Michael P. Johnson
Editor

Community-Based
Operations Research

Decision Modeling for Local Impact
and Diverse Populations

Springer
“This book would not have been possible without the committed, creative and enthusiastic participation of its contributing authors. The editorial process benefited greatly from the efforts of editorial and research assistants Rachel Drew, Joshua Rinaldi, Paula Ryan, and Alma Hallulli-Biba. Chapter reviewers went out of their way to provide rigorous, detailed and timely feedback to authors. I thank Fred Hillier, who encouraged me to pursue this book project; Karen Smilowitz, who helped develop the concept of community-based operations research, and James Cochran, who has encouraged me to take a more active leadership role in public-sector OR/MS. The guidance of Al Blumstein, Mark Daskin, Jon Caulkins, Rema Padman, and my dissertation advisor Art Hurter have been essential to my professional and personal development.

The love and support of my wife, Karen, sons Devon and Langston, and my parents ensured that the days and nights of work on this project would yield an end-product worthy of them.”
Foreword

While many in academia and business had explored (and sometimes exploited) what would eventually come to be known as operations research for decades before World War II, the interdisciplinary mathematical science has its formal origins firmly rooted in the war. Allied forces used operations research techniques to aid in the development of strategies, design of weapons and equipment, and efficient movement of supplies to troops. Many historians give a great deal of credit to operations research for the Allies’ victory.

In the aftermath of the war, industry and business began using the operations research tools that were developed during the war. Scholastic programs and academic communities developed, and the young discipline gradually grew. Eventually social scientists found uses for operations research, and the discipline began expanding beyond applications that reduced costs, increased profitability, and generated material wealth and into applications that focused squarely on improving quality of life. Presently this discipline, which was born of necessity during the most devastating war in history, ironically finds itself ever more frequently called upon in efforts to resolve social problems and alleviate human suffering.

Ultimately the focus on using operations research to improve quality of life evolved into two distinct areas: responding to needs that arise from immediate unpredictable events (i.e., disaster preparedness and coordination of relief efforts), and addressing chronic systemic problems such as hunger, disease, poverty, and access to adequate healthcare (which, when done at the community level, has come to be known as community operational research in the UK, and, in the USA, as community-based operations research). These two areas feature efforts by operations researchers to address problems both through research and through hands-on initiatives.

Much of the early effort in community-based operations research focused on increasing the efficiency and effectiveness of public services. Notable examples of pioneering efforts included work on emergency response systems by Richard Larson; health care and medicine by Larry Wein and Judith Liebman; AIDS prevention by Edward Kaplan; forestry and natural resources by Andreas Weintraub;
sustainability by Luc Van Wassenhove; and criminal justice systems and policy by Alfred Blumstein. Inspired by these and other early efforts to use operations research to address issues that have impact at the community level, the operations research community has taken an increasing interest in community-based operations research problems over the past two decades. One recent example of tangible evidence that the operations research community has embraced community-based operations research was provided at the 2007 INFORMS Conference in Seattle, Washington. This conference featured an extremely well attended and enthusiastically received tutorial on community-based operations research that was given by Michael Johnson and Karen Smilowitz.

Community-based operations research problems are of intrinsic interest because of the potentially profound ramifications of their resolutions, but they are also appealing to many operations researchers because they are extremely challenging. The problems of community-based operations research are ill-defined and require the analyst to have a deep understanding of the associated political, social, cultural, and economic systems and how they interact. These characteristics have lead operations researchers working in this area to use systems-based approaches consistent with what was advocated by Russell Ackoff, Peter Checkland, and C. West Churchman in their early contributions to problem structuring methods.

While many operations researchers address community-based operations research problems through their research, others are working to resolve such problems through direct involvement in hands-on initiatives. For example, the Institute for Operations Research and the Management Sciences (INFORMS) and the International Federation of Operational Research Societies (IFORS) have established several activities through which these organizations’ members can contribute to the resolution of community-based operations research problems. Many of these efforts focus on improving the quality of operations research education and applications. INFORMS publishes INFORMS Transactions on Education (ITE), a peer-reviewed academic journal devoted solely to issues in operations research education that is freely available online (www.informs.org/Journal/ITE). In addition to articles on issues in operations research education, ITE publishes teaching cases with accompanying teaching notes. The cases are freely available (so resource-poor instructors can provide their students with the URL rather than distribute printed copies), while the teaching notes are stored in a password protected site to prevent students from gaining access to these documents (instructors can contact INFORMS to request a password). By making the articles in ITE freely available, INFORMS actively addresses community-based operations research problems in a broad way by supporting improvement in operations research education, which results in improved applications of operations research at the community level.

INFORMS and IFORS also cosponsor an international education initiative through which annual teaching effectiveness colloquia are held in conjunction
with operations research conferences in developing nations. These innovative colloquia are designed to improve the quality of operations research education and applications as well as foster the development of a worldwide network of operations research professionals (academics and practitioners) who are interested in operations research education and application issues. Through this initiative, colloquia have been held in conjunction with the Latin-Ibero-American Conference on Operations Research, Operations Research Society of South Africa Conference, Conference of the Association of Asian Pacific Operational Research Societies, Operations Research Practice in Africa, and the Operations Research Society of Eastern Africa Conference. The colloquia, which have attracted participants from 45 nations, have been held in Montevideo, Uruguay (2006); Cape Town, South Africa (2007); Cartagena, Colombia (2008); Jaipur, India (2009); Buenos Aires, Argentina (2010); and Nairobi, Kenya (2011). When participants in these colloquia take what they have learned back to their respective colleges and universities, they are indeed addressing problems at a community level. Again, through support of this initiative, INFORMS and IFORS actively address community-based operations research problems in a broad way by supporting improvement in operations research education and applications.

Such efforts are not limited to professional societies. For example, the online version of the *Wiley Encyclopedia of Operations Research and Management Science* (http://www.wiley.com/WileyCDA/Section/id-380199.html), which was published in 2011, is available to operations researchers in developing nations for free or at a greatly reduced cost through Research4Life (http://www.research4life.org/). The online version of this eight volume, 6000+ page reference, which features several articles on community-based operations research and problem structuring methods, is updated quarterly to maintain the currency of the encyclopedia’s content. Through the *Wiley Encyclopedia of Operations Research and Management Science*, Wiley actively addresses community-based operations research problems in a broad way by disseminating knowledge and supporting improvement in operations research education and applications in communities of developing regions.

These efforts have culminated in a need for a resource that focuses solely on community-based operations research. In *Community-Based Operations Research: Decision Modeling for Local Impact and Diverse Populations*, Editor Michael Johnson and the contributing authors have filled this need admirably. The chapters of this book summarize studies that generally extend what are considered to be mainstream operations research techniques in a straightforward manner, and so are very approachable. Strong emphasis is placed on the role that transnational and comparative research is likely to play in solving complex problems of public concern. The importance of interdisciplinary and cross-cultural approaches is also considered. The authors frequently reflect on the question of how to increase diversity of operations research academics and practitioners across broader geographies, application areas, and methodological specializations.

The discipline of operations research has much to offer society. We have become very good at using operations research tools to reduce costs, increase profitability,
and generate material wealth, but the discipline is poised to contribute to society in a much broader way. While operations researchers have made several important contributions to applications that focus on improving quality of life, the discipline can and will do much more to contribute to the resolution of these problems. As the discipline moves forward in this area, it must continue to embrace and reflect the world’s racial and ethnic diversity. Operations researchers working in this area must also continue to take critical, inclusive, and flexible approaches to the discipline.

I am excited to have the opportunity to read about the efforts of several of my colleagues to address challenging community-based operations research problems. This documentation of these colleagues’ interactions with the political, social, cultural, and economic environments and integration of extremely important problem structuring methods will educate others in the operations research community who are interested in community-based operations research problems. I expect that the contents of this book will serve as an important step in our discipline’s realization of its full potential with regard to community-based operations research problems.

Ruston, LA

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