

# EVALUATION CRITERIA APPLIED IN BRIDGE INFRASTRUCTURE MAINTENANCE IN POLAND AND SELECTED COUNTRIES OF THE WORLD

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## SUMMARY

The article provides a presentation and comparison of various criteria applied in BMS systems for the purpose of assessing the technical condition of bridges. The criteria and the methods which are used have been analyzed also from the point of view of their usefulness for the purpose of bridge infrastructure management. Experience for Poland has been analyzed and confronted with relevant examples of the criteria used in other countries.

Basic and advanced methods of evaluation are addressed. Evaluation methods, which are useful for the purpose of parameterization of the results of bridge facilities assessment, have been selected for further research. Parameterization is understood in this case as drawing up, by the decision-making teams or computer program algorithms, of “rankings” for the needs of on-going and planned maintenance of bridge facilities. Attention has been drawn to the possibility of use of new technologies, e.g. BIM, AR, Big Data or IoT in the broadly defined bridge operation and maintenance systems.

**Keywords:** *Evaluation Criteria, Multiple Criteria Decision Making (MCDM), Bridge Management System (BMS).*

**Abbreviations:** *AR = Augmented Reality, BRIM = Bridge Information Modeling, FEST = Funkcja Ekspertowa Stanu Technicznego (Expert Function of the Technical State), GDDKiA = Generalna Dyrekcja Dróg Krajowych i Autostrad (General Directorate for National Roads and Motorways, a Polish authority), IABMAS = International Association for Bridge Maintenance and Safety, IoT = Internet of Things, LCCA = Life Cycle Cost Analysis, MCDM = Multiple Criteria Decision Making, NIK = Najwyższa Izba Kontroli (Supreme Audit Office, a Polish authority), SZOK = System Zarządzania Obiektami Komunikacyjnymi, oprogramowanie (Transport Facility Management System, a software program)*

## 1. INTRODUCTION

Currently, there are about 40,000 road bridge structures in Poland (hereafter referred to as the bridges). The biggest attention is paid to the maintenance of bridges which are part of transport routes and highways (according to the available data: 7675 items at the end of 2017) [1]. It is known that financing of ongoing maintenance of bridges, their renovation, modernization or replacement is insufficient, both in Poland and in other countries. Therefore, the decisions about the selection of facilities and the scope of maintenance work and their financing have to be taken while bearing in mind that there are limited resources. Many authors of studies covering this field draw attention to the need for thoughtful allocation of limited budget funds and their effective use. In Poland, the work on the development of rules and their implementation into computer systems dates back to 1990. There are also many international publications, for example by Romanian authors [2], Prof. D. Frangopol [3] or the materials from the IABMAS cyclical conference.