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A Study on Building Selection Criteria for
Urban Air Mobility's Rooftop Vertiport

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Summary

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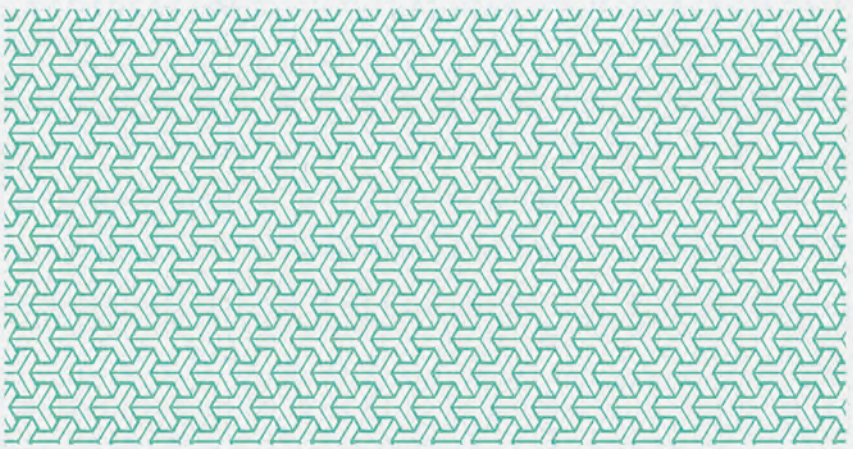

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1. Introduction

The key components of UAM commercialization services are aircraft (eVTOL) and vertiports. While eVTOL development has progressed significantly through aviation safety certifications, vertiports lack clear design standards and classifications. Vertiport installation and design determine the functionality and route expansion of UAM, making their development essential for successful commercialization.

In high-density urban areas like Seoul, securing open spaces for vertiports is challenging. Therefore, existing buildings closely located to public facilities, transport hubs, and emergency medical centers must be prioritized.

This study aims to establish criteria for selecting existing buildings capable of rooftop vertiport installations based on the classification outlined in Annex 3 of the Enforcement Decree of the Act on Promotion and Support of Urban Air Transportation Utilization.

This study focuses on developing selection criteria for buildings suitable for rooftop vertiport installation to support UAM deployment and commercialization. The research analyzes the applicability of proposed criteria and identifies suitable buildings in Seoul's Gangnam District. Gangnam District is ideal for this analysis due to its diverse scenarios, including no-fly zones, metropolitan transit hubs, and central business areas.

The study employed literature reviews and case analyses to systematically compile factors for UAM vertiport site selection. Expert advisory panels were convened four times to refine the selection elements and establish priority criteria.

Using Q-GIS, spatial data for 19,723 buildings in Gangnam District were constructed and analyzed. The evaluation focused on criteria relevant to commuting and business services. Certain criteria, such as parking availability and power supply, were excluded due to data limitations.

2. Derivation of Selection Criteria

Unlike helicopters, UAM has emerged as an alternative urban transportation network and a strategic national industry. Establishing UAM infrastructure, particularly accessible vertiports, is crucial. High urban density and real estate costs make independent landing facilities impractical, necessitating rooftop installations on existing buildings.

Challenges include regulatory relaxation, additional infrastructure requirements, and construction costs. Initial deployment in low-density areas is recommended, with expansion into urban centers.

Ninety elements related to UAM vertiport installation and operation were derived from literature and case studies, categorized into planning/operation, legal/societal acceptance, location, and building characteristics.

These elements were reorganized into three categories:

- Location Environment: High population and workplace density, public transit connectivity, and accessibility.
- Building Characteristics: Suitable zoning (commercial, office, medical), helipad availability, building height regulations, and ownership.
- Operational Environment: Rooftop space availability, load capacity, power supply, noise mitigation, and privacy considerations.

3. Establishing Building Selection Criteria for Rooftop Vertiports

Criteria were established based on service types:

- Public Services: Emergency transport, firefighting, and rescue operations were prioritized due to safety and speed requirements.
- Commercial Services: Commuting, business, tourism, and logistics services were assessed for commercialization potential.

The selection process involves:

- Preliminary Review: Analyzing regional traffic, physical environments, and UAM operational conditions.

- Service Type Determination: Selecting UAM services suitable for the area, categorizing criteria into essential/optional/excluded items, and assigning weights.
- Evaluation Framework: Developing and validating evaluation formulas for criteria.
- Spatial Analysis and Selection: Identifying optimal buildings through spatial analysis based on evaluation results.

4. Application of Evaluation Indicators to Gangnam District

Evaluation indicators were applied to buildings in Gangnam District, categorizing them into five grades. The top grade (Grade 1) included buildings scoring between 52.5 and 62.3 points, with 31 buildings identified as Grade 1. These buildings were predominantly located in high-density areas such as Yeoksam 1-dong and Nonhyeon 2-dong, featuring commercial, office, and medical facilities.

Most Grade 1 buildings were within 500 meters of a subway station, demonstrating strong public transit connectivity. However, a significant proportion were in no-fly or restricted flight zones, requiring regulatory adjustments for rooftop vertiport installations.

Grade 2 to 5 buildings also showed potential, particularly those outside restricted zones, suggesting that regulatory relaxation could enable their use.

5. Conclusion

This study established criteria and evaluation methods for selecting buildings suitable for rooftop vertiports in high-density urban areas. Key findings include:

- Many buildings have suitable locations for UAM operations, considering population density, transit connectivity, and zoning.
- A significant number of buildings are in no-fly or restricted zones, highlighting the need for regulatory adjustments.

Recommendations include improving data accuracy, adopting diverse analytical methods, and promoting multidisciplinary research. Long-term studies considering urban development and technological advancements are also essential.

Rooftop vertiports represent a transformative approach to urban transportation, requiring not only technological advancements but also societal consensus, legal reforms, and sustainable policies for successful implementation.

Keywords :

Urban Air Mobility, Rooftop Vertiport, Building, Selection Criteria, Assessment Indicator