Chapter 6: Transportation, Transshipment, and Assignment Problems

Chapter Topics

- The Transportation Model
- Computer Solution of a Transportation Problem
- The Transshipment Model
- Computer Solution of a Transshipment Problem
- The Assignment Model
- Computer Solution of an Assignment Problem

Overview

- Part of a larger class of linear programming problems known as network flow models.
- Possess special mathematical features that enabled development of very efficient, unique solution methods.
- Methods are variations of traditional simplex procedure.
- Detailed description of methods is contained in CD-ROM   Module B, *Transportation and Assignment Solution Methods*.
- Text focuses on model formulation and solution with Excel and QM for windows.

The Transportation Model Characteristics

- A product is transported from a number of sources to a number of destinations at the minimum possible cost.
- Each source is able to supply a fixed number of units of the product, and each destination has a fixed demand for the product.
- The linear programming model has constraints for supply at each source and demand at each destination.
- All constraints are equalities in a balanced transportation model where supply equals demand.
- Constraints contain inequalities in unbalanced models where supply does not equal demand.

Transportation Model Example Problem Definition and Data

- Problem: How many tons of wheat to transport from each grain elevator to each mill on a monthly basis in order to minimize the total cost of transportation?
- Data:

Grain Elevator	Supply	Mill	Demand
1. Kansas City	150	A. Chicago	220
2. Omaha	175	B. St. Louis	100
3. Des Moines	275	C. Cincinnati	300
Total	600 tons	Total	600 tons

	Transport Cost from Grain Elevator to Mill ($/ton		
Grain Elevator	A. Chicago	B. St. Louis	C. Cincinnat
1. Kansas City	$ 6	$ 8	$10
2. Omaha	7	11	11
3. Des Moines	4	5	12

Transportation Model Example Model Formulation

Minimize Z = $6x1A + 8x1B + 10x1C + 7x2A + 11x2B + 11x2C +   4x3A + 5x3B + 12x3C

subject to:

    x1A + x1B + x1C = 150
    x2A + x2B + x2C = 175
    x3A + x3B + x3C = 275
    x1A + x2A + x3A = 200
    x1B + x2B + x3B = 100

Chapter The Transportation And Assignment Problems

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Chapter The Transportation And Assignment Problems:

Linear Programming and Network Flows Mokhtar S. Bazaraa,John J. Jarvis,Hanif D. Sherali,2011-09-28 The authoritative guide to modeling and solving complex problems with linear programming extensively revised expanded and updated The only book to treat both linear programming techniques and network flows under one cover Linear Programming and Network Flows Fourth Edition has been completely updated with the latest developments on the topic This new edition continues to successfully emphasize modeling concepts the design and analysis of algorithms and implementation strategies for problems in a variety of fields including industrial engineering management science operations research computer science and mathematics The book begins with basic results on linear algebra and convex analysis and a geometrically motivated study of the structure of polyhedral sets is provided Subsequent chapters include coverage of cycling in the simplex method interior point methods and sensitivity and parametric analysis Newly added topics in the Fourth Edition include The cycling phenomenon in linear programming and the geometry of cycling Duality relationships with cycling Elaboration on stable factorizations and implementation strategies Stabilized column generation and acceleration of Benders and Dantzig Wolfe decomposition methods Line search and dual ascent ideas for the out of kilter algorithm Heap implementation comments negative cost circuit insights and additional convergence analyses for shortest path problems The authors present concepts and techniques that are illustrated by numerical examples along with insights complete with detailed mathematical analysis and justification An emphasis is placed on providing geometric viewpoints and economic interpretations as well as strengthening the understanding of the fundamental ideas Each chapter is accompanied by Notes and References sections that provide historical developments in addition to current and future trends Updated exercises allow readers to test their comprehension of the presented material and extensive references provide resources for further study Linear Programming and Network Flows Fourth Edition is an excellent book for linear programming and network flow courses at the upper undergraduate and graduate levels It is also a valuable resource for applied scientists who would like to refresh their understanding of linear programming and network flow techniques **Operations Research** A. M. Natarajan,P. Balasubramani,2006 **Linear Programming** James P. Ignizio,Tom M. Cavalier,1994 For senior graduate level courses in Linear Programming A comprehensive modern introduction to the philosophies and procedures used in the modeling solution and analysis of linear programming problems **Quantitative Decision Making with Spreadsheet Applications** Lawrence L. Lapin,William D. Whisler,2002 Written for students with a background in algebra this text provides a complete and modern treatment of basic management science methodology The authors survey the variety and power of management science tools working to alleviate students apprehension about the subject and to enable students to recognize on the job situations in which management science methodology can be successfully employed Emphasizing modeling skills for students of varying mathematical backgrounds the authors explain how to use Microsoft Excel

spreadsheets to build skills as they work through problems In general problems are broken into several parts to make difficult concepts easy for students to learn This book s modular structure affords instructors maximum flexibility This text contains a special student version of Palisade Corporation s DecisionTools Suite containing Risk PrecisionTree BestFit TopRank and RiskView This software is expressly provided for student use and requires student authorization to unlock the software for its full one year license Professional customers may use the software for 30 days at which point they must contact Palisade Corporation for a professional version should they wish to continue using the software **OPTIMIZATION MODELS FOR BUSINESS DECISIONS** Neeraj Vashishth,Puneet Kumar,2025-04-01 MBA SECOND SEMESTER According to the New Syllabus of Kurukshetra University Kurukshetra based on NEP 2020 *The Management Science System* Theron Ray Nelson,1988 **Introduction to Management Science** Thomas M. Cook,Robert A. Russell,1985 *Topics in Management Science* Robert E. Markland,1979 *An Introduction to Management Science* David Ray Anderson,Dennis J. Sweeney,Thomas Arthur Williams,2003 Intended for business professionals and managers who would like a better conceptual understanding of the role of management science in the decision making process this book blends problem formulation with managerial interpretation and maths technique **Study Guide to Accompany Introduction to Management Science** Sang M. Lee,1983 *Fuzzy-Like Multiple Objective Multistage Decision Making* Jiuping Xu,Ziqiang Zeng,2014-02-07 Decision has inspired reflection of many thinkers since the ancient times With the rapid development of science and society appropriate dynamic decision making has been playing an increasingly important role in many areas of human activity including engineering management economy and others In most real world problems decision makers usually have to make decisions sequentially at different points in time and space at different levels for a component or a system while facing multiple and conflicting objectives and a hybrid uncertain environment where fuzziness and randomness co exist in a decision making process This leads to the development of fuzzy like multiple objective multistage decision making This book provides a thorough understanding of the concepts of dynamic optimization from a modern perspective and presents the state of the art methodology for modeling analyzing and solving the most typical multiple objective multistage decision making practical application problems under fuzzy like uncertainty including the dynamic machine allocation closed multiclass queueing networks optimization inventory management facilities planning and transportation assignment A number of real world engineering case studies are used to illustrate in detail the methodology With its emphasis on problem solving and applications this book is ideal for researchers practitioners engineers graduate students and upper level undergraduates in applied mathematics management science operations research information system civil engineering building construction and transportation optimization *Introduction to Linear Programming Processes* Giuseppe Maria Ferrero Di Roccaferrera,1967 **Quantitative Models for Business Decisions** N. K. Kwak,Stephen A. DeLurgio,1980 Quantitative analysis operations research management science Mathematical concepts and models Probability and statistical

concepts Decision theory Linear programming The simplex method of linear programming The transportation and assignment problems Other mathematical programming techniques Game theory Network models pert time and pert cost Dynamic programming Inventory models Markov chain models Queueing models Simulation The implementation and future of quantitative models Mathematical supplements Computer programs Mathematical tables **Introduction to Management Science** Bernard W. Taylor,1996 This introduction to the often mathematically rigorous techniques and applications of management science is designed to make the subject accessible for students with no mathematical background or skills It focuses on management science not only as a collection of techniques and processes but as a philosophy and method for approaching problems in a logical manner as skill that is applicable across disciplines and endeavours in all types of jobs and organizations The author s perspective is contemporary his approach hands on and his pedagogy abundant supportive and user friendly for students and instructors alike **An Introduction to Quantitative Methods for Decision Making** Richard E. Trueman,1977 *Mathematical Programming with Business Applications* N. K. Kwak,1973 *Introduction to Management Science* William J. Stevenson,1989 Introduction to Mathematical Programming Wayne L. Winston,1991 *Newsletter* New Zealand Mathematical Society,2004 **Journal of Information & Optimization Sciences** ,1986

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