

A Parsimonious Multi-Criteria Decision Making Process for Supplier Selection

*Neda Javanmardi ^{*a}, Amin kaboli ^b, Iraj Mahdavi ^a, Babak Shirazi ^a*

Abstract

One of the main goals of supply chain management is to maintain long term relationship with few but reliable suppliers. Supplier selection has become an important part of supply chain management that seeks to evaluate a set of suppliers in order to select a limited number of them. At present, different criteria are bringing into account in the supplier selection process. However, providing such enormous information on different criteria for each supplier is a complicated and time consuming procedure that is not applicable in practice. In this paper, a new approach for effective supplier selection is developed based on the principle component analysis (PCA) and Topsis algorithm. The proposed procedure consists of two main parts: reducing supplier selection criteria to the most important ones by filtering out the parameters that don't impact the final decision significantly, and ordering suppliers based on the reduced set of criteria. In most of proposed models in literature experts determine the weights of criteria, however this work tries to weigh the criteria in a systematic way which can highly decrease the probable human error. For this purpose, principle component analysis is utilized to weigh all criteria and reduce them to the most important ones. Topsis algorithm is also applied to order suppliers from the best to the worst. Based on empirical study of 21 suppliers, 11 qualitative and quantitative criteria are determined for supplier evaluation process. Applying the proposed procedure, this number was reduced to 6 criteria. These 6 criteria are selected to evaluate the suppliers and sort them from the best to the worst. Interestingly, comparing this result to the result of evaluation based on 11 criteria, both methods sort the suppliers in the same way. However, the reduced set of criteria is less complicated and is more economical in terms of time and cost.

^a Department of Industrial Engineering, College of Technology, Mazandaran University of Science & Technology, Babol, Iran.

^b EPFL, Laboratory for Production Management and Processes, CH-1015 Lausanne, Switzerland

Corresponding author: Neda Javanmardi, Tel: 0041 78 838 09 85, Email address: neda.javanmardi62@gmail.com