning and policy development by visualizing the operational landscapes of urban farming. Future research should look deeper into policy consequences, economic outcomes, and socio-environmental advantages across the highlighted areas.

e-ISBN : 978-967-2776-60-4

6. ACKNOWLEDGMENT

This paper is part of a project funded by the Fundamental Research Grant Scheme (FRGS), Ministry of Higher Education, Malaysia, file no.: FRGS/1/2024/SS06/UITM/02/5.

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