

ABSTRAK

IMPLEMENTASI SISTEM PENDUKUNG KEPUTUSAN DALAM PENENTUAN JALUR PENDAKIAN GUNUNG MENGGUNAKAN *FUZZY MULTI ATTRIBUTE DECISION MAKING (FUZZY MADM)* DENGAN METODE TOPSIS (STUDI KASUS: MUNCAK.ID)

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Indonesia memiliki beragam jalur pendakian dengan tingkat kesulitan yang berbeda. Pemilihan jalur yang tidak sesuai kemampuan pendaki berpotensi meningkatkan risiko keselamatan karena masih dilakukan secara subjektif. Penelitian ini bertujuan merancang dan mengimplementasikan desain sistem rekomendasi jalur pendakian berbasis *website* yang terintegrasi dengan Muncak.id untuk membantu pendaki menentukan jalur yang sesuai dengan kondisi fisik, pengalaman, dan preferensi. Pengembangan sistem dilakukan menggunakan metode *Rapid Application Development* (RAD), yang memungkinkan proses pengembangan berlangsung secara berulang dan berfokus pada kebutuhan pengguna. Dalam proses ini, sistem rekomendasi dirancang dengan mengintegrasikan metode *Fuzzy Multiple Attribute Decision Making* (FMADM) dan *Technique for Order Preference by Similarity to Ideal Solution* (TOPSIS). Pendekatan *fuzzy* digunakan untuk merepresentasikan kriteria yang bersifat subjektif, sementara metode TOPSIS digunakan untuk menghasilkan peringkat jalur pendakian berdasarkan tingkat kedekatannya dengan solusi ideal. Desain sistem divisualisasikan menggunakan *Unified Modeling Language* (UML) berupa *activity diagram* dan *class diagram* untuk menggambarkan alur proses serta struktur sistem, kemudian diimplementasikan ke dalam aplikasi berbasis web dengan mengintegrasikan perhitungan FMADM TOPSIS. Hasil penelitian berupa sistem pendukung keputusan berbasis web yang terhubung dengan Muncak.id dan dilengkapi dengan modul *assesment* pengguna, pengelolaan data jalur pendakian, pengaturan kriteria dan bobot, serta mesin rekomendasi otomatis. Pengujian sistem dilakukan melalui *blackbox testing*, *Top-K Accuracy*, dan *User Acceptance Testing* (UAT). Hasil pengujian menunjukkan seluruh fungsi sistem berjalan dengan baik, dengan nilai Top-1 dan Top-3 *Accuracy* sebesar 100% serta tingkat penerimaan pengguna sebesar 86,25% yang termasuk dalam kategori sangat baik. Penerapan metode *Fuzzy TOPSIS* dalam kerangka RAD pada desain sistem memungkinkan proses pengambilan keputusan dilakukan secara terstruktur melalui pembobotan dan pengurutan alternatif jalur pendakian berdasarkan kriteria yang telah ditetapkan.

Kata Kunci: *Fuzzy MADM*, Jalur Pendakian Gunung, Sistem Pendukung Keputusan, TOPSIS

ABSTRACT

IMPLEMENTATION OF DECISION SUPPORT SYSTEM IN DETERMINING MOUNTAIN HIKING TRAILS USING FUZZY MULTI ATTRIBUTE DECISION MAKING (FUZZY MADM) WITH TOPSIS METHOD (CASE STUDY: MUNCAK.ID)

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Indonesia has a wide variety of hiking trails with different levels of difficulty. Selecting a trail that does not match a hiker's ability can increase safety risks, particularly because the selection process is often subjective and lacks structured decision support. This study aims to design and implement a web-based hiking trail recommendation system integrated with the Muncak.id platform to assist hikers in selecting trails that align with their physical condition, experience, and hiking preferences. The system was developed using the Rapid Application Development (RAD) method, which supports an iterative development process focused on user requirements. The recommendation mechanism integrates the Fuzzy Multiple Attribute Decision Making (FMADM) method and the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). The fuzzy approach is applied to represent subjective assessment criteria, while TOPSIS is used to generate rankings of hiking trails based on their closeness to the ideal solution. The system design is visualized using Unified Modeling Language (UML), including activity diagrams and class diagrams, to describe process flows and system structure. The design is then implemented in a web-based application by integrating FMADM–TOPSIS calculations. The resulting system is a web-based decision support system connected to Muncak.id, equipped with user assessment modules, hiking trail data management, criteria and weight configuration, and an automatic recommendation engine. System evaluation was conducted through black-box testing, Top-K Accuracy testing, and User Acceptance Testing (UAT). The results indicate that all system functionalities operate correctly, achieving Top-1 and Top-3 accuracy values of 100% and a user acceptance rate of 86.25%, which falls into the “very good” category. The application of the Fuzzy–TOPSIS method within the RAD framework enables a structured decision-making process through the weighting and ranking of hiking trail alternatives based on predefined criteria.

Keywords: *Decision Support System, Fuzzy MADM, Mountain Hiking Routes, TOPSIS*