

Assessment of Environmental Risk Factors of Railway Using Integrated ANP-DEMATEL Approach in Fuzzy Conditions

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Abstract : Evaluating the environmental risk factors is a combination of analysis of transportation effects. Various definitions for risk can be found in different scientific sources. Each definition depends on a specific and particular perspective or dimension. The effects of potential risks present along the new proposed routes and existing infrastructures of large transportation projects like railways should be studied under comprehensive engineering frameworks. Despite various definitions provided for 'risk', all include a uniform concept. Two obvious aspects, loss and unreliability, have always been pointed in all definitions of this term. But, selection as the third aspect is usually implied and means how one notices it. Currently, conducting engineering studies on the environmental effects of railway projects have become obligatory according to the Environmental Assessment Act in developing countries. Considering the longitudinal nature of these projects and probable passage of railways through various ecosystems, scientific research on the environmental risk of these projects have become of great interest. Although many areas of expertise such as road construction in developing countries have not seriously committed to these studies yet, attention to these subjects in establishment or implementation of different systems have become an inseparable part of this wave of research. The present study used environmental risks identified and existing in previous studies and stations to use in next step. The second step proposes a new hybrid approach of analytical network process (ANP) and DEMATEL in fuzzy conditions for assessment of determined risks. Since evaluation of identified risks was not an easy touch, mesh structure was an appropriate approach for analyzing complex systems which were accordingly employed for problem description and modeling. Researchers faced the shortage of real space data and also due to the ambiguity of experts' opinions and judgments, they were declared in language variables instead of numerical ones. Since fuzzy logic is appropriate for ambiguity and uncertainty, formulation of experts' opinions in the form of fuzzy numbers seemed an appropriate approach. Fuzzy DEMATEL method was used to extract the relations between major and minor risk factors. Considering the internal relations of risk major factors and its sub-factors in the analysis of fuzzy network, the weight of risk's main factors and sub-factors were determined. In general, findings of the present study, in which effective railway environmental risk indicators were theoretically identified and rated through the first usage of combined model of DEMATEL and fuzzy network analysis, indicate that environmental risks can be evaluated more accurately and also employed in railway projects.

Keywords : DEMATEL, ANP, fuzzy, risk

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