# Chapter 15
# Data Envelopment Analysis for Measuring and Evaluating Efficiency on IT Outsourcing Operations

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## ABSTRACT

*During the last decades, the IT service sector has been one of the fastest growing segment in the global economy, consequently, Information Technology (IT) outsourcing providers face several challenges: contracts are based on a multi-service configuration; high degree of variance between clients; market dynamism through rivalry, accelerated innovation, client requisites and relationship management. As a result, service providers employ several tools and methods to find the best fit between standardization (mainly for productivity increase) and customization (primarily for client satisfaction), because IT outsourcing operational context display a multi-input and multi-output set of variables that need to be known and managed, thus efficiency measurement is essential to delivery optimised IT operations. The purpose of this work is to identify, describe, evaluate and present a model based on Data Envelopment Analysis (DEA), which is a linear programming technique able to manipulate multiple inputs and outputs. DEA allows the identification of the most efficient operation that enables providers to set the best operational strategy to follow. To develop our research, design science research was applied, and eighteen contracts were used to evaluate our model's utility the results show the importance of quantitative measures in a dynamic business environment like IT outsourcing. This work is a major contribution for measuring efficiency in IT outsourcing operations.*

## INTRODUCTION

Inside Information Technology (IT) service sector, (IT) outsourcing has been one of the most studied subjects in the IT academic area (Lacity & Hirschheim, 1993; Quinn & Hilmer, 1994; Dibbern & all, 2004; Brown & Wilson, 2005; Cullen, 2009) offering a considerable body of knowledge. Consequently, like in other business areas, performance evaluation is a core concern for management (Schaffnit, Rosen, & Paradi, 1997; Gronroos & Ojasalo, 2004).

While in the manufacturing sector, efficiency measurement is well established, in which, efficiency is defined as a ratio of the production outputs to its inputs. In contrast, measuring service efficiency is still evolving, as services are configurations of people, technology, processes and stakeholders all connected by value propositions and shared information, thus simply transferring the traditional concept of productivity and efficiency from manufacturing to services is bound to fail because of the immateriality and intangibility of services.

Even though efficiency and productivity are used, generally, in the same meaning, they were defined by Abbott (Abbott, 2006) differently. While efficiency can be described as being the degree to which resources are being used in an optimal fashion to produce outputs of a given quantity, productivity is a measure of the physical output produced from the use of a given quantity of inputs.

Therefore, IT outsourcing providers face two main challenges: firstly, the balance between standardization (in order to obtain productivity gains) and customization (for client satisfaction). Secondly, efficiency measurement so as to record, analyse and optimize operations, regardless of the level of standardization or customization.

Therefore, our main research goal is to identify a set of common service dimensions feasible to characterize IT outsourcing operations and identify input and output variables to calculate efficiency ratios and facilitate comparisons between service operations in order to select the best practices and standardize those same practices, which will allow operations and costs optimization.

In this study the authors try to explore what variables can be used to determine the efficiency in IT outsourcing contracts. A nonparametric method based on mathematical programming technique, Data Envelopment Analysis (DEA) (Charnes, Cooper, & Rhodes, 1978) was used.

DEA compares each unit in terms of its abilities to convert inputs into outputs with all other units and computes (through linear programming) an efficiency score based on the ratio of outputs and inputs, establishing a rank among the contracts as well as discovering which dimension (the less performing one) has to be improved. The DEA method offers many opportunities for an inefficient unit (underperforming contracts) to become efficient regarding its reference set of efficient units (Charnes & al, 1994). DEA has already proven its usefulness in several service sectors and industries, but no study investigating their applicability in IT outsourcing performance measurement has so far been reported. It is, therefore, worthwhile to extend the traditional DEA models into IT outsourcing efficiency, a topic for academic and organizational enrichment.

This research was conducted using Design Science Research Methodology (DSRM) that aims at creating and evaluating artifacts to solve relevant organizational problems (Hevner A., March, Park, & Ram, 2004). The steps of DSRM are reflected in the sections of this research.

The paper proceeds as follows. Section 2 presents the related work. Section 3 presents the research problem. Section 4 details the research methodology. Section 5 explains in detail the developed artifact. Section 6 presents the artifact demonstration. Section 7 describes the evaluation. Finally, in Section 8 the conclusions that emerge from the present research work are presented as well as future research.

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