Editorial

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Chengbin Chu received his BSc degree from Hefei University of Technology (China) in 1985 and his PhD degree in Computer Science from Metz University (France) in 1990. He was with the INRIA, France, from 1987–1996. He is a Professor and the Founding Director of LOSI (UTT). His research areas are related to operations research and supply chain systems. He is the author of three books and nearly 80 articles in refereed journals. He was Associate Editor for *IEEE Transactions on Robotics and Automation* (2001–2004). He received the Robert Faure Award (1996) and the Best Transactions Paper Award from the IEEE Robotics and Automation Society.

The International Conference on Service Systems and Service Management[1] (ICSSSM06) was held on 25–27 October 2006 in Troyes, France. This conference was sponsored by the IEEE Systems, Man and Cybernetics Society. More than 500 articles were submitted to the conference and after a peer-reviewing process, 284 papers were accepted and published in the conference proceedings. All papers published in the proceedings are available in the IEEE database. The conference has attracted more than 220 participants from more than 24 countries and regions, including Algeria, Brazil, Belgium, Canada, China, Finland, France, Germany, Greece, Hong Kong, Iran, Italy, Japan, Jordan, Luxembourg, Macau, Portugal, Senegal, Switzerland, Taiwan, Tunisia, Turkey, the UK and the USA.

During the evaluation process, the referees were asked whether the reviewed papers could be recommended for submission for publication in international journals. Based on these recommendations, the authors were invited (after the conference) to submit a long

version of their papers for possible publication in a special issue of the *European Journal of Industrial Engineering*. Each of the received manuscripts was re-reviewed by three independent reviewers who were experts in their area, following the editorial policy of the *European Journal of Industrial Engineering*. Some papers required several revisions before final acceptance.

The papers included in this special issue are about mathematical approaches to combinatorial optimisation. This topic is of very significant scientific interest and practical relevance. Along with economic globalisation, the competition is becoming more and more intensive. All companies, regardless of their sector of activities, attempt to optimise their activities in every level. However, almost all such problems are NP-hard combinatorial optimisation problems. Effective approaches for solving such problems can drastically improve the performance of the companies and contribute to the social progress. On the other hand, despite the practical relevance, it is very challenging to find effective approaches from a scientific point of view due to the NP-hardness of the problems. The papers make significant contributions to this challenging area. After a careful evaluation process, only five articles were accepted for publication in this special issue.

Kerivin *et al.* consider a variant of the pickup and delivery problem. They assume that any demand may be dropped off elsewhere than at its destination, picked up later by the same or another vehicle, and so on until it has reached its destination. They study the complexity of this problem and present two mixed-integer linear programming formulations based on a space-time graph. Some valid inequalities are proposed for the problem, along with separation routines. Such inequalities may be added in order to improve the associated linear relaxations. Based on these results, they develop a branch-and-cut algorithm for solving the problem, and present some computational results.

Hifi *et al.* consider the well-known knapsack problem. They propose an adaptive branch-and-bound algorithm for solving the problem exactly, and provide the limits of the sensitivity intervals which guarantee the stability of the optimal solution when the profit of any arbitrary item is perturbed. Moreover, an adaptation of the exact algorithm for the perturbation of the weight coefficient of an arbitrary item is proposed. The computational results show the effectiveness of the proposed algorithm.

Pessan *et al.* study a practical industrial production resetting problem. They present how such a problem can be identified as an unrelated parallel machine scheduling problem with release dates and delivery times where the resources are the operators. They show that the data structure allows simplifying the studied problem into an assignment problem, even when we take into account the availability constraints of the operators. A branch-and-bound algorithm is proposed for solving the problem. This method has been tested on both industrial and random instances.

Augusto *et al.* study the surgery operation scheduling problem. Three types of resources are considered: transporters, operating rooms and recovery beds. In the studied problem, a patient is first transported from the ward to the operating theatre, is operated on in an operating room, and then immediately transferred to a recovery bed before being transported back to the ward. The operating room needs to be cleaned after the surgery before starting another operation. The aim is to assign patients to transporters, operating rooms and recovery beds in order to minimise an objective function of their completion

times. A Lagrangian relaxation approach is proposed to determine a near-optimal schedule and a tight lower bound for this NP-hard problem. Numerical results are presented to show the efficiency of the method.

Gourgand *et al.* consider a problem of scheduling multisite and multimode activities. The aim is to minimise the project duration that meets the constraints imposed by limited resources. The system reduced to only one site of production highlights the well-known problem of the Multimode Resource-Constrained Project Scheduling Problem (MRCPSP). They propose a mathematical programming approach based on efficient feasible solutions and tight lower bounds. The main element of this approach is the Lagrangean relaxation based on a time-indexed integer programming formulation. Moreover, they propose another method based on stochastic descent with restart for solving large-sized industrial instances. The numerical experiments show that this approach can provide satisfactory solutions for industrial instances.

Note

1 http://www.utt.fr/icsssm06/