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EDITORIAL

# Production and operations management in the automotive industry (part 2)

**Hans-Otto Günther · Herbert Meyr**

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With more than 70 million motor vehicles sold per year the automotive industry is one of the key industries of the world. While originally rigid labour division and paced assembly lines were employed to realize low-cost mass production of automotives, nowadays flexible mixed-model assembly lines make it possible to produce a large variety of customized products. The increased manufacturing flexibility, however, imposes new challenges not only for the design of the manufacturing system but also for the logistics coordination within global supply chains. In addition, novel planning and scheduling approaches are needed in order to manage the mismatch between increased product variety and the need to improve the utilization of the capital-intensive resources.

Focussing on the latest developments in automotive supply chains and manufacturing technologies, the primary objective of this special issue is to examine research issues concerned with production and operations management in the automotive industry. For the second part of the special issue four papers have been selected for publication after a thorough peer-review according to the standards of the FSM journal. In addition one erratum is included. The first part with the following papers has been published in Volume 22 (2010), Numbers 3–4, of FSM.

- H.A. Stephan, T. Gschwind, S. Minner: Manufacturing capacity planning and the value of multi-stage stochastic programming under Markovian demand
- T. AlGeddawy, H. ElMaraghy: Design of single assembly line for the delayed differentiation of product variants

H.-O. Günther (✉)
Department of Production Management, TU Berlin, Straße des 17. Juni 135, 10623 Berlin, Germany
e-mail: hans-otto.guenther@tu-berlin.de

H. Meyr
Department of Supply Chain Management, University of Hohenheim, 70593 Stuttgart, Germany
e-mail: H.Meyr@uni-hohenheim.de

- S. Oh, K. Ryu, I. Moon, H. Cho, M. Jung: Collaborative fractal-based supply chain management based on a trust model for the automotive industry
- T. Schöneberg, A. Koberstein, L. Suhl: An optimization model for automated selection of economic and ecologic delivery profiles in area forwarding based inbound logistics networks
- N. Boysen, M. Fliedner, A. Scholl: Level scheduling under limited resequencing flexibility

## 1 Papers in part 2 of the special issue

The first paper by *L. Zhao*, *F.R. Langendoen* and *J.C. Fransoo* investigates the ordering behavior of automotive companies that need high-value components with long distance transportation. By means of a simulation model the authors analyze the trade-off between using a cheaper means of transportation (usually ocean transportation) with larger lead time variance and accordingly higher capital investment, and a more expensive mode of transportation (air transportation), which requires a considerably lower capital investment. The study shows the adverse effects that a credit constraint has on the growth opportunities faced by these companies.

In their paper *J. Golz*, *R. Gujjula*, *H.-O. Günther*, *S. Rinderer*, and *M. Ziegler* develop a heuristic solution procedure to ensure the timely supply of parts to the designated stations at the assembly line of an automotive manufacturer. Transportation orders which are derived from the given mixed-model assembly sequence are assigned to tours of the shuttle trucks taking transportation capacity restrictions, due dates and tour scheduling constraints into account. Benchmark comparisons with Kanban systems reveal the superiority of the proposed predictive part feeding approach.

The paper by *H.A. ElMaraghy* and *T. AlGeddawy* addresses the flexibility requirements of assembly lines for automobile engine accessories caused by frequent design changes and increased product variety. The authors develop a co-evolution model which reveals if the product's processing requirements are fully satisfied by existing assembly lines and whether the available assembly capabilities would be perfectly utilized by planned products. The model also illustrates how co-evolution analysis can help decide on future planning of the assembly facilities when considering a new product.

*J.P. Garcia-Sabater*, *J. Maheut*, and *J.J. Garcia-Sabater* propose an operations planning scheme based on mixed-integer linear programming (MILP) models and integrated into a web-enabled Advanced Planning and Scheduling System (APS) for application at an engine assembler in the automotive industry. It is shown that the planning scheme is able to create plans that enable the coordination of different planning levels (mid-term and short-term) and planning domains (procurement, production and distribution). The presented models specifically consider supply chain objectives and constraints.

Finally, the erratum regarding the previously published paper by *S. Oh*, *K. Ryu*, *I. Moon*, *H. Cho*, and *M. Jung* on "Collaborative fractal-based supply chain management based on a trust model for the automotive industry" adds an acknowledgment for providing research funds which was inadvertently omitted in the original publication.

## 2 Concluding remarks

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.