

Preface

When a man dies, his good deeds come to an end except three: on-going charity, beneficial knowledge, and righteous offspring who will pray for him. (Prophet Muhammad [ﷺ])

Value has a value, only if, its value is valued. (Bryan Dyson, Former CEO of Coca Cola)

The future of societies around the world is being shaped by many change drivers: demographics, globalization, environmental concerns, societal relationships, social stability, and technology. These changes are creating challenges that are affecting virtually every person in the world and each organization on the planet with clear impacts on income distribution, poverty, job creation, social welfare, economic growth, and sustainability. Such challenges and impacts have led to the emergence of a new class of innovative and smart organizations that are shifting from traditional business models of value creations to shareholders only to embrace more sustainable innovative and inclusive models of shared values to all stakeholders. The new class of business innovative models is requiring a perpetual mandate of collaboration among stakeholders across businesses, societies, governments, and non-government organizations. It is also necessitating strong committed cognitive leadership, whether among public policymakers or private business leaders, to understand societal needs, identify best-practices on operational and technical standards, design effective strategies to improve organizational core essentials, build internal capabilities, facilitate the coordination and communication efforts to share knowledge and skills to manage, and control the execution processes of such innovative and smart models to achieve economic prosperity, societal, and environmental wellness and resolution of societal aspects.

The new innovative and smart models have differentiating sustainable factors and competitive advantages derived from strategic management and decision-making processes. This has consequences on organizational value proposition, commitment of leadership to promote organization culture and implement governance systems, in addition to the adoption of a flexible organization structure to continuously innovate on operating processes and enhance capabilities, providing the right technology support, integration, and scalability of the supporting systems to operate organizational functions efficiently. Despite the common recognition to have the right talent and capable teams to achieve desired organization performance, set performance targets, prioritize strategic initiatives, and attain an overall efficiency across the organization, recent changes in performance measurement are growing with trends towards managing performance improvement through focusing on the underlying drivers of performance, whether improvements in the production processes, minimization of underlying input resources, and/or maximization of outputs, outcomes, and impact capabilities. There is less obsessive reliance on pure

financial performance and a recognition that there is a big trade-off between what can be achieved today in terms of cost-benefit financial results and the potential of future opportunity and risk results to secure a sustainable growth and to enhance capabilities and competencies in order to allow companies to compete effectively in the future market.

Successful smart organizations are using these innovative business models to excel in today's competitive market and have information-based corporate strategies to make the best decisions among competing alternatives derived from internal and external best practices. Their managers recognized that strategic management and performance measurement have a great impact on strategic planning, management and organizational directions to consider various stakeholder perspectives, to integrate financial and non-financial metrics across various organizational functions, and to align metrics from the strategic top management to the operational levels. These successful companies are competing on analytics, committed to quantitative fact-based analysis at the enterprise level, and transforming technology from a supporting tool into a strategic weapon.

These companies are having an information-based cognitive organization-wide strategy to generate insights to boost productivity growth and manage performance by: 1) the commitment of senior executive leaders to develop a cognitive analytics management strategy to develop smart organizations that employ evidence-based decision-making processes and talent management strategies to recruit and hire the right talent with cognitive expertise in information, management, modeling, statistical, and communication intelligent capitals, in order to have cognitive and critical thinking future leaders to make the best informed decisions to lead future smart organization; 2) build enterprise-integrated systems to manage organization big data—this strategy requires investments in the right information and communication technology network infrastructures to integrate data from various sources and to invest in cognitive systems and software tools to generate intelligent performance insights for managerial actions and to visualize such knowledge and insights from organizations' big data systems—; 3) the cognitive systems, models, and tools to generate insights for continuous improvements based on recent advances in big data and business analytics; and 4) the advocacy of cognitive leaders to develop a communication strategy to develop and promote a culture for cognitive innovation and entrepreneurs, commitment to act on applied insights for deciding on strategic decision-making initiatives such as recruiting and rewarding excellence and developing organizational values based on accountability, empowerment, ethics, and trust to increase loyalty and satisfaction of stakeholders similar to the best practices at top consulting companies like IBM, McKinsey, Microsoft, and Intel, who are recommending innovation and technology as the main drivers to increase productivity and manage performance. Bill Gates, founder of Microsoft, said “Now, economic progress depends more than ever on innovation. And the potential for technology innovation to improve lives has never been greater.” Based on the proper integration of Technology and Innovation in business analytics, IBM reports showed that organizations using such drivers are outperforming their peers by an average growth rate of around 1.6 in revenue growth (McGee, 2008). This extra huge review is partially attributed to efficiency savings in scarce talent resources to benefit from experience and wisdom to execute more demanding critical-thinking jobs.

Innovation is as much about leadership and management as it is about technology and science. Unfortunately, existing performance measurement sciences have focused exclusively on statistical, accounting, finance, and econometric approaches to analyze quantitative performance metrics. Such approaches can only establish groups, trends, and relationships between a single output performance measure and other multiple-input independent performance measures, but they cannot establish simultaneous relationships and tradeoffs among multiple-output and multiple-input performances to determine single combined

indices that are easy to understand by busy managers for prioritization of initiatives and informing the decision-making process. They were useful to predict average performance trends rather than identifying best and bad performances, which are often treated as outliers and are dropped for the sake of average measures.

Therefore, traditional approaches based on financial and economic metrics could neither be used to identify the set of best practices (best outliers) nor can they identify the worst set of performers in a benchmarking process of peers. Such weaknesses often lead to improper decisions due to lack of data. As a consequence, managerial decisions on important aspects from resource allocation and investment to personal rewards are executed based on intuitive gut-feeling and negotiation power among senior leaders rather than on an informed and insightful analysis of the performance efficiency of the production process/organization, the efficiency of utilization of multiple-input resources, the effectiveness of the generated multiple outputs and outcomes and the effectiveness of future impact on stakeholders. The complexity of such multi-dimension analysis was highlighted by Mr. Bryan Dyson (n.d.)—former CEO of Coca Cola—who said “Value has a Value only if its value is valued” when talking about the juggling game of “work, family, health, friend, and spirit” in one’s life. Further, the importance of accurate measurement was further emphasized by the famous quote by Admiral Grace Hopper (n.d.), “One accurate measurement is worth more than thousand expert opinions.” The new trend is witnessing a move from performance measurement metrics to a science of valuation.

A movement in this direction is seen from the emergence of the frontier analysis and big data analytical approaches and its variants, including Data Envelopment Analysis (DEA) as the strategic performance measurement approach that can transform data into insights to inform the decision-making process. DEA measures organizational effectiveness by cleverly reversing the traditional use of mathematical programming, typically used to evaluate alternative courses of action before selecting the best one. It employs mathematical programming to obtain *ex-post-facto* evaluations of the relative efficiency of management accomplishments. The popularity and success of DEA among management science/operational research scientists are well documented by the existence of several books on its theory and applications and the thousands of scholarly published articles. For instance, searching Google Scholar for the term “data envelopment analysis” returned over 48,000 publications on March 18th 2014. Despite this huge success, there is only a recent awareness of DEA among management and other performance management scientists with the appearance of few papers in the *British Management* and *Academy of Management* journals.

This book aims to cover the fundamentals of strategic performance management, which is a set of management and analytic processes that enable the management of an organization to develop guidelines to achieve measurable mission goals and strategic measurable objectives, to monitor and report critical success factors, and to establish key performance indicators. Measuring performance can help managers in making informed decisions, setting strategic priorities, identifying successful strategies, allocating input resources, identifying underperforming activities, and planning intervention policies to improve output/outcome performance. Performance measures, however, could be tangible (specific return on sales, market shares) or intangible (reputation and image) for which several analytical tools have been developed to evaluate and analyze including financial ratio analysis, economic added value techniques, balance scorecard methodology that links strategy design to multidimensional performance measures. Such tools have practical limitations (e.g. financial ratio analysis neither satisfactorily discriminates best practice measures nor reflects the multiple performance dimensions of an organization), whereas the balanced scorecard does not provide a basis for a trade-off among different performance measures.

Moreover, the multiple performance measures divert management attention and focus, as a subjective weighted average measure is used to generate a simple and single performance index. Additionally, a criticism on the subjectivity of weights is raised, but it can be removed by using a recent management science methodology of Data Envelopment Analysis (DEA), which can determine objectively the optimal weights for each measurable variable in order to generate an aggregate performance index for an organization. Even though the weights may be different for each organization, they are objectively determined by the DEA models based on a sample of comparable organizations. Furthermore, DEA results provide useful help to managers in identifying the set of peers forming the efficient frontier, which represents the best-practice internal and external benchmarks. It also highlights which organizations are less efficient and helps to set targets for input/output measures to improve performance by projection to the set of efficient frontier of peers. After such identification, the management could make an informed decision to strategically implement improvement changes and track the impact of such changes over time and use the efficiency and effectiveness to develop new innovations and devote the scarce time of leaders and experts to more strategic and critical thinking tasks.

The book is designed to be self-contained so that academics, students, as well as practitioners would have access to the most important knowledge in the field of strategic management, measurement of performance through data envelopment analysis with an extensive summary of recent advances in the theory, and applications with special focus on real life cases of tangible impact on the development and improvement of organization performance. It is composed of six sections:

Section 1, “Cognitive Analytics Management Foundations to Manage Performance” contains six chapters on the background of strategic management and measurement as well as the DEA models, modeling of DEA applications, and DEA software background. The first chapter by Osman and Anouze is “A Cognitive Analytics Management Framework (CAM-Part 1): SAMAS Components, Leadership, Frontier Performance Growth, and Sustainable Shared Value.” The chapter presents reviews of the world’s current challenges, the shortcomings of strategic performance measurement and management methodologies to introduce a new *Cognitive Analytics Management (CAM)* framework using SAMAS components: Shared values to stakeholders; cognitive Analytics to generate applied insights; Mission, vision, and goals to develop corporate strategy; Activities to create—innovative models, products, and services—using various organizations’ supporting Structure from people, process, regulation, and technology to develop smart organizations. The efficient frontier data envelopment analysis is proposed to generate performance measures and derive insights from best practices. The input-efficiency and output-effectiveness performances are used to prioritize scenarios. Insights from the best scenarios are used to improve inefficient ones, to manage performance, and to boost productivity growth. CAM also introduces a new cognitive smart leadership concept to help making informed decisions in a smart competitive world while alleviating societal challenges. Finally, CAM implementation roadmap, supporting literature, and new research innovations are provided. Finally, supportive literature is provided in appendices, with highlights on new research innovations and directions. The second chapter by Osman and Anouze is “A Cognitive Analytics Management Framework (CAM-Part 2): Societal Needs, Shared-Value Models, Performance Indicators, Big Data, Business Analytics Models and Tools.” SAMAS—Shared values, Analytics, Mission, Activities, and Structures—components were explained in Chapter 1 to achieve CAM’s mission, set goals and shared-value objectives. CAM focuses on the development of innovative social business models through the usage of frontier data envelopment analysis to measure the delivery of shared values for sustainable growth of organizations. Chapter 2 first discusses the causes and effects of societal challenges and how

shared value models can alleviate them. Second, successful technology and non-technology innovations for shared-value models are reviewed. Third, guidelines to develop key performance smart indicators, pitfalls traps, and phases of budgeting steps for the design of performance management and measurement systems are discussed. Fourth, big data and business analytics challenges, potentials, models, and tools are presented. Fifth, the essential components for designing a corporate big data strategy are suggested. Finally, new ideas are explained to democratize shared-value knowledge through electronic services to transform loyalty of people from parties, clergies, and dictatorships to society's loyalty to achieve smarter communities in the 21st century. The third chapter by Osman and Anouze is "A Cognitive Analytics Management Framework (CAM-Part 3): Critical Skills Shortage, Higher Education Trends, Education Value Chain Framework, Government Strategy." The main objectives are to evaluate the impact of the tsunami of data, analytics, and technology on the delivery and diffusion of knowledge around the work through the use of Internet-of-things and to design future academic education and training programs. Global and local trends are analyzed to evaluate the impact of the digital tsunami on the delivery and diffusion of knowledge; to identify the shortage of critical skills, drivers of challenges, hot skills in demand, and salaries in big data/business analytics; to highlight obstacles to make informed decisions. CAM education framework is proposed to design customized higher education and training programs to meet current shortage and future generation with the relevant and rigorous skills to boost productivity growth and to impact society and professional domains in the digital economy. Finally, new ideas on how governments, academic institutions, technology companies, and professional employers can work together to reform the traditional education value chain and integrate the "massive open online courses" to achieve mass diffusion of knowledge, to transform people from loyalty to parties, clergies, and dictatorships to society's loyalty, and to develop a culture of shared-value in a move towards a smarter and fairer planet in the 21st century.

The fourth chapter, "Introduction to Data Envelopment Analysis and its Applications," by Emrouznejad and Cabanda provides the theoretical foundation and background on Data Envelopment Analysis (DEA) method and some variants of basic DEA models and applications to various sectors. Some illustrative examples, helpful resources on DEA, including DEA software package, are also presented in this chapter. DEA is useful for measuring relative efficiency for variety of institutions and has its own merits and limitations. This chapter concludes that DEA results should be interpreted with much caution to avoid giving wrong signals and providing inappropriate recommendations. The fifth chapter by Emrouznejad and Thanassoulis, "Introduction to Performance Improvement Management Software (PIM-DEA)," provides information on the use of Performance Improvement Management Software (PIM-DEA). This advanced DEA software enables users to make the best possible analysis of the data, using the latest theoretical developments in Data Envelopment Analysis (DEA). PIM-DEA software gives full capacity to assess efficiency and productivity, set targets, identify benchmarks, and much more, allowing users to truly manage the performance of organizational units. PIM-DEA is easy to use and powerful, and it has an extensive range of the most up-to-date DEA models and which can handle large sets of data. It concludes with a section on other available DEA software. The PIM software can be downloaded free of charge for those who buy the book in order to give the option to have hands-on experience with DEA modeling and solving. The sixth chapter by Anouze and Osman is "Mismanagement or Mismeasurement: The Application of DEA to Generate Performance Vales and Insights from Big Data." It presents a tutorial-like approach for a proper implementation of DEA models. It highlights the difference between the DEA modeling and DEA usage of models when conducting a process of performance measurement

and management applications. Three real-life strategic cases are presented along with a comprehensive review (probably the only up-to-date comprehensive on real life applications and cases) on strategic DEA applications with real tangible impact on performance of associated organizations.

Section 2 contains two chapters on “Negotiation and Prioritization through Frontier Analysis.” The first chapter by Abbasian-Naghneh, Ertaya, Felahat, and Jafarabadi, “A New Integrative Approach Based on Balanced Scorecard, Data Envelopment Analysis, and Management Performance to Prioritize Research and Development Projects,” proposes a new approach for evaluating Research and Development (R&D) projects in different stages of their life cycle. The approach is based on multiple objective linear programming through the integration of the Balanced Scorecard (BSC) and Data Envelopment Analysis (DEA). To this end, an interactive multiple objective DEA model to incorporate decision-maker preferences is presented. It effectively yields a common basis for ranking. A study has been carried out with 50 R&D companies to illustrate a case for this analysis. Finally, the second chapter by Krivonozhko, Piskunov, Lychev, and Ivasechko, “Models and Methods for Decision-Making Support in the Negotiation Process,” presents an approach for evaluation of agreements on transnational projects during the negotiation process. One can show that the negotiation process can be represented as the behavior of decision-making units (countries) in the multidimensional space of economic indicators using DEA models. In this case, the goals, which can be achieved by units as a result of accomplishment of a joint project, can be determined as points in the multidimensional space. Optimal directions toward these goals and cones of possible directions can be found with the help of Analytic Hierarchy Process (AHP). The efficiency measures for countries are calculated as ratios of the values of potential functions at the initial (intermediate) and final points. The increments of efficiencies measures are considered as arguments in the negotiation process. The approach is illustrated by the real-life data set taken from open international sources.

Section 3 contains six chapters on “Performance in Public Sector Organizations.” The first chapter by Poveda is “Corruption, Economic Development, and Insecurity in Colombia.” This research chapter evaluates the connection between corruption, economic development, and insecurity in several Colombian departments. This chapter explores the dynamics of these variables using two empirical techniques: the Data Envelopment Analysis (DEA) and the Dynamic Panel Data Model (DPDM). DEA is performed to evaluate social performance in terms of corruption, economic development, and insecurity in Colombian departments with a higher level and risk of corruption and insecurity. Dynamic panel data analysis is performed to define the variables that affect corruption, insecurity, and economic development. The DEA model evidences that corruption and insecurity have different trends where economic development, natural resources, and political instability are key factors. The dynamic panel data model applied shows that Colombian departments with a higher level and risk of corruption and insecurity have lower economic growth, development, and social conditions, but higher levels of mineral resources and illegal drug activity, as well as the presence of irregular armed groups. The second chapter by Bruno and Erbetta, “Benchmarking Regulators: A Data Envelopment Analysis of Italian Water Authorities’ Performance,” conducts a Data Envelopment Analysis to evaluate efficiency performance from a regulatory perspective. Until 2010, the Italian water sector regulation was highly fragmented with 92 regulators over the country that makes it a very interesting case for benchmarking analysis. The rationale of this approach relies on the fact that regulators, like other public entities, are resource-consuming operators, whose cost ultimately burdens the consumers. Therefore, it is relevant to test whether they operate efficiently. The authors run several DEA-based models, including different sets of variables and assuming different orientation. From the empirical analysis, a relevant “pure”

technical inefficiency Variable Return to Scale (VRS) emerges. A secondary but not negligible role is also played by the scale effect, with some interesting considerations related to the optimal regulatory size. The third chapter by Ertek, Tokdil, Günaydın, Göğüş, “Benchmarking Competitiveness of Top 100 U.S. Universities,” presents a comprehensive benchmarking study of the top 100 U.S. universities. The methodologies used to come up with insights into the domain are Data Envelopment Analysis (DEA) and information visualization. Various approaches to evaluating academic institutions have appeared in the literature, including a DEA literature dealing with the ranking of universities. This study contributes to this literature by the extensive incorporation of information visualization and subsequently the discovery of new insights. The main purpose of the study is creating an objective basis of assessment for the candidate students to use for university preferences. Meanwhile, the actionable insights obtained for the domain can guide university managers, as well as candidate students. The fourth chapter by Davutyan and Bilsel, “Efficiency of Turkish Provincial General Hospitals with Mortality as Undesirable Output,” presents a directional distance model where quality of care is brought in by treating mortality in each hospital as a strongly disposable “bad output.” After deriving pure technical and scale inefficiencies under strong disposability, the authors derive “congestion” inefficiencies via allowing weak disposability. A second stage, “seemingly unrelated” regression of these inefficiencies against hospital level variables like spare capacity, inpatient-to-outpatient ratio, and bed turnover rate allows pinpointing the critical areas for hospital performance improvement. Evidence shows that the smallest hospitals are operating on an inefficient scale. Moreover, allocation of specialists should be done very carefully, as shortage of specialists seems to cause congestion inefficiency, while having too many specialists causes technical inefficiency. The fifth chapter by Mulwa, “Non-Parametric Estimation of Environmental Efficiency Using Data Envelopment Analysis and Free Disposable Hull,” states that nitrogen, phosphate, and herbicide use are three main environmental problems caused by agriculture. Modeling these undesirable outputs and other detrimental side effects of production activities has attracted considerable attention and debate among production economists. A common approach is to treat detrimental variables as inputs mainly using DEA, which has enjoyed a lot of success over the years. On the other hand, FDH has not enjoyed as much success as its counterpart, DEA. This chapter demonstrates how environmental efficiency can be modelled using both DEA and FDH under strong and weak disposability assumptions. Results show that weak disposability assumption is more superior in achieving relatively high emission reductions and that FDH tends to allocate efficiency to more DMUs compared to DEA. The last chapter by Falavigna, Manello, and Pavone, “Productivity and Public Funds: A Directional Distance Function Approach Applied to the Italian Agricultural Sector,” aims at evaluating the effect of Italian regional policies in the agricultural field. Performances of regional systems have been evaluated through an extension of Data Envelopment Analysis (DEA), the Directional Distance Function (DDF), which allows one to consider emissions of ammonia as undesirable output. Productivity and efficiency of agricultural systems are based not only on agri-production but also on the contraction of emissions deriving from the fertilizer’s usage. Results show that a convergence path between productivity and public funds exists and that there are differences among Italian macro-areas considering both efficiency and productivity dynamics. In particular, if efficiency scores are interpreted with the amount of public funds distributed by the Rural Development Programs over the period 2000-2006, empirical evidence suggests that more resources are received by disadvantaged areas. Findings underline that the most disadvantaged areas, in terms of productivity, are those receiving more structural public funds. In this meaning, productivity dynamics affect public policies. Finally, results give stimulus for reflection about public fund flows in the agricultural sector highlighting interesting policy implications for future actions.

Section 4 contains four chapters on “Performance in Private Sector Organizations.” The first chapter by Vincent, Charles, and Kumar, “The Performance of Printed Circuit Boards in the Presence of Production Errors: A Comparative Analysis using Various DEA Models,” presents how the Printed Circuit Boards (PCBs) assembling production process is generally optimized to ensure very low levels of production errors (defects) so as to assure a higher quality product. In view of the number of components and solder joints in the products, and the very high demands placed on quality, the operation of this process is critical to the success of the products that are manufactured. A special class of the efficiency identification problem considered in this case relates to the occurrence of different kinds of production errors during the assembling process of the PCBs. Each assembled PCB goes through a certain number of processes in the respective assembly unit. However, the process of assembling often gets influenced by certain factors, which make some of the assembled PCBs defective. This chapter addresses the efficiency identification problem of a teleprinter-manufacturing company that assembles PCBs. The technique of Data Envelopment Analysis (DEA) is used to assess the efficiency of different types of PCBs, known as cards, in the presence of various kinds of production errors under the assumption of weak disposability. The hyperbolic efficiency measure, directional distance function approach, and linear monotone decreasing transformation to undesirable outputs are the approaches discussed in this chapter. The efficiency of each card is evaluated across all of the assembly units under different alternative approaches in DEA. The evaluation of the efficiency of the cards could help the management in identifying the areas of inefficiency and in formulating suitable strategies to improve its relative position in the assembly unit. It can also provide a better framework to assess/assure the quality of the individual type of PCB and to work out appropriate interventions to prevent failures in the assembly process. The second chapter by Ertek, Sevinç, Ulus, Köse, and Şahin, “A New Framework for Industrial Benchmarking,” present a benchmarking study on the companies in the Turkish food industry based on their financial data. The aim is to develop a comprehensive benchmarking framework using Data Envelopment Analysis (DEA) and information visualization. Besides DEA, a traditional tool for financial benchmarking based on financial ratios is also incorporated. The consistency/inconsistency between the two methodologies is investigated using information visualization tools. In addition, k-means clustering, a fundamental method from machine learning, is applied. Finally, other relevant data, apart from the financial data, is introduced to the analysis through information visualization to discover new insights into DEA results. The results show that the framework developed is a comprehensive and effective strategy for benchmarking; it can be applied in other industries as well. The study contributes to the literature with a novel methodology that integrates the various benchmarking methods from the fields of operations research, machine learning, and financial analysis. The third chapter by Aghayi et al., “Measuring Performance of Dynamic and Network Structures by SBM Model,” presents how the conventional Data Envelopment Analysis (DEA) model considers Decision Making Units (DMUs) as a black box, meaning that these models do not consider the connection and the inner structures of DMUs. Moreover, these models consider that the activities of DMUs in each time are independent of other times, but in the real world, the inner structures of DMUs are complicated, and the activities of DMUs are dependent on other times. Therefore, in this chapter, the authors consider DMUs with network structure and the activity of each DMU in each time dependent to activity of other times, so they call this structure a dynamic network. To this end, in this chapter, models are suggested to evaluate dynamic network efficiency based on the SBM model, which is a non-radial model of three types with respect to orientation: input-oriented, output-oriented, and non-oriented. In order to distinguish the relationships between sub-DMUs, there are two classifications employed, free

and fixed, and to distinguish the relationships between times, there are four classifications, free, fixed, desirable, and undesirable. In addition to calculating overall efficiency, the proposed model can calculate the efficiency of sub-DMUs one by one at different times. Finally, the authors present an example with seven DMUs at three times. The last chapter by Füsün is “The Efficiency Performance of the Turkish Ceramic Sector in Terms of Revenue and Export: DEA Model.” Turkey is one of the leading countries in the world in the field of tile production and exportation. The ceramic sector constitutes the main focus and scope of this chapter, which makes some suggestions and recommendations to the industrial companies ranked among the 1,000 largest companies in 2011 based on their performance in revenue and exportation. Data Envelopment Analysis (DEA) is used in the measurement of the ceramic companies’ performances. Three inputs (net assets, number of workers, and equity) and one output (revenue) are used in the first analysis where nine companies are taken as decision-making units. This chapter shows that Eczacıbaşı and Vitra were efficient in revenue making in 2011. Likewise, three inputs and one output (export) are used in the second analysis where nine companies are taken as decision-making units. According to DEA model findings, only Vitra was efficient in exporting in 2011. This study illustrates the importance of linking the objective of the performance analysis to the right choice of key performance indicators and the difference between the frontier analysis and the average regression analysis.

Section 5 contains four chapters on “Performance in Financial Sector Organizations.” The first chapter by Vargas Serrano et al. “Global Financial Crisis and Bank Productivity in Mexico,” presents an attempt of comparison of productivity for the Mexican banking sector in two different periods: the 2007-2011 period of global financial crisis and the 2003-2006 stage, which can be regarded as a relatively stable period. The purpose of this study is to disclose whether the global financial crisis affected Mexican banking productivity. The second chapter by Datta, “Dynamic Evaluation of Indian Commercial Banking Sector: A Bank-Level Growth Frontier Approach,” investigates the Indian commercial banking sector in the dynamic framework. Growth frontiers are derived with the help of Data Envelopment Analysis (DEA) to identify growth-efficient and growth-inefficient banks. The growth theories demand a steady-state growth path for each sector of the economy; on the other hand, the resource-based theory assumes firm-specific growth rates. The analysis shows dismal performance by domestic banks, both public sector and private; most of these domestic banks are growth-inefficient both in the short-run and in the long-run. The short-run as well as long-run findings strongly support the role of learning by doing as an engine to augment growth for all categories of banks. The analysis also exposes that the resource-based view of firm that generates rent generating competitive advantage ultimately drives both the managerial strategies and the performance of the Indian banking sector. The third chapter by Sinha, “Performance Benchmarking of the Indian Life Insurance Industry: A Unified Approach,” says that in the last decade, the life insurance companies operating in India have made significant progress in terms of business consolidation. In view of the same, it is of interest to make an enquiry about the operating performance of these companies. This chapter compares 15 life insurance companies operating in India from the period 2005-06 to 2008-09 using the Hybrid Efficiency Model (Tone, 2004). The Hybrid Model provides a unified framework for the estimation of technical efficiency integrating the radial and non-radial characterisation of inputs and outputs. Out of the 15 in-sample life insurance companies, the number of technically efficient life insurers declined from 9 in 2005-06 to 4 in 2006-07 and further to 3 in 2007-08 and 2008-09. The mean technical efficiency scores of the in-sample life insurers declined sharply between 2005-06 and 2006-07 and improved somewhat thereafter. The last chapter by Eken and Kale, “Bank Branch Efficiency with DEA,” evaluates that inefficiency of bank branches on different

dimensions with slack-based model of data envelopment analysis. Each efficiency dimension reveals the strengths, weaknesses, and improvement capabilities of branches. Multi-dimensional comparison enables the determination of the overall characteristics and the choice of the improvement strategies accordingly. An extant literature analysis of bank branches and future research directions is also presented.

Finally, we hope the book will add value to business, government, and professional readers in various sectors of society, including business leaders, policymakers, professional/practitioners in agriculture, banking, economic, education, environment, energy, finance, government, healthcare, regulation, transport, sustainability, social, and well-being developments. Similar hopes go to researchers and students who are specializing in the areas of strategic management, performance measurement and management, big data and business analytics, cognitive analytics management, business, computing, engineering management, economic, environment, management science, cognitive systems, operational research, entrepreneurship, and technology.

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