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Editorial

Logistics Systems Optimization under Competition

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Nowadays, optimization on logistics and supply chain systems is a crucial and critical issue in industrial and systems engineering. Important areas of logistics and supply chain systems include transportation control, inventory management, and facility location planning. Under a competitive market environment, decision making for all these critical areas requires more sophisticated mathematical modeling and analysis. For example, the noncooperative and cooperative analytical game theory and computational based evolutionary algorithms are some popular tools in exploring logistics systems optimization problems under competition. Since many of these optimization problems are complex, innovative analytical models and novel algorithms will be needed in order to optimize the respective logistics systems under the competitive environment. Motivated by the importance of the topic, this special issue of this journal is compiled and it aims at publishing the timely and significant findings on scientific research in logistics systems optimization under competition. This special issue puts high emphasis on the advance of optimization methods, innovative models, and analytical explorations from an industrial engineering and operations research perspective.

After rigorous review, this special issue features twelve interesting research papers. The topics of these papers range from vehicle routing problems, reverse logistics management, channel coordination challenges, dual-channel operations, and distribution network optimization, to retail inventory ordering decisions in supply chain systems. We briefly introduce these interesting research studies in the following.

In "Optimal Routing for Heterogeneous Fixed Fleets of Multicompartment Vehicles," Q. Wang et al. develop a novel metaheuristic based search method, known as the reactive guided tabu search (RGTS) method, to solve the multicompartment vehicle routing problem (MCVRP) with heterogeneous fleet. They consider the case when there is only a single vehicle which helps to support multiple customer orders. Since finding the optimal solution of MCVRP is computationally expensive, they design a few guiding rules, which employ the searching history, to enhance the searching. They conduct numerical analysis and reveal that their proposed method significantly outperforms the classical method.

In "Evaluating Reverse Supply Chain Efficiency: Manufacturer's Perspective," motivated by the importance of environmental sustainability and remanufacturing operations, M. Kumar et al. use the well-established fuzzy data envelopment analysis (FDEA) approach to study reverse supply chain management. They conduct their analysis from the manufacturer's perspective. Technically, they convert the proposed FDEA model into a crisp linear programming optimization problem. As a result, the problem is formulated as an interval programming problem. They argue that their proposed model can help to generate robust results. They show that the ISO 14001 certification scheme only slightly helps improve the supply chain's level of environmental sustainability. Furthermore, their findings interestingly show that companies which have implemented reverse supply chain practices for a shorter period of time would actually outperform those which have implemented reverse supply chain practices for a longer duration of time.

In "Competition with Online and Offline Demands considering Logistics Costs Based on the Hotelling model," Z.-H. Hu et al. examine, via the Hotelling model, the competition

effects of shops' location. To be specific, they consider two kinds of logistics costs, namely, the consumer's travelling cost for bricks-and-mortar store's demand and the seller's delivery cost for online demands. They further examine the consumer's waiting cost for online orders and highlight the importance brought by the ratio of online demand to the total demand (online plus offline).

In "Electronic Markets Selection in Supply Chain with Uncertain Demand and Uncertain Price," F. Yang et al. study the critical supply chain management problems in the presence of electronic markets. They develop some stylish analytical models to examine the optimal decision on the selection between public and private electronic markets. They consider three different scenarios: (i) the electronic market is solely used for buying, (ii) the electronic market is solely used for selling, and (iii) the electronic market is used for both selling and buying. They consider two sources of uncertainty, including demand uncertainty and price uncertainty, in their model. They derive the analytical conditions in which it is optimal for the supply chain agent to select a particular electronic market. One important finding that this study shows is that the electronic market's usage fee is a critical factor for assessing the electronic market's performance. It should be a focal point in the optimal selection and proper development of electronic market.

In "A Methodology to Exploit Profit Allocation in Logistics Joint Distribution Network Optimization," Y. Wang et al. study the logistics joint distribution network (LJDN) optimization problem. Their problem includes the optimal vehicle routes scheduling and profit allocation mechanism for multiple distribution centers. To be specific, they develop a model with an objective to minimize the total cost of the multiple distribution centers in the joint distribution network. They consider the situation in which each distribution center is assigned to serve a certain number of distribution units. They first develop and employ a novel revised particle swarm optimization (PSO) algorithm, which combines the PSO algorithm and genetic algorithm, to solve this problem. Then, they propose a cooperative game theory based model to derive the optimal profit allocation mechanism among the distribution centers.

In "Multiple Objective Fuzzy Sourcing Problem with Multiple Items in Discount Environments," F. Arikan develops a multiple criteria fuzzy sourcing problem with multiple items in discounts. He formulates the problem as a single period multiobjective mixed integer linear programming problem with fuzzy parameters on demand level and aspiration level of each objective. He employs a hybrid fuzzy approach which combines three fuzzy mathematical models to identify the solution. He argues that the fuzzy formulation makes the problem more realistic and the solution mechanism can be implemented in real world applications.

In "Impact of Heterogeneous Consumers on Pricing Decisions under Dual-Channel Competition," Y. Wei and F. Li analytically investigate the impacts brought by heterogeneous consumer behaviors on the equilibrium pricing decisions under a competitive dual-channel environment. To be specific, they consider a supply chain with one retailer and one manufacturer. The supply chain is led by the manufacturer and there are two channels, namely, the direct channel (i.e., selling directly to consumers) and the indirect channel (i.e., supplying to the retailer first). Consumers can decide which channel to make their purchases, which depends highly on the prices offered by the different channels. Owing to the complexity of the problem, they make use of an agent-based modeling and computational simulation approach to study the problem. They find that when the consumers are increasingly loyal to the indirect channel, the retailer will set a higher selling price and make more profit. They also reveal that when the consumer rationality level increases, the offered selling prices by both channels would decrease.

In "Optimal Ordering and Disposing Policies in the Presence of an Overconfident Retailer: A Stackelberg Game," Z. Wang et al. examine the behavioral decision making issue in inventory control. To be specific, they consider the case when the retailer has an overconfident behavior on the supply chain performance. They find that the retailer's overconfident behavior may not harm the supply chain provided that the level of overconfidence is less than a certain threshold. They further study the supply chain channel coordination issue with the buy-back returns contract. They prove that the buy-back returns contract will achieve the Pareto improving situation in the supply chain if the level of overconfidence is low.

In "Customized Transportation, Equity Participation, and Cooperation Performance within Logistics Supply Chains," X. Lin et al. explore the customized transportation issues in a logistics system. They develop a game-theoretic model. They analytically find that a take-or-pay supply contract cannot properly deal with the problem. They hence propose an equity participation plus simple contract scheme to help improve the performance of customized transportation. They show that, at the equilibrium, the private-type of logistic supply chains would choose a more efficient customized production level than the public-type counterpart.

In "Two-Echelon Inventory Optimization for Imperfect Production System under Quality Competition Environment," X. Lai et al. develop a novel two-echelon optimal inventory control model for a supply chain system with quality competition. They consider the situation in which the supplier's production process is imperfect and there are quality problems. They hence derive the optimal ordering policy for the buyer and the optimal shipping policy from the vendor to the buyer. They conclude that, in the supply chain system, both the supplier and the buyer may benefit from the quality improvement investment made by the supplier.

In "A Hybrid Approach to the Optimization of Multiechelon Systems," P. Sitek and J. Wikarek examine the freight transportation challenges with different distribution strategies. They propose a hybrid approach to tackle the multiechelon capacitated vehicle routing problem. They make use of mathematical programming and constraint logic programming approaches in developing the solution algorithm. They have also illustrated the implementation of the proposed approach and compared its performance with other existing mathematical programming methods.

In "The Newsvendor Problem with Different Delivery Time, Resalable Returns, and an Additional Order," F. Zeng

et al. study the case when the newsvendor faces demands with different delivery times. They investigate the case in the presence of resalable returns. They also consider the case when an additional order can be placed by the newsvendor. They construct the formal analytical model and examine numerically the impacts brought by the proportion of instant delivery needs and the return rate on the optimal ordering quantity. They show that the newsvendor's expected profit decreases as the proportion of instant delivery needs and rate of returned increase.

We believe that this special issue presents many interesting and timely research studies on logistics systems optimization. The coverage is indeed comprehensive: some studies focus on manufacturing side and some on retailing side; some studies explore transportation problems and some explore inventory decisions. The valuable academic and managerial insights generated by the papers of this special issue contribute significantly to the literature. In addition, hopefully, these important research results will help motivate future research on logistics systems optimization under a competitive setting.

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