Critical Success Factors of Business Intelligence System Implementations:
Evidence from the Energy Sector

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ABSTRACT

Business Intelligence (BI) systems are applied by increasing numbers of organizations in a wide range of sectors. Despite the growing numbers of BI solutions and the experience augmented in many implementation projects worldwide, as well as the value that BI systems provide to organizations, IT literature lacks a coherent set of definitions through which BI systems can be classified, categorized, and assessed. Furthermore, BI implementation projects often do not succeed or do not fully accomplish the degrees of value and performance as expected, when firms fail to complete the system implementation, to satisfy the needs of users or when the benefits BI systems produce are lower than anticipated. This paper presents an analytical framework through which BI systems are defined and classified. On the basis of this framework, possible technical, organizational, and personal factors that affect the failure, partial or full success of BI system implementations are discussed. These factors are followed by a case study and empirical data analyses that exemplify and assess the extent to which various organizational attributes and properties of users influence the success or failure of BI implementation projects. Finally, implications regarding the management of BI system implementation projects and the organizations that apply them are derived.

Keywords: *Business Intelligence Implementation Projects, Business Intelligence Systems, Critical Success Factors, Data Analysis Tools, Decision Making*

INTRODUCTION

Information derived from data describing the business activities in which organizations are engaged has become one of the most important resources for firms and for public organizations, as it indicates the breadth and the quality of their operations and orientates their visions, strategies and business activities. When firms and organizations can access relevant information pertaining to their clients, operations, rivals and business environment, or even organizing existing data to generate the needed information, they obtain crucial inputs and useful insights for decision making processes and for analyzing changes and trends in their business environment (Buchanan & O'Connell, 2006; Gibson et al., 2004).

As a part of their daily tasks, managers are required to make reliable and well-based

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decisions that adequately reflect the business reality or parts of it that are relevant to the business processes of the firm. These decisions are usually based on data that are augmented throughout the period of the operation of the firm. However, in many cases, these data amount to substantial volumes and are stored in different locations and forms that hinder their frequent retrieval and use, despite their substantial value and usefulness to decision makers (Markus, 2001). For example, the challenge that a large bank attempting to identify particular changes in the behavior of its customers from millions of daily transactions that they perform can be likened to finding specific information needles within a gigantic data haystack.

Business intelligence (BI) technologies were developed to address such challenges and to provide firms and other business entities with efficient and rapid solutions for the organization of their data (Philips & Vriens, 1999). Since the very first stages of their development, BI systems play a major role in decision making and in strategic thinking processes in a wide spectrum of organizations, re-organizing large volumes of unstructured data and enabling managers and decision makers to generate necessary information (and to some extent even to produce know-how).

Some scholars refer to BI as a tool (Graves, 2005), while others regard it in the broader context of a technology (Gibson et al., 2004; Hannula & Pirttimäki, 2003). Consequently, the definitions and the reference models of BI may vary and the impact of BI on the organization may be assessed in different ways. Despite the differences between the definitions of BI systems as products or as technologies, we can identify several commonalities among them. Researchers agree that the relative success of gathering data from the business environment of the firm and producing useful inputs for decision makers is amongst the most important assessment criteria of BI systems. Another common attribute of BI definitions consists of the links between organizations, systems and the domains in which they operate.

Prior studies on BI systems that attempted to produce a single and unified definition of BI systems (Bock et al., 2009; Buchanan & O'Connell, 2006) emphasized several essential objectives that BI systems aim to achieve, as follows (Codd, 1993; Corbitt, 2003):

- BI systems describe the business environment in which organizations operate, by producing specific indicators on the activities of actors within it.
- BI systems provide a description of the organizations themselves and their position in the market via the processed data and information.
- BI systems represent the links between firms, their customers, rivals and the economic climate in which they operate.

Following the models of Graves (2005) and Lönnqvist and Pirttimäki (2006), we can form a unified definition of BI systems as tools that gather, process, produce and present information on the business environment and on internal operations to provide useful inputs for managerial decision making processes within the firm.

In general, BI tools correspond to one or several of the following categories:

1. *Data warehouse tools* – enabling extraction, transformation and loading/retrieval of large volumes of data and processing it into information (Corbitt, 2003).
2. *Data mining tools* – aim at gathering and processing information that is stored in existing databases (for example, historical data on past transactions, vendors and customer lists) to generate new information that serves as an input in managerial processes.
3. *Online analytical processing (OLAP) systems* – the term OLAP was first presented by Codd (1993), describing it as "dynamic synthesis, analysis and consolidation of large volumes of multidimensional data". Indeed, OLAP tools are based on queries that are formed to reveal a range of defined