

# Chapter XIV

## Empirical Investigation of Critical Success Factors for Implementing Business Intelligence Systems in Multiple Engineering Asset Management Organisations

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### **ABSTRACT**

*Engineering asset management organisations (EAMOs) are increasingly motivated to implement business intelligence (BI) systems in response to dispersed information environments and compliance requirements. However, the implementation of a business intelligence (BI) system is a complex undertaking requiring considerable resources. Yet, so far, there are few defined critical success factors (CSFs) to which management can refer. Drawing on the CSFs framework derived from a previous Delphi study, a multiple-case design was used to examine how these CSFs could be implemented by five EAMOs. The case studies substantiate the construct and applicability of the CSFs framework. These CSFs are: committed management support and sponsorship, a clear vision and well-established business case, business-centric championship and balanced team composition, a business-driven and iterative develop-*

*ment approach, user-oriented change management, a business-driven, scalable and flexible technical framework, and sustainable data quality and integrity. More significantly, the study further reveals that those organisations which address the CSFs from a business orientation approach will be more likely to achieve better results.*

## **INTRODUCTION**

### **Background**

Engineering asset management organisations (EAMOs), such as utilities and transportation enterprises, store vast amounts of asset-orientated data (Lin, Gao, Koronios, & Chanana, 2007). However, the data and information environments in these organisations are typically fragmented and characterised by disparate operational, transactional, and legacy systems spread across multiple platforms, diverse structures, and different data formats (Haider, 2007; Haider & Koronios, 2003). The plethora of different systems makes it very difficult, even impossible, for a system in one functional unit to communicate with systems in other units. This lack of integration of information systems, together with the large volumes of transactional data which might be spread in different pools across the enterprise, can lead to increased difficulties in analysing, summarising, and extracting actionable information resulting in suboptimal management performance (Ponniah, 2001). Moreover, heightened competition resulting from market deregulation as well as increased regulatory compliance and governance requirements, such as the Sarbanes-Oxley ordinance in the U.S. and the CLERP 9 Acts in Australia, have demanded greater accountability for decision making within such organisations (Logan & Buytendijk, 2003; Mathew, 2003).

On the other hand, existing management information systems are no longer adequate for EAMO's modern business needs and not always meeting the expectations of decision makers at

all hierarchical levels (Olszak & Ziemba, 2007). These systems were unable to handle the integration of different, dispersed, and heterogenic data within such enterprises. Nor could they effectively interpret such data in any broader contexts or discover new data interdependencies (Bui, 2000, cited in Olszak & Ziemba, 2007; Gray & Watson, 1998), due to improper techniques of data acquisition, analysis, discovery, and visualisation (Olszak & Ziemba, 2007). Therefore, in response to these pressing challenges of information dispersion and compliance requirements, EAMOs are compelled to improve their business execution and management decision support through the implementation of a contemporary BI system (Olszak & Ziemba, 2007).

According to Negash (2004), "BI systems combine data gathering, data storage, and knowledge management with analytical tools to present complex internal and competitive information to planners and decision makers." Whilst Moss and Atre (2003) state that "it is an architecture and a collection of integrated operational as well as decision-support applications and databases that provide the business community easy access to business data." Stated simply, the main tasks of a business intelligence (BI) system include "intelligent exploration, integration, aggregation and a multidimensional analysis of data originating from various information resources" (Olszak & Ziemba, 2007). Implicit in this definition, data is treated as a highly valuable corporate resource, and transformed from *quantity* to *quality* (Gangadharan & Swami, 2004). As a result, critical information from many different sources of an asset management enterprise can be integrated into a

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