Land use Compatibility Assessment of Birjand City Based on Analytic Hierarchy Process (AHP)

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Extended Abstract

Introduction

In the wake of the rapid urban spatial evolution, urban land use planning is based on two principles of sustainable development and promotion of quality of life. This seeks to achieve some goals such as balanced distribution of uses, prevention of conflicts in incompatible uses, and formulation of land use standards. The city of Birjand, the capital of the southern Khorasan province, has administrative, service, educational and economic role respectively in a regional, provincial and trans-regional scale. Given the urban land use analysis in Birjand, it is of great importance to improve the quality of service to the residents of the city and the influence and achievement of the economic and social goals. The main purpose of this research is to assess the compatibility of land uses in Birjand City. In this research, the compatibility and incompatibility of Birjand city utilization are investigated through the application of modern knowledge of GIS and computational models such as hierarchical analysis.

Process evaluation and hierarchical analysis model are among the multi-criteria evaluation methods. Using this model, the internal and basic weights of the data are measured and then the relevant ranking is extracted. The given weight is involved in the assessment as a number. This indicates the relative importance of that criterion over other criteria. Typically, the weights are normalized to a total of one. It should be ensured that the weight is consistent before adjusting, and that the incompatibility rate is calculated, and if this value is less than 0.1, then compatibility is acceptable. Geographic information system and the model presented in various analytical fields such as urban, rural, demographic, service, agriculture, climate, etc., can be used to make better decision making.

Methodology

This is a descriptive-analytical research, and in terms of the purpose, it is an applied research. This study combines documentary-field data. Due to the combined approach of GIS capabilities with available models for urban issues, the analysis is carried out using the GIS system and AHP. In the end, a map will be created in which the compatibility and incompatibility of the Birjand city are obtained in different parts.

Results and discussion

In this research, the layers have initially been collected including the existing status of Birjand city from existing organizations and centers. The total area of the existing land use in Birjand is 2573 hectares. Then, for each layer after digitizing and transforming into shape format in the

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ArcGIS software environment, according to land use compatibility table, valuation maps and weighing have been done in multidimensional space using a hierarchy analysis model. After the data collection, digitization and shape format conversion of each land use is evaluated according to compatibility matrix for other uses: 1- Compatible (value 9), 2- Relatively compatible (value 7), 3-indifferent (value 5), 4- relatively incompatible (value 3) and 5-incompatible (value 1). Finally, the evaluated maps of each use are obtained based on the degree of compatibility. In this study, to combine layers with each other, the extension of AHP is used in the ArcGIS environment. The results are shown (map 12), and finally, by categorizing the AHP output map, a map is obtained to show compatible and incompatible areas of Birjand (Map No. 13). According to this map, majority of Birjand urban land uses are compatible and relatively compatible, and limited areas of that are incompatible and completely incompatible.

Conclusion

In this study, planning of Birjand urban land use has been investigated with the aim of assessment of the quality and compatibility of various urban land uses in order to ensure the logical deployment of the landuses and necessary proportions. In the method, for separation of incompatible uses we have employed the new data in GIS and computational models such as Analytical Hierarchy Process. Finally, a map has been created that to show different landuses in the degree of compatibility and incompatibility in Birjand City. According to this map, most uses in the city of Birjand are compatible and completely compatible, and the limited areas show the location of industrial and municipal facilities. In the final map residential and service-tourism facilities are incompatible and complete incompatible. Most of the areas include the workshops, industrial uses and urban facilities along with residential and tourist uses.

Some suggestions for the area are use of open space such as barren lands, attracting partnerships and cooperation of citizens, locating the proper facilities of the city, finding the correct location of industrial workshops according to compatibility is the basis of urban development management in order to comply with the principles of sustainable urban development.

Keywords: urban sustainable development, urban facilities, Land use Compatibility Assessment, Birjand City

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