Editorial

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Biographical notes: Mingming Leng is an Associate Professor of Operations Management in Faculty of Business at Lingnan University, Hong Kong. He received his PhD in Management Science/System from McMaster University's DeGroote School of Business, Canada. He is currently interested in operations and supply chain management, game-theoretic analysis of various business problems, and interface between operations and other disciplines. He has published around 25 papers in *Operations Research, Production and Operations Management*, *Naval Research Logistics*, *IIE Transactions*, *Operations Research Letters*, *European Journal of Operational Research*, etc.

1 Background and motivation

In practice, the interactions between two or among three or more firms with conflicting or common interests always exist. Such interactions may result in competitive or cooperative settings, which can be regarded as 'games'. To make a strategic decision in an interactive situation, each rational firm should understand other firms' actions or responses to its decision. This necessitates the theory of games, which is an interactive decision theory concerning conflict and cooperation that involves two or more decision makers. In the past three decades, many academic publications have appeared to investigate a variety of game-related problems arising in business, economics, sociology, political science, etc. This shows the theory's important role in effectively modelling diverse social, business, and economic phenomena in competitive or cooperative settings, and in systematically analysing strategic reasoning and decision-making processes.

Since the middle of the 1980s, a great number of game models have been developed to examine various inventory management problems. As inventory-related topics are important in the operations management field where two- or multiple-firm competition and cooperation are usually interesting to most relevant researchers, inventory research with game theoretical analysis should still be a focus in the near future. Moreover, many scholars' research plans are centred on the interface between inventory control and other business functions such as marketing, finance, accounting, and information systems. Because game theory intersects with many disciplines, it will apply to more research problems in the inventory research area. We are thus motivated to edit this special issue of the *International Journal of Inventory Research*, which is expected to help more researchers understand the importance of game theory in inventory research.

2   Inside this issue

The special issue includes seven papers in which authors investigated different inventory-related supply chain systems in non-cooperative or cooperative settings. Six papers applied non-cooperative game theory to analyse static or dynamic inventory problems, and one paper used cooperative game theory to address a profit-sharing problem in an inventory system.

Four papers in this issue are concerned with *non-cooperative* game theory in *static* inventory systems. In these papers, authors used Nash or Stackelberg equilibrium to characterise supply chain members' decisions. The first paper of this issue was proposed by Zhang and Zeephongsekul to consider a two-echelon supply chain where a supplier and a retailer serve a strategic consumer. The authors analysed three leader-follower game models allowing each player or coalition of players be the game leader, and discussed the impact of leadership and coalition on the supply chain members' Stackelberg equilibrium-characterised decisions and the consumer's welfare. The second paper, written by Martagan and Ekşioğlu, studied an inventory game involving two retailers who sell substitutable products and face uncertain supply from their suppliers. The two retailers make order quantity decisions to satisfy stochastic demand, under their agreement that a fraction of unsatisfied demand at a retailer can switch to the other retailer. The authors investigated the existence and uniqueness of Nash equilibrium for the game, and provided some insights regarding the joint impact of product substitution and supply uncertainty on the retailers' inventory ordering policies and profits.

The third paper, proposed by Nalça, Süral and Gerchak, addressed the economic manufacturing quantities problem in a two-echelon supply chain involving multiple suppliers and an assembler. The authors discussed both the centralised and the decentralised systems in the supply chain. Deriving the formulas for calculating the costs in the two different systems, the authors drew the main conclusion that the decentralised decision making induces a higher cost than the centralised decision making. The fourth paper was proposed by Choi. The author investigated a leader-follower game in a multi-period fashion supply chain, where a manufacturer acts as the leader and offers a contract to a risk-averse retailer. The retailer determines the order quantity for a newsvendor problem in each period by solving a mean-variance optimisation problem.

The fifth and the sixth papers in this issue developed *dynamic* game models to analyse inventory-related multi-period problems. In the fifth paper, Song and Liang developed a two-seller two-fare-class dynamic inventory control game, where a seller's acceptance/rejection decisions in each period are affected not only by its own available inventory, but also by inventory levels of the other seller who sells the same or substitutable products in the same geographic market. In the market, the ordering requests from different fare classes arrive concurrently. The authors analysed the dynamic game for both the non-cooperative and the cooperative cases, and compared their results to draw some insights. The sixth paper, which is from Fas and Bilgiç, considered a two-player, two-period dynamic game for a substitutable product inventory problem. The authors examined the existence and uniqueness of Nash equilibrium for both the single-and the two-period games with a stochastic demand.

The last paper was proposed by Elomri, Ghaffari, Jemai and Dallery, who used *cooperative* game theory to address a cost allocation problem among multiple retailers when they jointly replenish their inventories. The retailers may sell identical or different types of products but each faces a retailer-specific deterministic and constant demand

rate. Under the assumption that retailers can only order full-truckload shipments when replenishing the inventories of their products, the retailers can either make the shipment orders independently or form coalitions to do joint replenishment. The authors showed that there is a cost allocation rule guaranteeing that all the retailers would benefit from forming the grand coalition than any other form of coalitions. The Shapley-value-based allocation rule is also applied to the coalition formation game and the authors fond that it is not in the core in general unless all the retailers are completely identical.

Acknowledgements