Journal of Database Management
Volume 31 • Issue 3 • July-September 2020

A Framework for Building Mature Business Intelligence and Analytics in Organizations

Amrita George, Marquette University, USA
https://orcid.org/0000-0002-6441-251X

Kurt Schmitz, Georgia State University, USA
https://orcid.org/0000-0003-1187-9068

Veda C. Storey, Georgia State University, USA

ABSTRACT

As activities are increasingly being digitalized in business and society, organizations have sought ways to effectively and competitively, use data. Business intelligence and analytics (BI&A) systems which support managerial decision-making continue to be developed and used. Given the importance of these systems, it would be useful to have a comprehensive and mature guide to support their development and improvement. This research proposes a BI&A Competitive Advantage Maturity Model to identify the main technical and non-technical dimensions of a system to support business intelligence and analysis. The model is based on work systems theory and related research. It maps descriptive characteristics of its main dimensions across analytic adoption stages of aspirational, experienced, and transformed. The development of the model employed a modified Delphi study technique, design science research, and citation analysis.

KEYWORDS

Analytics, Analytics Adoption Stages, Aspirational, BI&A Competitive Advantage Maturity Model, Business Intelligence, Citation Analysis, Content Analysis, Delphi Study, Descriptive, Design Science Research, Experienced, Maturity Model, Predictive, Prescriptive, Transformed, Work Systems Theory

INTRODUCTION

Business decisions, once the realm of intuition and anecdotal experience, are being reinvented by modern organizations using data. Business Intelligence and Analytics (BI&A) encompasses the technologies, systems, practices, techniques, and methods that analyze data to help organizations understand themselves, their markets and their customers, in order to make business decisions (Chen, Chiang, and Storey, 2012). Mature BI&A systems can be the basis for making effective decisions, improving performance, and exploiting new opportunities (Olszak, 2016). Organizations attempt to improve and expand their BI&A capabilities to advance their competitive position. There has been much press coverage, with exemplars such as Google and Amazon, as well as significant investment

DOI: 10.4018/JDM.2020070102

across industries. However, the majority of organizations (over 87% in one study) are considered as having "low maturity" (Chien 2018), and failing to reach their strategic goals (Grover et al., 2018).

Progressing from stand-alone analytics projects to a BI&A capability that drives decisions across an organization, requires more than big databases and powerful processing capabilities. Competitive advantage requires maturity across many dimensions: collection and analysis of data (Delen and Demirkan, 2013); sophistication of data consumers (Kiron and Shockley, 2011); alignment with organization strategies (Hribar Rajterič, 2010); and cultural commitment of an organization (Davenport, Harris, De Long, and Jacobson, 2001). However, current maturity models focus on specific components (Lahrmann et al., 2011; Foshay et al., 2015; Chen and Nath, 2018). Although various BI&A maturity models have been proposed (Larhmann et al., 2010), they often lack theoretical foundations, empirical validation, and the ability to operationalize maturity measurements (Lasadro, Vatrapu, and Andersen, 2015). Instead, they typically focus on improving technological, business-technical alignment, or analytical capabilities, with little emphasis on the main value proposition of competitive advantage (Chen and Nath, 2018).

Organizations use BI&A system to sense and respond to market needs by focusing on automation and cost reduction, optimization, profitability and exploring newer avenues (LaValle et al., 2011). While the aim is to be competitive, the purchase or development of a BI&A tool alone is not sufficient (Siow, Tiropanis, and Hall, 2018). Many questions arise about the organizational resources and capabilities that influence successful deployment of analytical capabilities (Kohli and Tan, 2016; Abbasi, Sarker, and Chiang, 2016). These include the: role of executive leadership and information technology (IT) departments; data needs and how they can be made available to stakeholders; organizational transformation from an intuition-based decision-making culture to a data-driven one; potential instrumental and humanistic outcomes; and main factors influencing business value for real-time decision making using big data. Organizational resources and capabilities have an immense influence on the success of using a BI&A system to gain competitive advantage. Therefore, to derive value from a BI&A initiative, an organization needs to ensure that its initiative is aligned with its organizational context.

Alignment involves understanding under what conditions organizational actors are able to generate insights using BI& A systems, although this topic has not been well-explored (Günther et al., 2017). It necessitates the need to understand the specific contributions of human and algorithmic intelligence to gain insights for different situations (Günther et al., 2017). Examples are cost reduction, operational efficiencies, or using BI&A for emergent or temporal situations. Although many capabilities have been proposed that enable accessing, tracking, collecting, managing, governing, processing, and analyzing big data for data-driven decision making and implementation, organizations still need to identify how to effectively develop, mobilize and use the technical and human resources related to big data in a structured fashion (Günther et al. 2017). Organizations face questions regarding how to acquire or develop technical and human resources, and how to structure teams or departments (Günther et al., 2017). Deploying and structuring organizational resources alone will not enable value creation using BI&A. An understanding of the capabilities of an existing BI&A system for achieving a given objective is needed, as is an understanding of the actions required to achieve a high level of effectiveness (Rajterič, 2010).

The objectives of this research are to: develop a maturity model for BI&A that: defines the capability dimensions needed for data-based decision making; and identifies the characteristics needed at different maturity capability levels to achieve competitive advantage. To do so, relevant literature on BI&A is reviewed, and a Delphi Study conducted from which a Business Intelligence and Analytics (BI&A) Competitive Advantage Maturity Model is derived. Then, a content analysis is applied to improve the validity and robustness of the proposed model. The contribution is the development of a BI&A Competitive Advantage Maturity Model that can help organizations recognize and measure their maturity profile, while providing prescriptive advice for progressing BI&A to advance a firm's competitive position.