

SIMULATION MODELING IN OPERATIONS MANAGEMENT:

A Sampling of Applications

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Abstract

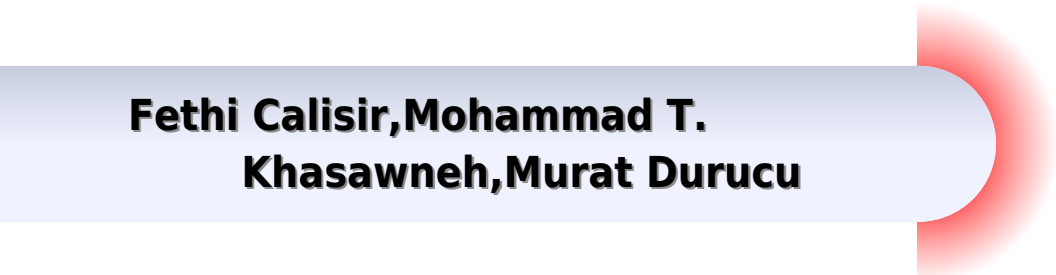
Simulation modeling has become a promising technology for a variety of operations management applications. The modern software has made it easy for managers to initiate simulation projects to address various operational problems. The objective of this presentation is to review the latest applications of simulation projects addressing operations management issues.

Introduction

Computer-assisted simulation modeling has become more common as a method of inquiry for operations management and the service industry since the 1990's. Many technology driven managers now rely on extensive use of simulation to test new ideas and options before actual implementation of their ideas. Instead of building extensive mathematical models by experts, the readily available simulation software has made it possible to model and analyze the operation of a real system by managers who are not well versed in programming languages. Simulation allows the manager to both quantify and observe the system's behavior. Whether the system is a production line, a distribution network or a communications system, simulation can be used to study and compare alternative designs or troubleshoot existing operations. With simulation models, the manager can explicitly visualize how an existing operation might perform under varied inputs, and how a new or proposed operation might behave under same or different inputs [2,13]. The ability to easily construct and execute models and to generate statistics and animations about results has been the main attractions of simulation. The windows based simulation software such as ARENA, have made simulation modeling not only affordable but relatively easy for managers to initiate simulation studies of a variety of situations including operations and processes, feasibility studies, business processes, human resource deployment, call center staffing, capacity planning and others.

Simulation Modeling In Operations Management

**Fethi Calisir, Mohammad T.
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Simulation Modeling In Operations Management:

Computer Simulation in Operations Management Keith Klafehn, Jay Weinroth, Jess S. Boronico, 1996-10-21 The management of production and service processes can be supported by microcomputer simulation models effectively and inexpensively if the techniques are presented in an understandable manner Drs Klafehn Weinroth and Boronico prove this and show how to do it not only for the benefit of operations managers themselves but for others with management responsibilities in a variety of businesses and industries They will learn how important daily operations problems can be modeled on a microcomputer gain understanding of overall simulation methodology and learn the several forms of cost savings achievable through simulation For teachers in business schools the book will also provide a link between general management and the management of engineering and R D The first chapter introduces the reader to the concepts and steps for undertaking a microcomputer simulation project In addition the benefits drawbacks and myths are reviewed in detail Chapter two explores in a conversational scenario what is involved in taking a management operations problem involving a truck transfer depot from its point of inception to the formulation of a systems operation model which in a later chapter is ultimately put into a computer simulation model and tested to in a sense come up with answers to the questions posed in the hypothetical conversation Subsequent chapters in the book are oriented to a discussion of other operations management problems and the effort to seek insight and solutions through simulation modeling A Just in Time manufacturing system is addressed recognizing the push pull concept as well as looking at the quality aspect Attempting to determine the optimum levels for safety stock order points and order quantity is investigated through computer simulation These levels are predicated on balancing the costs associated with ordering and holding goods as well as the penalty costs of stocking out Using a simulated environment enables the inclusion of the variability evidenced by the type of distribution The remaining chapters also review alternative rules and what ifs as applied to machine configuration facility location for a satellite EMS unit and job shop operations Each of the applications chapters provides a printout of the basic computer model written in GPSS that was then modified to investigate alternative scenarios

Simulation Modeling and Arena Manuel D. Rossetti, 2015-06-10 Emphasizes a hands on approach to learning statistical analysis and model building through the use of comprehensive examples problems sets and software applications With a unique blend of theory and applications Simulation Modeling and Arena Second Edition integrates coverage of statistical analysis and model building to emphasize the importance of both topics in simulation Featuring introductory coverage on how simulation works and why it matters the Second Edition expands coverage on static simulation and the applications of spreadsheets to perform simulation The new edition also introduces the use of the open source statistical package R for both performing statistical testing and fitting distributions In addition the models are presented in a clear and precise pseudo code form which aids in understanding and model communication Simulation Modeling and Arena Second Edition also features Updated coverage of necessary statistical

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Operations Management and Data Analytics Modelling Lalit Kumar Awasthi, Sushendra Kumar Misra, Dilbagh Panchal, Mohit Tyagi, 2021-12-30 Operations Management and Data Analytics Modelling Economic Crises Perspective addresses real operation management problems in thrust areas like the healthcare and energy management sectors and Industry 4 0 It discusses recent advances and trends in developing data driven operation management based methodologies big data analysis application of computers in industrial engineering optimization techniques development of decision support systems for industrial operation the role of a multiple criteria decision making MCDM approach in operation management fuzzy set theory based operation management modelling and Lean Six Sigma Features Discusses the importance of data analytics in industrial operations to improve economy Provides step by step implementation of operation management models to identify best practices Covers in depth analysis using data based operation management tools and techniques Discusses mathematical modelling for novel operation management models to solve industrial problems This book is aimed at graduate students and professionals in the field of industrial and production engineering mechanical engineering and materials science

Modeling Operations Research and Business Analytics William P Fox, Robert E. Burks, 2024-08-30 This book provides sample exercises techniques and solutions to employ mathematical modeling to solve problems in Operations Research and Business Analytics Each chapter begins with a scenario and includes exercises built on realistic problems faced by managers and others working in operations research business analytics and other fields employing applied mathematics A set of assumptions is presented and then a model is formulated A solution is offered followed by examples of how that model can be used to address related issues Key elements of this book include the most common problems the authors have encountered over research and while consulting the fields including inventory theory facilities location linear and integer programming assignment transportation and shipping critical path dynamic programming queuing models simulation models reliability of system multi attribute decision making and game theory In the hands of an experienced professional mathematical modeling can be a powerful tool This book presents situations and models to help both professionals and students learn to employ these techniques to improve outcomes and to

make addressing real business problems easier The book is essential for all managers and others who would use mathematics to improve their problem solving techniques No previous exposure to mathematical modeling is required The book can then be used for a first course on modeling or by those with more experience who want to refresh their memories when they find themselves facing real world problems The problems chosen are presented to represent those faced by practitioners The authors have been teaching mathematical modeling to students and professionals for nearly 40 years This book is presented to offer their experience and techniques to instructors students and professionals

Handbook of Dynamic System

Modeling Paul A. Fishwick, 2007-06-01 The topic of dynamic models tends to be splintered across various disciplines making it difficult to uniformly study the subject Moreover the models have a variety of representations from traditional mathematical notations to diagrammatic and immersive depictions Collecting all of these expressions of dynamic models the Handbook of Dynamic System

Agent-based Modeling and Simulation S. Taylor, 2014-08-27 Operational Research OR deals with the use of advanced analytical methods to support better decision making It is multidisciplinary with strong links to management science decision science computer science and many application areas such as engineering manufacturing commerce and healthcare In the study of emergent behaviour in complex adaptive systems Agent based Modelling Simulation ABMS is being used in many different domains such as healthcare energy evacuation commerce manufacturing and defense This collection of articles presents a convenient introduction to ABMS with papers ranging from contemporary views to representative case studies The OR Essentials series presents a unique cross section of high quality research work fundamental to understanding contemporary issues and research across a range of Operational Research OR topics It brings together some of the best research papers from the esteemed Operational Research Society and its associated journals also published by Palgrave Macmillan

Encyclopedia of Operations Research and Management Science Saul I. Gass, Carl M. Harris, 2001 Audience Anyone concerned with the science techniques and ideas of how decisions are made

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Enterprise and Organizational Modeling and Simulation Joseph Barjis, Tillal Eldabi, Ashish Gupta, 2011-09-25 This book constitutes the post conference proceedings of the 7th International Workshop on Enterprise and Organizational Modeling and Simulation EOMAS 2011 held in conjunction with CAiSE 2011 in London UK in June 2011 Enterprises are purposefully designed systems used to fulfill certain functions An extended enterprise and organizational study involves both analysis and design activities in which modeling and simulation play prominent roles The related techniques and methods are effective efficient economic and widely used in enterprise engineering organizational study and business process management The 14 contributions in this volume were carefully reviewed and selected from 29 submissions and they explore these topics address the underlying challenges find and improve on solutions and demonstrate the application of modeling and simulation in the domains of enterprises their organizations and underlying business processes

Simulation Modeling and Analysis with ARENA Tayfur Altioğlu, Benjamin Melamed, 2010-07-26 Simulation Modeling and Analysis with Arena is a highly readable

textbook which treats the essentials of the Monte Carlo discrete event simulation methodology and does so in the context of a popular Arena simulation environment It treats simulation modeling as an in vitro laboratory that facilitates the understanding of complex systems and experimentation with what if scenarios in order to estimate their performance metrics The book contains chapters on the simulation modeling methodology and the underpinnings of discrete event systems as well as the relevant underlying probability statistics stochastic processes input analysis model validation and output analysis All simulation related concepts are illustrated in numerous Arena examples encompassing production lines manufacturing and inventory systems transportation systems and computer information systems in networked settings Introduces the concept of discrete event Monte Carlo simulation the most commonly used methodology for modeling and analysis of complex systems Covers essential workings of the popular animated simulation language ARENA including set up design parameters input data and output analysis along with a wide variety of sample model applications from production lines to transportation systems Reviews elements of statistics probability and stochastic processes relevant to simulation modeling

Innovations in Information Systems for Business Functionality and Operations Management Wang, John, 2012-04-30 This book offers the latest research in IS IT applications related to business and operations management with contributions in the form of case studies methodologies best practices frameworks and research Provided by publisher

Port Planning and Management Simulation Wen Yuan Wang, Yun Peng, 2021-10-27 Port Planning and Management Simulation examines port planning simulation applications showing how they support better port decision making Using a clear organizational format based on actual port system structure and operation processes the book provides practical and theoretical insights on port planning and management The book describes the water land collecting and distributing components of the port system focusing on management development and risk mitigation It examines the key challenges based on discrete system simulation theory that is less affected by local or national regulations It compares various simulation scenarios for optimal port operational strategy It quantifies port emissions analyzes the impact of different reduction strategies and presents operational strategies for green port planning development and management Port Planning and Management Simulation provides guidance for carrying out deep analysis in a complex and dynamic system providing an integrated solution framework based on simulation techniques for improving efficiency and cost savings of the port system Bridges the gaps between theory practice and policy Comprehensive practical and multidisciplinary content Case Studies

Operations Research Michael Carter, Camille C. Price, Ghaith Rabadi, 2018-08-06 Operations Research A Practical Introduction is just that a hands on approach to the field of operations research OR and a useful guide for using OR techniques in scientific decision making design analysis and management The text accomplishes two goals First it provides readers with an introduction to standard mathematical models and algorithms Second it is a thorough examination of practical issues relevant to the development and use of computational methods for problem solving Highlights All chapters contain up to date topics and summaries A succinct presentation to fit a

one term course Each chapter has references readings and list of key terms Includes illustrative and current applications New exercises are added throughout the text Software tools have been updated with the newest and most popular software Many students of various disciplines such as mathematics economics industrial engineering and computer science often take one course in operations research This book is written to provide a succinct and efficient introduction to the subject for these students while offering a sound and fundamental preparation for more advanced courses in linear and nonlinear optimization and many stochastic models and analyses It provides relevant analytical tools for this varied audience and will also serve professionals corporate managers and technical consultants

A Summary of Research 1995 United States. Naval Postgraduate School, Monterey, CA.,1995 *Advances in Modeling and Simulation* Andreas Tolk,John Fowler,Guodong Shao,Enver Yücesan,2017-08-27 This broad ranging text reference presents a fascinating review of the state of the art of modeling and simulation highlighting both the seminal work of preeminent authorities and exciting developments from promising young researchers in the field Celebrating the 50th anniversary of the Winter Simulation Conference WSC the premier international forum for disseminating recent advances in the field of system simulation the book showcases the historical importance of this influential conference while also looking forward to a bright future for the simulation community Topics and features examines the challenge of constructing valid and efficient models emphasizing the benefits of the process of simulation modeling discusses model calibration input model risk and approaches to validating emergent behaviors in large scale complex systems with non linear interactions reviews the evolution of simulation languages and the history of the Time Warp algorithm offers a focus on the design and analysis of simulation experiments under various goals and describes how data can be farmed to support decision making provides a comprehensive overview of Bayesian belief models for simulation based decision making and introduces a model for ranking and selection in cloud computing highlights how input model uncertainty impacts simulation optimization and proposes an approach to quantify and control the impact of input model risk surveys the applications of simulation in semiconductor manufacturing in social and behavioral modeling and in military planning and training presents data analysis on the publications from the Winter Simulation Conference offering a big data perspective on the significant impact of the conference This informative and inspiring volume will appeal to all academics and professionals interested in computational and mathematical modeling and simulation as well as to graduate students on the path to form the next generation of WSC pioneers *Advances in Industrial Engineering and Operations Research* Alan H.S. Chan,2008-03-03 This volume contains contributions from prominent researchers who participated in the 2007 IAENG International Conference on Operations Research It presents theories and applications of modern industrial engineering and operations research to meet the needs of rapidly developing fields The book reflects the tremendous advances in communication systems and electrical engineering and also serves as an excellent reference work for researchers and graduate students

Research in Production/operations Management Christopher Voss,1984

Operations Management Massimiliano Schiraldi, 2013-03-13 Operations Management is an area of business concerned with managing the process that converts inputs into outputs in the form of goods and or services Increasingly complex environments together with the recent economic swings and substantially squeezed industrial margins put extra pressure on companies and decision makers are pushed to increase operations efficiency and effectiveness This book presents the contributions of a selected group of researchers reporting new ideas original results and practical experiences as well as systematizing some fundamental topics in Operations Management Although it represents only a small sample of the research activity on Operations Management people from diverse backgrounds academia industry and research as well as engineering students can take advantage of this volume

Patient Flow: Reducing Delay in Healthcare Delivery Randolph Hall, 2006-10-11 Patient Flow Reducing Delay in Healthcare Delivery is dedicated to improving healthcare through reducing the delays experienced by patients One aspect of this goal is to improve the flow of patients so that they do not experience unnecessary waits as they flow through a healthcare system Another aspect is ensuring that services are closely synchronized with patterns of patient demand Still another aspect is ensuring that ancillary services such as housekeeping and transportation are fully coordinate with direct patient care It is the first book treatment to have reduction in patient delay as its sole focus and therefore provides the foundation by which hospitals can implement change Reflecting the highly interdisciplinary and practitioner nature of this book the chapters have been written by doctors nurses industrial engineers system engineers and geographers and thus these perspectives provide the comprehensive view needed to address the problem of patient delay

Simulation and Model-Based Methodologies: An Integrative View Tuncer I. Ören, B.P. Zeigler, M.S. Elzas, 2012-12-06 NATO Advanced Institute Ottawa Ontario Canada July 26 August 6 1982

Industrial Engineering in the Sustainability Era Fethi Calisir, Mohammad T. Khasawneh, Murat Durucu, 2024-03-29 This book gathers extended versions of the best papers presented at the Global Joint Conference on Industrial Engineering and Its Application Areas GJCIE held on August 14 16 2023 in New York USA Continuing the tradition of previous volumes it highlights recent developments of industrial engineering and digital and intelligent technologies for improving manufacturing processes and healthcare and transportation services among others applications A special emphasis is given to engineering methods and strategies fostering a sustainable business development

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