

3-9 July 2023, Albena, Bulgaria, ISBN 978-61-97603-61-3

Multicriterial investment analysis and environmental impact on the longest suspension bridge from Romania

**Andrei BEJUSCA, Daniel LEPADATU, Loredana JUDELE, Ion
RUSU, Eduard PROASPAT**

<https://doi.org/10.5593/sgem2023/6.1/s26.39>

Abstract

The process of selecting and prioritizing investment project proposals in construction is characterized by multiple objectives and uncertainties due to incomplete information and the multitude and dynamics of factors that can intervene. Knowing their significance and influence on the final investment decision, it is a complex problem that requires a multi-critical analysis with both quantitative and qualitative factors, necessary for a good quantification and evaluation. In recent years, the increase in the complexity of projects involves a large number of factors that ensure the technical and economic success of infrastructure investments and therefore it is necessary to identify the optimal decision criteria in their selection and prioritization. Identifying and setting these criteria is generally difficult and depends on the professional skills of the project manager but should follow a systematic process to ensure its validity and transparency. The paper presents such an analysis of the Braila Bridge, which crosses the Danube River and is the largest suspended bridge in Romania and the third in Europe, which required such a study in order to benefit from the best investment decision from all points of view. Thus, two design versions with multiple and varied implications of parameters are analyzed, starting from the financial or technical one with the length of the route, the difficulty of the design and execution and especially its impact on the environment and biodiversity.

Keywords: multicriterial analysis, longest investment management, environmental impact

References:

**2023 International Multidisciplinary Scientific GeoConference
Surveying Geology and Mining Ecology Management (SGEM)**

3-9 July 2023, Albena, Bulgaria, ISBN 978-61-97603-61-3

1. Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU.
2. Bellos I. *Multicriteria Decision-Making Methods for Optimal Treatment Selection in Network Meta-Analysis*. *Med Decis Making*. 2023, 43(1), pp 78-90. doi: 10.1177/0272989X221126678.
3. Maysam Shmlls, Mohammed Abed, Tamas Horvath, David Bozsaky, *Multicriteria based optimization of second generation recycled aggregate concrete, Case Studies in Construction Materials*, Volume 17, 2022, e01447, DOI: 10.1016/j.cscm.2022.e01447
4. Pankaj P. Awate, Shivprakash B. Barve, *TOPSIS & EXPROM2 multicriteria decision methods for Al₂O₃/Al 6061 nanocomposite selection*, *Materials Today: Proceedings*, Volume 46, Part 17, 2021, Pages 8352-8358, DOI: 10.1016/j.matpr.2021.03.402.
5. Andrea Valencia, Jiangxiao Qiu, Ni-Bin Chang, *Integrating sustainability indicators and governance structures via clustering analysis and multicriteria decision making for an urban agriculture network*, *Ecological Indicators*, Volume 142, 2022, 109237, <https://doi.org/10.1016/j.ecolind.2022.109237>.
6. Jaume Fito, Julien Ramousse, Sacha Hodencq, Frederic Wurtz, *Energy, exergy, economic and exergoeconomic (4E) multicriteria analysis of an industrial waste heat valorization system through district heating*, *Sustainable Energy Technologies and Assessments*, Volume 42, 2020, 100894, <https://doi.org/10.1016/j.seta.2020.100894>.
7. Mladineo M., Jajac N., Rogulj K., *A simplified approach to the PROMETHEE method for priority setting in management of mine action projects*, *Croatian Operational Research Review*, 2016, pp 249-268, DOI: 10.17535/crorr.2016.0017.
8. Lepadatu D., Morariu D.I., Cherradi T., Rotaru A., Serbanoiu I. and Judele I., *Smart technology optimization by multicriteria analysis of civil engineering structure in service stage through topo-geodetic monitoring*, *Proceedings of the 4th International Conference on Smart City Applications (SCA) 2019*, Article No.: 71, pp 1-4, DOI: 10.1145/3368756.3369055.
9. Daniel LEPADATU, Dorina ISOPESCU, Ion RUSU, Loredana JUDELE, Gabriel SANDULACHE, *Optimisation of Several Estimating Functions by Multicriterial Analysis of Civil Engineering Structure in Service Stage Monitoring*, *Proceedings of the International Conference "Interdisciplinarity and Cooperation in Cross-border Research"*, Chisinau, Republic of Moldova published in ACROSS journal, Engineering section, Vol. 6. No. 2, pp 1-12, 2022.
10. VP Solutions – VPS, *Visual Promethee Gaia Manual*, 2013.
11. *Visual PROMETHEE Software Academic 2022*. Retrieved from: <http://en.promethee-gaia.net/academic-edition.html>