

RANKING EXPRESS BUS COMPANIES: AN ANALYSIS OF KEY FACTOR THAT INFLUENCE STUDENTS USING FUZZY TOPSIS APPROACH

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Abstract

Express bus services are a popular transportation choice among university students in Malaysia due to their affordability and convenience. This study focuses on ranking four express bus companies, namely Perdana Express, Sani Express, Queen Express, and Pancaran Matahari, based on the preferences of UiTM Perlis students who travel between Perlis and Kelantan. Using the Fuzzy TOPSIS method, the study handles subjective opinions and uncertainty in student responses. A total of 80 students participated in an online survey, evaluating four key criteria which are comfort and cleanliness, safety, price, and punctuality. Their responses were expressed using linguistic variables and converted into triangular fuzzy numbers. The Fuzzy TOPSIS process was then used to calculate the closeness coefficients for each bus company. The results showed Perdana Express ranked highest, followed by Sani Express, Queen Express, and Pancaran Matahari. Safety was found to be the most important factor for students. The study provides insights for service improvements and suggests broader future research.

Keywords: *Topsis, Criteria, Express Bus Services, Student Preferences.*

1. Introduction

Express buses in Malaysia provide essential intercity transportation, especially for university students who rely on them for affordability and convenience (Azman et al., 2020). However, factors such as safety concerns, inconsistent punctuality, and varying comfort levels complicate students' decision-making (Thi et al., 2023). This study focuses on ranking the express bus companies using Fuzzy Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). The specific objectives are to identify factors that influence the decision of UiTM Perlis students when selecting express bus companies and to rank express bus companies used by UiTM Perlis students based on their ratings for key factors. The scope is limited to data collected from 80 UiTM Perlis students who have used these services, emphasizing four key factors: comfort and cleanliness, safety, price, and punctuality.

2. Methodology

A quantitative approach was adopted, applying the Fuzzy TOPSIS to handle linguistic uncertainty and subjective judgments. Data was gathered using a structured online questionnaire distributed via WhatsApp and Google Forms to UiTM Perlis students. Respondents rated the importance of each criterion and evaluated each bus company using linguistic variables. For example, Very High, High, Medium, Very Low and Low, which were then translated into triangular fuzzy numbers. The methodology involved constructing fuzzy decision matrix for both criteria weights and alternative ratings, followed by normalization and application of weights. Subsequently, the fuzzy positive-ideal solution (FPIS) and negative-ideal solution (FNIS) were determined for each criterion. Distances of each alternative from FPIS and FNIS were computed, enabling the calculation of closeness coefficients (CCi). This process allowed an objective ranking of bus companies based on how closely they met student preferences.

3. Results / Findings

The study revealed safety to be the most critical factor influencing students' decisions, followed by comfort and cleanliness, punctuality, and price (Misiran et al., 2021). The Fuzzy TOPSIS analysis ranked Perdana Express highest with a closeness coefficient (CCi) of 0.8105, reflecting strong performance across all key factors. Sani Express closely followed with a CCi of 0.8098, particularly noted for punctuality and cleanliness. Queen Express ranked third (CCi=0.6554), indicating moderate satisfaction, while Pancaran Matahari lagged significantly (CCi=0.1500), suggesting shortcomings especially in safety and comfort. These findings emphasize that students are willing to accept slightly higher fares for assured safety and better travel experiences.

4. Novelty of Research

This research uses Fuzzy TOPSIS to study intercity bus services in Malaysia. It focuses on the views of university students, a group often overlooked in transport studies. Unlike normal surveys, fuzzy logic helps turn students' opinions into clear, measurable data (Joas et al., 2019). The study also supports the use of public buses, which can help reduce traffic and pollution (Angin et al., 2024). By connecting students' detailed opinions with bus company rankings, this research gives useful ideas for improving safety, service, and reliability. It helps bus companies better meet what students want and expect.

5. Conclusion and Future Work

UiTM Perlis students place the highest importance on safety and comfort, identifying Perdana Express as their preferred choice, and demonstrate a willingness to pay more for superior and more reliable bus services.

By including students from more campuses and testing other methods like AHP or PROMETHEE, future studies can confirm and build on these results. This would give better ideas to help bus companies improve safety, comfort, and service quality for students who rely on express buses.

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