SYSTEMS EVALUATION

Methods, Models, and Applications

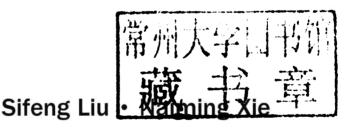


Sifeng Liu • Naiming Xie Chaoqing Yuan • Zhigeng Fang



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Chaoqing Yuan • Zhigeng Fang



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Preface

Evaluation is a practical activity by which people judge the value of an object or process. The need for socioeconomic development and scientific decision making led to a wide range of evaluation activities such as engineering project evaluation, science project evaluation, industrial development assessment, environmental assessment, evaluation of university subject construction, enterprise competitiveness assessment, personnel quality evaluation related to technology and economic development evaluation, and even evaluation of comprehensive national strength and government policies. Evaluation is related to all aspects of production and life.

This book outlines various systems evaluation methods and models. The evolution of systems evaluation is presented in a clear, logical way, starting with qualitative assessment and proceeding to a description of the process and methods to building an index system of evaluation, and again with some common evaluation methods and models of comparative evaluation methods, the logical framework approach, analytic hierarchy process (AHP), and data envelopment analysis (DEA) methods. Several new evaluation models of grey systems including the general grey incidence model, grey incidence models based on similarity and closeness, grey cluster evaluation based on triangular whitenization functions, and multi-attribute grey target decision models are introduced. Empirical studies based on reality are introduced and cover evaluation of road—bridge construction projects, the efficiency evaluation of science and technology activities, assessment of energy saving in China, and the evaluation and selection of international cooperation projects.

This book is unique in its emphasis on the practical applications of systems evaluation methods and models. The methods and models are introduced briefly and we attempt to explain intricate concepts in an easily understandable way. In addition, practical examples illustrate the practical application, analysis, and computation of systems evaluation methods and models.

Chapters 1 and 2 are written by Sifeng Liu, Chapter 3 by Zhigeng Fang, Chapters 4 and 6 by Naiming Xie, and Chapter 5 by Chaoqing Yuan. Lirong Jian, Hongzhuan Chen, Jeffrey Forrest, Yaoguo Dang, Hecheng Wu, Chuanmin Mi, Shawei He, Yong Liu, Yaping Li, Zhaowen Shi, Jianfei Xiao, Lifang He, Ying Cao,

Liang Yu, Yuqiang Guo, Xiao Tang, Mei Wang, Tong Yin, Hongchang Ren, Pengtao Lin, Dufang Fan, Fei Wang and Xin Jin participated in related studies. Professor Sifeng Liu took charge of the draft summarization and the final approval.

This book is intended to serve as a textbook for postgraduates and senior undergraduate students specializing in economics and management and as a reference text for those engaged in management, scientific research, engineering technology, and other disciplines.

Any errors or omissions that may be pointed out by readers will be appreciated.

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The authors consulted several experts, studied the research of many scholars, and received a great deal of help from Professor Jeffrey Forrest. We wish to thank them all.

Introduction

This book outlines systems evaluation methods and models. The qualitative assessment methods of nominal group technique, brainstorming, and Delphi are presented. The methods for building an evaluation index system, common evaluation methods and models of comparative evaluation, the logical framework approach, the analytic hierarchy process (AHP), and data envelopment analysis (DEA) for evaluating relative efficiency are presented as well. Several new grey systems evaluation models including the generalized grey incidence model, models based on different visual angles of similarity and/or closeness, cluster evaluation models based on end point and center point triangular whitenization functions, and multi-attribute target decision models are introduced. We cover empirical studies based on reality including postevaluation of road—bridge construction projects, efficiency evaluations of scientific and technological activities, the evaluation of energy saving efforts in China, and the evaluation and selection of international cooperation projects for Jiangsu Province.

This book is unique in its emphasis on the practical application of systems evaluation methods and models. We attempt to explain intricate concepts in an easily understandable way utilize step-by-step explanations of methods and models. The book is suitable as a text for postgraduates and senior undergraduate students specializing in economics and management. It is also intended as a reference for those interested in the methods and technology of complex assessments.

Authors

Sifeng Liu earned a B.S. in mathematics in 1981 from Henan University, an M.S. in economics in 1986, and a Ph.D. in systems engineering in 1998 from Huazhong University of Science and Technology, both in China. He served as a visiting professor at Slippery Rock University in Pennsylvania, De Montfort University in England, and Sydney University in Australia. At present, he is the director of the Institute for Grey Systems Studies and the dean of the College of Economics and Management at Nanjing University of Aeronautics and Astronautics (NUAA) and a distinguished professor, academic leader, and doctor tutor in management science and systems engineering. His research focuses on grey systems theory, systems evaluation, and prediction modeling. He has published over 200 research papers and 19 books.

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