

Introduction: Today, one of the most prominent health and environmental problems of cities is ascending trend of solid wastes. This must be managed and the institutionalization of phenomena such as recycling, composting, and so on from municipal solid waste must be taken into consideration. In Iran, there is no essential management in collection, disposal and recycling of over 40 thousand tons of the waste per day which approximately 70 percent of them can be recycled into compost with thousands of plastics, papers and cartons. Thus, the waste are buried in the excess trend or scattered around cities. Usually based on the weight and physical composition of municipal solid wastes, we can say that most components of municipal solid wastes after organic solid wastes and an important part of municipal and industrial solid wastes in most parts of the world are paper wastes. While amount of recyclable paper waste generated in Iran is considerable, but only a small part of that is recycled and the remaining is exerted as garbage. While, it is possible to recycle the most part of the paper waste for the production of paper with high quality. In the recent decades, with growing public awareness of the dangers of uncontrolled harvesting of hardwood resources, increasing prices of raw materials for paper production, decreasing the forest area in some major areas of wood production and resistance of organizations and environmentalists against the damages, there are increasing demands towards the recycling of consumed paper in order to meet the needs for paper. There are various capacities in the converting machines for the paper recovery that provide the possibility for developing paper recovery centers in the regains with medium or large areas. With these qualities, investing in the creation of paper recovery units and consequently selecting appropriate locations for the deployment of these units is a critical step for municipal waste management system. Therefore, it is necessary to institutionalize using of decision support systems, in process of site selection for paper recovery units. The process to determine the suitability of land for locating paper recovery centers requires consideration of multiple criteria. That makes it necessary to use multi-criteria analysis models and techniques as inevitable choice. Thus, using multi-criteria models and techniques that are applied in conjunction with GIS capabilities can be considered as the outstanding aspects of decision support systems (DSS) in the decision process. Using decision rules, we can classify alternatives according to priority in the process of site selection. Accordingly, in this paper, there are intentions to test the operational capabilities of TOPSIS model as one of the leading techniques in multi-criteria decision making. This is applied in the experimental field of site selection for paper recovery centers in Fars Province.

Methodology: The data and tools used in this paper are maps and information that have been collected based on the need for the criteria and the constraints that are applied to determine the desirability of lands in locating paper recovery centers in Fars Province. In this study, softwares have been used to fit the needs in the phases of data entry, data storage, data management, data processing, data analysis, and etc. These softwares are including Excel 2007, Arc GIS 9.3, ARC View 3.3, Kilimanjaro IDRISI, and ILWIS 3.3. The main steps in the process of this study related to the research methodology are:

1. Providing criterion and constraint maps that are used in locating landfills which have led to defining of 10 criteria and 8 constraints.
2. Valuation and standardization of criterion maps: the process of valuation and standardization was performed based on value of membership in fuzzy set. Standardization was performed using the possibilities that exist in the FUZZY function of IDRISI Kilimanjaro software.
3. The method for weighting criterion maps: in this step, we have tried to determine criterion weights and criterion significance coefficient by using CRITIC method.
4. Operational use of multi-criteria decision rules: in this step, there is intention to test the operational capabilities of TOPSIS model as a prominent example of the multi-criteria analysis techniques in the experimental field of the site selection for paper recovery centers in Fars Province

Discussion: In this research, classified maps represent suitability of locations for paper recovery centers. The values are assigned by the accomplishment of operational procedures and guidelines that is obtained the process of using TOPSIS method (Fig. 1). In the obtained map as the score of each pixel approaches to 1, this is indicating favorable conditions for that pixel to be selected as a paper recovery center. Taking to consideration the constraints (Fig. 2), these pixels can be used proportionally to show the ability of that area for another land use. Therefore, obtained maps can be used as guidance by the decision makers in selecting appropriate locations for paper recovery centers. For further documentation of the validity of land use suitability map that has been acquired in the process of using TOPSIS, we have tried to investigate on the characteristic of one sample pixel that is selected as preferable and is located on the area with no constraints, dealt with defined criteria.

Conclusion: In this paper by considering Fars Province as a case study, capabilities and operational mechanisms of TOPSIS model has been tested in site selection of paper recovery centers. In this step, there was the goal to test the operational capabilities of TOPSIS model as a prominent example of the multi-criteria analysis techniques in the experimental field of the site selection for paper recovery centers in Fars Province. For further documentation of the validity of land use suitability map acquired in the process TOPSIS application, we have tried to investigate further on the conditions of one sample pixel that is selected as suitable pixel on the area with no constraints. Results of the investigation indicate that the pixels that are selected as preferable pixels in the output map have the optimal conditions in terms of defined criteria. For example, this pixel that has been selected as a preferable pixel is labeled with scores more than 230 in 9 criteria and is located in the acceptable condition in terms of degree of membership in fuzzy function. Therefore, this model can be used as a Decision Support System (DSS) in the modeling spatial arrangement of paper recovery centers.

Fars Province, locating, multi, criteria evaluation, municipal solid waste, paper recovery

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