
Editorial: supply chain modelling and simulation

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Biographical notes: Sanjay Jain is an Assistant Professor with the Department of Decision Sciences at the School of Business of The George Washington University. Earlier he was a Research Faculty Member at Virginia Tech. Prior to joining academia, he earned industry experience at Accenture, Singapore Institute of Manufacturing Technology, and General Motors Technical Centre. His research interests are in application of decision- science techniques to complex systems. He received a Bachelor of Engineering from Indian Institute of Technology (IIT)-Roorkee, a Post Graduate Diploma from the National Institute of Industrial Engineering, India, and a PhD in Engineering Science from Rensselaer Polytechnic Institute, USA.

Supply chains have become a critical component of business success in this era of global competition. Modelling and simulation provide key techniques to help design, analyse and improve the performance of the supply chains. This special issue of the *International Journal of Simulation and Process Modelling (IJSPM)* is devoted to Supply Chain Modelling and Simulation to present the leading research in this important area.

The importance of the topic of this issue, supply chain modelling and simulation, can be gauged using the internet-era metric, the Google search, which estimates about 7.65–7.73 million hits depending on the spelling of ‘modelling’. A similar search on Google Scholar brings up a list of 25,100 (with supply chain *modelling* simulation) to 31,200 (with supply chain *modelling* simulation) documents. This indicates a total of 56,300 documents combining both American and British English publications, indicating a tremendous interest in the topic. The growth of interest in this topic is driven by the evolution in the subject matter itself, that is, in supply chains. The recognition of its importance is evident from the rapid increase in the membership of the Supply Chain Council, which now includes nearly 1000 organisations located across the globe per their website.

Supply chain modelling and simulation research is advancing in methodology and applications. The papers in this special issue reflect the advances in both the areas. Building supply chain models continues to be a challenging and tedious task. The methodology papers present approaches to facilitate the model development process. One effort provides a modelling language for describing the supply chain and an automatic translator to convert the description into a simulation model. A flexible interface using XML is used. Another effort presents an Excel interface to automatically generate a simulation model in a discrete event simulation software. The methodologies have been demonstrated through example applications. In recognition of the need to model the supply chains at

various levels of details, the approaches include those based on systems dynamics simulation, discrete event simulation and agent-based modelling. One uses a hybrid of systems dynamics and discrete event simulation to attack the complexity. Another paper reports on using agent-based modelling with a focus on customer perspective for supply chain simulation.

The supply chain practitioners have helped the methodology area through the development of the Supply Chain Operations Reference (SCOR) model under the auspices of the Supply Chain Council. The representation of the supply chains in a common structure afforded by the SCOR model facilitates modelling and simulation of these complex entities. The role of SCOR model is recognised by a couple of papers in this special issue. One paper discusses a hierarchical approach for supply chain modelling and simulation based on the SCOR model. Another paper proposes a conceptual framework for supply chain modelling and simulation and a common designation for classifying such models based on the SCOR model.

The application papers cover a spectrum representing the range of issues facing the practitioners. The use of simulation to evaluate strategies and policies is exemplified in a paper quantifying the impact of information sharing on economic performance of the supply chains. One of the efforts is focused on using simulation to support decision making for supply chain management. The concept can be developed for training new generations of supply chain managers. Another effort helps to improve the decision making through use of modelling and simulation to detect and analyse patterns in supply chain behaviour and using the understanding for improving performance. The fourth effort attacks the problem of large computation times by developing distributed simulation implementation suitable for supply chain modelling. Together these papers identify the modelling and simulation application opportunities, provide the means to execute the analysis and use the output for decision making.

This special issue attracted a lot of good papers, so much so that they could not all be accommodated here and some will have to appear in a later issue. I thank all the authors for their submissions and their patience in working through the revisions. Special thanks are due to the nearly 50 anonymous referees who gave their valuable time to

review the papers, some of them multiple times. My gratitude to Dr. Mohammed Dorgham, Editor-in-Chief and Dr. Nuno Melão, Editor, for giving me the opportunity to edit this special issue. Thanks to Dr. Melão also for his support throughout the process.