

Two Approaches to Ranking Aggregation in The Methodology of Multiple-Level, Multiple Criteria Evaluation of Urban Transportation Projects*

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Abstract

Purpose: The objective of the study was to propose an alternative approach to aggregating rankings in a multi-level, multi-criteria methodology for assessing urban transport projects (UTP).

A gap in the literature: In the literature, only one approach (so-called horizontal) is presented for aggregating rankings in a multi-level, multi-criteria methodology for assessing UTPs, implemented at two levels: operational (level II) based on the normalization formula for aggregating the substantive utility - local (in a given class) of individual UTPs of an appropriate nature to the substantive utility - global of all UTPs in the entire population, and a global assessment of UTPs, leading to obtaining the final ranking of all projects (level V) based on the aggregation formula for hierarchizing UTPs according to their global utility.

Methodology/Approach used in the study: The study used the multi-level, multi-criteria methodology for assessing UTPs, including the horizontal approach to aggregating rankings; the multi-criteria decision support (MCDS) methodology, the AHP method, which is used to conduct computational experiments; and Spearman's rank correlation coefficient used to evaluate the vertical approach.

Summary of findings: This article develops and presents a new approach to aggregating rankings in the multi-level, multi-criteria UTP evaluation methodology. This approach aggregates rankings only at one, level V of the methodology and is based: firstly on the original aggregation formula for prioritizing UTPs according to their global utilities obtained within predefined project classes based on their partial utilities (substantive, sectoral, strategic); and secondly on the original formula for normalizing the aggregation of global UTP utilities from predefined classes to prioritize UTPs in the final ranking according to their global utilities of all UTPs in the entire population (irrespective of the project class they were in). This article also evaluates the proposed vertical approach to aggregating rankings in the multi-level, multi-criteria UTP evaluation methodology.

Keywords: ranking aggregation; normalizing aggregation formula; multiple criteria decision support; methodology of multiple-level, multiple criteria evaluation of varied urban transportation projects; Spearman's rank correlation coefficient.