OR Spectrum (2016) 38:279–281
DOI 10.1007/s00291-016-0438-y

EDITORIAL

Editorial "Project Management and Scheduling"

Rainer Kolisch[1] · Erik Demeulemeester[2] · Rubén Ruiz Garcia[3] · Vincent T'Kindt[4] · Jan Węglarz[5]

Published online: 3 March 2016

Project management and scheduling are indispensable for every company and organization. This special issue addresses quantitative approaches to project management and scheduling to improve managerial decision making. Following the International Conference on Project Management and Scheduling 2014 in Munich, the 14th of the biannual conferences of the EURO working Group on Project Management and Scheduling, an open call for papers led to 40 submissions of which 8 were accepted.

✉ Rainer Kolisch
rainer.kolisch@tum.de

Erik Demeulemeester
erik.demeulemeester@kuleuven.be

Rubén Ruiz Garcia
rruiz@eio.upv.es

Vincent T'Kindt
vincent.tkindt@univ-tours.fr

Jan Węglarz
jan.weglarz@cs.put.poznan.pl

1 TUM School of Management, Technische Universität München, Arcisstr. 21, 80333 München, Germany

2 Faculty of Economics and Business, KU Leuven, Naamsestraat 69-bus 3555, 3000 Leuven, Belgium

3 Grupo de Sistemas de Optimización Aplicada, Instituto Tecnológico de Informática Ciudad Politécnica de la Innovación, Edifico 8G, Acc. B., Universitat Politècnica de València, Camino de Vera s/n, 46021 Valencia, Spain

4 Laboratoire d'Informatique (EA6300) ERL CNRS 6305 Ordonnancement et Conduite Ecole Polytechnique de l'Université de Tours, 64, Avenue Jean Portalis, 37200 Tours, France

5 Institute of Computing Science, Poznan University of Technology, Plac Marii Skłodowskiej-Curie 5, 60-965 Poznań, Poland

Additionally, two regularly submitted papers on the subject by Esmaeilbeigi et al. (2016) and Braun et al. (2016) were added. The 10 papers arch the entire field from new approaches for well-known studied problems as in Schnell and Hartl (2016) to modeling of complex industry scheduling problems as in Schulze et al. (2016), approaches and insights for new project organizations such as public private partnership presented in De Clerck and Demeulemeester (2016) to, finally, the treatment of classical machine scheduling problems as in Braun et al. (2016) More detailed, this special issue contains the following contributions.

Schnell and Hartl (2016) propose exact approaches using branch-and-bound with principles from constraint programming and boolean satisfiability for solving the multi-mode resource-constrained project scheduling problem with generalized precedence relations to optimality.

Poppenborg and Knust (2016) present a tabu search algorithm for the resource-constrained project scheduling problem with transfer times. Solutions are represented by resource flows extending the disjunctive graph model for shop scheduling problems. Neighborhoods are defined by parallel and serial modifications rerouting or reversing flow on certain arcs.

Baydoun et al. (2016) introduce a mixed-time mixed-integer programming model for project capacity planning with different possibilities for overlapping levels between work packages. In the model, the planning time horizon is divided into time buckets used to evaluate resource usage, while starting and ending times for work packages are continuous.

Schulze et al. (2016) treat a scheduling problem that occurs in potash mining, where a block excavation sequence has to be found, taking into account a limited number of underground machines as well as safety-related restrictions and the objective is to minimize the maximum completion time of excavations. They transform the problem into a hybrid flow shop scheduling problem with reentry, unrelated machines and job-precedences, and present a mixed-integer program, a multi-start heuristic and an adapted version of the Giffler and Thompson algorithm.

Bianco et al. (2016) study the problem of leveling resources in a project with generalized precedence relationships, given a deadline for the completion of all the activities, variable execution intensities and flexible durations of the activities. By this they extend the work of Kis (2005). The authors propose a mixed-integer linear programming formulation, a lower bound based on Lagrangian relaxation and a branch-and-bound algorithm.

De Clerck and Demeulemeester (2016) build a sequential private public partnership procurement model and heuristically approximate the Markov perfect equilibrium in which contractors determine how much money they are willing to invest in the bid preparation and which mark-up is appropriate for each project in the pipeline.

Nattaf et al. (2016) address a scheduling problem with a continuously divisible, cumulative and renewable resource with limited capacity. To minimize the resource consumption the authors propose three mixed-integer mathematical programs and an adapted satisfiability test for the cumulative constraint. A hybrid branch-and-bound method using both the satisfiability test and the mathematical programs is presented.

Esmaeilbeigi et al. (2016) present three mathematical models for the setup assembly line balancing and scheduling problem where sequence-dependent setup times are considered between the tasks. The models are enhanced by preprocessing and valid inequalities.

Zhang et al. (2016) consider the two-machine open-shop scheduling problem with rejection. The objective is to minimize the sum of the makespans of accepted jobs and the total rejection cost of rejected jobs. They show that the problem is NP hard, even in three special cases and present a pseudo-polynomial time algorithm, a two-approximation algorithm and a fully polynomial time approximation scheme.

Finally, Braun et al. (2016) consider single machine scheduling with time restrictions, present an improved bound for list scheduling and analyze the worst-case behavior of LPT ordered jobs.

This special issue has greatly benefited from the cooperation among the authors, reviewers and editors. We would like to express our sincere thanks to the reviewers for their excellent and timely refereeing. Last but not least, we thank all authors for their contributions which made this special issue possible.

References

Baydoun G, Haït A, Pellerin R, Clément B, Bouvignies G (2016) A rough-cut capacity planning model with overlapping. OR Spectrum. doi:10.1007/s00291-016-0436-0 (this issue)

Bianco L, Caramia M, Giordani S (2016) Resource levelling in project scheduling with generalized precedence relationships and variable execution intensities. doi:10.1007/s00291-016-0435-1 (this issue)

Braun O, Chung F, Graham G (2016) Worst-case analysis of the LPT algorithm for single processor scheduling with time restrictions. doi:10.1007/s00291-016-0431-5 (this issue)

De Clerck D, Demeulemeester E (2016) A sequential procurement model for a PPP project pipeline. OR Spectrum. doi:10.1007/s00291-015-0421-z (this issue)

Esmaeilbeigi R, Naderi B, Charkhgard P (2016) New formulations for the setup assembly line balancing and scheduling problem. doi:10.1007/s00291-016-0433-3 (this issue)

Kis T (2005) A branch-and-cut algorithm for scheduling of projects with variable-intensity activities. Math Program 103(3):515–539

Nattaf M, Artigues A, Lopez P, Rivreau D (2016) Energetic reasoning and mixed-integer linear programming for scheduling with a continuous resource and linear efficiency functions. doi:10.1007/s00291-015-0423-x (this issue)

Poppenborg J, Knust S (2016) A flow-based tabu search algorithm for the RCPSP with transfer times. doi:10.1007/s00291-015-0402-2 (this issue)

Schnell A, Hartl RF (2016) On the efficient modeling and solution of the multi-mode resource-constrained project scheduling problem with generalized precedence relations. doi:10.1007/s00291-015-0419-6 (this issue)

Schulze M, Rieck J, Seifi C, Zimmermann J (2016) Machine scheduling in underground mining: an application in the potash industry. doi:10.1007/s00291-015-0414-y (this issue)

Zhang L, Lu L, Yuan J (2016) Two-machine open-shop scheduling with rejection to minimize the makespan. doi:10.1007/s00291-015-0409-8 (this issue)