Research Article

Exploring the economic viability and marketability of aeroponics systems: An urban agriculture study in Navotas City*

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Abstract

Aeroponics is an innovative soilless farming method increasingly recognized for its potential in urban agriculture. However, research on its economic and environmental viability remains limited, particularly in the Philippine context. This study explores the potential of aeroponics as a sustainable business model by focusing on its implementation in Navotas City. Using a qualitative approach, insights were gathered from individuals directly involved in operating aeroponics systems. Findings indicate that while aeroponics requires high initial investment, it offers notable benefits such as efficient resource use, scalability, and consistent high-yield production. These features suggest strong potential for profitability. Environmentally, the system reduces water usage and land requirements, supporting sustainable urban farming. Despite these advantages, challenges persist. Aeroponic produce, although marketable, often fails to meet specific weight standards required for sale. Additionally, energy consumption and high setup costs remain significant barriers to widespread adoption. In conclusion, aeroponics shows promise for increasing food production in space-constrained urban areas. However, for it to become a viable and scalable business model, further improvements in system efficiency and operational methods are needed. Future quantitative research is recommended to deepen the understanding of economic and environmental factors affecting its adoption in the Philippines.

Keywords: Creative leadership; Institutional effectiveness; Private higher education; Bangkok

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Introduction

Particularly in highly populated locations like Navotas City, urban agriculture has grown in importance as a component of modern farming. To solve global agricultural difficulties, the Food and Agriculture Organization (FAO) proposed in 2017 that sustainable farming methods, such as hydroponics, aeroponics, and aquaponics, be used. Among these, aeroponics is a highly advanced soilless farming method that makes utilizes cutting-edge equipment to optimize the efficiency of food production.

Aeroponics is particularly helpful in times of crisis, like pandemics, when availability to fresh produce can be limited and food supply networks are upset. In these situations, aeroponics can be an effective means to guarantee food security. The necessity to investigate sustainable and creative food production methods is further highlighted by the difficulties urban farmers frequently encounter in maximizing profit and preserving market competitiveness, especially in urban environments where resources and space are limited.

With profit margins reportedly ranging from 10% to 40%, aeroponic farming has become a viable option (FinModelsLab, 2024; Agri Farming, 2024). Crop selection, operational effectiveness, and the rising demand for locally grown, fresh, and pesticide-free food are some of the variables that affect these margins. Health-conscious consumers are especially drawn to high-value crops that can be grown quickly and sold for high prices, such as herbs and leafy greens.

Notwithstanding its potential, aeroponics is still a relatively new idea, and little research has been done on it, particularly in the Philippine environment. The majority of research has been done in other nations with diverse climates and frequently focuses on rural rather than urban settings. Additionally, the majority of the literature now in publication places more emphasis on aeroponics' sustainability than on its economic feasibility.

Objectives

In response to these gaps, this study aims to evaluate the long-term sustainability and economic feasibility of aeroponics systems in Navotas City. Specifically, it investigates the challenges faced by local government units and organizations in establishing and managing aeroponic systems and explores potential solutions to promote sustainable urban agriculture.

Literature review

Aeroponics has emerged as a specialized branch of soilless agriculture in which plant roots are suspended in air and supplied with a nutrient-rich mist. This production method is increasingly discussed within the broader framework of controlled environment agriculture and vertical farming because it allows high levels of environmental control, efficient nutrient delivery, and intensive use of limited urban space. A recent systematic review of 47 aeroponics studies found that the technology is commonly associated with sensing systems, automation, and Industry 4.0 applications, which can improve time efficiency, production control, and sustainability; however, the same review also emphasized technical complexity and dependence on stable power systems as recurring implementation barriers (Garzón et al., 2023). More recent synthesis work likewise positions aeroponics as a resource-efficient response to constraints on water, land, and emissions, especially in dense cities where conventional agriculture is spatially constrained (Chu et al., 2026).

Within the urban agriculture literature, profitability remains one of the most debated issues. A major review of urban agriculture noted that urban farming is often difficult to expand because of weak economic profitability, even though its social, health, and environmental benefits are widely recognized. This suggests that economic viability cannot be judged only by output volume, but must also consider savings in transport, freshness, resilience, and community-level value creation (Yuan et al., 2022). A related review on urban vertical farming argued that while controlled environment production is often promoted as a solution for local food security and urban sustainability, its socio-economic benefits are highly context-dependent and may be undermined by unaffordability, exclusion of low-income consumers, and weak integration into local food systems (Kluczkovski et al., 2025). Together, these studies indicate that the economic case for aeroponics in cities must be assessed not only through cost–benefit indicators, but also through the structure of local demand, accessibility, and the institutional environment in which the system operates.

The literature specifically on the **economic viability** of aeroponics shows both promise and caution. On the positive side, studies consistently report that aeroponics can increase land-use efficiency and reduce water use relative to conventional soil cultivation. In a city-scale techno-economic assessment in Hong Kong, rooftop aeroponics combined with photovoltaics was found to reduce land demand by up to 86.8%, with one strategy achieving a reported payback period of 0.8 years while also covering substantial fresh-vegetable demand for selected crops (Kazemian et al., 2025). In Bangladesh, a study on a vertical aeroponic tower made from locally available materials reported a benefit–cost ratio of 1.164, suggesting economic feasibility for small-scale adoption (Singha et al., 2026). These findings support the argument that aeroponics can be financially viable when systems are properly matched to crop type, energy conditions, and construction costs.

At the same time, the literature warns that the economic success of urban aeroponics is highly sensitive to energy and infrastructure costs. A recent review of technological innovations in urban and peri-urban agriculture noted that energy expenses alone can account for approximately 28% of total vertical farming costs, while several well-known commercial vertical farms have struggled or failed because of high operating expenditures (Fei et al., 2025). Similarly, a review on vertical farming efficiency stressed that economic viability in controlled environment systems depends heavily on crop productivity and operational costs, especially electricity for lighting and heating, ventilation, and cooling (Wheeler et al., 2024). Even environmental assessments of containerized aeroponic farms have shown that energy demand is the principal driver of impacts, although renewable power can substantially improve performance (Rivera et al., 2023). Therefore, while aeroponics offers strong technical advantages, its economic viability in urban areas depends on careful management of energy, scale, crop choice, and system design.

Another important strand of literature concerns the **marketability** of aeroponics produce. Marketability refers not only to whether produce can be sold, but also to how consumers perceive its quality, safety, freshness, price, and “naturalness.” Research on vertically farmed produce in Russia found that consumer attitudes were mixed: while many respondents were favorable, others associated vertically farmed vegetables with being unnatural, less tasty, or less nutritious. The authors concluded that purchase intentions could be improved through better consumer education on nutrient content, safety, taste, and production methods (Yano et al., 2021). A separate comparative study on buying vertically farmed produce reported generally positive acceptance, though consumer evaluations varied according to prior knowledge and perceptions of production systems (Ares et al., 2023). Recent work from Scotland similarly focused on willingness to pay for vertical farming produce, reinforcing the importance of consumer attitudes in determining market success (Bucky et al., 2026). Taken together, these studies suggest that the marketability of aeroponics in urban settings depends not only on output quality, but also on communication strategies, labeling, public trust, and localized consumer education.

The literature also indicates that **marketability is strongest when aeroponics targets high-value, fast-turnover crops**. Reviews of vertical farming repeatedly note that leafy greens, herbs, and microgreens are the crop categories most compatible with indoor and soilless urban systems because they mature quickly, command relatively favorable prices, and fit consumer demand for freshness and convenience. Recent reviews further argue that the commercial viability of vertical farming often depends on high-value crops, because energy-intensive systems are much harder to justify for staple crops with lower margins (Akpenpuun et al., 2025). This has direct implications for aeroponics studies in cities like Navotas, where income diversity, purchasing power, and access to neighborhood markets may shape which crops are commercially feasible.

In the **Philippine context**, the literature on aeroponics remains limited, but adjacent work on hydroponics and urban aquaponics provides useful guidance. A 2025 case study in Nueva Ecija found that hydroponics could improve yields, reduce water and chemical inputs, and enhance financial returns, but adoption remained constrained by initial investment costs and the need for specialized knowledge (Macaso, 2025). Research on Philippine urban agriculture also documents efforts to promote low-space food production technologies in urban communities, while noting that many initiatives suffer from weak long-term monitoring, manpower constraints, or insufficient production data. This indicates that technological introduction alone does not guarantee sustainability; training, maintenance, and market linkage are also necessary for long-term success. These Philippine findings are highly relevant because they suggest that any study of aeroponics in Navotas should examine not just production performance, but also the institutional and human capacity required to sustain the system.

Navotas City presents a particularly relevant case for urban aeroponics because of its extreme land constraints and its recent investments in local food production infrastructure. The city's land area is only 10.69 square kilometers, and its physical profile describes Navotas as a flat, highly urbanized coastal city with limited agricultural land (Navotas City Government, 2016–2025). Recent local reporting also shows that the city has expanded greenhouse and vertical farming initiatives to strengthen local food supply and reduce reliance on external sources of produce (VerticalFarmDaily, 2024). These conditions make Navotas an important site for examining whether aeroponics can function as a commercially viable urban agriculture strategy in a dense coastal environment where land scarcity is acute and food resilience is a policy concern.

Despite the growing literature, several **research gaps** remain. First, much of the published work emphasizes technical performance, environmental efficiency, or generalized vertical farming discourse, while relatively few studies directly examine the combined issues of **economic viability and marketability** of aeroponics in a specific Philippine urban setting. Second, the international literature often assumes mature supply chains and higher-income consumers, which may not fully reflect the realities of neighborhood-based urban markets in Metro Manila. Third, there is still limited empirical work linking production-side indicators—such as capital cost, operating expenses, crop yield, and payback period—to market-side variables such as consumer awareness, willingness to buy, preferred crops, acceptable prices, and trust in soilless produce. For Navotas City, these gaps justify a study that integrates business feasibility analysis with consumer and market assessment, rather than treating the production system as a purely technical innovation.

In summary, the literature suggests that aeroponics has strong potential for urban agriculture because it is space-efficient, resource-saving, and adaptable to dense city environments. However, its economic success is not automatic. Profitability depends on capital costs, energy use, crop choice, and system scale, while marketability depends on consumer trust, product positioning, price acceptability, and local distribution channels. For Navotas City, where land is scarce and local food resilience is increasingly important, aeroponics appears promising, but its real viability must be tested through an integrated analysis of production economics and market demand.

Methodology

A qualitative research method was employed to gain deeper insights into the informants' experiences and involvement with the aeroponics system in Navotas City. This method is particularly effective for exploring complex human behaviors, perspectives, and the contextual factors influencing them (Creswell, 2014). Qualitative research enables the researcher to understand how individuals interpret and make sense of their experiences, making it suitable for examining social phenomena in real-world settings (Denzin & Lincoln, 2018).

In particular, a descriptive research design was employed to assess the aeroponics system's current condition, pinpoint its salient features, and offer thorough justifications to aid in interpretation. In order to accurately depict a condition or phenomena, descriptive research focuses on answering questions like what, when, where, and how—without necessarily looking into the underlying causes (Babbie, 2020). It lays the foundation for further investigation and study, even though it does not usually examine causal relationships. Representatives from the local government unit (LGU) of Navotas City, the Boy Scouts of the Philippines (BSP), and an aeroponics company in the city were among the chosen participants. These partakers were picked because they actively participated in the aeroponics system's implementation, which gave the researchers a deeper comprehension of aeroponic procedures and the difficulties that arise in various settings. This information was critical for informing improvements and best practices to enhance the effectiveness of aeroponic systems.

The study was conducted in Navotas City, a coastal urban area in Metro Manila, known for hosting the tallest aeroponic towers in the Philippines. Data were collected through interviews with informants involved in urban agriculture in Navotas Homes 2-Tanza. Researchers prepared nine interview questions, validated by professionals to ensure accuracy and credibility. These questions facilitated an in-depth exploration of participants' experiences, perceptions, and motivations, enabling researchers to gather rich and detailed data.

Through methodical coding and subject formulation, thematic analysis was used to find patterns in the interview responses. Triangulation was used by cross-referencing interview data with pertinent literature and supporting documentation in order to increase the validity of the results. The limits and possible biases of individual data sources were lessened by this technique. Through the use of numerous independent sources to corroborate findings, triangulation improved the study's credibility and reliability.

Results

This study generated empirical findings on the implementation of aeroponics systems in Navotas City, focusing on economic viability, sustainability, market acceptance, operational performance, and system effectiveness.

1. Economic Challenges and Benefits

The findings reveal that aeroponics requires high initial capital investment and operational costs. Infrastructure such as vertical towers, automation systems, and nutrient delivery mechanisms significantly increase expenses (Atlas Scientific, n.d.; Top Hydroponic Garden, n.d.). Informants reported initial setup costs of approximately ₱5 million, while operational expenses reached about ₱12 million since 2019.

Energy consumption is a major contributor to operational costs, as systems rely heavily on electricity for automation and environmental control (Grow Pod Solutions, n.d.; Booker & Booker, 2024). Nutrient solutions also add recurring costs (Ramalingannanavar et al., 2020).

Despite these constraints, the system enables year-round production, reduced labor, and high-quality crops, with some informants suggesting a potential return on investment within one year or slightly longer .

2. Sustainability of Aeroponics Systems

The findings highlight multiple sustainability advantages, including reduced water consumption, minimal pesticide use, space efficiency, and automation. Water usage was reduced by approximately 90% compared to traditional farming, supported by a closed-loop recycling system (Grow Pod Solutions, n.d.).

Aeroponics also demonstrated strong spatial efficiency, conserving up to 75% more space than conventional agriculture (Agrotonomy, 2024). Additionally, participants reported no need for pesticides, as the absence of soil reduces pest occurrence.

The system supports continuous production, with crops harvested 2–3 times per month, and automation allows operation with minimal labor input .

3. Market Acceptance and Stakeholder Perception

Findings indicate strong support from the Navotas City Local Government Unit (LGU), which recognizes aeroponics as a viable strategy for addressing urban food insecurity. The system improves access to fresh, locally produced vegetables, reducing dependence on external supply chains.

Consumers reported increased trust in food safety, particularly due to the absence of pesticides. However, price sensitivity remains a concern, as aeroponics produce is perceived to be more expensive. Some residents opted for alternative systems such as hydroponics.

The system also contributes to social impact, particularly through programs targeting underserved communities .

4. Operational Barriers and Advantages

The findings show that the system has not yet achieved its target crop weight of 1 0 0 grams, largely due to ongoing adjustments and technological limitations. Challenges include:

-Limited technological infrastructure

-High energy costs (₱8,000–₱50,000/month)

-Need for continuous system calibration

Despite these barriers, aeroponics provides advantages such as:

-High yield in limited space

-Automation reducing labor requirements

-Job creation and community participation

Automation systems (e.g., sensors, mobile control) improve efficiency and consistency in plant growth .

5. Climate Adaptability and Production Stability

The findings reveal that while aeroponics reduces dependence on soil and climate, external weather conditions still affect operations. Typhoons damaged infrastructure, causing temporary disruptions, while dry seasons required adjustments in irrigation schedules.

Thus, system performance depends on the resilience of protective structures, such as greenhouses. Strengthening infrastructure is necessary to ensure continuous year-round production.

6. Proposed System Improvements

The study identified key innovations to enhance system performance, including:

-Rotating tower system to improve sunlight distribution

-Solar energy integration to reduce electricity costs

-Use of polycarbonate materials for durability and insulation

-Conveyor-based plant movement to ensure equal light exposure

The proposed system improves:

-Energy efficiency (reduced reliance on grow lights)

-Crop yield and quality

-Space utilization

Discussion

The findings of this study align with and extend existing literature on aeroponics and urban agriculture, particularly in terms of economic feasibility, sustainability, and market dynamics.

1. Economic Viability

The high capital and operational costs identified in this study support previous research indicating that aeroponics systems are **capital-intensive and energy-**

dependent (Fei et al., 2025; Wheeler et al., 2024). The reported costs in Navotas confirm that **financial barriers remain a primary constraint** to adoption.

However, the potential for **rapid return on investment** reflects findings from Kazemian et al. (2025), suggesting that profitability is achievable when systems are efficiently managed and aligned with high-value crop production.

Thus, aeroponics in Navotas demonstrates **conditional economic viability**, dependent on cost optimization, energy efficiency, and market alignment.

2. Sustainability and Resource Efficiency

The significant reduction in water use and elimination of pesticides strongly support prior studies that identify aeroponics as a **highly sustainable agricultural system** (Garzón et al., 2023; Chu et al., 2026).

The findings further reinforce the role of aeroponics in addressing **urban land scarcity**, particularly in densely populated areas such as Navotas. This confirms the argument that aeroponics is well-suited for **urban food systems where space and resources are limited**.

3. Marketability and Consumer Behavior

The positive perception of locally produced, pesticide-free crops aligns with studies showing **growing consumer acceptance of vertically farmed produce** (Ares et al., 2023).

However, concerns about price reflect broader literature indicating that **marketability is constrained by affordability and consumer awareness** (Yano et al., 2021). This suggests that market success depends not only on production efficiency but also on:

-Pricing strategies

-Consumer education

-Value-added products

The Navotas case highlights the importance of **linking production with local market conditions**, particularly in mixed-income urban communities.

4. Technological and Operational Constraints

The technological challenges observed in Navotas confirm findings from Ramalingannanavar et al. (2020) that developing countries face **limitations in precision agriculture infrastructure**.

Energy consumption also emerges as a critical issue, consistent with literature identifying electricity costs as a major barrier to vertical farming scalability (Fei et al., 2025).

Thus, improving **system design and energy efficiency** is essential for long-term sustainability.

5. Climate Resilience

Although aeroponics is designed for controlled environments, the findings demonstrate that **external climate risks still affect system performance**, particularly through infrastructure vulnerability.

This supports the argument that **technological systems alone are insufficient without resilient physical structures**, reinforcing the need for integrated design approaches combining engineering and agriculture.

6. Innovation and System Optimization

The proposed rotating tower system represents a practical innovation that addresses key limitations identified in both this study and existing literature—particularly **uneven light distribution and high energy use**.

The integration of solar energy aligns with sustainability frameworks promoting **renewable energy in urban agriculture systems**.

Furthermore, value-added processing strategies reflect market-oriented approaches that enhance profitability, supporting literature emphasizing the importance of **diversification in urban farming enterprises**.

Summary Insight

Separating the findings and discussion reveals that:

-Findings provide empirical evidence specific to Navotas City

-Discussion situates those findings within broader academic and practical contexts

Overall, the study demonstrates that aeroponics is **technically viable and environmentally sustainable**, but its **economic success and marketability depend on cost control, consumer acceptance, and system innovation**.

Knowledge Contribution

This study contributes to the body of knowledge on urban agriculture, particularly in the context of aeroponics systems, by integrating economic, technological, and market perspectives within a localized urban setting such as Navotas City.

First, the study provides **context-specific empirical evidence** on the economic viability of aeroponics in a densely populated coastal city. While existing literature often focuses on developed countries or generalized vertical farming models, this research demonstrates how high capital investment, operational costs, and energy consumption manifest in a real-world Philippine urban environment. By presenting actual cost estimates, return expectations, and operational challenges, the study advances understanding of **financial feasibility under resource-constrained conditions**.

Second, the research contributes to the literature by linking **sustainability with economic practicality**. It confirms that aeroponics systems are highly efficient in terms of water use, space utilization, and pesticide reduction, while also revealing that sustainability alone does not guarantee economic success. This dual perspective enriches theoretical discussions by emphasizing that **environmental efficiency must be balanced with financial and operational considerations** in urban agriculture systems.

Third, the study offers new insights into the **marketability of aeroponics produce**, particularly in emerging urban markets. It highlights the role of consumer perception, affordability, and trust in shaping demand for soilless agricultural products. By documenting both acceptance and resistance among local consumers, the research expands current knowledge on **consumer behavior in urban agriculture**, especially in developing country contexts where price sensitivity is significant.

Fourth, the study contributes to **technological and systems innovation** by proposing an improved aeroponics model, specifically the rotating tower system with solar integration. This proposed design addresses key limitations identified in the findings, including uneven light distribution, high energy consumption, and suboptimal crop yield. The integration of renewable energy and mechanical innovation offers a **practical framework for improving efficiency and scalability**, thereby extending existing technological models in aeroponics.

Fifth, the research provides a **holistic analytical framework** by integrating production factors (costs, yield, efficiency) with market factors (consumer acceptance, pricing, value-added products) and institutional support (local government initiatives). This multidimensional approach contributes to the literature by demonstrating that the success of urban agriculture systems depends on the interaction of **economic, social, technological, and policy dimensions**, rather than on isolated variables.

Finally, the study contributes to **policy and practice** by offering evidence-based recommendations for local governments, private investors, and urban farmers. It highlights the importance of infrastructure resilience, energy optimization, skills development, and market linkage in ensuring the sustainability of aeroponics systems. These insights are particularly valuable for urban planners and policymakers seeking to enhance **food security and sustainable urban development** in similar metropolitan environments.

Conclusion

Interviews with employees of an aeroponics corporation in Navotas City, along with participation from the Boy Scouts of the Philippines, revealed several key themes, including economic challenges and the broad benefits of implementing aeroponics in the area. Despite financial hurdles, the aeroponics system's potential extends beyond profitability, encompassing social and environmental advantages.

Employees emphasized that urban agriculture in Navotas is viewed primarily as a social tool rather than solely a business venture. The aeroponics tower functions not only as a farming apparatus but also as a community resource, providing fresh vegetables and donations to local beneficiaries. This dual role highlights the system's contribution to food security and social welfare, fostering cooperation and resilience within the community.

While efforts to generate income through crop sales exist, the primary focus remains on creating lasting community impact. The system's sustainability is reflected in its low-maintenance farming methods and its capacity to engage residents in urban agriculture, empowering them and promoting a culture of environmental stewardship.

In conclusion, the aeroponics system in Navotas City holds significant promise for promoting sustainability and enhancing community welfare. It is crucial for stakeholders—including local government units and community organizations—to support and invest in initiatives that balance economic viability with social responsibility. Future research should explore the long-term sustainability and scalability of aeroponics systems in diverse urban contexts to optimize both social and economic outcomes.

Operating within the framework of the Triple Bottom Line, the aeroponics system addresses economic viability, environmental sustainability, and social equity.

Economically, it offers profit margins between 10 to 40 percent, although initial investments of several million pesos are required, with break-even achievable within a year due to lower labor costs and continuous production. However, high energy consumption remains a challenge, which could be mitigated through renewable energy integration.

Environmentally, aeroponics demonstrates significant water efficiency by utilizing a closed-loop irrigation system that uses much less water than conventional farming. It also maximizes vertical space in urban areas with limited land and eliminates the need for pesticides. Socially, the system enjoys strong support from local government and communities for enhancing food security and is increasingly integrated into educational programs. Nonetheless, high setup costs and the need for skilled labor continue to limit broader adoption.

Recommendation

To effectively promote the adoption of aeroponics systems in Navotas City, a strategic, multi-sectoral approach is essential. Local government units must develop policies that encourage financially sustainable investments in agricultural technology. Collaborations with NGOs can provide logistical support to expand adoption, while certification and branding initiatives will help differentiate aeroponic produce in the market, tapping into growing consumer demand for sustainable, local food. Partnerships with educational and technical institutions are critical for equipping farmers with the necessary skills. Establishing direct market channels—such as connections between farms, restaurants, grocery stores, and online platforms—will secure reliable sales avenues and broaden consumer access. By integrating strong partnerships, financial incentives, market development strategies, and continuous research and development, the long-term success of aeroponics in urban farming can be ensured, emphasizing ongoing improvements, cost reduction, and ecological benefits.

Analyzing the adoption of aeroponics in Navotas City is crucial to advancing sustainable urban agriculture in space-constrained environments. Aeroponics maximizes crop yields with minimal land use, particularly for fast-growing leafy greens like lettuce and kale. The system's ability to conserve water significantly and eliminate harmful agrochemicals underscores its environmental advantages. Additionally, the potential for profitability—estimated between 10 to 40 percent—provides a compelling economic incentive. The integration of solar-powered systems and innovative designs, such as rotating towers, promises to further reduce operational costs while improving efficiency and sustainability.

To ensure the viability and sustainability of aeroponics, active support from local government units, organizations, and consumers is imperative. LGUs should offer infrastructure support and financial incentives to encourage aeroponics adoption. Consumer education campaigns must highlight the benefits of aeroponics, including sustainability, improved food quality, and consistent year-round harvests. This comprehensive approach will address food scarcity issues and reduce urban food deserts by ensuring a steady supply of fresh, affordable, and locally grown produce accessible to urban populations.

Addressing operational barriers requires collaboration between schools and local communities to integrate aeroponics into educational curricula. Schools can educate students about modern farming technologies and nurture future professionals in agriculture and agribusiness. Dedicated resource allocation for research and development is needed to scale aeroponics effectively in urban areas. Moreover, partnerships among LGUs, businesses, and schools can establish pilot urban gardening projects, fostering community engagement and raising awareness of sustainable agriculture. Such coordinated efforts will facilitate knowledge sharing, overcome technical challenges, and enhance the long-term success of aeroponics.

Aeroponics systems provide resilience against unpredictable climate conditions by offering controlled environments conducive to year-round crop production in urban areas. However, challenges such as typhoon damage and extreme heat in Navotas City expose the need for more durable infrastructure and improved system efficiency. LGUs should provide funding to develop disaster-resistant farming setups, while educational programs can promote sustainable agricultural practices. Business investments in research and development will support technological advancements like rotating towers and solar-powered operations to boost efficiency and yields. Community and consumer support for local aeroponic farms is vital for strengthening urban food security. Through policy backing, technological innovation, and community engagement, aeroponics can evolve into a scalable and sustainable urban farming solution.

This study highlights both the strengths and challenges of aeroponics in Navotas City. While the system excels in space efficiency, improvements are needed in design, energy use, and market integration. A key limitation is that crops frequently fail to meet commercial weight standards, impacting profitability. Rotating aeroponic towers offer a solution by ensuring uniform sunlight exposure and consistent growth. Diversifying output to include value-added products such as vegetable-based snacks or powdered greens can enhance profitability. Energy consumption remains a significant concern due to high electricity costs for lighting and irrigation; transitioning to solar power can alleviate this issue and improve sustainability. LGUs have a crucial role in providing training and financial support to urban farmers. Wider adoption will depend on continued innovation, infrastructure investment, and supportive policies. With these improvements, aeroponics has the potential to strengthen urban food production and food security substantially.

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