The IT Department’s Role in Enabling Business Value from Business Analytics

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Abstract

With increasing maturity of analytical software tools, many companies deploy at least basic forms of business analytics to improve data-based decision making. Research about analytics in the field of information systems is currently scarce. While existing work primarily focused on capabilities for successful implementations, no attention has been paid to the role of the IT department. The goal of this paper is to explore and validate different roles of how the IT unit contributes to business value for business analytics. The proposed research model draws from the resource-based view and IT management theory. It provides a comprehensive summary of critical resources that are derived from literature. Preliminary results of case studies with nine CIOs and senior IT executives confirm the presence of four typological profiles for the IT. In a next step, we plan to formulate hypotheses and empirically validate the model.

Keywords

Business Analytics, Business Value, IT Department, IT Alignment, Resource-Based View

Introduction

Over a decade after Davenport and Harris (2007) introduced the concept of business analytics to a broader audience, many firms increased efforts to become data-driven. Less mature companies may deploy business intelligence tools like data warehouses to create weekly reports. Analytical competitors, in contrast, integrate analytics into their business model to achieve a sustainable advantage (Davenport and Harris, 2007). For this paper, we follow an established definition and see business analytics as the use of data to make sounder, more evidence-based decisions. Business intelligence includes IT tools like data warehouses, data mining or visualization software that enable analytics (Seddon et al., 2017).

Prior work on the business value of analytics investigated critical capabilities that create value. Those are generally divided in technical and organizational aspects. However, none of those investigations looked at the role of the IT department. Therefore, we follow Abbasi et al.’s (2016, p.17) call with our research question:

What is the Role of the IT department in enabling business value from business analytics?

To answer this question, we summarize past research in a model that incorporates all relevant factors that build analytics capability. Subsequently, we use IT management theory (Guillemette and Pare, 2012) to preliminarily evaluate the model from the perspective of different types of the IT. We hypothesize that already existing roles of the IT can also be found with regards to analytics. This research will add to the body of knowledge about analytics in two ways. We first test a comprehensive set of success factors in the model, which helps to consolidate constructs that influence business value from prior studies. We then derive ideal profiles of the IT department with tasks and responsibilities. Our results offer valuable input to the discussion about how the IT unit can help to succeed with analytics (Marchand and Peppard, 2013).
Theoretical Background & Research Framework

Business Value of Business Analytics

Research on the business value of IT studies how IT investments create organizational benefits and improve business performance (Schryen, 2013). Aral and Weill (2007) argue that investments in IT do not directly have a positive outcome, unless IT resources, consisting of assets and capabilities, are built first. Regarding the business value of analytics, Vidgen et al. (2017) find that analytics endeavors require a strong alignment between technical aspects, organizational commitment and the right strategy for creating big data and analytics capabilities. Seddon et al. (2017) summarize existing work in an integrated analytics success model. Drawing from 16 prior studies, they present a framework that differs between long-term factors like analytical leadership or enterprise-wide analytics orientation, and project-related drivers like the functional fit analytics tools and availability of high-quality data. Krishnamoorthi and Mathew (2018) propose a comprehensive model that attributes business performance to both analytics technology assets and capabilities. Value-enhancers like a mature analytics ecosystem or strong leadership moderate the effect.

The resource-based view (RBV) is widely used as a theory in strategic management research because it combines economic principles with a management perspective. Barney (1991) argues that organizations deploy different combinations of resources to achieve a competitive advantage. Resources consist of assets and capabilities. Assets can be tangible or intangible and are used to create new products and services, while capabilities are repeatable patterns of actions in the use of assets to transform input into value-added output (Grant, 1996). With regards to information systems (IS) research, Aral and Weill (2007) find that spends in general IT assets do not directly improve performance. A firm’s strategy, e.g., achieving high operational effectiveness, must guide investments in various kinds of IT assets to deliver value for a dedicated purpose.

IT Management Theory

Organizations permanently need to respond to external and internal developments to stay ahead of the competition, which also affects the role of the IT. Guillemette and Pare (2012) propose a theory about the contribution of the IT. They derive five types (Partner, Systems Provider, Architecture Builder, Technological Leader, and Project Coordinator) from literature and validate them following a case study approach. Each function describes a unique combination of the primary mission of the IT, the focus of IT activities, the relationship with business units (BUs), and IT professionals’ skills. For example, a company with the IT’s role as technological leader aims to derive new IT-based strategic opportunities, experiments with IT applications, is characterized by a strong CEO-CIO relationship and employees need technical, interpersonal skills and industry knowledge. The authors find that organizations that closely match one these roles outperform others. Additionally, three contingency factors that allow a classification of any firm’s IT in one of the profiles are developed. The criteria are the CIO’s interpretation of how executives see the IT, the CIO’s personal view of his/her strategic influence and the CIO’s perception of the management’s IT knowledge.

Research Framework

Building on previous work about the business value of analytics and IT management theory, we arrive with a research model, which is presented in figure 1. Our motivation is to explore what resources different types of IT departments need to improve their business performance. The model primarily draws from the RBV (Barney, 1991) and we see its high acceptance in extant literature as a proxy for its explanatory usefulness. We argue that building analytics resources derives business value. Like Aral and Weill (2007), we define resources as a mutually reinforcing system of investments in assets and building capabilities. Analytics assets include spends in infrastructure, automatization, data sources, and strategy. Analytics capabilities consist of interacting competencies and practices. Data management and data analytics skills relate to IT and IT management skills as defined by Aral and Weill (2007). Effective project management will deliver high-quality data and systems for internal and external use (Wixom and Watson, 2001). Overcoming organizational inertia measures the extent to which employees are motivated to learn, use and accept new systems and services (Seddon et al., 2017). Leadership and the alignment of analytics with BUs are drawn from Davenport and Harris (2007). User-focused change management aims to improve user participation and acceptance (Yeoh and Koronios, 2010). Analytical decision making describes the extent to which a culture of evidence-based decision making is embedded in the core values and processes of a firm (Seddon et al.,
While the business value as dependent variable is often not properly defined, we see business performance as composition of different variables. Profitability, market value, and operational performance are used to quantify financial aspects. Innovation is the extent to which firms can use analytics to strengthen their product and service portfolio to achieve a competitive advantage.

**Research Methodology**

Our model builds on established theory about the benefits of analytics. However, the role of the IT department, which we assume has a moderating effect on analytics resources, has not yet been considered and requires explorative methods (Benbasat et al., 1987). We chose a case study approach because it offers an in-depth view of a phenomenon and helps to answer the how and why of our research question (Yin, 2014).

As the goal was to understand if the five roles of the IT were applicable to analytics or needed modifications, we conducted a multiple-site case study. The total population and unit of analysis were IT departments within firms that deploy at least basic forms of analytics. We focused on CIOs and senior executive IT staff to ensure the reliability of data. A survey with open-ended questions was created from the constructs in the research model. It consisted of questions that determine the role of the firm’s IT, its analytics assets, capabilities and business performance. We additionally gathered descriptive data about the firm and respondents. To ensure validity, we asked four PhD scholars with and without analytics background to think of themselves as CIOs and to rate how well our questions fit. Reliability of the results can be tested by interviewing new participants with the same set of questions we designed. The survey was sent to industry contacts from the authors’ networks as well as CIOs that were identified via LinkedIn. We deliberately reached out to respondents from various industries and company sizes to gather a broad range of input. Open questions and follow-ups were handled via email or phone. In total, we reached out to a hundred contacts and collected nine useful data records for an early analysis. In a first step, we determined the role of the IT applying the contingency factors provided by Guillemette and Pare (2012), which resulted in four cases being labeled as partner and technological leader each, and one as systems provider. We investigated if there were any patterns observable within each class or in comparison to others that allowed a distinctive characterization. Additionally, we looked at answers that were consistent throughout all participants. Those were then handled as the common denominator that every IT functions must provide.
Preliminary Results

Our case study participants had a minimum of ten and a maximum of 30 years IT experience, with roles as a CIO (6x), business development director, senior data scientist, and senior consultant. The number of employees ranged from 12 to 144,000 with a median of 750. Participants originated from the IT service (3x), automotive (2x), consumer electronics, engineering, fashion and power/electronics industry. Based on the above-described contingency factors, we classified companies as partner (4x), technology leader (3x) and one each as systems provider and project coordinator. The profile of an architecture builder did not occur. All respondents stated to a certain extent that the IT needs to be an active partner in an innovation process. Throughout all cases, it is the IT’s responsibility to implement analytical applications and maintain the architecture. IT staff need at least basic technical and analytical skills. We see those tasks and capabilities as the minimum level of contribution every IT department needs to provide.

<table>
<thead>
<tr>
<th>Role</th>
<th>Partner</th>
<th>Technology Leader</th>
<th>Project Coordinator</th>
<th>Systems Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary mission of IT for analytics</td>
<td>Facilitate and be key contact for analytics endeavors</td>
<td>Actively promote analytics and conduct efforts to develop new strategic opportunities</td>
<td>Create value by sourcing analytics capabilities from external partners</td>
<td>Supply systems and infrastructure for analytics needs</td>
</tr>
<tr>
<td>Analytics practices</td>
<td>Leadership, analytical culture, business alignment</td>
<td>Analytical culture, change management, leadership, business alignment</td>
<td>Leadership, change management</td>
<td>No additional activities beyond minimum level of contribution required</td>
</tr>
<tr>
<td>Analytics skills</td>
<td>Data and project management</td>
<td>Data analytics, overcoming organizational inertia, project management</td>
<td>Data and project management</td>
<td>Data management</td>
</tr>
<tr>
<td>Analytics assets</td>
<td>Infrastructure, automation, strategy</td>
<td>Infrastructure, data sources, strategy</td>
<td>Infrastructure, data sources</td>
<td>Infrastructure, data sources</td>
</tr>
<tr>
<td>Relationship with BUs</td>
<td>Proactive/reactive, strong presence</td>
<td>Proactive, strong CIO/CEO relationship</td>
<td>Proactive/reactive</td>
<td>Reactive</td>
</tr>
<tr>
<td>Minimum contribution</td>
<td>Be an active partner in business transformation through analytics, maintain IT architecture and implement new analytics applications</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Table 1. Modified Roles of the IT for Analytics

A summary of new profiles for the IT is presented in table 1. Each role is a unique combination of the primary mission of the IT, analytics practices, skills, assets and the relationship with BUs. We found support for all except the architecture builder role. All case studies revealed that building and maintaining a performant analytics infrastructure is the minimum contribution every IT must offer. Being an architecture builder for analytics applications is the first step to subsequently leverage data. The partner profile describes a setting in which the IT facilitates analytical aspirations. Its task is to give ideas a voice, while the active process of data analytics is conducted within BUs. Technological leaders go a step further by promoting analytics and actively leading projects to create new strategic opportunities. Because projects are actively driven to create new strategic opportunities, a strong relationship between CIO and CEO is necessary. Project coordinators promote activities from BUs and coordinate efforts with external teams. In contrast to the partner role, skills and knowledge are obtained from third partners. System provider is the least influential role with the sole duty to offer infrastructure and data. In most cases, this type occurs if there is a dedicated analytics unit. We could not identify any variations in business performance. All roles contribute to profitability, market valuation, operational performance and innovation to some extent.
Discussion & Further Work

In this work, we aimed our efforts to answer the question through what mechanisms the IT department contributes to business value. The goal was accomplished by summarizing prior findings in a framework and using a multiple case study approach with nine CIOs and senior executives. Early results showed support for four roles by Guillemette and Pare (2012) regarding analytics. CIOs can use the results as a reference to identify their role and adjust activities. The small sample size of nine respondents only serves as a first assessment. While the case study approach allowed us to initially explore different roles, it probably did not cover all possible configurations. Going forward, we intend to modify our model to conduct quantitative assessment. Hypothesizes will be created that measure assets, skills, and practices that were deemed as critical for each of the four roles. We plan to use Partial Least Square Structural Equation Modeling (PLS-SEM) as it has several strengths compared to other methods (Hair et al., 2011). It allows identifying key constructs, which, in our case, are very important as they are used to differentiate between the roles of the IT department. Because we focused on CIOs and senior executives, it was difficult to find participants for our case studies. We expect this to be an issue again for an empirical analysis. PLS-SEM covers this as it is robust to non-normal data and only requires a sample size of ten times the number of formative indicators used to measure one construct. Collecting enough responses might be an issue, because we explicitly target CIOs and senior IT staff. We plan to contact respondents using the Data Warehousing Institute’s email list or leads from market research companies.

References


