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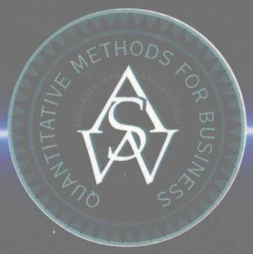

QUANTITATIVE METHODS FOR BUSINESS 7e

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Dedicated to
Krista and Mark
Mark, Linda, Brad, Tim, Scott, and Lisa
Cathy, David, and Kristin

PREFACE

The purpose of this seventh edition, as with previous editions, is to provide undergraduate and graduate students with a conceptual understanding of the role that quantitative methods play in the decision-making process. The text describes the many quantitative methods that have been developed over the years, explains how they work, and shows how the decision maker can apply and interpret them.

We have written this book with the nonmathematician in mind. It is applications oriented and uses the problem scenario approach. In each chapter a problem is described in conjunction with the quantitative procedure being introduced. The development of the quantitative technique or model includes applying it to the problem to generate a solution or recommendation. We have found that this approach helps to motivate the student by demonstrating not only how the procedure works, but also how it can contribute to the decision-making process.

The mathematical prerequisite for this text is a course in algebra. Two chapters on probability and probablility distributions have been included to provide the necessary background for the use of probability in subsequent chapters.

Throughout the text we utilize generally accepted notation for the topic being covered. In this regard students who pursue study beyond the level of this text will have little difficulty reading more advanced material. To assist in further study, a bibliography is included in the backmatter of this book.

Changes in the Seventh Edition

In preparing the seventh edition we were careful to maintain the overall format and approach of the previous editions. However, based on our own classroom experience and suggestions from users of previous editions, we made several significant changes to enhance the content, organization, and readability of the text.

- **Simulation** Chapter 16 on simulation has been completely rewritten and modernized. The chapter begins with an application involving risk analysis and makes extensive use of spreadsheet output. An inventory simulation model and a waiting line simulation model are also covered. The use of spreadsheets has eliminated the dependence on using random number tables and performing simulation computations by hand. A chapter appendix shows how to use Microsoft Excel for simulation.

- **Markov Processes** At the request of several users we have added a new Chapter 17 on Markov processes. We show how Markov process models can be used to analyze the effect of brand switching behavior on market share and we show how to compute and interpret steady state probabilities. A section is included on using Markov processes with absorbing states for accounts receivable analysis.

- **The Management Scientist Version 4.0** The Management Scientist is a software package, developed by the authors, to solve most of the problems encountered in a quantitative methods course. Version 4.0 includes a graphical user interface and runs on Windows 95 and earlier versions of Windows. Easy to use dialog boxes and spreadsheets for data input make the system more user friendly.

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● **More Emphasis on Applications and Managerial Interpretation** We have increased our emphasis on applications and the use of quantitative methods to solve real problems. Several quantitative methods in action vignettes have been added, new case problems have been added in integer programming and simulation, and several new spreadsheet appendixes have been added. Spreadsheet appendixes are now included for 11 chapters. However, the chapters themselves are not dependent on knowledge of any particular computer software.

Other Changes

With this edition we have dropped the chapter on the simplex method and the sections on special purpose algorithms for the transportation and assignment problems. With the wide availability of problem solving software, instructors are now able to de-emphasize algorithms and focus on managerial issues.

Many other changes, suggested by users, have been made. For example, a new problem scenario is used to introduce integer linear programming in Chapter 11. A number of student annotations have been added and about 10 percent of the problems are new to this edition.

Supplementary Materials

As has always been the case, this new edition of *QUANTITATIVE METHODS FOR BUSINESS* has ancillaries that will increase the value of the text to both students and instructors.

● **Study Guide** The *Study Guide* (ISBN: 0-538-87605-0) by John Loucks of St. Edward's University in Austin, Texas illustrates and reinforces the basic concepts of the text, and helps students organize text materials for review. Each chapter of the study guide includes illustrated problems that are worked out in full as well as problems for the student to do on his or her own. Answers are provided for these problems.

● **Solutions Manual** The *Solutions Manual* (ISBN: 0-538-87602-6) prepared by the text authors, includes solutions for all textbook problems, and Quantitative Methods in Practice questions. At the request of the instructor, the Solutions Manual can be packaged with the text.

● **The Management Scientist™** *The Management Scientist Version 4.0 for Windows™ and Windows® 95* (ISBN: 0-314-21646-4) provides 12 computer modules for working through the problems in the course. The software is class tested to run with little or no instructor supervision. Thorough documentation including examples of how to use the software on actual problems accompanies the IBM-compatible software. The software is available free to adopters as a site license; students may purchase the software packaged with the text for a small additional charge.

● **LINDO® 6.0 for Windows** The new Windows version of LINDO has been completely redesigned to make it more intuitive and easier to use. It has the familiar Windows graphical interface with drop-down menus, dialog boxes and a tool bar for frequently used commands. An educational version of LINDO 6.0 software (ISBN: 0-538-87829-0) is sold at a discounted price when it is packaged with the text.

● **Instructor's Manual and Demonstration Problems** The *Instructor's Manual* (ISBN: 0-538-87604-2), also prepared by the text authors, includes the topic for each end-of-chapter problem and the solutions to the case problems. Included with the manual are

transparency masters for fully worked demonstration problems that parallel examples and end-of-chapter problems in the text.

- **PowerPoint Presentation Files** Prepared by John Loucks of St. Edward's University, the PowerPoint presentation files (ISBN: 0-538-87607-7) contain a teaching outline that incorporates graphics to help professors create even more stimulating lectures. The Power Point 7.0 slides parallel the information provided in the Study Guide, and may be adapted using PowerPoint software to facilitate classroom use.

- **Test Bank and WESTEST™** The *Test Bank* (ISBN: 0-538-87603-4) by Constance McLaren of Indiana State University includes multiple choice, true-false, short answer, and computational problems for each chapter. The WESTTEST (ISBN: 0-538-87608-5) computerized testing software allows instructors to create, edit, store and print exams.

Course Outline Flexibility

The text has been designed to give the instructor substantial flexibility in selecting topics to meet specific course needs. Although many variations are possible, the single-quarter and single-semester outlines that follow are illustrative of the options available.

- Possible One-Quarter Outline
  - Introduction (Chapter 1)
  - Decision Analysis (Chapters 4 and 5)
  - Linear Programming (Chapters 7, 8, and 9)
  - Transportation, Assignment, and Transshipment Problems (Chapter 10)
  - PERT/CPM (Chapter 12)
  - Waiting-Line Models (Chapter 15)
  - Simulation (Chapter 16)
- Possible One-Semester Outline
  - Introduction (Chapter 1)
  - Probability Concepts (Chapters 2 and 3)
  - Decision Analysis (Chapters 4 and 5)
  - Forecasting (Chapter 6)
  - Linear Programming (Chapters 7, 8, and 9)
  - Transportation, Assignment, and Transshipment Problems (Chapter 10)
  - Integer Linear Programming (Chapter 11)
  - PERT/CPM (Chapter 12)
  - Waiting-Line Models (Chapter 15)
  - Simulation (Chapter 16)

Many other possibilities exist for such a course, depending on course objectives and the student background.

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Our associates from organizations who supplied the Quantitative Methods in Practice applications made a major contribution to the text. These individuals are cited in a credit line on the first page of each application.

We are also indebted to our editors Alice Denny and John Szilagyi and others at South-Western College Publishing for their editorial counsel and support during the preparation of this text.

David R. Anderson
Dennis J. Sweeney
Thomas A. Williams

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At the University of Cincinnati, Professor Anderson has taught introductory statistics for business students as well as graduate level courses in regression analysis, multivariate analysis, and management science. He has also taught statistical courses at the Department of Labor in Washington, D.C. He has been honored with nominations and awards for excellence in teaching and excellence in service to student organizations.

Professor Anderson has coauthored six textbooks in the areas of statistics, management science, linear programming, and production and operations management. He is an active consultant in the field of sampling and statistical methods.

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Professor Williams is the coauthor of seven textbooks in the areas of management science, statistics, production and operations management, and mathematics. He has been a consultant for numerous Fortune 500 companies and has worked on projects ranging from the use of elementary data analysis to the development of large-scale regression models. His current research focuses on the application of total quality management in an academic setting.

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