# Table of Contents

Foreword ......................................................................................................................... xxiii  
Preface .............................................................................................................................. xxv  
Acknowledgment ............................................................................................................ xxxv  

## Section 1  
Cognitive Analytics Management Foundations to Manage Performance

**Chapter 1**  
*Ibrahim H. Osman, American University of Beirut, Lebanon*  
*Abdel Latef Anouze, Qatar University, Qatar*

**Chapter 2**  
*Ibrahim H. Osman, American University of Beirut, Lebanon*  
*Abdel Latef Anouze, Qatar University, Qatar*

**Chapter 3**  
*Ibrahim H. Osman, American University of Beirut, Lebanon*  
*Abdel Latef Anouze, Qatar University, Qatar*

**Chapter 4**  
Introduction to Data Envelopment Analysis and its Applications ................................ 235  
*Ali Emrouznejad, Aston Business School, Aston University, UK*  
*Emilyn Cabanda, Regent University, USA*

**Chapter 5**  
Introduction to Performance Improvement Management Software (PIM-DEA) ............ 256  
*Ali Emrouznejad, Aston Business School, Aston University, UK*  
*Emmanuel Thanassoulis, Aston Business School, Aston University, UK*
Chapter 6
Mismanagement or Mismeasurement: The Application of DEA to Generate Performance Values
and Insights from Big Data

Abdel Latef Anouze, Qatar University, Qatar
Ibrahim H. Osman, American University of Beirut, Lebanon

Section 2
Negotiation and Prioritization through Frontier Analysis

Chapter 7
A New Integrative Approach Based on Balanced Scorecard, Data Envelopment Analysis, and Management Performance to Prioritize Research and Development Projects

Salaman Abbasian-Naghneh, Islamic Azad University, Iran
Mahboobeh Samiei, Islamic Azad University, Iran
Marziyeh Felahat, Ghaen College, Iran
Marziyeh Mahdavi, Islamic Azad University, Iran

Chapter 8
Models and Methods for Decision Making Support in the Negotiation Process

V. E. Krivonozhko, National University of Science and Technology “MISIS”, Russia
A. A. Piskunov, Accounts Chamber of the Russian Federation, Russia
A. V. Lychev, Accounts Chamber of the Russian Federation, Russia
M. A. Ivasechko, Accounts Chamber of the Russian Federation, Russia

Section 3
Performance in Public Sector Organizations

Chapter 9
Corruption, Economic Development, and Insecurity in Colombia

Alexander Cotte Poveda, University of Göttingen, Germany & University of La Salle, Colombia & University Santo Tomas, Colombia

Chapter 10
Benchmarking Regulators: A Data Envelopment Analysis of Italian Water Authorities’ Performance

Clementina Bruno, University of Piemonte Orientale, Italy & HERMES Research Centre, Italy
Fabrizio Erbetta, University of Piemonte Orientale, Italy & HERMES Research Centre, Italy

Chapter 11
Benchmarking Competitiveness of Top 100 U.S. Universities

Gürdal Ertek, Sabancı University, Turkey
Bengi Tokdil, Sabancı University, Turkey
İbrahim Günaydın, Sabancı University, Turkey
Aytaç Göğüş, Sabancı University, Turkey
Chapter 12
Efficiency of Turkish Provincial General Hospitals with Mortality as Undesirable Output.......... 426
Nurhan Davutyan, KHas University, Turkey
Murat Bilsel, Marmara University, Turkey

Chapter 13
Non-Parametric Estimation of Environmental Efficiency Using Data Envelopment Analysis and Free Disposable Hull................................................................. 437
Richard Mulwa, University of Nairobi, Kenya

Chapter 14
Productivity and Public Funds: A Directional Distance Function Approach Applied to the Italian Agricultural Sector ........................................................................... 467
Greta Falavigna, CNR-Ceris, Italy
Alessandro Manello, CNR-Ceris, Italy
Sara Pavone, University of Insubria, Italy & CNR-Ceris, Italy

Section 4
Performance in Private Sector Organizations

Chapter 15
The Performance of Printed Circuit Boards in the Presence of Production Errors: A Comparative Analysis Using Various DEA Models ..................................................... 487
Vincent Charles, CENTRUM Católica Graduate Business School, PUCP, Peru
Mukesh Kumar, CENTRUM Católica Graduate Business School, PUCP, Peru
Irene Kavitha Charles, Dravidian University, India

Chapter 16
A New Framework for Industrial Benchmarking ................................................................. 510
Gürdal Ertek, Sabanci University, Turkey
Mete Sevinç, Sabanci University, Turkey
Firdevs Ulus, Sabanci University, Turkey
Özlem Köse, Sabanci University, Turkey
Güvenç Şahin, Sabanci University, Turkey

Chapter 17
Measuring Performance of Dynamic and Network Structures by SBM Model .................... 527
N. Aghayi, Ardabil Branch, Islamic Azad University, Ardabil, Iran
Z. Ghelej Beigi, Mobarakeh Branch, Islamic Azad University, Mobarakeh, Iran
K. Gholami, Boushehr Branch, Islamic Azad University, Boushehr, Iran
F. Hosseinzadeh Lotfi, Science and Research Branch, Islamic Azad University, Tehran, Iran

Chapter 18
The Efficiency Performance of the Turkish Ceramic Sector in Terms of Revenue and Export: DEA Model ................................................................................................. 559
Füsun Yenilmez, Eskişehir Osmangazi University, Turkey
Section 5
Performance in Financial Sector Organizations

Chapter 19
Global Financial Crisis and Bank Productivity in Mexico ........................................ 581
  Francisco Vargas Serrano, Universidad de Sonora, Mexico
  Luis Rentería Guerrero, Universidad de Sonora, Mexico
  Gang Cheng, Peking University, China
  Panagiotis D. Zervopoulos, Bursa Orhangazi University, Turkey
  Arnulfo Castellanos Moreno, Universidad de Sonora, Mexico

Chapter 20
Dynamic Evaluation of Indian Commercial Banking Sector: A Bank-Level Growth Frontier Approach .......................................................... 600
  Nitish Datta, University of Kalyani, India

Chapter 21
Performance Benchmarking of the Indian Life Insurance Industry: A Unified Approach ............. 616
  Ram Pratap Sinha, Government College of Engineering and Leather Technology, India
  Nitish Datta, University of Kalyani, India

Chapter 22
Bank Branch Efficiency with DEA ....................................................................... 626
  Mehmet Hasan Eken, Istanbul Commerce University, Turkey
  Süleyman Kale, Ziraat Bankası, Turkey

Afterword ............................................................................................................. 668

Compilation of References ..................................................................................... 670

About the Contributors .......................................................................................... 723

Index ...................................................................................................................... 733