Measuring and Evaluating Efficiency on IT Outsourcing operations through Data Envelopment Analysis

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ABSTRACT

Information Technology (IT) outsourcing is a set of IT services that require providers to manage a long relationship with multiple services that have a high degree of variance between clients. IT outsourcing operational contexts display multi-input and multi-output variables, so managers need guidance on developing suitable approaches in order to identify the set of variables to analyse. This work proposes 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, which in turn enables providers to set the best operational strategy to follow. The results demonstrate the importance of quantitative measures in a dynamic business environment like IT outsourcing. To develop the authors’ research, design science research was applied, and eighteen IT outsourcing contracts were used to demonstrate their model’s utility. This work is a major contribution for measuring efficiency in IT outsourcing operations.

KEYWORDS

Data Envelopment Analysis, Design Science, Efficiency, IT Outsourcing, Performance Management, Standardization

1. INTRODUCTION

Information Technology (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; Hancox & Hackney, 2000; Willcocks & Lacity, 1998; Cullen, 2009; Willcocks, Cullen, & Craig, 2010), offering a considerable body of knowledge of one of the biggest business trends.

Consequently, like in other business areas, in IT outsourcing performance evaluation is a core activity for management (Schaffnit, Rosen, & Paradi, 1997). Organizations need to evaluate performance to investigate deviations from plan and to determine if they are doing better or worse than their competitors. Performance measurement can go deep into departments, shops, services or people that must be measured for efficiency in order to optimize their relative productivity.

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.
Nowadays, IT outsourcing providers face two main challenges: firstly, the standardization of processes in order to obtain productivity gains according to transaction cost theory (Williamson, 1985), and secondly, efficiency measurement so as to record and analyse operations.

Therefore, our main research goal is to identify a set of common processes and variables (inputs and outputs) between outsourcing contracts to calculate efficiency ratios and facilitate comparisons between contracts 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, March, Park, & Ram, 2004).

The steps of DSRM are: problem identification and motivation; objectives of a solution definition; design and development; demonstration; evaluation; and communication (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007). These steps are reflected in the sections of this research.

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

2. RELATED WORK

According to Stern (Stern & Deimler, 2006), “One of the primary tactical decisions a manager must make is how performance will be measured.” Performance measurement can be defined as the process of quantifying the efficiency and effectiveness of actions. Thus, the measurement function is to develop a method for generating a class of information (metrics) that will be useful in a variety of problems and situations (Neely, Gregory, & Platts, 2005).

One of the most known methods for performance measurement in organizations is the balanced scorecard (Kaplan & Cooper, 1998), which allows performance measure and reporting.

In IT outsourcing, Domberger (2000) measured performance in two fronts, the desired performance (client expectation of service quality prior to awarding a contract) and the realized performance (that can be referred to as effective performance). Necessarily, contract management involves realized performance assessment.

Cullen (2009) developed the IT outsourcing contract scorecard based on four vectors (quality, finance, relationship and strategy) to measure contract success through a set of key performance indicators based on accomplished goals and descriptive statistics.

Thus, in IT outsourcing literature, performance and efficiency measurement focuses on the post-contract management reporting, in which a report is delivered by the provider when problems are detected in contract execution (mainly at the operational level). This guarantees that communication
Leveraging Enterprise Resource Planning Systems to Digitize Business Functions
www.igi-global.com/chapter/leveraging-enterprise-resource-planning-systems-to-digitize-business-functions/177337?camid=4v1a

A Reference Application Architecture for the CRM Domain: The Portuguese Citizen Space Case Study
www.igi-global.com/article/a-reference-application-architecture-for-the-crm-domain/132707?camid=4v1a