The day after optimal : Operations Research for modern logistics

Stefan Nickel[1]

Karlsruhe Institute of Technology (KIT), Germany
`stefan.nickel@kit.edu`

Abstract   Operations Researchers support decision makers by developing adequate mathematical optimization models and providing suitable solution procedures. In this talk we discuss what "adequate" could mean when decisions have to be made in uncertain environments. Therefore, we may ask several questions concerning "optimality" under causal and temporal uncertainty : What is an optimal solution? When is it optimal? For how long is it optimal? How should the design of a supply chain be changed when conditions and requirements ask for new structures? We discuss new approaches to advanced planning concepts in order to give an optimal transformation from an initial solution over multiple periods to a desired one rather than just specifying an optimal snapshot solution. Time and uncertainty are the factors triggering the whole discussion. Several flaws often found when dealing with these factors result in so-called "time traps". In the context of operational supply chain planning and control, we look at the impact of recent developments such as the integration of simulation/optimization or the consideration of machine learning, and we show how online optimization can help to cope with these challenges. Moreover, we take a look at how the increased availability of data and forecasts affects models and decisions on a strategic level and find that with new opportunities also new challenges and stumbling blocks occur.

Biographical Sketch   Stefan Nickel is a full professor at the Karlsruhe Institute of Technology - KIT (Germany) and one of the directors of the Institute of Operations Research. He obtained his PhD in mathematics at the Technical University of Kaiserslautern (Germany) in 1995. From 1995 to 2003 he was assistant and associate professor in mathematics at the Technical University of Kaiserslautern. After a full professor position at the Saarland University (Chair of Operations Research and Logistics) from 2003 to 2009, he joined the Karlsruhe Institute of Technology as the Chair in Discrete Optimization and Logistics in April 2009. From 2014-2016 he was the dean of the Department of Economics and Management at the KIT. Stefan Nickel was also member of the scientific advisory board as well as of the management board of the Fraunhofer Institute for Applied Mathematics (ITWM) in Kaiserslautern from 2004-2016. Since 2011 he additionally holds the positions of one of the directors of the Karlsruhe Service Research Institute (KSRI) and of the Research Center for Computer Science (FZI). From 2006-2015 he was editor-in-chief of Computers Operations Research. Moreover, he is editor-in-chief of Operations Research for Health Care. He has coordinated the Health Care working group within the German OR society (GOR) and has been the president of GOR from 2013-2014. Since 2019 Stefan Nickel serves as VP IFORS in the EURO executive committee and is member of the AC of IFORS. Stefan Nickel has authored or co-authored 6 books as well as more than 120 scientific articles in his research areas Locational Analysis, Supply Chain Management, Health Care Logistics, and Online Optimization. He has been awarded the EURO prize for the best EJOR review paper (2012) and the Elsevier prize for the EJOR top cited article 2007-2011. In addition, he conducted several industry projects with well-known companies such as BASF, Lufthansa, Miele, or SAP.