Preface

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This Special Issue is a compilation of selected papers presented at the 30th National Congress on Operations Research and Industrial Engineering, which convened at Sabancı University in Istanbul, Turkey during June 30th–July 2nd, 2010. 665 participants took part in the Congress making 408 presentations. 11 papers presented in the congress have been accepted for publication in this Special Issue. The diversified nature of the presentations has also reflected itself to the spectrum of the papers published here.

Two papers are from the general area of production planning. Tapkan, Özbakır, and Baykasoğlu employ bees algorithm for the solution of the constrained multi-objective two-sided assembly line balancing problem. The two-sided assembly line balancing problem is defined here so as to reflect the challenges of the real production environment. Positional, zoning and synchronous task constraints are taken into account where the objective is to maximize the work slackness index and line efficiency and minimize the total balance delay. The authors present extensive computational results for problems from the literature.

Ağralı studies the effects of co-production on the lot-sizing decisions for multiple products, whose demands are different and dynamic over a planning horizon. Co-production refers to an important class of production where a family of several different

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products is produced simultaneously in a single production line. Co-production exists both in low- and high-technology production environments. Several mixed-integer linear programming formulations and extensions are presented. The author shows that the problem can be reduced to the single-item lot-sizing problem, and hence, a dynamic program that is given in the literature for that problem can be used to solve it. The proposed method is demonstrated at the hand of an example problem.

This issue contains two papers in the area of vehicle routing and variants. Aksen, Kaya, Salman, and Akça report a modeling effort for waste vegetable oil collection using mathematical programming. The real-life problem is cast into a selective and periodic inventory routing problem. The objective is to minimize the total collection, inventory, and purchasing costs while satisfying the production requirements and operational constraints. The authors propose two different formulations, compare them on six real-life instances, and use the preferred formulation over 36 scenarios. As a result, vehicle costs are observed to have the largest share in the objective function and using the vehicle type with the higher capacity decreases the objective function significantly. It is observed that the optimality gap for the proposed MILP model increases considerably when the number of source nodes increases to 40.

The second paper on vehicle routing is essentially a novel metaheuristic procedure that is effective particularly for vehicle routing problem with time windows. This metaheuristic is provided by Yildirim and Çatay as an extension of the ant system. The authors propose a time-based pheromone approach for the ant system. The distinguishing feature of the time-based pheromone approach is the multi-layer pheromone network structure that utilizes time as a heuristic information. Motivated by this feature of the proposed method, the authors employ vehicle routing problem with time windows as a benchmarking tool for demonstrating the effectiveness of the proposed method. For that purpose, problem instances from the literature are used. An extensive computational study is performed producing promising results. It is observed that the method has the potential of being extended further for hard combinatorial problems including time information.

This issue has three articles on applications of operations research in public service. The first one, by Keçici, Aras, and Verter, studies the problem of determining locations of new public service facilities or how to relocate existing facilities when there is a threat of possible terrorist attacks. The goal is to maximize the total service coverage within a pre-specified budget. A bi-level programming model is proposed where the system planner is the leader and the attacker is the follower. A tabu search heuristic is proposed to find near optimal solutions. The performance of the proposed method is evaluated through a comparison against the results obtained by complete enumeration.

Döyen, Aras, and Barbarosoğlu, develop a two-stage stochastic programming model for a humanitarian relief logistics problem, where the decisions are made for pre- and post-disaster rescue centers. The goal is to decide on the amount of relief item flows at rescue centers and each echelon, and the amount of relief item shortage in order to minimize the total cost of facility location that includes inventory holding, transportation, and shortage costs. The mixed-integer linear program that results from the deterministic equivalent of the model is solved by a heuristic based on Lagrangian relaxation. The solution method is shown to produce acceptable results for the randomly generated scenarios.

The emergency service station location problem has been widely studied in the literature since 1970s. Başar, Çatay, and Ünlüyurt present a taxonomic framework for the emergency service station location problem by considering types of emergency, objective function, constraints, model assumptions, modeling and solution techniques. The authors analyze a wide variety of publications in order to demonstrate the effectiveness of the taxonomy and present insights for possible research directions.

The following two articles are from the general area of graph theory and network flows. Taşkın and Ekim develop a set of integer programming formulations for the minimum weighted maximal matching problem, which is NP-hard, using valid inequalities. The formulations are evaluated through the solution of randomly generated instances with varying sizes using CPLEX. In addition, the authors compare solutions obtained by a greedy heuristic with solutions obtained by the exact models.

Bahçeci and Feyzioğlu present a variant of the minimum cost network flow problem defined on a disconnected graph with several components. The flows on arcs belonging the same component are required to be proportional. This type of networks is mostly observed in large supply chains of assemble-to-order products. Any feasible solution of a reformulation of the problem is shown to possess a special structure and a network simplex based algorithm is proposed.

Duran, Swann, and Yakıcı present an application of revenue management in sports and entertainment industry. The authors study the sales of event tickets in the sports and entertainment industries, where tickets are sold exclusively as season tickets or as single events later in the selling horizon. The optimal time to switch between these market segments dynamically as a function of state of the system is determined under certain conditions. It is shown under Poisson demand that the optimal switching time is a set of time thresholds which depends on the remaining inventory and time left in the horizon. The authors also present an extension where “early switch to low demand event” is allowed.

The last paper of this Special Issue reports the results of a metaheuristic application on selection of a subset of the Single Nucleotide Polymorphism (SNP) biomarkers from the whole SNP set that is informative and small enough for subsequent association studies. In this study, Üstümkar, Özögür-Akyüz, Weber, Friedrich, and Son introduce a novel simulated annealing based feature-selection algorithm. The authors state that the proposed simulated annealing based algorithm provides the highest ratios of reduction in the dimension of the data compared to other algorithms in the literature with comparable accuracy measures. A further and important conclusion of this research is that the field of genome sciences can benefit from already established algorithms of management science and operations research to handle high dimensional genomic data.

We would like to thank all the authors for having used this Special Issue of *Optimization Letters* as the outlet for their research results and for having made this volume a valuable collection of papers on various subjects of operations research. We also would like to thank all anonymous referees who have contributed generously to the improvement of the quality of the papers presented here. Last but not least, we would like to thank the Editor-in-Chief Prof. Panos M. Pardalos and the *Optimization Letters* staff for their continuous support throughout the editorial process.