

## The Location of Park and Ride Facilities Using the Fuzzy Inference Model

**Authors :** Anna Lower, Michal Lower, Robert Masztalski, Agnieszka Szumilas

**Abstract :** Contemporary cities are facing serious congestion and parking problems. In urban transport policy the introduction of the park and ride system (P&R) is an increasingly popular way of limiting vehicular traffic. The determining of P&R facilities location is a key aspect of the system. Criteria for assessing the quality of the selected location are formulated generally and descriptively. The research outsourced to specialists are expensive and time consuming. The most focus is on the examination of a few selected places. The practice has shown that the choice of the location of these sites in a intuitive way without a detailed analysis of all the circumstances, often gives negative results. Then the existing facilities are not used as expected. Methods of location as a research topic are also widely taken in the scientific literature. Built mathematical models often do not bring the problem comprehensively, e.g. assuming that the city is linear, developed along one important communications corridor. The paper presents a new method where the expert knowledge is applied to fuzzy inference model. With such a built system even a less experienced person could benefit from it, e.g. urban planners, officials. The analysis result is obtained in a very short time, so a large number of the proposed location can also be verified in a short time. The proposed method is intended for testing of car parks location in a city. The paper will show selected examples of locations of the P&R facilities in cities planning to introduce the P&R. The analysis of existing objects will also be shown in the paper and they will be confronted with the opinions of the system users, with particular emphasis on unpopular locations. The research are executed using the fuzzy inference model which was built and described in more detail in the earlier paper of the authors. The results of analyzes are compared to documents of P&R facilities location outsourced by the city and opinions of existing facilities users expressed on social networking sites. The research of existing facilities were conducted by means of the fuzzy model. The results are consistent with actual users feedback. The proposed method proves to be good, but does not require the involvement of a large experts team and large financial contributions for complicated research. The method also provides an opportunity to show the alternative location of P&R facilities. The performed studies show that the method has been confirmed. The method can be applied in urban planning of the P&R facilities location in relation to the accompanying functions. Although the results of the method are approximate, they are not worse than results of analysis of employed experts. The advantage of this method is ease of use, which simplifies the professional expert analysis. The ability of analyzing a large number of alternative locations gives a broader view on the problem. It is valuable that the arduous analysis of the team of people can be replaced by the model's calculation. According to the authors, the proposed method is also suitable for implementation on a GIS platform.

**Keywords :** fuzzy logic inference, park and ride system, P&R facilities, P&R location

**Conference Title :** ICURPT 2015 : International Conference on Urban, Regional Planning and Transportation

**Conference Location :** Paris, France

**Conference Dates :** October 29-30, 2015