Editorial

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Biographical notes: Dmitry Ivanov is a Full Professor for International Supply Chain Management at Berlin School of Economics and Law. He is the (co)-author of more than 200 scientific works, including the monograph Adaptive Supply Chain Management. His research interests lie in the area of supply chain disruption management, adaptive supply chains, applied optimal control theory, mathematical programming, and collaborative networks. He is a Chair of the WG 'Supply Network Engineering' in IFAC TC 5.2. He is an Associate Editor in *International Journal of Systems Science*. His works have been published in various academic journals, including *International Journal of Production Research*, *European Journal of Operational Research*, *Journal of Scheduling*, etc.

Alexandre Dolgui is a Full Professor and the Deputy Director for research of the Henri Fayol Institute at the Ecole des Mines de Saint-Etienne (France). His principal research focuses on manufacturing line design, production planning and supply chain optimisation. The main results are based on exact mathematical programming methods and their intelligent coupling with heuristics and metaheuristics. He has co-authored five books, edited 13 additional books or conference proceedings, and published ~145 papers in refereed journals, 28 book chapters and over 300 papers in conference proceedings. He is Editor-in-Chief of the *International Journal of Production Research*, an Area Editor of the *Computers & Industrial Engineering* journal and an Associate Editor of *Omega* – the *International Journal of Management Science*, Chair of the IFAC Technical Committee 5.2, etc.

During the last decade, new information and product technologies for supply chain integration have been developed. Details of managerial and technical implementation on these technologies differ, but most of them share attributes of intelligence. Examples include data mining, cloud computing, physical internet, pattern recognition, knowledge discovery, early warning systems, and product intelligence, to name but a few.

Since supply chain integration depends on the use of information and product technology, in the coming years these new tools will change the landscape of managerial concepts and decision support systems for supply chain management. Associating (and even embedding) information technology and product intelligence into supply network planning and organisational structures has been discussed for over 10 years now. However, questions remain about the benefits and obstacles in allowing orders, deliveries and products to be able to plan and control their own progress through a supply chain. These questions have been frequently the focus of discussions at the meetings of the Working group "Supply Network Engineering" of the IFAC TC 5.2 "Manufacturing Modelling for Management and Control", and served along with discussions with Professor Ajay Das, Editor-in-Chief IJISM, as motivation for this Special Issue.

It is observed that current concepts and systems for supply chain integration do not provide adequate decision support from intelligent information and product technologies; we regard this shortcoming as an opportunity for research and development that could significantly improve the practice of supply chain management. Although technological frameworks have been extensively presented in literature so far, the systematic representation of interaction between information, product and organisational structures is quite limited. Therefore, through this special issue, the guest editors hope to move supply chain integration research forward by placing emphasis on studies that cover multiple supply chain processes and which address the organisational, product and informational aspects.

The papers in this issue address many of the above issues conceptually, empirically and methodologically. We briefly describe the contributions below.

Heiko Woehner, Inga-Lena Darkow and Gernot Kaiser analyse in their paper 'How do Information Technology and Integrative Planning drive performance in today's supply chains?' the supply chain information systems and integrated planning capabilities in the light of their interact with each other. The study applies transaction cost theory and resource-based view to investigate integration resources within the supply chain. The article demonstrates with a sample of 124 supply chain experts and structural equation modelling that internal communication and connectivity do not have a direct impact on operational performance. However, these resources are antecedents of performance-related integration. In contrast, inter-company integration in information technology and integrative planning are resources with significant influence on operational performance. The findings can encourage supply chain managers to focus attention on antecedents and performance drivers to realise the advantages of integrated information technology and planning in the supply chain.

Kari Korpela, Paavo Ritala, Jyri Vilko and Jukka Hallikas consider in their paper 'A management and orchestration model for integrating Digital Business Ecosystems'. In particular, the aim is to explore how various types of coordination mechanisms are related to creating value for different stakeholders in a DBE context. The research design combines several data sources and methods. First, a coordination model is built based on existing literature, and generic success factors are identified based on expert interviews. Secondly, the model is tested by utilising information gathered from key informant focus groups in global B2B integration. The supply chain managers can use the results of this study to develop specific coordination mechanisms related to network management and orchestration to design DBE integration. Managers can use the model in designing different network coordination mechanisms to ensure better implementation of B2B

integration and analyse how they affect the success factors from stakeholder and value creation perspectives.

Dmitry Ivanov, Aleaxandre Dolgui and Boris Sokolov in their paper 'Multi-disciplinary analysis of interfaces "Supply Chain Event Management – RFID – control theory"', address issues of disruption management in supply chains from perspectives of business process frameworks, information technologies and control theory. On the basis of the multi-disciplinary nature of the supply chain control domain, this study delineates the intersections of the elements from supply chain event management, RFID and control theory. The objectives are to identify possible interfaces and new managerial insights emerging from the synergetic effects. With the gained results, supply chain managers can systematically analyse on the interfaces "technology-process-model" to improve existing practices of supply chain control.

Meysam Maleki, Eduard Shevtshenko and Virgilio Cruz-Machado consider in their paper 'Development of Supply Chain Integration model through application of Analytic Network Process and Bayesian Network', the correlations among supply chain practices and customer values. Supply chain practices are categorised as manufacturing/assembly and logistics practices. The proposed model combines the Analytic Network Process and Bayesian network. The Analytic Network Process is used to prioritise and synthesise practices. Bayesian network is initially employed to analyse customer values. Thereafter, the research incorporates the output of the Analytic Network Process to construct a model. Finally, a case study in the fashion industry is presented to clarify the application of the proposed model. The model can be used by supply chain managers to produce a quantitative measure for monitoring the influence of practices on expectations of end customers.

Alexander Smirnov, Kurt Sandkuhl and Nikolay Shilov present in their paper 'Multilevel self-organisation of cyber-physical networks: synergic approach' new possibilities to supply chain configuration as CPS. Operation and configuration of CPS require approaches for managing the variability at design time and the dynamics at runtime caused by a multitude of component types and changing application environments. The proposed approach benefits from integration of such technologies as multilevel self-organisation and knowledge fusion. Supply chain managers can use the presented self-organisation approach within CPS towards providing new services at runtime, which need to be accommodated in the adaptable business models.

Dmitry Ivanov, Tobias Teich and Boris Sokolov develop in their paper 'Task re-allocation in temporary production networks' a conceptual model and describe a case-study to agile (re)-allocation of tasks in supply chains of temporary production networks. A model of task re-allocation on the basis of recently developed structure dynamics control theory is presented. Supply chain managers can use the results of this study for flexible partner selection planning and task re-planning within a joint engineering and quantitative framework.

Christoph Besenfelder, Sandra Kaczmarek and Yilmaz Uygun consider in their paper 'Process-based cooperation support for complementary outtasking in production networks of SME' the collaboration design problem in production networks of Small and Medium-sized Enterprises (SME). In particular, the application domain for small and medium-sized manufacturing enterprises deciding to start cooperation with other SMEs is presented. The phases and the associated tasks of cooperation are described and how the web services support and guide the company in these processes. Supply chain managers

can use the developed framework for the analysis of core competencies, the review of the ability to cooperate and the implementation of a cross-company coordination process into the production planning process.

Enjoy the issue!

Acknowledgements

We sincerely hope that this special issue stimulates new research on supply chain integration theory using the lens of multi-disciplinary domains of knowledge.