GIS-based Multi-Criteria Decision-Making Approach to Airport Site Selection

[1] Nattaphon Rangsaritvorakarn, [2] Korawit Fakkhong, [3] Niti Iamchuen

[1 2] Healthcare Logistics Management Research Center, School of Management Mae Fah Luang University Chiang Rai, Thailand

[3] Niti Iamchuen School of Information and Communication Technology, University of Phayao, Phayao, Thailand

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ABSTRACT

The study used the Analytical Hierarchy Process (AHP) tool combined with the Map Overlay Model to determine the appropriate evaluation criteria for establishing a second airport in Chiang Mai province, Thailand. The researchers collected data from 17 previous studies and consulted with five experts to establish the main criteria and to create a suitable map display. They then used a pairwise comparison matrix (PCM) to evaluate 16 sub-criteria and collected decision-making data from four experts. The study found that the Social Criteria had the highest weight (0.499), followed by Topography (0.231), Safety and Risk (0.142), and Environment (0.127). The Distance to Main Transportation was the most critical sub-criteria (21.34%), followed by the population in the area (14.54%), slope (13.01%), Distance from Flood history (9.04%), Wind speed (7.21%), and Distance from the residential region (6.04%). Finally, the researchers used the Overlay tool and found approximately 5,825,231 square meters for Average Suitability, 280,876,398 square meters for Good Suitability, and 88,868,024 square meters for Excellence Suitable Area. This is beneficial for state enterprises in planning which location is suitable for establishing a new airport to reduce passenger congestion. Furthermore, the study can serve as a reference for the establishment of new airports in developing countries in the future.

Keywords: Airport, Site Selection, Location, AHP, Criteria, GIS, Suitable Area