

handbook of healthcare operations management methods and applications international series in operations research

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This comprehensive handbook explores modern methods and practical applications crucial for effective healthcare operations management. Part of the International Series in Operations Research, it provides invaluable insights for professionals, researchers, and students. Discover advanced strategies to optimize healthcare processes, enhance efficiency, and improve patient outcomes through robust operations research healthcare techniques and real-world applications.

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Handbook of Healthcare Operations Management

From the Preface: Collectively, the chapters in this book address application domains including inpatient and outpatient services, public health networks, supply chain management, and resource constrained settings in developing countries. Many of the chapters provide specific examples or case studies illustrating the applications of operations research methods across the globe, including Africa, Australia, Belgium, Canada, the United Kingdom, and the United States. Chapters 1-4 review operations research methods that are most commonly applied to health care operations management including: queuing, simulation, and mathematical programming. Chapters 5-7 address challenges related to inpatient services in hospitals such as surgery, intensive care units, and hospital wards. Chapters 8-10 cover outpatient services, the fastest growing part of many health systems, and describe operations research models for primary and specialty care services, and how to plan for patient no-shows. Chapters 12 – 16 cover topics related to the broader integration of health services in the context of public health, including optimizing the location of emergency vehicles, planning for mass vaccination events, and the coordination among different parts of a health system. Chapters 17-18 address supply chain management within hospitals, with a focus on pharmaceutical supply management, and the challenges of managing inventory for nursing units. Finally, Chapters 19-20 provide examples of important and emerging research in the realm of humanitarian logistics.

Operations Research and Health Care

In both rich and poor nations, public resources for health care are inadequate to meet demand. Policy makers and health care providers must determine how to provide the most effective health care to citizens using the limited resources that are available. This chapter describes current and

future challenges in the delivery of health care, and outlines the role that operations research (OR) models can play in helping to solve those problems. The chapter concludes with an overview of this book – its intended audience, the areas covered, and a description of the subsequent chapters. **KEY WORDS** Health care delivery, Health care planning **HEALTH CARE DELIVERY: PROBLEMS AND CHALLENGES** 3 1.1 **WORLDWIDE HEALTH: THE PAST 50 YEARS** Human health has improved significantly in the last 50 years. In 1950, global life expectancy was 46 years [1]. That figure rose to 61 years by 1980 and to 67 years by 1998 [2]. Much of these gains occurred in low- and middle-income countries, and were due in large part to improved nutrition and sanitation, medical innovations, and improvements in public health infrastructure.

Operations Research and Health Care

This book offers a comprehensive reference guide to operations research theory and applications in health care systems. It provides readers with all the necessary tools for solving health care problems. The respective chapters, written by prominent researchers, explain a wealth of both basic and advanced concepts of operations research for the management of operating rooms, intensive care units, supply chain, emergency medical service, human resources, lean health care, and procurement. To foster a better understanding, the chapters include relevant examples or case studies. Taken together, they form an excellent reference guide for researchers, lecturers and postgraduate students pursuing research on health care management problems. The book presents a dynamic snapshot on the field that is expected to stimulate new directions and stimulate new ideas and developments.

Operations Research Applications in Health Care Management

"This handbook provides a broad healthcare context for operational research/management science (OR/MS) researchers with an encyclopedic account of the most vexing international healthcare issues. In addition, the handbook features a practical guide for OR/MS researchers to learn the most important quantitative research tools in conducting healthcare research, including classical OR techniques enhanced with game theory (such as queuing games); classical economics methods enhanced by operational considerations (like matching markets); econometrics; and data-science methods (from statistics and machine learning). Over the past decade, a lively discussion on healthcare has touched virtually every stakeholder with the system, and three key issues have emerged from this discussion: cost, quality, and access, which are jointly referred to as the "iron triangle" of healthcare. There is an urgent need to study these three "big issues"

Handbook of Healthcare Analytics

A comprehensive review of behavioral operations management that puts the focus on new and trending research in the field The Handbook of Behavioral Operations offers a comprehensive resource that fills the gap in the behavioral operations management literature. This vital text highlights best practices in behavioral operations research and identifies the most current research directions and their applications. A volume in the Wiley Series in Operations Research and Management Science, this book contains contributions from an international panel of scholars from a wide variety of backgrounds who are conducting behavioral research. The handbook provides succinct tutorials on common methods used to conduct behavioral research, serves as a resource for current topics in behavioral operations research, and as a guide to the use of new research methods. The authors review the fundamental theories and offer frameworks from a psychological, systems dynamics, and behavioral economic standpoint. They provide a crucial grounding for behavioral operations as well as an entry point for new areas of behavioral research. The handbook also presents a variety of behavioral operations applications that focus on specific areas of study and includes a survey of current and future research needs. This important resource: Contains a summary of the methodological foundations and in-depth treatment of research best practices in behavioral research. Provides a comprehensive review of the research conducted over the past two decades in behavioral operations, including such classic topics as inventory management, supply chain contracting, forecasting, and competitive sourcing. Covers a wide-range of current topics and applications including supply chain risk, responsible and sustainable supply chain, health care operations, culture and trust. Connects existing bodies of behavioral operations literature with related fields, including psychology and economics. Provides a vision for future behavioral research in operations. Written for academicians within the operations management community as well as for behavioral researchers, The Handbook of Behavioral Operations offers a

comprehensive resource for the study of how individuals make decisions in an operational context with contributions from experts in the field.

The Handbook of Behavioral Operations

This edited volume captures and communicates the best thinking on how to improve healthcare by improving the delivery of services -- providing care when and where it is needed most -- through application of state-of-the-art scheduling systems. Over 12 chapters, the authors cover aspects of setting appointments, allocating healthcare resources, and planning to ensure that capacity matches needs for care. A central theme of the book is increasing healthcare efficiency so that both the cost of care is reduced and more patients have access to care. This can be accomplished through reduction of idle time, lessening the time needed to provide services and matching resources to the needs where they can have the greatest possible impact on health. Within their chapters, authors address: (1) Use of scheduling to improve healthcare efficiency. (2) Objectives, constraints and mathematical formulations. (3) Key methods and techniques for creating schedules. (4) Recent developments that improve the available problem solving methods. (5) Actual applications, demonstrating how the methods can be used. (6) Future directions in which the field of research is heading. Collectively, the chapters provide a comprehensive state-of-the-art review of models and methods for scheduling the delivery of patient care for all parts of the healthcare system. Chapter topics include setting appointments for ambulatory care and outpatient procedures, surgical scheduling, nurse scheduling, bed management and allocation, medical supply logistics and routing and scheduling for home healthcare.

Handbook of Healthcare System Scheduling

In both rich and poor nations, public resources for health care are inadequate to meet demand. Policy makers and health care providers must determine how to provide the most effective health care to citizens using the limited resources that are available. This chapter describes current and future challenges in the delivery of health care, and outlines the role that operations research (OR) models can play in helping to solve those problems. The chapter concludes with an overview of this book – its intended audience, the areas covered, and a description of the subsequent chapters. **KEY WORDS** Health care delivery, Health care planning **HEALTH CARE DELIVERY: PROBLEMS AND CHALLENGES** 3 1.1 **WORLDWIDE HEALTH: THE PAST 50 YEARS** Human health has improved significantly in the last 50 years. In 1950, global life expectancy was 46 years [1]. That figure rose to 61 years by 1980 and to 67 years by 1998 [2]. Much of these gains occurred in low- and middle-income countries, and were due in large part to improved nutrition and sanitation, medical innovations, and improvements in public health infrastructure.

Operations Research and Health Care

Operations research tools are ideally suited to providing solutions and insights for the many problems health policy-maker's face. Indeed, a growing body of literature on health policy analysis, based on operations research methods, has emerged to address the problems mentioned above and several others. The research in this field is often multi-disciplinary, being conducted by teams that include not only operations researchers but also clinicians, economists and policy analysts. The research is also often very applied, focusing on a specific question driven by a decision-maker and many times yielding a tool to assist in future decisions. The goal of this volume was to bring together a group of papers by leading experts that could showcase the current state of the field of operations research applied to health-care policy. There are 18 chapters that illustrate the breadth of this field. The chapters use a variety of techniques, including classical operations research tools, such as optimization, queuing theory, and discrete event simulation, as well as statistics, epidemic models and decision-analytic models. The book spans the field and includes work that ranges from highly conceptual to highly applied. An example of the former is the chapter by Kimmel and Schackman on building policy models, and an example of the latter is the chapter by Coyle and colleagues on developing a Markov model for use by an organization in Ontario that makes recommendations about the funding of new drugs. The book also includes a mix of review chapters, such as the chapter by Hutton on public health response to influenza outbreaks, and original research, such as the paper by Blake and colleagues analyzing a decision by Canadian Blood Services to consolidate services. This volume could provide an excellent introduction to the field of operations research applied to health-care policy, and it could also serve as an introduction to new areas for researchers already familiar with the topic. The book is divided into six sections. The first section contains two chapters that describe several different applications

of operations research in health policy and provide an excellent overview of the field. Sections 2 to 4 present policy models in three focused areas. Section 5 contains two chapters on conceptualizing and building policy models. The book concludes in Section 6 with two chapters describing work that was done with policy-makers and presenting insights gained from working directly with policy-makers.

Operations Research and Health Care Policy

Global competition has caused fundamental changes in the competitive environment of the manufacturing and service industries. Firms should develop strategic objectives that, upon achievement, result in a competitive advantage in the market place. The forces of globalization on one hand and rapidly growing marketing opportunities overseas, especially in emerging economies on the other, have led to the expansion of operations on a global scale. The book aims to cover the main topics characterizing operations management including both strategic issues and practical applications. A global environmental business including both manufacturing and services is analyzed. The book contains original research and application chapters from different perspectives. It is enriched through the analyses of case studies.

Operations Management

This book aims to demonstrate and detail the pervasive nature of Discrete Optimization. The handbook couples the difficult, critical-thinking aspects of mathematical modeling with the hot area of discrete optimization. It is done with an academic treatment outlining the state-of-the-art for researchers across the domains of the Computer Science, Math Programming, Applied Mathematics, Engineering, and Operations Research. The book utilizes the tools of mathematical modeling, optimization, and integer programming to solve a broad range of modern problems.

Handbook on Modelling for Discrete Optimization

This book is a comprehensive survey of the mathematical concepts and principles of industrial mathematics. Its purpose is to provide students and professionals with an understanding of the fundamental mathematical principles used in Industrial Mathematics/OR in modeling problems and application solutions. All the concepts presented in each chapter have undergone the learning scrutiny of the author and his students. The illustrative material throughout the book was refined for student comprehension as the manuscript developed through its iterations, and the chapter exercises are refined from the previous year's exercises.

ECKM 2018 19th European Conference on Knowledge Management

Operations Research (OR) began as an interdisciplinary activity to solve complex military problems during World War II. Utilizing principles from mathematics, engineering, business, computer science, economics, and statistics, OR has developed into a full fledged academic discipline with practical application in business, industry, government and m

Principles of Mathematics in Operations Research

This book presents healthcare logistics solutions that have been successfully implemented at a variety of healthcare facilities. In each case, a major challenge is presented, along with the solution approach and implementation steps, followed by the impact on hospital operations. Problems encountered when implementing the results in practice are also discussed. Much of the work presented is drawn from the experiences of members of the Center for Healthcare Operations Improvement and Research (CHOIR) at Twente, along with the CHOIR spin-off company, Rhythm.

Operations Research and Management Science Handbook

This handbook covers DEA topics that are extensively used and solidly based. The purpose of the handbook is to (1) describe and elucidate the state of the field and (2), where appropriate, extend the frontier of DEA research. It defines the state-of-the-art of DEA methodology and its uses. This handbook is intended to represent a milestone in the progression of DEA. Written by experts, who are generally major contributors to the topics to be covered, it includes a comprehensive review and discussion of basic DEA models, which, in the present issue extensions to the basic DEA methods, and a collection of DEA applications in the areas of banking, engineering, health care, and services. The handbook's chapters are organized into two categories: (i) basic DEA models, concepts, and their

extensions, and (ii) DEA applications. First edition contributors have returned to update their work. The second edition includes updated versions of selected first edition chapters. New chapters have been added on: different approaches with no need for a priori choices of weights (called “multipliers”) that reflect meaningful trade-offs, construction of static and dynamic DEA technologies, slacks-based model and its extensions, DEA models for DMUs that have internal structures network DEA that can be used for measuring supply chain operations, Selection of DEA applications in the service sector with a focus on building a conceptual framework, research design and interpreting results.

Handbook of Healthcare Logistics

In this volume, scientists and practitioners write about new methods and technologies for improving the operation of health care organizations. Statistical analyses play an important role in these methods with the implications of simulation and modeling applied to the future of health care. Papers are based on work presented at the Second International Conference on Health Care Systems Engineering (HCSE2015) in Lyon, France. The conference was a rare opportunity for scientists and practitioners to share work directly with each other. Each resulting paper received a double blind review. Paper topics include: hospital drug logistics, emergency care, simulation in patient care, and models for home care services.

Handbook on Data Envelopment Analysis

This volume reflects the theme of the INFORMS 2004 Meeting in Denver: Back to OR Roots. Emerging as a quantitative approach to problem-solving in World War II, our founders were physicists, mathematicians, and engineers who quickly found peace-time uses. It is fair to say that Operations Research (OR) was born in the same incubator as computer science, and it has spawned many new disciplines, such as systems engineering, health care management, and transportation science. Although people from many disciplines routinely use OR methods, many scientific researchers, engineers, and others do not understand basic OR tools and how they can help them. Disciplines ranging from finance to bioengineering are the beneficiaries of what we do — we take an interdisciplinary approach to problem-solving. Our strengths are modeling, analysis, and algorithm design. We provide a quantitative foundation for a broad spectrum of problems, from economics to medicine, from environmental control to sports, from e-commerce to computational geometry. We are both producers and consumers because the mainstream of OR is in the interfaces. As part of this effort to recognize and extend OR roots in future problem-solving, we organized a set of tutorials designed for people who heard of the topic and want to decide whether to learn it. The 90 minutes was spent addressing the questions: What is this about, in a nutshell? Why is it important? Where can I learn more? In total, we had 14 tutorials, and eight of them are published here.

Health Care Systems Engineering for Scientists and Practitioners

In today’s global economy, operations strategy in supply chains must assume an ever-expanding and strategic role of risks. These operational and strategic facets entail a brand new set of operational problems and risks that have not always been understood or managed very well. This book provides the means to understand, to model and to analyze these outstanding issues and problems that are the essential elements in managing supply chains today.

Tutorials on Emerging Methodologies and Applications in Operations Research

Supply chains are currently globalized and companies operate internationally owing to the fact that raw materials, production processes, and the consumption of the final products are carried out in different countries. This implies high material and information flow, which incurs high costs associated with the supply chain and logistics, sometimes up to 60% of the total cost of the product. Therefore, companies seek to optimize their resources to reduce these costs and improve sustainability in a globalized market. This book, entitled *Tools, Methodologies and Techniques Applied to Sustainable Supply Chains*, contains 15 chapters that report case studies applied to industrial and service sectors. The authors come from areas such as Mexico, Colombia, Italy, Sweden, Slovakia, China, and Australia. They indicate how managers make use of tools and techniques to solve problems associated with supply chains to reduce their cost and remain competitive. A great effort has been made to analyze this problem, and the methodologies are clearly described here to facilitate the reproducibility of each technique and tool. This was done in the hope that hoping that they may one day be applied in more companies.

Supply Chain Games: Operations Management and Risk Valuation

This handbook focuses on Data Envelopment Analysis (DEA) applications in operations analytics which are fundamental tools and techniques for improving operation functions and attaining long-term competitiveness. In fact, the handbook demonstrates that DEA can be viewed as Data Envelopment Analytics. Chapters include a review of cross-efficiency evaluation; a case study on measuring the environmental performance of OECS countries; how to select a set of performance metrics in DEA with an application to American banks; a relational network model to take the operations of individual periods into account in measuring efficiencies; how the efficient frontier methods DEA and stochastic frontier analysis (SFA) can be used synergistically; and how to integrate DEA and multidimensional scaling. In other chapters, authors construct a dynamic three-stage network DEA model; a bootstrapping based methodology to evaluate returns to scale and convexity assumptions in DEA; hybridizing DEA and cooperative games; using DEA to represent the production technology and directional distance functions to measure bank performance; an input-specific Luenberger energy and environmental productivity indicator; and the issue of reference set by differentiating between the uniquely found reference set and the unary and maximal types of the reference set. Finally, additional chapters evaluate and compare the technological advancement observed in different hybrid electric vehicles (HEV) market segments over the past 15 years; radial measurement of efficiency for the production process possessing multi-components under different production technologies; issues around the use of accounting information in DEA; how to use DEA environmental assessment to establish corporate sustainability; a summary of research efforts on DEA environmental assessment applied to energy in the last 30 years; and an overview of DEA and how it can be utilized alone and with other techniques to investigate corporate environmental sustainability questions.

Tools, Methodologies and Techniques Applied to Sustainable Supply Chains

By one estimate, the U.S. wastes \$480 billion annually on healthcare expenditures that don't improve care. Worse, because of faulty systems – not personnel – up to 98,000 people die every year due to preventable medical errors – and that doesn't count non-terminal events such as hospital-acquired infections. In *Hospital Operations*, two leading operations management experts and four senior physicians demonstrate how to apply new OM advances to substantially improve any hospital's operational, clinical, and financial performance. Replete with examples, this book shows how to diagram hospital flows, trace interconnections, and optimize flows for better performance. Readers will find specific guidance on improving emergency departments, operating rooms, hospital floors, and diagnostic units; and successfully applying metrics. Coverage includes: reducing ER overcrowding and enhancing patient safety...improving OR scheduling, enhancing organizational learning, and responding to surgeons and other stakeholders... improving bed availability, optimizing nurse schedules, and creating more seamless patient handoffs... reducing lab turnaround time, improving imaging responsiveness, and decreasing lab errors...successfully applying the right metrics for every facet of hospital performance. The authors conclude by previewing the "Hospital of the Future," addressing issues ranging from prevention and self-care to the evolution of technology and evidence-based medicine.

Handbook of Operations Analytics Using Data Envelopment Analysis

This important book is by top scholars in supply chain management, revenue management, and e-commerce, all of which are grounded in information technologies and consumer demand research. The book looks at new selling techniques designed to reach the consumer.

Hospital Operations

This handbook covers various areas of Higher Education (HE) in which operations research/management science (OR/MS) techniques are used. Key examples include: international comparisons, university rankings, and rating academic efficiency with Data Envelopment Analysis (DEA); formulating academic strategy with balanced scorecard; budgeting and planning with linear and quadratic models; student forecasting; E-learning evaluation; faculty evaluation with questionnaires and multivariate statistics; marketing for HE; analytic and educational simulation; academic information systems; technology transfer with systems analysis; and examination timetabling. Overviews, case studies and findings on advanced OR/MS applications in various functional areas of HE are included.

Consumer-Driven Demand and Operations Management Models

This new Handbook addresses the state of the art in the application of operations research models to problems in preventing terrorist attacks, planning and preparing for emergencies, and responding to and recovering from disasters. The purpose of the book is to enlighten policy makers and decision makers about the power of operations research to help organizations plan for and respond to terrorist attacks, natural disasters, and public health emergencies, while at the same time providing researchers with one single source of up-to-date research and applications. The Handbook consists of nine separate chapters: Using Operations Research Methods for Homeland Security Problems Operations Research and Homeland Security: Overview and Case Study of Pandemic Influenza Deployed Security Games for Patrol Planning Interdiction Models and Applications Time Discrepant Shipments in Manifest Data Achieving Realistic Levels of Defensive Hedging Mitigating the Risk of an Anthrax Attack with Medical Countermeasures Service Networks for Public Health Preparedness and Large-scale Disaster Relief Efforts Disaster Response Planning in the Private Sector

An Administrator's Handbook on the Application of Operations Research to the Management of Mental Health Systems

This note from Prof. Vargas regarding a competitive title by Prof. Saaty with an almost identical title (THEORY AND APPLICATIONS OF THE ANALYTIC NETWORK PROCESS: Decision Making with Benefits, Opportunities, Costs, and Risks. RWS Publications, 2005): "The other book is theoretical with passing mention of examples to show how the subject is used. In our book (the one you have) the applications are different and given in full detail relevance and originality. They have never appeared in print as they are here and most users would prefer them to the theoretical book. In addition chapter 1 summarizes the theory given in four chapters on the book showing the important parts without going into too much detail. I would rather read this book than the other one definitely and this could not have been done so elegantly had not the other been written before. Therefore this book has the cream of the ideas and the best published applications so far."

Handbook of Operations Research and Management Science in Higher Education

Arising from the urgent operational issues of World War II, the philosophy and methodology of Operations Research (OR) has permeated the resolution of decision problems in business, industry, and government. This work recounts the evolution of OR as the science of decision making. It chronicles the history of OR in the form of expository entries.

Handbook of Operations Research for Homeland Security

A new edition of the bestselling industrial and systems engineering text, this book provides students, researchers, and practitioners with easy access to a wide range of industrial engineering tools and techniques in a concise format. It expands the breadth and depth of coverage, emphasizing new systems engineering tools, techniques, and models. New coverage includes control charts, engineering economy, health operational efficiency, healthcare systems, human systems integration, lean systems, logistics transportation, manufacturing systems, material handling systems, process view of work, queuing systems, reliability systems and tools, and six sigma techniques.

Decision Making with the Analytic Network Process

This book reviews operations research theory, applications and practice in airline planning and operations. It examines the business and technical landscape, details best practices, and identifies open questions and areas for future research.

An Annotated Timeline of Operations Research

This book concentrates on real-world production scheduling in factories and industrial settings. It includes industry case studies that use innovative techniques as well as academic research results that can be used to improve production scheduling. Its purpose is to present scheduling principles, advanced tools, and examples of innovative scheduling systems to persons who could use this information to improve their own production scheduling.

Handbook of Industrial and Systems Engineering

This book grew out of an effort to salvage a potentially useful idea for greatly simplifying traditional quantitative risk assessments of the human health consequences of using antibiotics in food animals. In 2001, the United States FDA's Center for Veterinary Medicine (CVM) (FDA-CVM, 2001) published a risk assessment model for potential adverse human health consequences of using a certain class of antibiotics, fluoroquinolones, to treat flocks of chickens with fatal respiratory disease caused by infectious bacteria. CVM's concern was that fluoroquinolones are also used in human medicine, raising the possibility that fluoroquinolone-resistant strains of bacteria selected by use of fluoroquinolones in chickens might infect humans and then prove resistant to treatment with human medicines in the same class of antibiotics, such as ciprofloxacin. As a foundation for its risk assessment model, CVM proposed a dramatically simple approach that skipped many of the steps in traditional risk assessment. The basic idea was to assume that human health risks were directly proportional to some suitably defined exposure metric. In symbols: $\text{Risk} = K \times \text{Exposure}$, where "Exposure" would be defined in terms of a metric such as total production of chicken contaminated with fluoroquinolone-resistant bacteria that might cause human illnesses, and "Risk" would describe the expected number of cases per year of human illness due to fluoroquinolone-resistant bacterial infections caused by chicken and treated with fluoroquinolones.

Quantitative Problem Solving Methods in the Airline Industry

Paul Williams, a leading authority on modeling in integer programming, has written a concise, readable introduction to the science and art of using modeling in logic for integer programming. Written for graduate and postgraduate students, as well as academics and practitioners, the book is divided into four chapters that all avoid the typical format of definitions, theorems and proofs and instead introduce concepts and results within the text through examples. References are given at the end of each chapter to the more mathematical papers and texts on the subject, and exercises are included to reinforce and expand on the material in the chapter. Methods of solving with both logic and IP are given and their connections are described. Applications in diverse fields are discussed, and Williams shows how IP models can be expressed as satisfiability problems and solved as such.

Handbook of Production Scheduling

Managers are often under great pressure to improve the performance of their organizations. To improve performance, one needs to constantly evaluate operations or processes related to producing products, providing services, and marketing and selling products. Performance evaluation and benchmarking are a widely used method to identify and adopt best practices as a means to improve performance and increase productivity, and are particularly valuable when no objective or engineered standard is available to define efficient and effective performance. For this reason, benchmarking is often used in managing service operations, because service standards (benchmarks) are more difficult to define than manufacturing standards. Benchmarks can be established but they are somewhat limited as they work with single measurements one at a time. It is difficult to evaluate an organization's performance when there are multiple inputs and outputs to the system. The difficulties are further enhanced when the relationships between the inputs and the outputs are complex and involve unknown tradeoffs. It is critical to show benchmarks where multiple measurements exist. The current book introduces the methodology of data envelopment analysis (DEA) and its uses in performance evaluation and benchmarking under the context of multiple performance measures.

Quantitative Health Risk Analysis Methods

Game Theoretic Risk Analysis of Security Threats introduces reliability and risk analysis in the face of threats by intelligent agents. More specifically, game-theoretic models are developed for identifying optimal and/or equilibrium defense and attack strategies in systems of varying degrees of complexity. The book covers applications to networks, including problems in both telecommunications and transportation. However, the book's primary focus is to integrate game theory and reliability methodologies into a set of techniques to predict, detect, diminish, and stop intentional attacks at targets that vary in complexity. In this book, Bier and Azaiez highlight work by researchers who combine reliability and risk analysis with game theory methods to create a set of functional tools that can be used to offset intentional, intelligent threats (including threats of terrorism and war). These tools will help to address problems of global security and facilitate more cost-effective defensive investments.

Logic and Integer Programming

This edited volume contains 16 research articles. It presents recent and pressing issues in stochastic processes, control theory, differential games, optimization, and their applications in finance, manufacturing, queueing networks, and climate control. One of the salient features is that the book is highly multi-disciplinary. The book is dedicated to Professor Suresh Sethi on the occasion of his 60th birthday, in view of his distinguished career.

Quantitative Models for Performance Evaluation and Benchmarking

This book will help readers to better manage supply chains in emerging economics. It addresses a host of issues and challenges, from infrastructure constraints and the logistics inefficiencies to contributing to the social and environmental developments of emerging economies. Innovative approaches are outlined and illustrated with examples of real-world experiences by progressive companies and thought leaders.

Game Theoretic Risk Analysis of Security Threats

Written by a world leader in the field and aimed at researchers in applied and engineering sciences, this brilliant text has as its main goal imparting an understanding of the methods so that practitioners can make immediate use of existing algorithms and software, and so that researchers can extend the state of the art and find new applications. It includes algorithms on seeking feasibility and analyzing infeasibility, as well as describing new and surprising applications.

Stochastic Processes, Optimization, and Control Theory: Applications in Financial Engineering, Queueing Networks, and Manufacturing Systems

This book concentrates on providing technical tools to make the user of Multiple Criteria Decision Making (MCDM) methodologies independent of bulky optimization computations. These bulky computations have been a necessary, but limiting, characteristic of interactive MCDM methodologies and algorithms. The book removes these limitations of MCDM problems by reducing a problem's

computational complexity. The result is a wider and more functional general framework for presenting, teaching, implementing and applying a wide range of MCDM methodologies.

Building Supply Chain Excellence in Emerging Economies

Markov chains are a particularly powerful and widely used tool for analyzing a variety of stochastic (probabilistic) systems over time. This monograph will present a series of Markov models, starting from the basic models and then building up to higher-order models. Included in the higher-order discussions are multivariate models, higher-order multivariate models, and higher-order hidden models. In each case, the focus is on the important kinds of applications that can be made with the class of models being considered in the current chapter. Special attention is given to numerical algorithms that can efficiently solve the models. Therefore, *Markov Chains: Models, Algorithms and Applications* outlines recent developments of Markov chain models for modeling queueing sequences, Internet, re-manufacturing systems, reverse logistics, inventory systems, bio-informatics, DNA sequences, genetic networks, data mining, and many other practical systems.

Feasibility and Infeasibility in Optimization:

Soft Computing for Complex Multiple Criteria Decision Making