Using Fuzzy Logic for Optimizing Business Intelligence Success in Multiple Investment Combinations

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INTRODUCTION

Because of the markets agglomeration and economic environment evolution, the ability to collect data and convert them to useful information for the decision process can be the element which introduces value-added services ahead of the competition and makes competitive advantage. Lack of vertical integration of information systems, together with the rapidly increasing volume, velocity, and variety of data spread across the enterprise, make it extremely difficult for management to analyze, summarize and extract reliable, relevant, and easy to use information for decision making. In response to these problems, many organizations are compelled to improve their business execution and manage cross-organizational decision support needs in terms of access to relevant information through the investment of a BI system (Akhavan & Salehi, 2013; Luminita & Magdalena, 2012; Petrini & Pozzebon, 2009).

The main task of a BI system (BIS) include intelligent exploration, integration, aggregation and a multidimensional analysis of data as a highly valuable corporate resource which originate from various information resources in order to provides a better understanding of underlying trends and dependencies that affect the business. Hence, meaningful and actionable information can be delivered at the right time, at the right location, and in the right form to assist individuals, departments or divisions to facilitate effective decision making. Business intelligence system is wide spread across organizations throughout most

industries and become a technological solution offering data analytical capabilities and has a significant role in business value of the firm (Azma & Mostafapour, 2012; Ramakrishnan, Jones & Sidorova, 2012). BI is comprised of technical and organizational elements which aggregate and present greater volumes of data in different ways from multiple sources. It enable management support, increase autonomy, organizational performance and flexibility of users by creating quick and simple analyses (Isıka, Jones & Sidorova, 2013; Jamaludin & Mansor, 2011).

In today's highly competitive and increasingly uncertain world, the quality and timeliness of an organization's BI can mean not only the difference between profit and loss, but also even the difference between survival and bankruptcy (Bahrami, Arabzad & Ghorbani, 2012). Companies using BI systems can achieve a single consistent new and unified insight of business information, manage and analyze structural and non-structural information and exploit it to gain knowledge about the business domain (Bonney, 2013; Lin et al., 2009). Consequently organization could comprehend hidden meanings in data, predict, solve problems, innovate and learn in ways that increase organizational knowledge, implement new business model, optimize decision making processes, and establish and achieve business goals effectively (Rouhani, Ghazanfari & Jafari, 2012). It also reduces the probability of underperformance or sudden extreme decisions due to late arrival of information and enhances efficiency and transparency in the internal affairs of the key processes and procedures (Rubin & Rubin, 2013). BI technolo-

gies integrate a large set of packages and tools for data analysis, query, and reporting such as online analytical processing[1], data mining tools, report extractors, applied artificial intelligence, visualizations, statistical analysis, forecasting, dashboards, and the underlying specialized IT infrastructure (such as data warehouses, data marts and ETL tools) (Elbashir, Collier & Davern, 2008).

A successful investment of BI system requires abilities such as ensuring the delivery and investment of BI projects; ability of acquiring standardized data elements and changing process to ensure the quality of data acquired, integrating all strategic objectives within the organization, designing strategic map and transmitting important corporate value (Jamaludin & Mansor, 2011; Lin at al., 2009). However BI investments make diverse problems for business management associated with its investment success and hence can put an organization at the risk of losing associated with competitive advantageous. Those problems can be derived from the existence of a large amount of criteria for considering and evaluating in the investment which are not all tangible. Difficulty of understanding the complex factors involved in BI success is due to scope and impact of the decision, the concept of value and its multi-dimensional facets, vagueness natures of BI success and estimating the impact of them accordingly. As a result, many organizations struggle to measure BI success and they search for better ways to evaluate BI systems investment to understand their role and better justify their procurement.

In this regards researchers and practitioners propose fuzzy logic in order to overcoming the complexity of evaluation the business intelligence investment. Using the concept of fuzzy sets theory and natural language to evaluate the success criteria is more convenient, allow to adequately establishing a model that can provide managers with the tool to deal with complex issues in BI success. Even though an abundance of research in fuzzy logic has been conducted in the past, relatively little attention has been paid to applications of fuzzy logic technology in business intelligence success. Consequently, the main purpose of this article is to evaluate the critical factors of BI success by a powerful and precise method named fuzzy logic. These critical factors contribute in creating the fuzzy inference system and form a firm basis for guiding the managers and scholars to make more optimized results of investing on business intelligence. The structure of the article is as follows. In the next section, the BIS success factors

are presented to reflect the most significant influential factors on this system. The fuzzy inference system of BI success evaluation is then designed. Finally, the results are discussed, while further possible research directions are outlined.

BACKGROUND

BI success is related to the positive value such as improved profitability, reduced costs and improved efficiency which an organization obtains from its BI investment and fit between an organization's BI and its goals. A successful project must be completed within budget and according to schedule while functioning as required (Sangar & Iahad, 2013). Since BI system investment effort is a costly, time-consuming, resource intensive process, there is a common view among scholars which it is difficult to measure its influential factors then there has been little empirical research about the critical success factors (CSFs) impacting the investment of such systems (Akhavan & Salehi, 2013). This is because the study of BI systems is a relatively new area that has primarily been driven by the IT industry and vendors, and thus there is limited rigorous and systematic research into identifying the CSFs of BI system investment (Yeoh, Koronios & Gao, 2009). However, no study has provided an in-depth analysis of BIS success. Consequently, our study's main objective is to provide a comprehensive understanding of the interrelationships between BIS success dimensions.

1. Committed Management Support and Sponsorship

Consistent support and sponsorship from business executives make it easier to secure the necessary operating resources throughout the investment process. BI system investment is a continual information improvement program and evolves through an iterative process of systems development in accordance to dynamic business requirements. What's more users tend to conform to the expectations of top management and so are more likely to accept a system backed by their superiors. Therefore the BI initiative requires consistent resource allocation and top-management support such as financial support, qualified human resources, adequate time and the required technologies in the application process in each

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