

A Comparative Soft Computing Approach to Supplier Performance Prediction Using GEP and ANN Models: An Automotive Case Study

Authors : Seyed Esmail Seyedi Bariran, Khairul Salleh Mohamed Sahari

Abstract : In multi-echelon supply chain networks, optimal supplier selection significantly depends on the accuracy of suppliers' performance prediction. Different methods of multi criteria decision making such as ANN, GA, Fuzzy, AHP, etc have been previously used to predict the supplier performance but the "black-box" characteristic of these methods is yet a major concern to be resolved. Therefore, the primary objective in this paper is to implement an artificial intelligence-based gene expression programming (GEP) model to compare the prediction accuracy with that of ANN. A full factorial design with 95% confidence interval is initially applied to determine the appropriate set of criteria for supplier performance evaluation. A test-train approach is then utilized for the ANN and GEP exclusively. The training results are used to find the optimal network architecture and the testing data will determine the prediction accuracy of each method based on measures of root mean square error (RMSE) and correlation coefficient (R²). The results of a case study conducted in Supplying Automotive Parts Co. (SAPCO) with more than 100 local and foreign supply chain members revealed that, in comparison with ANN, gene expression programming has a significant preference in predicting supplier performance by referring to the respective RMSE and R-squared values. Moreover, using GEP, a mathematical function was also derived to solve the issue of ANN black-box structure in modeling the performance prediction.

Keywords : Supplier Performance Prediction, ANN, GEP, Automotive, SAPCO

Conference Title : ICIEST 2014 : International Conference on Innovations in Engineering, Science and Technology

Conference Location : Kuala Lumpur, Malaysia

Conference Dates : August 25-26, 2014