HOW DATA MANAGEMENT AND ANALYTICS TOOLS BENEFIT AN ORGANIZATION – A CASE STUDY

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ABSTRACT

Utilization of Big Data and data analytics have become prominent at a variety of businesses in the past few years. Many have started large scale efforts and dedicated significant resources to initiatives with the expectation that there will substantial value created for organizations at the end. With this case study we identify sources of value as it emerges from processes and employers. We found that at the company studied analytic efforts evolved from client requests, efforts to streamline internal operations, and personal development desires of motivated employees.

INTRODUCTION

Organizations manage vast amounts of data, but few are able to actualize value [3]. Reasons include the inability to fully understand 'their' data, failure to create viable insights from data, investments in data warehousing (or other data-related endeavors) that never mesh with business processes, and complicated analytics environments that don't reticulate with business value [2].

One exception is Amazon that tracks customer history to align customer preferences [18]. Amazon relies on this data to align with customer preferences, segment customers, and create better customer loyalty. Another is Euclid (a Silicon Valley startup) that created software that uses smartphone Wi-Fi signals to monitor customer movements and augment customer profiles [5]. Data collected enables customer tracking of location inside or outside a store, length of time in store, and frequency visiting a store. It also provides information on return customers, how much customers spend, and customer loyalty over time.

Early adopters are already harnessing value from data analytics [9], which is also pushing organizations to consider Big Data initiatives to remain competitive [20]. However, sifting through the 'hype' is not easy. [13] augments the four 'Vs' of Big Data – variety, veracity, velocity, and volume – with 'value', where 'value' is the most important and often overlooked. Adding 'value' to the mix is critical because dealing with the 4 'Vs' is meaningless without value. Value creation hinges on several factors including the customer experience, data people, and leadership. Each area is presented in turn.

Customer Experience

Seventy percent of Big Data is created and consumed via digital television, social media, devices over the Internet, online shopping, and in-store shopping [15]. However, organizations have barely tapped the potential value because such data tends to be unstructured [2], [13], [15]. The reason is that very few methodologies exist to directly analyze unstructured data [13]. As a result, organizations attempt to structure it without mapping to a 'tested' methodology, which inevitably results in lost meaning and value. [13] suggests collecting some big data and start analyzing it. Continue by focusing on a 'quick' win to prove the data's value. A simple method like this not only enables value creation, it aids in

identifying procedural mistakes before moving on to much bigger projects. Moreover, proving the value of the data with a small project mitigates anxiety of business executives because it is less risky and costly.

An enhanced customer experience is measured by customer satisfaction, loyalty, and retention. Big data allows more refined customer segmentation [20], which leads to better understanding of customer desires and behavior [15]. Understanding customers through analytics can also facilitate a more strategic fit with current and potential product and service offerings [20]. Once Big Data can be leveraged to enhance the customer experience, business executives can make informed decision based on what the data reveals [9].

For value creation to happen, business executives must be able to glean business process information from their data. That is, they must be able to understand what the technical analyst provides relative to solving business problems and enhancing business processes that ultimately provide customers what they want. For instance, the ability to tag customer images in real time might create insight into what customers really want and enjoy [15]. However, business executives must be able to extract data that has business purpose. A major problem is that data people may not understand business process and/or how to translate what they extract from their data into something palpable for a business person. The next section delves into the relationship between data and business people.

Data People

Business executives are experts in business process, but not necessarily in data analytics. Since talented data people thrive in environments that encourage freedom to experiment, explore, and question the status quo [10], they must be able to identify, nurture, and retain data people that do possess such talent and cultivate an environment that empowers such people to leverage big data to cut cost, enhance performance, and create value [1], [3], [8], [9], [10], [20], [21], [22]. The best data people are very scarce and are attracted to organizations that encourage ideas about markets, market trends, and new ways to create value from analytics and Big Data [19].

Leadership

There is evidence that companies using data and business analytics to guide decision making are more productive and experience higher returns on equity than companies that do not [6]. Yet, business executives may be slow to embrace Big Data and analytics because they see it as a threat to their ability to make good decisions based on their deeply held intuition [3]. It is a natural reaction to resist what is not understood and a challenge to their decision making acumen. However, business executives can still trust their instincts while working with data people to provide empirical and analytical evidence to support their decisions [1]. They should rely on what they know about business and how to align business processes with Big Data initiatives [17]. Leadership in the analytics era requires leaders to be more creative [2], more interactive with data people [8], [10], [23], more focused on developing business-relevant implementations [2], and more engaged in creating a culture that rewards data-oriented solutions [1]. Leaders should cultivate a culture that encourages and rewards ideas from data. This introduction leads to the *Research Questions* we address in our stream of qualitative research: In what way(s), perceived and/or tangible, do big data and analytics initiatives add value in organizations? How are organizations actually utilizing data analytics initiatives?

METHODOLOGY

Case study research is appropriate when existing theoretical knowledge of phenomena are limited, few studies exist [4], [12] and understanding complex social phenomena are desired [23]. As such, case study research can capture holistic real world context and richness in a business setting [16], [23] by addressing 'how' and 'why' phenomena occur without requiring control of behavioral events [7], [14], [23]. Since our research goal is to capture 'why' an organization embraces Big Data and 'how' it leverages analytics garnered from it, case study research methodology is appropriate.

Unit of Analysis and Case Selection

We chose a single case as a starting point for a research stream for two reasons. First, we had a contact organization amenable to our research agenda. In our experience, gaining entry into an organization requires trust and availability. The contact person was a former student in our program, so he was willing to meet with us informally to discuss our research agenda. He helped us define an interview schedule with key data people and managers within the organization. Second, we want to build our research one case at a time. With this bounded case [23], we were able to gain a fundamental understanding of why an organization collects data, and how it analyzes it for value.

Data Collection

The company we studied is headquartered in the Intermountain area of the United States. After acquainting ourselves with publicly available information about the company, data collection occurred during semi-structured interviews of 45-90 minutes duration. Four subjects participated, two who were previously identified by the researchers, and two who were recommended by the first subjects. The interviews began with a set of pre-defined questions, and then proceeded in a less structured way as the subjects' responses led. Additional questions were added to the later interviews as details emerged from the earlier interviews. The researchers took notes during the interviews, recorded the interviews, and kept a journal of each visit. After each interview, the recording was transcribed, and the researchers met to compare notes, discuss, and summarize both the content of the interviews and their subjective impressions. The transcriptions were later reviewed and verified, coded, and analyzed.
The Vice President over Information Technology was first approached by the researchers at a professional meeting at the local University. A subsequent conversation over lunch solidified the agreement to allow the researchers to visit the company, and to participate in the study. The VP was instrumental in setting up interviews with the other officers in the company: a Reporting Team Leader, a Software Development Team Leader, and a Database Administrator. The variety of perspectives made available thus included upper- and middle-management, from within and outside the IT department.

Data Analysis

The dominant mode of analysis [11] embraced by the researchers was to work through the data from the "ground up" [23, p.136]. This approach encourages researchers to pour through the data to identify patterns, gain insights, and find useful concepts [23].
Adhering to this analytical approach, three major findings emerged. After the first interview, the researchers poured through the transcript, met several times to discuss emergent insights, and collated insights into three drivers related to data analytics – client, internal process improvement, and personal development motivation. The 'client' driver is when clients (customers) of the organization push for data analytics. That is, clients ask the organization to provide analytics as a service. The 'internal process improvement' driver is when data analytics facilitates improvements (e.g., cost savings, improved efficiencies, and better customer service) to existing business processes within the

organization. The 'personal development motivation' driver is when data analytics prompts 'techies' to keep up with leading edge technologies. That is, the organization's technical staff continually learns from data analytics initiatives with which they have been involved.

Insights (three emergent findings) from the first interview informed the three subsequent interviews by compelling the researchers to refine the interview instrument to probe respondent perceptions of possible drivers of data analytics initiatives. After each of the subsequent interviews, the researchers followed the same analytic approach as the first interview and found that the three drivers consistently emerged from the data.

The analytic path that led to our insights emerged naturally from an interwoven process of data collection and analysis. After the initial lunch meeting with the Vice President of IT, we began to form our perception regarding the state of the organization's 'Big Data' initiatives. However, our perception changed after the formal interview with him. He indicated that his company was interested in applying 'Big Data' technology. We concluded that the company was pursuing at least a modicum of initiatives related to data analytics. Not until the formal interview did we learn that significant investment of resources (time and money) was not yet a reality. Thus, our 'mind map' of big data in the organization shifted after just the first interview. Subsequent interviews mandated further adjustments to our 'mind map' as we learned more about how the organization perceived data analytics as a means to potential value creation. Our 'mind map' adjustments progressed from gross to fine, as each succeeding interview allowed us to refine our perceptions. We also became acquainted with the reasoning, requirements, and desires that drive decision making in the organization.

A combination of maintaining copious field notes (journals), coding, reflective remarks, emergent insights, researcher ruminations, and following an established analytic path facilitated emergence of a set of drivers related to data analytics from the data. As the process unfolded, the researchers were able to delve deeply into the data to gain a profound understanding of how data analytics initiatives create value for the organization being investigated.

FINDINGS

"... We are a 'yes' company. If our customer asks us to do something we basically always say yes."
-Vice President of Information Technology

The company is a privately held utility billing company. In roughly ten years of existence it has grown to nearly 600 employees with offices in three states. The company has recently enjoyed yearly growth at 40-60%, and thus experiences some of the "growing pains" that are typical among companies that grow so rapidly. Resource scarcity, and bottlenecks in resource allocation decisions – particularly where non-revenue generating activities are involved, such as reports and analysis – are challenges that manifest themselves frequently. The company is profitable, but did not disclose revenue or earnings to us. Clients of the company are property owners, and property management companies numbering approximately 10,000 (in 2014). These clients manage varying numbers of residential units; some manage tens of thousands of units. The company's services "...include utility and ancillary billing, metering equipment installation and maintenance, conservation products and services, as well as daily meter reads allowing for leak detection and asset integrity. Products such as utility expense management, vacant billing and cost recovery, and resident payment processing ... energy procurement, data exchange, contract management, and due diligence services." The Company deals with over 3,000 utility service providers. Additionally, utility billing data is stored and organized for analysis and reporting purposes. Recipients and users of the reports and analysis include clients, government and regulatory agencies, and internal analysts.

Challenges of Traditional Data Handling

The company faced challenges on two main areas. In managing the data, there were issues originating from entering data from paper bills, i.e. typing errors, incorrect categorization. These resulted in accuracy and integrity problems. Other difficulties came from the integration of data from different electronic sources. Some sources used different standards while other sources did not even follow standards. Since the number of clients grew quite rapidly, the size of the database, measured by the number of rows, grew proportionally. This was not a problem yet from the perspective of database systems, but many operative and analytic tasks performed on data pulled into spreadsheets started to slow down. Eventually, consolidation of information from multiple tables into one place became cumbersome under the existing methods and tools.

The other area where challenges emerged was in the analysis of data. Using spreadsheets and consolidating the data became bottlenecks for analytics and occasionally slowed regular operations as well. Digging deeper into the data, i.e. slicing and dicing along property, utility, meters, and date dimensions were hindered. Preparing both standard and ad-hoc reports took longer. At the same time, with the growth of the business, more and more sophisticated questions emerged and needed answers.

Responses to the Data Challenges

The company's reaction to the challenges followed the familiar pattern: first, it threw more resources at it. Assigned more people to work on the IT issues, more people spent more time to prepare the reports. The software licenses were upgraded to more users and hardware system was expanded to handle the increased load. This way it was possible to keep up with the growth for a while but when the increase in resource requests reached a tipping point, several people started to think about solving problems in different, innovative ways.

Several business process went through reengineering: e-bills were not only accepted, but requested, demanded. To encourage the improvement in data quality, company-wide data governance policies were established. A solid-state data storage environment with fast speed storage area network was installed. There were some new tools introduced: a large file was created to support the needs of some report generation and basic analytics tasks. It was referred to a cube but people responsible for the database were the first to mention that it was not yet a developed data warehouse. Preparing a company-wide data-warehouse was put on the development road-map along with data visualization tools. These innovations resulted in additional benefits: operations were streamlined and more could be done with less. New capabilities emerged within the area of gaining insights about spending and usage patterns which made it possible to recommend cost-saving solutions for clients and to offer new services for future revenue streams. These represented new revenue opportunities. As a final consequence, a heightened sense of trust emerged regarding the quality of data and the reliability of reports. This increased trust also brought the ability offer more services that relied on the data available.

THE THREE DRIVERS OF DATA ANALYTICS

Clients

Most analytics tasks related to the bills the company handled: from the observations of simple measures, like averages, variances to more complex phenomena, such as trends, seasonal changes, detections of exceptions and outliers, more services were provided to clients. Some of these services addressed the needs of 3rd party requests. Some examples include investment companies' and utility companies' request for costs, trends, variations related to properties; engineering firms, agencies' and local

governments' needs for energy efficiency data. Interestingly, many of the additional services / analytic tasks were provided as a favor, for no cost, to maintain good relationships with existing customers or as reputation enhancing additions to gain new customers. While to some of the services there was obvious potential for revenue, they ended up being resource drains and caused bottlenecks in operations.

Internal process improvements

A second area of analytics activities focused on internal business processes. Some were triggered by business metrics, like the number and amounts of late fees originating from payments not made on time. The analysis of this data led to the analysis of processing times per bills, tasks, and employees. Subsequent cost/benefit analysis led to decisions in pursuing the conversion of certain bills to e-bills; work load balancing based on expected or predicted processing times. There were also ad-hoc analyses based on perceived cost or time saving opportunities. Most of these requests came from upper or mid-managers with business domain expertise. A large part of process analysis for cost savings started out with the as-is process review to identify wastes of time or effort and resulted in increased efficiencies. Process data played a key role in theses analytic tasks.

Personal development motivation

While the initial triggers behind the analytics efforts came from client requests, team leaders or department heads, the reporting team inside the IS/IT department had to provide them. These employees can be characterized as individuals with a drive to do better, make the company more successful. Clients relayed the needs of 3rd parties, agencies, governments by way of the account managers who needed the data for the reports. Senior team leaders and department heads often saw the business needs and opportunities for cost savings, efficiency gains and process bottlenecks. The reporting team in IS/IT faced the most of the technological boundaries, the increased workload necessary to satisfy internal or external clients' demands. They were also the ones motivated by upgrading their marketable skills and keeping up with technological trends.

CONCLUSIONS

The single case study method resulted in discovering three sources of value creating process for the company in the study. It helped to answer our research questions about the 'whys' and 'hows' of value creation through data initiatives and deployment of analytics. The first study set the stage for conducting further individual case studies and subsequent comparative studies. These next steps are crucial to gain deeper understanding of how management (and/or other company employees, clients, or third parties) directs resources in anticipation of value creation through analytics and Big Data processing methodologies.

REFERENCES

Available upon request.