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Ondrej Stopka

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SUMMARY

APPLICATION OF OPERATIONS RESEARCH METHODS IN CITY LOGISTICS

The monograph is focused on the topical issue, both in practical and scientific-research fields. This literature work specifically deals with the draft procedures in terms of locating logistics service centers as well as addressing distribution tasks at a scale of urban agglomerations, and examines the options of using chosen mathematical methods in the given subject. The particular recommendation consists primarily in application of specific Operations Research techniques in order to locate public logistics service centers at a national scale in unique link to model various scenarios of delivery routes at a city logistics scale to optimize the total distance traveled during supplying customers.

In particular, the author of the monograph aims to implementation of the Operations Research methods that are suitable for assignments dealing with location of service centers (multi-criteria decision making techniques) as well as methods for modeling circuit delivery scenarios (vehicle routing problem techniques). For the purposes of investigation, the following apparatuses are gradually applied: Weighted Sum Approach (referred to as WSA), Analytic Hierarchy Process (referred to as AHP) and Technique for Order Preference by Similarity to Ideal Solution (referred to as TOPSIS) to locate the public logistics service center, followed by Greedy algorithm, Clarke-Wright method, Mayer method and Nearest Neighbor algorithm to determine the optimal delivery routes in terms of supplying certain logistics facilities at a city logistics scale.

The monograph is divided into a theoretical-methodological part (Introduction and Chapters 1–3), a practical part (Chapters 4 and 5) and a part containing an evaluation of the most important results achieved and discussion (Chapter 6). The theoretical-methodological part explains the basic concerns related to the very concepts of logistics service centers, city logistics, and above all, a literature review of existing methods of Operations Research with a focus on placing and allocating logistics facilities, networking logistics centers among each other, as well as circuit distribution tasks with primary emphasis on the field of urban agglomerations and city logistics area.

The application (practical) part of the monograph, first, formulates a draft of approach methodological guideline for locating public logistics centers at a national level when using appropriate multi-criteria analysis methods for the purpose of creating a network of public logistics centers in a certain territory. The monograph designs, among other benefits, a methodology that mathematically

verifies an effective location for such a logistics object, recommends the most suitable region in the Slovak Republic, as well as compares it with other alternatives. Multi-criteria decision making approach is used with the support of tool to determine the weights of criteria, namely the Saaty method. The criteria are identified by mostly socio-economic and demographic factors related to transport and logistics sphere. These criteria are evaluated by calculating their weights and specifying a compromise option. And then, the very multi-criteria evaluation of variants to define a compromise one is carried out.

Second, the monograph also includes Chapter 5, which discusses a topic of distribution tasks. At the beginning of this part, the original model of distribution activities, which are realized in a form of circuit delivery routes when supplying customers, is identified. After that, individual scenarios of modeling optimized delivery routes are proposed by using determined Operations Research techniques. The designed models are thereafter compared with the initial state of the distribution task and with each other.

Following the adequate analysis and synthesis, induction and deduction of findings based on the very calculations by using individual tools of Operations Research, the application of chosen techniques is proposed, the solution and the way of their implementation are presented, as well as suggestions and ideas for future research studies are recommended at the end of the monograph.