Editorial

Elkafi Hassini

DeGroote School of Business, McMaster University, 1280 Main Street West, Hamilton, Ontario L8S 4M4, Canada E-mail: hassini@mcmaster.ca

Biographical notes: Elkafi Hassini is an Associate Professor at the DeGroote School of Business, McMaster University. He holds a PhD and MASc in Management Sciences from the Faculty of Engineering at the University of Waterloo. In his research, he uses mathematical models and optimisation techniques to solve business decision problems. His current research focuses on the logistics of e-tailing, joint pricing and inventory management, and supplier selection and procurement auctions.

1 Introduction

The Annual International Symposium on Supply Chain Management is held on each fall to bring together researchers and practitioners from around the world. The highlights of the symposium include: a collection of high quality academic papers, practitioner white papers or presentations, keynotes by renowned practitioners and academics and panel discussions on current topics. This Special Issue is drawn from the academic papers that were presented during the fifth symposium held from 17 to 19 October 2007 in Toronto, Canada.

One key aspect of the symposium is its goal to bring together academics and practitioners in one forum where they can share ideas and contribute to the advancement of the theory and practice of supply chain management. In addition to the interaction between academics and practitioners in the presentation and discussion panels, the symposium papers include contributions that span the spectrum of operations management methodologies from case studies and empirical work to quantitative and analytical studies. The papers in this Special Issue, the second issue to be withdrawn from the 2007 symposium, highlight the analytical aspect of the symposium contributions. While they use different analytical methodologies, all the papers share a common theme: designing efficient supply chain operations that integrate the procurement functions.

Procurement plays an important role in supply chain management. Estimates put the cost of procurement of goods and services at about 70–80% of the total cost of manufacturing (Benton, 2007; Monczka et al., 2005). The importance of procurement has been further emphasised by the recent trend in outsourcing: according to Hayes et al. (2005), it is expected that about 50% of manufacturing activities will be outsourced by the year 2010. Procurement functions within a company now extend to different departments within the company, such as engineering and marketing, as well as different parts of the globe. As such there is a need for operations research models that treat these

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different aspects of procurement. Aissaoui et al. (2007) present a recent review of the relevant operations research literature and highlight the need for models that treat recent developments in the practice of procurement. It is hoped that this issue fulfils part of this need and will spur more research in this direction.

2 The papers

There are six papers in this Special Issue. Table 1 provides a summary of the key features of the papers along three dimensions: methodology, major procurement issues that are discussed in the paper and contributions. The papers address a wide spectrum of procurement issues; from auctions to detailed bill of material planning to global outsourcing. In addition, two papers touch on quality related issues in the supply chain, a topic that is not well researched in the supply chain literature. In the paper by Alzaman et al., they incorporate the cost of quality in a practical supply chain design model. The paper by Amer et al. uses six sigma quality principles in the design of supply chain processes.

Authors	Methodology	Procurement issues	Contribution
Von Massow and Hassini	Simulation	The impact of reverse auction parameters (number of vendors and bid increment) on the outcome of the auction	Developed a simulation model by which different reverse auctions strategies can be evaluated
Chaabane, Ramudhin, and Paquet	Multi-criteria decision- making, analytic hierarchy process and dynamic programming	Selection of raw material vendors and subcontractors within a comprehensive supply chain network design model	A two-phase supply chain network design model that incorporates multiple criteria and SCOR model measures
Ramudhin and Benkaddour	Mixed integer programming	Dynamic assignment of subassemblies and modules to subcontractors	The impact of modularisation on supply chain design and subcontracting dynamics
Saboonchi and Zhang	Mixed-integer programming and stochastic programming	Outsourcing strategies in a global supply chain	A comprehensive design model for global supply chains to study outsourcing strategies
Alzaman, Ramudhin and Bulgak	Non-linear integer programming, simulated annealing	Selection of vendors and subcontractors while taking into account the cost of quality	Incorporating the cost of quality in supply chain design
Amer, Asharaf, Luong, Lee and Wang	Fuzzy set theory and design for six sigma	Designing order fulfillment processes and their related performance measures	Application of six sigma design methodology to supply chains. Use of fuzzy logic to develop supply chain order performance measures

Table 1Summary of key paper features

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In the paper 'The impact of supplier numbers and bid increment on reverse auction outcomes', von Massow and Hassini describe a simulation model that allows a purchaser to investigate the effect of reverse auction parameters, such as number of vendors and bid increment, on the outcome of the auction. They find that it is not an incentive to increase bid decrement in an effort to lower the expected purchase cost in a traditional 'single bidder' reverse auction process. To lower the mean expected price for the buyer, they propose an alternate reverse auction specification in which all participants must bid at each increment if they wish to continue in the auction.

Chaabane et al. present a supply chain network design model that incorporates multiple criteria and uses performance measures from the SCOR model. Their work entitled 'A two-phase multi-criteria decision support system for supply chain management' incorporates procurement decisions such as the selection of raw material vendors and subcontractors. They develop a two-phase decision model where in the first stage the selection is done through the use of the analytical hierarchy process technique and in the second stage they optimise the safety stock level within the supply chain using a dynamic programming approach. Their problem is motivated by their work with the aeronautic industry.

Motivated by a problem faced by a jet engine manufacturer, Benkaddour and Ramudhin develop a model that would help a manufacturer to decide on the number of modules and subassemblies as well as the appropriate subcontractors to use in their supply chain. In their work entitled 'Supply chain network design with considerations for modular assembly', they apply integer programming and consider multiple sourcing where the number of parts sourced from a business partner must exceed a lower bound as dictated by purchasing contracts. They investigate three scenarios to determine when to start or discontinue business relationships with suppliers and subcontractors.

In the paper 'A two-stage stochastic programming method for designing multi-stage global supply chains with stochastic demand', Saboonch and Zhang consider outsourcing strategies in a global supply chain. They setup a mixed integer programming model and handle the uncertainty in demand through a two-stage stochastic programming approach. They find that outsourcing from low-cost countries is not always profitable when relevant supply chain costs such as exchange rate fluctuations are taken into account.

In their paper entitled 'Quality in operational supply chain networks: an aerospace case study', Alzaman et al. incorporate the cost of quality in the design of supply chains. They consider the problem of configuring a supply chain network by selecting vendors and subcontractors based on *n*-level bills of materials and taking into account the cost of quality. They develop a non-linear integer programme and solve it using simulated annealing. They illustrate their model through a case study with an aerospace company.

In their paper 'Systems approach to order fulfilment', Amer et al. use concepts from the design for six sigma approach and apply it to designing supply chain processes. They use the order fulfilment process to illustrate their methodology. They employ fuzzy set theory to develop a measure for the supply chain order performance.

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