The Impact of Data Environment and Profitability on Business Intelligence Adoption

Chien-wen Shen, Ping-Yu Hsu, and Yen-Ting Peng

Department of Business Administration, National Central University
No.300, Jhongda Rd., Jhongli City 32001, Taiwan
cwshen@ncu.edu.tw, pyhsu@mgt.ncu.edu.tw, amberpeng@hotmail.com

Abstract. The deployment of business intelligence (BI) involves complex processes of data reconfiguration and resource alignment. This study investigated whether the issues of data environment and profitability affect BI implementation for the manufacturers that have already adopted enterprise resource planning systems. We individually considered the factors of data warehousing, online analytical processing (OLAP), and data mining for the data environment, while return on assets, return on sales, and return on investment were transformed into a single component of profitability using principal component analysis. Through logistic regression, we determined that OLAP and data warehousing play important roles in the adoption of BI; however, data mining and profitability indicated no such influence.

Keywords: Business Intelligence, Data Environment, Profitability, Enterprise Resource Planning.

1   Introduction

Business intelligence (BI) is a set of technologies that can improve a firm's decision-making and work-flow through the acquisition and analysis of business data [12]. Because obtaining comprehensive information in a timely manner is critical to the development of new products and the improvement of business operations, BI also plays a central role in producing up-to-date information for operative and strategic decision-making [10]. The implementation of BI enables organizations to acquire, analyze, and disseminate information from internal and external sources in an organized and systematic manner [19]. In addition, BI applications provide tools that can be used throughout the organization to access, analyze and share information from a variety of data sources [3]. Managers involved in manufacturing typically implement BI tools to streamline inventory queries, response orders, and decision making. Hence, BI is considered an important IT investment due to its ability to enhance competitive advantage through the analysis of profitability, product or service usage, and marketing. According to a survey in Network Magazine [22], the total worldwide revenue of the five major BI vendors, which included SAP, Oracle, SAS, IBM and Microsoft, was US$73.63 billion in 2010, representing a 14.3% growth rate from 2009. Although the annual growth rate of the BI market is

impressive, the adoption rate of BI for service organizations is only 43%, which is relatively low compared to the 94% adoption rate of enterprise resource planning (ERP) [26]. One of the reasons for the low BI adoption rate is that the benefits of BI are mostly non-financial or intangible [21]. A BI system must often compete with other IT projects for limited capital resources because managers tend to look for IT solutions offering the highest risk-adjusted return on investment. Hence, profitability plays an important role in the investment decisions related to BI projects. In addition, companies must deal with a variety of issues associated with decision process engineering, functional use, information usage, strategic alignment, technical readiness, and IT partnership to ensure the successful implementation of BI. When the readiness of the data environment is critical to the delivery of information and analytical applications, the deployment of BI typically involves complex processes of data reconfiguration and system alignment.

The main objective of this study is to investigate the impact of the data environment and profitability on the implementation of business intelligence, as both factors are important considerations in the purchase of BI. However, there remains a lack of research investigating this connection. Exploring the relationships between the data environment and the adoption of BI enables companies to prioritize the preparation of data infrastructure in capital-constrained circumstances, while assessing the correlation between profitability and BI implementation helps managers to evaluate the financial feasibility of BI projects. Thus, in Section 2, we begin with a discussion of general information environments associated with BI. In Section 3, we describe the methodology of principal component analysis and logistic regression analysis used in this study. Because BI is generally the next IT solution implemented after ERP, this empirical study evaluated how the data environment and profitability influence the adoption of BI systems by manufacturers with existing ERP systems. Results are summarized in Section 4. We conclude our findings and suggest potential future research topics in the final section.

2   Information Environment of BI

An integrated framework of BI elements commonly includes operational data, integrated data, data storage, BI software, and analytical applications [3]. The tier of operational data provides data that are retrieved from CRM applications, ERP applications, and online transaction processing (OLTP). The tier of integrated data consolidates, merges and stores enterprise-wide operational data from various transactional systems [3]. Meanwhile, the tier of data storage contains data warehouse (DW) and data mart to enable rapid, complex, ad hoc queries with drill-down capability. Generally speaking, constructing a BI system progresses through the extraction, transformation, and loading of data dispersed throughout various information systems into a data warehouse system [15]. Data warehousing comprises a shared data warehouse and a subject-oriented data mart for the management of support-oriented data [25]. The construction of data warehouses is commonly designed in a star schema, snowflake schema, or fact constellation. Data warehouses are sometimes called multidimensional databases because they present a