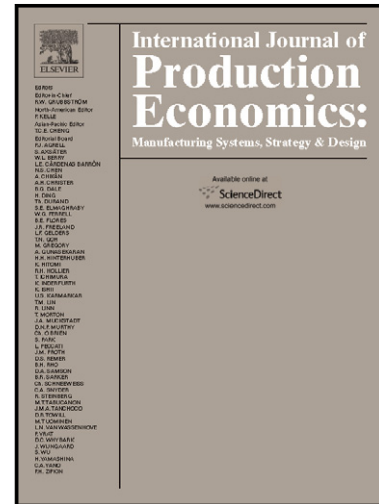


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A decision support system for supplier selection and order allocation in stochastic, multi-stakeholder and multi-criteria environments

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Abstract

Integrated supplier selection and order allocation is an important decision for both designing and operating supply chains. This decision is often influenced by the concerned stakeholders, suppliers, plant operators and customers in different tiers. As firms continue to seek competitive advantage through supply chain design and operations they aim to create optimised supply chains. This calls for on one hand consideration of multiple conflicting criteria and on the other hand consideration of uncertainties of demand and supply. Although there are studies on supplier selection using advanced mathematical models to cover a stochastic approach, multiple criteria decision making techniques and multiple stakeholder requirements separately, according to authors' knowledge there is no work that integrates these three aspects in a common framework. This paper proposes an integrated method for dealing with such problems using a combined AHP-QFD (Analytic Hierarchy Process – Quality Function Deployment) and chance constrained optimization algorithm approach that selects appropriate suppliers and allocates orders optimally between them. The effectiveness of the proposed decision support system has been demonstrated through application and validation in the bioenergy industry.

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