

This is a pre print version of the following article:

Supplier selection for global service providers: a decision support system / Bruck, B., Iori, M., Magni, C.A., Pretolani, D., Vezzali, D.. - In: INFOR. - ISSN 0315-5986. - 63:1(2025), pp. 57-84.
[10.1080/03155986.2024.2367193]

Terms of use:

The terms and conditions for the reuse of this version of the manuscript are specified in the publishing policy. For all terms of use and more information see the publisher's website.

29/06/2026 12:56

(Article begins on next page)

8 AIROYoung Workshop 2024 — Book of Abstracts
**Supplier Selection for Global Service
Providers: a Decision Support System**

Bruno Petrato Bruck – bruno.bruck@ci.ufpb.br

Centro de Informática, Universidade Federal da Paraíba, 58058-600
João Pessoa, Brazil

Manuel Iori – manuel.iori@unimore.it

Department of Sciences and Methods for Engineering, University of
Modena and Reggio Emilia, Via Amendola 2, 42122, Reggio Emilia,
Italy

Carlo Alberto Magni – carloalberto.magni@unimore.it

Department of Economics “Marco Biagi”, University of Modena and
Reggio Emilia, Viale Berengario 51, 41121, Modena, Italy

Daniele Pretolani – daniele.pretolani@unimore.it

Department of Sciences and Methods for Engineering, University of
Modena and Reggio Emilia, Via Amendola 2, 42122, Reggio Emilia,
Italy

Dario Vezzali – dario.vezzali@unimore.it

Department of Sciences and Methods for Engineering, University of
Modena and Reggio Emilia, Via Amendola 2, 42122, Reggio Emilia,
Italy

Abstract In this paper, we develop a decision support system (DSS) aimed at solving a real-world supplier selection problem (SSP) for a global service provider (GSP) operating in the facility management industry. The GSP provides its customers with facility management services, which are subcontracted to external suppliers selected on the basis of multiple criteria, like economic soundness, quality of service, capacity, and closeness. The SSP is formulated as a multi-objective generalized assignment problem, where the quality and the closeness of the selected suppliers are maximized, whereas a penalty produced by overcapacity assignments is minimized. The quality of each supplier is

computed by applying a weighted sum method, resulting from a multi-criteria decision analysis in which the criteria weights are determined through an Analytic Hierarchy Process. The DSS is developed using a modular architecture with a relational database, a supplier evaluator, and a simulator, as well as an additional user-friendly interface. The simulator relies on a rolling horizon algorithm and three alternative configurations to assign contracts to suppliers. The effectiveness of the DSS is assessed by means of extensive computational experiments on historical data from the GSP. The results show a significant average improvement of at least 25% in terms of objective function value compared to the solution adopted by the company and prove the advantage of using the DSS.

Keywords: Decision Support System, Supplier Selection Problem, Global Service Providers, Integrated Multi-Criteria Decision Analysis.

References

- [1] Figueira, J. R., Roy, B., *Determining the weights of criteria in the ELECTRE type methods using a revised Simos' procedure*, European Journal of Operational Research, volume 139(2), pages 317–326, 2002.
- [2] Ishizaka, A., Labib, A., *Review of the main developments in the analytic hierarchy process*, Expert Systems with Applications, volume 38(11), pages 14336–14345, 2011.
- [3] Ho, W., Ma, X., *The state-of-the-art integrations and applications of the analytic hierarchy process*, European Journal of Operational Research, volume 267(2), pages 399–414, 2018.
- [4] Pretolani, D., *Multiple criteria decision analysis theory and tools for the SDEWES index*, Journal of Sustainable Development of Energy, Water and Environment Systems, volume 8(4), pages 654–677, 2020.
- [5] Bruck, B. P., Vezzali, D., Iori, M., Magni, C. A., Pretolani, D., *A Decision Support System to Evaluate Suppliers in the Context of Global Service Providers*, Proceedings of the 23rd International Conference on Enterprise Information Systems - Volume 1: ICEIS, pages 420–430, 2021.