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ORIGINAL ARTICLE

# Assessing call centers' success: A validation of the DeLone and Mclean model for information system

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## KEYWORDS

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Composite indicators

**Abstract** Business process outsourcing (BPO) is becoming one of the most growing industries in 21st Century and a significant workforce in the global economy. Revolution in telecommunications, free trade agreements, and cultural behavior in a number of developing countries paved the way for the growth of BPO industry. Technology based BPO services are those services provided by Call centers, services that vary from receiving simple phone calls, to marketing services, sales services, and up to remote diagnosis and technical support services.

This paper introduces a model to evaluate the performance of call centers based on the DeLone and McLean Information Systems success model. A number of indicators are identified to track the call center's performance. Mapping of the proposed indicators to the six dimensions of the D&M model is presented. A Weighted Call Center Performance Index is proposed to assess the call center performance; the index is used to analyze the effect of the identified indicators. Policy-Weighted approach was used to assume the weights with an analysis of different weights for each dimension. The analysis of the different weights cases gave priority to the User satisfaction and net Benefits dimension as the two outcomes from the system. For the input dimensions, higher priority was given to the system quality and the service quality dimension. Call centers decision makers can use the tool to tune the different weights in order to reach the objectives set by the organization. Multiple linear regression analysis was used in order to provide a linear formula for the User Satisfaction dimension and the Net Benefits dimension in order to be able to forecast the values for these two dimensions as function of the other dimensions

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## 1. Introduction

Business process outsourcing (BPO) is defined [1] simply as the movement of business processes from inside the organization to an external service provider. With the global telecommunications infrastructure now well established and consistently reliable, BPO initiatives often include shifting work to international providers. Research from Gartner [2] forecasts the

growth of the BPO industry 5% worldwide in 2012, The Asia/Pacific (excluding Japan) business process outsourcing (BPO) market forecast to reach \$9.5 billion in 2016, up from \$5.9 billion in 2011. Top countries in BPO industry include India, China, Philippines, Malaysia, and Poland. In 2007, Egypt has launched a national BPO strategy with a substantial ongoing government investment [3] and support that resulted in improving Egypt's ranking in A.T. Kearney Global services location Index [4] from number 13 in 2007 to number 6 in 2009 and to number 4 in 2011. The positive growing impact of this industry on the Egyptian economy [5] reaching \$1.7 billion in 2012, and the large number of job opportunities offered to youngsters in different disciplines make this research critical to the development and growth of this industry in Egypt.

Technology based call centers are used by outsourcing companies to fulfill a large number of business process outsourcing services. A call center system [6] is a computer-based system that provides call and contact routing for high-volume telephony transactions, with specialist answering "agent" stations and a sophisticated real-time contact management system. The definition includes all call center systems that provide inbound contact handling capabilities and automatic contact distribution, combined with a high degree of sophistication in terms of dynamic contact traffic management. Therefore, its effective and efficient operation is a key ingredient to the overall success of any BPO service.

Measuring the performance of call centers has been extensively addressed in the literature; The Outsourcing Institute [7] indicates the growing importance of identification of qualitative metrics in measuring the performance of the outsourced call center. In [8], NAQC Issue Paper presents best practices in performance measurement and management to maximize call center Efficiency and Quality. The paper proposes identification of performance evaluation indicators instead of the classical ways based on customer surveys, customer praise, complaints, and observation of customer interactions. The modeling and simulation techniques in [9–11] are used to study the effect of different call centers parameters and to forecast the performance of the system.

This paper presents a new methodology to evaluate the performance of call centers based on the DeLone and McLean Information System model [12]. A complete set of performance indicators for call centers are identified and mapped to the six dimensions of the DeLone model. A weighted performance index is introduced to calculate the call center overall performance. Dimension weights reflect the relative priority of a certain dimension on the overall performance. The rest of the paper is described as follows: Section 3 describes the DeLone and McLean model as applied to Call centers. The indicators identified to track the call center's performance together with the mapping of these indicators to the six dimensions of the D&M model are presented in Section 3. Section 4 introduces the proposed Weighted Call Center Performance Index; Section 5 shows the results of the proposed methodology and the effect of different dimension weights on the performance assessment of the call centers under study. Finally, Section 5 concludes the paper.

## 2. The DeLone and McLean success model as applied to call centers

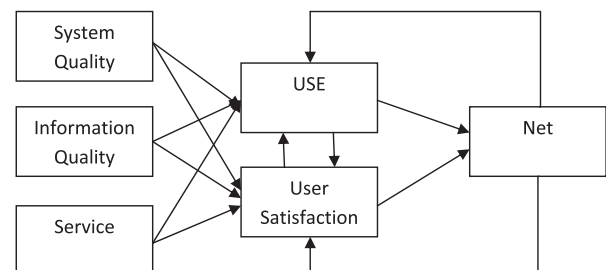
The original D&M IS success model [13] published in 1992 presented a conceptual framework to measure the success or

failure of information systems. According to D&M [16,17], measurement of IS success is critical for understanding the value and efficacy of IS management actions and IS investments. Ten years later, an update of the model was introduced that was based on theoretical and empirical IS research conducted by different researchers who have tested or discussed the original model [12,14]. In [15], DeLone and McLean adapted the updated model to the measurement challenges of the e-commerce systems. Two case examples have been presented to demonstrate how the model can be used to guide the identification and specification of e-commerce success metrics. The updated model, presented in Fig. 1, consists of six interrelated dimensions that should be considered in the evaluation of information systems:

- System quality
- Information quality
- Service quality
- Usage
- User satisfaction
- Net benefits

Following the same conceptualization method, this paper is applying the updated DeLone model as a framework to measure the performance of call centers. In this work, the six success dimensions of the DeLone and McLean IS success model can be applied to the call centers environment as follows:

1. System quality measures the essential characteristics of call center systems. Characteristics include the following:
  - a. Availability of the system (provides 7 × 24 customer services through the automated voice response unit).
  - b. Reliability of the system especially that the call centers depend mainly on the telecommunication infrastructure.
  - c. Intelligent call routing so that resources can be fully utilized, the use of intelligent call processing (ACD) routing determined by the choice of a variety of conditions.
  - d. Flexible channels of communication, allowing customers with the sales representative when you are free to choose, including traditional voice, IP telephony, e-mail, fax, text chat, video, etc., any means of communication.
  - e. Response time represented by calls abandoned, waiting time to answer, Average call-handling time (time actually on phone with customer).



**Figure 1** DeLone and McLean updated IS success model.

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