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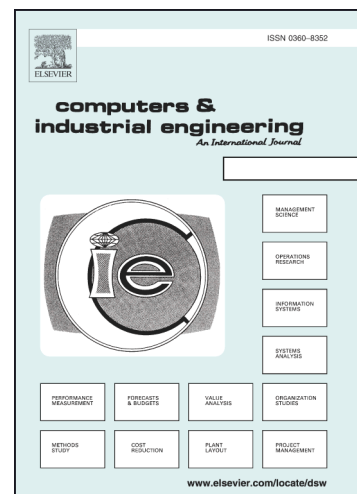
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Compound Mechanism Design of Supplier Selection Based on Multi-attribute Auction and Risk Management of Supply Chain

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Abstract: The quality of the supplier base affects the competitiveness of firms and the attendant supply chain. The supplier selection decision is key to effective supply chain management. This paper investigates the problem of supplier selection under multi-source procurement for a type of divisible goods (such as coal, oil, and natural gas). By considering both the risk attributes and the attributes under a commercial criterion, we design a new two-stage compound mechanism for supplier selection based on multi-attribute auction and supply chain risk management. In the first stage, a multi-auction mechanism is established to determine the shortlist among all qualified suppliers based on four attributes (quality, price, quantity flexibility, and delivery time reliability) under a commercial criterion. In the second stage, seven risk attributes against the shortlisted suppliers are further considered, and a new ranking method based on grey correlation degree of mixed sequence is proposed to rank the finalists and to select the final winners. Moreover, the implementation, availability, and feasibility of the two-stage compound mechanism are highlighted by using an example of the multi-source procurement of electricity coal. This presented compound mechanism may well improve the procurement efficiency of divisible goods and greatly reduce the procurement risk.

Keywords: Supply chain, Supplier selection, Two-stage compound mechanism, Multi-attribute auction, Risk management, Grey correlation degree

1. Introduction

Suppliers have several roles under supply chain management: to manufacture parts and components for their customers, to ensure product quality and assurance, to indirectly help manage the cost over-runs of their downstream partners in the supply chain. As such, a supplier's production capacity can limit the output level of the entire supply chain. Further, a supplier's quality level determines the quality assurance of the final product, and the supplier's cost control affects the cost control capacity of the entire supply chain, and the supplier's new product development capacity influences the quality and cycle of the new product development.

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