Title	Design of the numbers of vertiports and air taxis for business realization of on-demand air mobility in Tokyo
Sub Title	
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Publisher	慶應義塾大学大学院システムデザイン・ マネジメント研究科
Publication year	2019
Jtitle	
JaLC DOI	
Abstract	
Notes	修士学位論文. 2019年度システムエンジニアリング学 第295号
Genre	Thesis or Dissertation
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO40002001-00002019-0011

Master's Dissertation 2019

Design of the Numbers of Vertiports and Air Taxis for Business Realization of On-Demand Air Mobility in Tokyo

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September 2019

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ABSTRACT

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Title

Design of the Numbers of Vertiports and Air Taxis for Business Realization of On-Demand Air Mobility in Tokyo

Abstract

With the gradually increasing population, road congestion has become a major challenge that is plaguing major metropolitan cities across the globe. In the recent years however, with the advent of Urban Air Mobility (UAM), the transportation system is once again expected to take a giant leap forward in improving our mobility and the way we live through on-demand air mobility or air taxi service.

With the purpose to improve mobility of citizens in metropolitan area, this study analyzes the required infrastructure needed to support on-demand air mobility. At first, with the past taxi trips data, the study estimates the demands of potential customers that have the highest likelihood to use on-demand air taxi service in Tokyo. A concept of operation of the on-demand air taxi service is proposed, as well as the proposal for installing a fixed number take-off and landing points, referred as vertiports, across Tokyo. With the aim to lower capital and infrastructure construction cost, different numbers of vertiports and air taxis are simulated to meet the predicted demands of trips. The results show that only a small number of vertiports and air taxis are required to obtain a significant time savings for the majority of air taxi trips. Unfortunately, on some unusual trips, air taxis' performances are on par or worse in comparison with ground taxis' due to the transportation time required to travel from and to the vertiports. This can be resolved by significantly increasing the density of the vertiports scattered in Tokyo, creating ubiquitous on-demand air mobility but with much higher cost in infrastructure. In exchange for the benefits of time savings, depending on the distance, on-demand air taxis fares are expected to be 40-60% more expensive in comparison to the ground taxis fares.

Keywords

On-demand, air taxi, flying car, vertiport, Tokyo, demand analysis