International Series in Operations Research & Management Science

Volume 235

More information about this series at http://www.springer.com/series/6161

Christopher W. Zobel • Nezih Altay
Mark P. Haselkorn
Editors

Advances in Managing Humanitarian Operations

Springer

Editors
Christopher W. Zobel
BIT Department
Virginia Tech
Blacksburg
Virginia
USA

Mark P. Haselkorn
HCDE Department
University of Washington
Seattle
Washington
USA

Nezih Altay
Department of Management
DePaul University
Chicago
Illinois
USA

ISSN 0884-8289 ISSN 2214-7934 (electronic)
International Series in Operations Research & Management Science
ISBN 978-3-319-24416-7 ISBN 978-3-319-24418-1 (eBook)
DOI 10.1007/978-3-319-24418-1

Library of Congress Control Number: 2015958654

Springer Cham Heidelberg New York Dordrecht London

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media (www.springer.com)

Contents

Contributors

Emel Aktas School of Management, Cranfield University, Bedford, UK

Nezih Altay Department of Management, DePaul University, Chicago, IL, USA

Johanna Amaya Center for Infrastructure, Transportation, and the Environment, and the VREF Center of Excellence for Sustainable Urban Freight Systems, Civil and Environmental Engineering, Rensselaer Polytechnic Institute, Troy, NY, USA

Industrial Engineering, Universidad del Norte, Barranquilla, Colombia

Felipe Aros-Vera Department of Industrial and Systems Engineering Russ College of Engineering and Technology, Ohio University, Athens, OH, USA

Gemma Berenguer Krannert School of Management, Purdue University, West Lafayette, IN, USA

Mauro Bernuzzi GSK Vaccines, Wavre, Belgium

Luther G. Brock III Department of Industrial and Systems Engineering, North Carolina Agricultural and Technical State University, Greensboro, NC, USA

Lauren Berrings Davis Department of Industrial and Systems Engineering, North Carolina Agricultural and Technical State University, Greensboro, NC, USA

Catherine Decouttere Katholieke Universiteit Leuven, Leuven, Belgium

Ramzi El-Haddadeh Brunel University, Uxbridge, UK

Trilce Encarnación Center for Infrastructure, Transportation, and the Environment, and the VREF Center of Excellence for Sustainable Urban Freight Systems, Civil and Environmental Engineering, Rensselaer Polytechnic Institute, Troy, NY, USA

Ira Haavisto HUMLOG Institute, Hanken School of Economics, Helsinki, Finland

Charlie Hale Food Bank of Central & Eastern North Carolina, Raleigh, NC, USA

Sara Hasani Business School, University of Bedfordshire, Luton, UK

Mark P. Haselkorn HCDE Department, University of Washington, Seattle, WA, USA

Graham Heaslip National University of Ireland Maynooth, Ireland & University of New South Wales, Canberra, Australia

José Holguín-Veras Center for Infrastructure, Transportation, and the Environment, and the VREF Center of Excellence for Sustainable Urban Freight Systems, Civil and Environmental Engineering, Rensselaer Polytechnic Institute, Troy, NY, USA

Julie Simmons Ivy Edward P. Fitts Department of Industrial and Systems Engineering, North Carolina State University, Raleigh, NC, USA

Miguel Jaller Civil and Environmental Engineering, University of California, Davis, CA, USA

Steven Jiang Department of Industrial and Systems Engineering, North Carolina Agricultural and Technical State University, Greensboro, NC, USA

Cigdem Gonul Kochan Ohio Northern University, Ada, OH, USA

Laura Rock Kopczak The MIT-Zaragoza Masters in International Logistics Program, Zaragoza, Spain

NYU Wagner School of Public Service, New York, NY, USA

Gyöngyi Kovács HUMLOG Institute, Hanken School of Economics, Helsinki, Finland

Shailesh S. Kulkarni University of North Texas, Denton, TX, USA

Stef Lemmens Katholieke Universiteit Leuven, Leuven, Belgium

Gregory Matthews IRC (International Rescue Committee), New York, NY, USA

Robin Mays Human Centered Design & Engineering, University of Washington, Seattle, WA, USA

Earline Middleton Food Bank of Central & Eastern North Carolina, Raleigh, NC, USA

Shona D. Morgan School of Business and Economics, North Carolina Agricultural and Technical State University, Greensboro, NC, USA

Thomas Münzberg Institute for Nuclear and Energy Technologies, Karlsruhe Institute of Technology, Karlsruhe, Germany

David R. Nowicki University of North Texas, Denton, TX, USA

Natalie Privett Robert F. Wagner Graduate School of Public Service, New York University, New York, NY, USA

Frank Schultmann Institute for Industrial Production, Karlsruhe Institute of Technology, Karlsruhe, Germany

Irem Sengul Orgut Edward P. Fitts Department of Industrial and Systems Engineering, North Carolina State University, Raleigh, NC, USA

Reha Uzsoy Edward P. Fitts Department of Industrial and Systems Engineering, North Carolina State University, Raleigh, NC, USA

Nico Vandaele Katholieke Universiteit Leuven, Leuven, Belgium

Tricia Wachtendorf Department of Sociology and Criminal Justice, Disaster Research Center, University of Delaware, Newark, DE, USA

Rebecca Walton Technical and Professional Communication, Utah State University, Logan, UT, USA

Marcus Wiens Institute for Industrial Production, Karlsruhe Institute of Technology, Karlsruhe, Germany

Christopher W. Zobel BIT Department, Virginia Tech, Blacksburg, VA, USA

About the Authors

Emel Aktas has BSc, MSc and PhD degrees in industrial engineering from Istanbul Technical University, Turkey. She began her career at Istanbul Technical University as a research and teaching assistant. She worked as a visiting researcher at Wayne State University, USA and as a lecturer at Dogus University, Istanbul, Turkey during her PhD studies. She was a researcher in public and private funded projects on location selection, shift scheduling and transportation master plan strategy. Her refereed articles have appeared in a variety of journals including European Journal of Operational Research, Interfaces, and Transportation Research Part A: Policy and Practice. Emel is currently working on minimising waste in the food supply chain, improving urban logistics of food and minimising carbon emissions in maritime logistics. Her research interests are logistics and transportation, disaster relief logistics, supply chain decisions, and mathematical modelling.

Johanna Amaya MSc is a researcher at the Center for Infrastructure, Transportation, and the Environment and at the Volvo Research and Educational Foundation's Center of Excellence for Sustainable Urban Freight Systems at the Rensselaer Polytechnic Institute (RPI) in Troy, NY. She received her BSc in Industrial Engineering from Universidad del Norte, Colombia where she serves as Assistant Professor. She got a MSc in Industrial and Systems Engineering, from University of Florida in Gainesville and currently is pursuing her PhD. in Transportation Engineering at RPI. Ms. Amaya is an Eno Fellow and the recipient of a Fulbright Scholarship sponsored by the U.S. Department of State. Her research interests are in the areas of urban freight transportation systems, humanitarian logistics, and operations management. She has several publications in such areas and has been part of diverse research projects and committees.

Felipe Aros-Vera PhD is an Assistant Professor in the Department of Industrial and Systems Engineering at Ohio University. Felipe holds a PhD in Transportation Engineering from the Rensselaer Polytechnic Institute (RPI), and a MS and BS on Engineering Sciences from the Pontificia Universidad Católica de Chile. His research spans the fields of Disaster Relief Logistics, Transportation and Urban Logistics. Before joining Ohio University, Felipe worked as a Postdoctoral

Research Associate at the Center for Infrastructure, Transportation and the Environment at RPI. His expertise includes transportation operations and planning, operations research, mathematical optimization, and computer programming. His work has been published in prestigious journals such as European Journal of Operational Research (EJOR), Journal of Operations Management (JOM), and Transportation Research Part B: Methodological. Felipe has participated in several research and applied research projects including: Park and Ride Facility Location in New York City, Integrative Freight Demand Management in the New York City Metropolitan Area, and Cyber Enabled Discovery System for Advanced Multidisciplinary Study of Humanitarian Logistics for Disaster Response.

Gemma Berenguer is an Assistant Professor at the Krannert School of Management, Purdue University since June 2012. She received her PhD in Operations Research at the University of California, Berkeley. She also holds an MEng in Logistics and Supply Chain Management from the Zaragoza Logistics Center, an MS in Economics from the Barcelona Graduate School of Economics, and an undergraduate degree in Mathematics from the Universitat Politècnica de Catalunya.

Professor Berenguer's research focuses on integrated supply chain design problems, global health supply chains, and nonprofit operations. She has experience collaborating with public and nonprofit organizations in the global healthcare space and the solar cooking industry. She has published in journals such as Operations Research and Transportation Science. Professor Berenguer teaches Operations Management, Supply Chain Management, and Sustainable and Socially Responsible Operations in the MBA program at Krannert. She is a member of INFORMS, POMS and MSOM.

Mauro Bernuzzi has worked in supply chain operations throughout his professional life. He began his career in the army as a junior lieutenant before joining Glaxo in 1986 where he held various positions both at manufacturing plants and at corporate headquarters. In 2005 he joined GSK Vaccines as Vice President Global Supply Chain Management and he was deeply involved in the supply chain redesign aimed at coping with the challenges triggered by the collaboration with GAVI and UNICEF.

He is currently responsible for the Supply Chain Centre of Excellence for GSK Vaccines and he is a member of the KU Leuven Research Chair on Operations Management scientific committee. In 2007 he was appointed to the adjunct faculty of the Università Cattolica del Sacro Cuore, Milan where he teaches System Dynamics and Simulation. Since 2009 he is also fellow of the KU Leuven Hogenheuvelcollege.

Luther G. Brock III is a member of the Institute for Operations Research and the Management Sciences (INFORMS) and the American Production and Inventory Control Society (APICS). His research interests include the use of optimization models, data mining, and modern heuristics to address issues related to supply chain management. He is particularly interested in addressing logistics challenges in the context of humanitarian relief, public health, and sustainability. Dr. Brock com-

pleted his doctoral studies in Industrial & Systems Engineering at North Carolina A&T State University.

Lauren Berrings Davis is an Associate Professor in the Department of Industrial and Systems Engineering at North Carolina A&T State University. She is a member of the Institute for Operations Research and Management Science (INFORMS), the Institute of Industrial Engineers, and served as the president for the INFORMS Minority Issues Forum (2013–2015). Her research interests are in stochastic optimization particularly in the areas of supply chain management and humanitarian logistics. Her research has been funded by NSF and the Department of Homeland Security.

Catherine Decouttere holds a degree Civil Engineering (1995) from the KU Leuven. Sequentially, she was trained in management, R&D management and Leadership at KU Leuven, Vlerick Business School and INSEAD. She conducted further research in coastal engineering at KU Leuven and worked as hydraulic engineer in the consulting business and local government. She worked for 10 years in a large food company, where she expanded her engineering experience with R&D management and Innovation Management. At a Flemish competence center for design and innovation, she managed the research program and was consultant in human-centered design and design management.

Currently she holds a senior research position at the KU Leuven, Center for Operations Management at the GSK Vaccines Research Chair on Operations Management. Her research interests are supply chain design, stakeholder analysis, R&D portfolio management and scenario based planning. She published in international journals and participates regularly in academic and industrial oriented conferences. She is co-founder of Athlycs, a university spin-off company.

Ramzi El-Haddadeh BSc, MSc, PhD is a faculty member at Brunel Business School. Prior to that, Dr. El-Haddadeh was a faculty member at the School of Information Systems, Computing and Mathematics in Brunel University. He is a member of the Information Systems Evaluation and Integration Research Group (ISEing). Dr. El-Haddadeh is on the editorial board of a number of international journals, and has published in a number of leading journals and international conferences in the areas of Telecommunications, Computer Networks and Information Systems.

Trilce Encarnación MSc is a PhD. student in the Department of Civil and Environmental Engineering at Rensselaer Polytechnic Institute. Before joining RPI, Trilce worked as a business analytics consultant in Santo Domingo, Dominican Republic. She holds a BS *cum laude* in Systems Engineering from the Pontificia Universidad Católica Madre y Maestra, in Dominican Republic, and an MSc in Scientific Computing from the University of Puerto Rico at Mayagüez. Her research interests are: sustainable transportation systems, demand modeling, freight transportation and humanitarian logistics.

Ira Haavisto is an Assistant Professor in Supply Chain Management and Social Responsibility at Hanken School of Economics in Helsinki, Finland. She is a co-editor of the Journal of Humanitarian Logistics and Supply Chain Management and the director of the Humanitarian Logistics and Supply Chain Research Institute (HUMLOG Institute) since 2014. Her research interests are in humanitarian logistics and supply chain management.

Charlie Hale is the Vice-President of Information Technology and Operations at the Food Bank of Central and Eastern North Carolina. He has spent more than 7 years in this role and 10+ years at FBCENC. He served on Feeding America's Underserved Counties Task Force in 2010. He received a Bachelor of Science in Meteorology with a minor field of emphasis in Computer Science and Mathematics from NC State University in 1989.

Sara Hasani started her career in various industries including automotive manufacturing and logistics as a supply chain manager, which triggered her interest towards operations management. After completing her BSc in Economics and Msc in business research methods, she obtained her PhD in disaster management from Brunel University. She is currently a lecturer and researcher in Bedfordshire University focusing on various aspects of operations management, systems thinking, disaster management, decision making and serious games. Her most recent piece of research is the development of a predictive framework for disaster response networks as a solution to partner proliferation problems after a disaster strike. She also provides consultancy to various not-for-profit organisations on pro-bono basis.

Graham Heaslip is Associate Professor of Logistics at UNSW, Australia. Prior to joining UNSW Graham was the Deputy Head of the Business School and programme director for the MSc in Humanitarian Logistics and Emergency Management at Maynooth University. Graham completed his PhD studies in the area of Civil Military Cooperation/Coordination at the Logistics Institute, University of Hull, for which he was awarded the James Cooper Memorial Cup for best PhD in Logistics and Supply Chain Management by the Chartered Institute of Logistics and Transport. Prior to entering academia Graham spent 14 years working in the Irish Defence Forces both at home and abroad in a variety of logistical appointments, as well as spending time seconded to Humanitarian agencies in a logistical capacity. Graham's research interests are broadly in the intersections between global logistics/supply chain management, humanitarian logistics and organisational management development.

José Holguín-Veras PhD, PE is the William H. Hart Professor and Director of the Volvo Research and Educational Foundations Center of Excellence for Sustainable Urban Freight Systems, and the Center for Infrastructure, Transportation, and the Environment at Rensselaer Polytechnic Institute. He is the recipient of numerous awards, including the 2013 White House's Transportation Champion of Change Award, the 1996 Milton Pikarsky Memorial Award, and the 2001 National Science

Foundation's CAREER Award. His research interests are in the areas of freight transportation modeling and economics, and humanitarian logistics. His research has led to major changes in transportation policy and substantial improvements in the ability to improve urban freight systems. His work on humanitarian logistics has played an influential role in disaster response procedures, and has led to deeper insight into how best to respond to large disasters and catastrophic events.

Dr. Holguín-Veras is a member of the prestigious National Academy of Sciences' Disaster Research Roundtable, a highly selective group of disaster responders and researchers charged with advising the federal government in disaster policy, and providing a bridge between the research and practitioner communities. Dr. Holguín-Veras' team has pioneered the holistic study of humanitarian logistics by: (1) analyzing response operations as a socio-technical system; (2) conducting research to characterize actual operations and identify lessons learned; and (3) developing suitable mathematical models as decision-support tools. This work has had a transformative effect on disaster policy. His team has conducted extensive fieldwork research and conducted interviews with hundreds of individuals directly involved in the largest disasters of recent times: World Trade Center, Katrina, Joplin, Hurricanes Irene and Sandy, Port-au-Prince and Chile earthquakes, and the Tohoku disasters in Japan, among others. The lessons learned through this fieldwork are routinely shared with disaster agencies. The RPI team develops mathematical models that incorporate the realities and behaviors identified in the fieldwork, such as: inventory allocation models that account for deprivation costs, dynamic control models to manage material convergence, and models of immediate resource requirements, among others.

He is President of the Scientific Committee of the Pan-American Conferences of Traffic and Transportation Engineering, and member of the Scientific Committee of the World Conference of Transport Research. He is a member of numerous technical committees and editorial boards of leading journals. He received his PhD from The University of Texas at Austin in 1996; a MSc from the Universidad Central de Venezuela in 1984; and a BSc from the Universidad Autónoma de Santo Domingo en 1982.

Julie Simmons Ivy is an Associate Professor in the Edward P. Fitts Department of Industrial and Systems Engineering and Fitts Faculty Fellow in Health Systems Engineering. She is a member of Institute of Operations Research and Management Science (INFORMS) and the Institute of Industrial Engineers, Dr. Ivy served as the 2007 Chair (President) of the INFORMS Health Applications Society (HAS) and the 2012–2013 President for the INFORMS Minority Issues Forum. Her research interests are mathematical modeling of stochastic dynamic systems with emphasis on statistics and decision analysis as applied to health care, public health, and humanitarian logistics. Her research has been funded by the NSF and the Centers for Disease Control and Prevention.

Miguel Jaller PhD is an Assistant Professor at the University of California, Davis (UC Davis). He has strong theoretical foundations and practical experience in

industrial and transportation engineering. He received his BSc and MSc in Industrial Engineering from Universidad del Norte, Colombia. His ME in Transportation Engineering, MSc in Applied Mathematics, and PhD. in Transportation Engineering from Rensselaer Polytechnic Institute. His research interests are in the areas of humanitarian logistics, disaster response logistics, disaster management, freight transportation, sustainable transportation systems, and operations research. He has scientific and technical publications on these topics, and has presented at different national and international venues. Dr. Jaller has been part of a number of important research projects after Hurricane Katrina, the Port au Prince, Chile and Tohoku Earthquakes, and the storms hitting the Northeast coast of the U.S., among other small and large scale disasters. His research is a combination of field work findings and multidisciplinary perspectives and theories.

Steven Jiang is an Associate Professor in the Department of Industrial and Systems Engineering at North Carolina A&T State University. He is a member of the Institute of Industrial Engineers, Human Factors and Ergonomics Society, and American Society for Engineering Education. His research interests are in visual analytics, human computer interaction as applied to manufacturing and service industries. His research has been funded by NSF, ARO, and ARL.

Cigdem Gonul Kochan is an Assistant Professor of Operations Research and Supply Chain Management at the Ohio Northern University. She has received her MS degree in Information Technology Management from University of Texas at Dallas and her PhD in Logistics and Supply Chain Management from University of North Texas. She is a certified SAP Solution Architect and has 4 years of industry experience in IT and operations management fields. Her research focuses on supply chain resilience, cloud based supply chain management, healthcare supply chains and inventory optimization.

Laura Rock Kopczak is an educator, researcher and consultant in Supply Chain Management, a field in which she has over 25 years of experience. Her current focus is on humanitarian and global health supply chains. Laura teaches courses on humanitarian logistics at NYU Wagner School of Public Service and in the MIT-Zaragoza Masters in International Logistics Program. She also consults and does research with organizations such as MSF, IFRC, Save the Children, UNHCR, UNICEF, UN WASH cluster, GAVI, PSI, JSI, the Rockefeller Foundation, and the Bill and Melinda Gates Foundation. Laura obtained her MBA from Columbia Business School, her MS in Operations Research from Columbia University School of Engineering and her PhD in Industrial Engineering and Engineering Management from Stanford University. In the past, Laura worked as a professor at Stanford University, as one of three co-directors of the Stanford Global Supply Chain Management Forum and in a number of positions at Hewlett-Packard Company.

Gyöngyi Kovács is the Erkko Professor in Humanitarian Logistics at the Hanken School of Economics in Helsinki, Finland. She is a founding editor of the Journal

of Humanitarian Logistics and Supply Chain Management, and has also edited a book on Relief Supply Chain Management. She has led the Humanitarian Logistics and Supply Chain Research Institute (HUMLOG Institute) up till 2014 and has been a European regional editor of the International Journal of Physical Distribution and Logistics Management 2008–2013. Her research interests include humanitarian logistics and sustainable supply chains.

Shailesh S. Kulkarni is an Associate Professor of Decision Sciences in the Department of Information Technology and Decision Sciences at the University of North Texas (UNT). Professor Kulkarni's research interests are in the areas of supply chain networks and stochastic modeling and analysis. His research has been published in various academic journals including *Production and Operations Management, IIE Transactions, Decision Sciences Journal, European Journal of Operational Research and the International Journal of Production Research.* He has received teaching and research awards at UNT. He currently serves as the Associate Vice President for Sponsorships for the Production and Operations Management Society (POMS) and on its Board. He also serves on the Editorial Board of the Journal of Industrial Engineering and Engineering Science Letters.

Stef Lemmens is currently pursuing a PhD in Applied Economics at the Katholieke Universiteit Leuven, Faculty of Business and Economics. He holds a master degree Commercial Engineering (2012) and Advanced Business Research (2013). He is a research member of the GSK Vaccines Research Chair on Operations Management.

His primary research focuses on modeling and optimization of real-world supply chains. More specifically, he is interested in the acquisition of (multiple) relevant key performance measures and the integration of internal and external supply chain risks for supply chain design problems. For the development of his research, he particularly uses operations research methods as mathematical programming and factory physics.

Gregory Matthews is the Senior Advisor for Emergency Livelihoods at the International Rescue Committee (IRC). Greg is a food security and nutrition specialist with over 10 years of experience in humanitarian response and coordination. He currently oversees the IRC's cash transfer programming and emergency market analysis efforts, including the promotion and further development of the Emergency Market Mapping and Analysis (EMMA) toolkit. Since joining the IRC in 2012, Greg has primarily focused on starting and supporting emergency programs in response to the Syria crisis and in the Philippines, and is now focused on strengthening capacity to rapidly deliver cash grants at scale in emergencies. Prior to joining the IRC, Greg worked at the Humanitarian Response Department at Oxfam America and the International Disaster Response and Africa units at the American Red Cross. Greg has previously worked in the Philippines, Haiti (several times), Madagascar, Tanzania, Ethiopia, Kenya, Senegal and Gambia, and is currently focused on the Syria crisis response. He holds a MSc in Nutrition from Tufts University, and a BSc in International Politics from Georgetown University.

Robin Mays is an ethnographic researcher who explores the human and contextual factors of disaster and humanitarian response systems that lead to effective response. Her research revolves around understanding contextualized and dynamic meanings of value and effectiveness within humanitarian work; the balance of structure and flexibility in effective rapid response; the role of decision-making and implications for design of technology. She is currently pursuing her PhD with the Department of Human Centered Design & Engineering at the University of Washington. She has worked for over 18 years in rapid response operations and logistics, with an 11-year career as a humanitarian logistician. As a member of the response communities she studies, her research couples an insider perspective with a theoretical framework drawn from human-centered design, understanding hidden work, change adoption, and lowest level empowerment.

Earline Middleton is the Vice-President of Agency Services and Programs at the Food Bank of Central and Eastern North Carolina. She has served more the 15 years in this role and 25 years at FBCENC. She was appointed to serve on the North Carolina State Food Policy Council and continues to serve on North Carolina Local Food Council; she is a founding member of the Southeast Anti-Hunger Consortium. Earline has been recognized by Triangle Business Journal and is a recipient of the Z. Smith Reynolds Foundation Sabbatical. She received a BSEd from Wilberforce University and completed additional studies at the University of Dayton, in Dayton, Ohio and North Carolina State University in Raleigh, NC.

Shona D. Morgan is an associate professor in the School of Business and Economics at North Carolina A&T State University. Her research interests include the analysis and design of heuristics and algorithms for intractable discrete optimization problems, remanufacturing and reverse supply chains, and non-profit supply chains. She has published articles in *IIE Transactions,* the *European Journal of Operational Research,* and *The International Journal of Production Research* to name a few. She is a member of the Decision Sciences Institute and currently serves as the Vice President of Publications for the Southeastern Decision Sciences Institute.

Thomas Münzberg is a research associate at the *Karlsruhe Institute of Technology (KIT)*. His research aims at minimizing and preparing for the adverse impacts of critical infrastructure disruptions by providing analytical assistance for decision-makers of local disaster management authorities and critical infrastructure providers. A great interest of his research is the assessment of power outage impacts and community resilience in the context of critical infrastructure disruptions.

Thomas Münzberg is an active member of the *Center for Disaster Management and Risk Reduction Technology (CEDIM),* a joint collaboration between the Helmholtz Centre Potsdam–German Research Centre for Geosciences (GFZ) and the Karlsruhe Institute of Technology (KIT). The *CEDIM* is part of the IRDR International Centres of Excellence on Critical Infrastructures and Strategic Planning (IRDR ICoE-CISP).

Thomas Münzberg has vast practical experiences and corresponding qualifications in safety engineering, business continuity management, disaster management, and emergency medical services. He holds a Master of Science in disaster management and safety engineering from the *Cologne Technical University (CTU), Germany,* where he also worked as a research associate at the *Institute for Rescue Engineering and Civil Protection.*

David R. Nowicki is an Associate Professor at the University of North Texas. He holds a joint appointment in the College of Business' Department of Marketing and Logistics and the College of Engineering's Department of Engineering Technology. Dr. Nowicki received his Masters Degree in Industrial and Systems Engineering from Virginia Tech and both his bachelors and doctorate degrees in Industrial and Systems Engineering from the University of Wisconsin—Madison.

Dr. Nowicki's research efforts focus on applying advanced analytical techniques to solve supply chain management problems from a systems engineering context. Professor Nowicki's research is concentrated on performance based logistics modeling, supply chain management, resiliency and risk, multi-resource optimization, reliability theory, and inventory optimization. Dr. Nowicki brings over 20 years of industry experience holding executive positions at i2 Technologies and the TFD Group with a focus on supply chain management, systems engineering, lifecycle affordability, operations research modeling, reliability, inventory optimization and software engineering.

Irem Sengul Orgut received her PhD in Industrial Engineering in 2015 from the Edward P. Fitts Department of Industrial and Systems Engineering at North Carolina State University. She now works at Lenovo as the Corporate Quality Statistics Project Manager where she uses Big Data and Analytics tools to improve customer engagement. Prior to starting her doctoral studies, she received her BS degrees in Industrial Engineering and Mechanical Engineering from Bogazici University, Istanbul, Turkey in 2010. Her research interests include stochastic modeling of complex supply chains with multiple objectives and conflicting decision makers with application focus on long-term humanitarian issues and public health problems. She received various awards for her teaching and research. She is a member of INFORMS, Alpha Pi Mu and IIE. Her web address is https://iremsengul.wordpress.com/.

Natalie Privett PhD is an Assistant Professor of Management and Policy at the Robert F. Wagner Graduate School of Public Service at New York University. Her research focus is operations and supply chain management in the context of global public health, international public service, and nonprofit and public management. Currently, Privett's multidisciplinary research aims to explore the notion of strategic operational interventions to improve health delivery and markets in developing countries.

Privett received her Masters and PhD from Stanford University's department of Management Science & Engineering, specialized in operations and supply chain

management. Privett received her BS in industrial engineering from Texas A&M University and subsequently worked in manufacturing. Prior to joining Wagner, she was a Postdoctoral Research Fellow at the MIT-Zaragoza Logistics Program in Zaragoza, Spain, where she worked on global cold chain pharmaceutical tracking projects supported by the European Space Agency. Privett has most recently been published in the journals Operations Research for Healthcare (ORHC) and Manufacturing & Service Operations Management (MSOM).

Frank Schultmann is Chair Professor at the Karlsruhe Institute of Technology (KIT), Germany, and Director of the KIT's Institute for Industrial Production (IIP) and the French-German Institute for Environmental Research (DFIU). He is also Director of Project Management for the University of Adelaide, Australia.

Professor Schultmann studied Business and Industrial Engineering at the University of Karlsruhe. He completed his doctoral thesis in 1998 at the Faculty of Economics and Business Engineering and his Habilitation in 2003 receiving the venia legendi (teaching authority) in Management Science. Prior to his present positions, he was Professor of Industrial Management at the University of Koblenz-Landau and holder of the Chair of Business Administration, Construction Management and Economics at the University of Siegen.

Professor Schultmann was Editor of an international leading scientific journal and is member of several editorial boards. He served as elected chairman of several scientific boards and is coordinator of international task forces and member of numerous international committees. He conducted various research projects on national and international level and has been awarded with several research grants and prices.

His research interests include sustainable production and logistics, decision support, supply chain management and optimization, project management, technology assessment, construction management, and information and communication technologies. This goes along with various industry collaborations. Among others Professor Schultmann has worked with companies from resource industries, automotive, chemical, construction, security, food, transport and logistics.

Reha Uzsoy is Clifton A. Anderson Distinguished Professor in the Edward P. Fitts Department of Industrial and Systems Engineering at North Carolina State University. He holds BS degrees in Industrial Engineering and Mathematics and an MS in Industrial Engineering from Bogazici University, Istanbul, Turkey. He received his PhD in Industrial and Systems Engineering in 1990 from the University of Florida. His teaching and research interests are in production planning and supply chain management. Before coming to the US he worked as a production engineer with Arcelik AS, a major appliance manufacturer in Istanbul, Turkey. He has also been a visiting researcher at Intel Corporation and IC Delco. He was named a Fellow of the Institute of Industrial Engineers in 2005, Outstanding Young Industrial Engineer in Education in 1997, and has received awards for both undergraduate and graduate teaching.

Nico Vandaele holds a degree Commercial Engineering (1990) and obtained a PhD in Applied Economics, Operations Research and Operations Management from KU Leuven in 1996. He is currently Full Professor at the Research Center for Operations Management at the Katholieke Universiteit Leuven, Faculty of Business and Economics. He is holder of the GSK Vaccines Research Chair on Operations Management. He is also a visiting researcher at CORE and IAG (Université Catholique de Louvain). Nico Vandaele teaches courses in operations research, operations management and supply chain management.

His research interests are situated in modeling of manufacturing and service systems, performance measurement, the design of planning systems, sales and operations management, factory physics, health care management and traffic modeling. Other research deals with decision support systems for product design and development and portfolio management as well as scenario based planning. He published in leading journals and he is active in several executive training programs, both national and international, and has served as consultant/advisor for major global companies as well as for small and medium sized companies. He served as executive director of the Innovation and Incubation Center (2007–2015). He co-founded two KU Leuven spin-off companies, Nyo Alatus and Athlycs.

Tricia Wachtendorf PhD is an Associate Professor of Sociology at the University of Delaware and the Associate Director of the world-renown Disaster Research Center—the oldest center in the world focused on the social science aspects of disaster. Over the past two decades, her research has focused on multi-organizational coordination before, during and after disasters, transnational crises, and social vulnerability to disaster events. Dr. Wachtendorf has engaged in quick response field work after such events as the 2001 World Trade Center attacks, the tsunamis affecting India, Sri Lanka (2004) and Japan (2011), Hurricanes Katrina (2005) and Sandy (2012), as well as the earthquakes in China (2008) and Haiti (2010). With numerous research grants from agencies such as the National Science Foundation, she has published widely on improvisation in disasters as well as disaster convergence. Her most recent funded research projects examine the temporal nature of household and emergency management decision-making during hurricane events, investigate humanitarian logistics during disaster response, and use a visual sociology approach to explore benchmarks of recovery following the 2011 disaster in Japan.

Rebecca Walton is an Assistant Professor of Technical Communication in the Department of English at Utah State University. She studies the role that communication can play in more equitably distributing power. Much of her research investigates how people in resource-constrained environments such as in the Global South and humanitarian organizations create, access, share, evaluate, and use information to meet their personal and professional goals. Her work has appeared in *Technical Communication Quarterly, Journal of Business and Technical Communication, and Information Technologies and International Development,* as well as other journals and edited collections.

Marcus Wiens studied Economics in Bayreuth (GER), Dijon (FRA) and Saarbrücken (GER) and received his PhD in Economics at the Bundeswehr University Munich (GER). He leads the research unit in risk management at the Institute for Industrial Production (IIP) at KIT. His fields of interest are systemic risk management, behavioural risk management, decision theory, game theory and experimental economics. Marcus Wiens is adjunct professor at the International School of Management (ISM), member of the German Operation Research Society, of the German Experimental Economics Society and of the Center for Disaster Management and Risk Reduction Technology (CEDIM), an interdisciplinary research center in the field of disaster management founded by Helmholtz Centre KIT.

His research group participated/participates in projects covering a wide range of risk management topics such as resilience of transportation networks (EU-projects WEATHER and MOWE-IT), resilience of industrial value chains (project KLIMOPASS), safety of the food supply chain (project SEAK), protection of critical infrastructure against adversarial risks (project RIKOV) and other topics such as business continuity management, incentives systems and contracts.

About the Editors

Nezih Altay is an Associate Professor at the Driehaus College of Business of DePaul University. He earned his PhD in Operations Management from Texas A&M University. Dr. Altay is an experienced and highly qualified teacher-scholar. His research specializes in after-sale service operations, disruption management and humanitarian supply chains. He has published his research in leading academic journals and presented in national and international arenas. He co-edited a book titled Service Parts Management: Demand Forecasting and Inventory Control that was published also with Springer. He is the co-Editor-in-chief for the Journal of Humanitarian Logistics & Supply Chain Management, and directs the Master program in Supply Chain Management at DePaul University.

Mark P. Haselkorn is a Professor of Human Centered Design & Engineering at the University of Washington. He is Director of the new university Center on Collaborative Systems for Security, Safety & Regional Resilience (CoSSaR) and currently leads the Maritime Operations Information Sharing (MOISA) project, a research partnership sponsored by three Federal Agencies – DHS Interagency Operations Center (IOC), Program Manager for the Information Sharing Environment (PM-ISE), and National Maritime Intelligence-Integration Office (NMIO) – with the goal of better understanding and enhancing the information sharing requirements for regional maritime safety and security. He also is a lead investigator on an AHRQ R01 to develop work and information centered methods for achieving evidence-based health information technology. Dr. Haselkorn also conducts research for the Red Cross Global Disaster Preparedness Center and has completed an NSF initiative to define the emerging frontier of "Humanitarian Service Science & Engineering." He has worked with the military on a number of projects, including the integration of DOD and VA electronic medical records and the Air Force's strategic management of ICT under the threat of Y2K (a study published by the National Research Council). Dr. Haselkorn has conducted foundational research in the area of intelligent transportation systems, including development of the first Web-based real-time traveler information system (Traffic Reporter, 1990). He is Past President of the IEEE Professional Communication Society, has served on ISO/IEC-JTC1, is a member of the IEEE Medical Technology Policy Committee, and was a founding

Board Member of the International Community on Information Systems for Crisis Response and Management (ISCRAM).

Christopher W. Zobel is the R.B. Pamplin Professor of Business Information Technology in the Pamplin College of Business at Virginia Tech. He earned a Ph.D. in Systems Engineering from the University of Virginia, and an M.S. in Mathematics from the University of North Carolina at Chapel Hill. His primary research interests include disaster operations management and humanitarian supply chains, and he has published his work in journals such as *Decision Sciences, Decision Support Systems*, and the *Journal of Humanitarian Logistics and Supply Chain Management*, among others. Dr. Zobel is one of the Co-Directors of Virginia Tech's Interdisciplinary Graduate Education Program in Disaster Resilience, and he was a 2015 Fulbright Scholar to Germany. He is on the Board of Directors of the ISCRAM Association and an active member of the Decision Sciences Institute (DSI) and the Institute for Operations Research and the Management Sciences (INFORMS).