Assessment of Stability Indices in Urban Transport Using TOPSIS Technique (Case Study: Kermanshah City)

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Expanded Abstract

Introduction

In recent years, attention to the impact of stability indices on transportation, especially in the public sector, has been among the main approaches to assess urban transport systems. This is an important issue, because nowadays we see that most of urban public spaces and streets are heavily dominated by cars due to the complete dependence of people's lifestyle on the automobiles and, hence, the related spaces are of low quality. Therefore, moving towards stability requires the knowledge on the priority and position of the elements of the transportation system in relation to stability indices. In this regard, this research addresses the assessment of stability indices in Kermanshah urban transportation with the aim of prioritizing the ideal options in the transportation system of this city. This paper focuses on public transportation practices. To achieve this goal, four systems of public transportation, i.e. taxis, buses, monorail and walking have been evaluated via 20 indices in the economic, social, physical and environmental aspects.

Methodology

This study was carried out using descriptive methodology. As different indices were used for selecting options, in this research, multi-attribute decision-making methods and TOPSIS technique have been employed for the analyses and evaluations. The statistical community of this research includes all transport experts of Kermanshah, among whom about 45 people were randomly selected according to their cooperation announcement. The data were collected through a questionnaire. Each of the participants was asked a total of 20 questions about the various aspects of the stability. Responses were classified into five point Likert spectrums. After the pre-test process, the related validity and reliability were measured by expert's opinions and Cronbach alpha. To measure the reliability, Cronbach's alpha was used in SPSS software. That was about 0.734. This suggests that the questions in the questionnaire have been internally consistent. The final questionnaires were distributed among at least 45 urban transport experts, including experts in this field and professors with urban planning majors. Finally, about 40 questionnaires were fully collected.

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Results and discussion

A total of 20 indices were evaluated in the four economic, social, physical, and environmental fields to determine the position and priority of four public transportation systems, i.e. taxis buses, monorails and walking. As the indices had different scales in the initial decision making matrices, the normalization methods were used to compare the indices. Since all options were used to increase, we used normalization. The results of the prioritization of the options using the TOPSIS technique showed that the walking option had a higher priority than other options. Taxis and buses are ranked the second in common. Monorail option was also ranked the last. According to the field results, the indices of flexibility in route selection, promotion of social interactions, and the relationship of transportation systems with the environmental and physical axes of the city, like the negative impact of these practices on the biological resources and unplanned and scattered urban growth, had the highest score. It has been important for citizens to choose a system that enhances the vitality of urban space in a city with a high degree of attendance on urban spaces. Among the different transportation systems, monorail had the least importance in terms of the related indices; its low flexibility, being expensive, failed to provide equal access to all classes of the society and all urban spaces, being non-native, and the heavy costs of launching are all the causes that made it unfavorable.

Conclusion

The results of this study showed that the walking option, as the best option compared with other options, had the highest score. High flexibility in choices in the case of walking and the possibility of reducing the cost of accidents and increasing safety are all among the charming reasons that make walking option the most preferable, because walking, in comparison with other options, leads to the formation of quiet, safer and more desirable neighborhoods with more solid social cohesion. The feel of alienation in such neighborhoods is minimized. The options of taxis and buses were ranked the second in commonbecause of the relatively acceptable responses to the demand for travel in urban areas via these communication elements and the existing capacity of urban infrastructure, the acceptance of taxis and buses in relation to the mentioned indices with particular importance. The extensiveness of urban space on one hand and the distance between workplace and living place on the other hand have made these two elements important in the transportation system of Kermanshah. However, monorail as a new element in the urban transport system of Kermanshah, due to its low flexibility versus other options, in one hand and the high cost of it on the other hand, was ranked the lowest compared with other options. Just as the demand for buses and taxis as public transportations is one of the concerns of most citizens for moving on relatively long paths in the city and the suburbs and using them can lead to reduction of using personal cars, walking can also be a desirable option in urban short-distance routes. By reducing the negative and destructive effects of the cars on the urban environment, it can bring about calmness to urban centers and making the city more understandable by citizens. The important point is that, as the results of this paper showed, the combination of these three elements could improve the quality of the urban environment.

Keywords: transportation indices, stability, TOPSIS, Kermanshah City.

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