

DATA ANALYTICS AND CUSTOMER SATISFACTION: A CASE STUDY OF DOCRM

Research Project – Data Analytics

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Abstract

Data-driven systems are at the heart of most modern-day data businesses. The vast majority of these organizations rely on traditional relational database management systems (RDBMS) to maintain operations. To fully leverage the data in these systems, underlying technologies, tools and approaches to managing information must move beyond the RDBMS. Data Analytics is a maturing field with modern tools and techniques that can assist in turning data into knowledge. This paper will use a case study approach to examine a specific scenario of a physician customer relationship management (CRM) platform called docRM. The ultimate goal of the study is to increase the organizations knowledge and thus customer (physician) satisfaction by leveraging docRM interaction data (both structured and unstructured). The study examines analytical approaches, techniques, and tools appropriate for the organization. Novel and leading edge designs will be incorporated in final recommendations.

Problem Statement: Data analytical techniques can be used to improve member satisfaction with docRM.

Introduction

Organizations today are leveraging their data resources by using data analysis techniques to enhance decision-making. Legacy systems were purpose-built for specific tasks and are very effective with product specific data (product-centric). These systems were not designed for analytical processing and need to undergo transformations or cleansing to make the information ‘analytical ready’. Today, systems are being developed with future analytics in mind. Customer-centric platforms (such as CRM’s) are a natural fit for including data analytics initiatives (Nemati, Barko, & Moosa. 2003). A lack of sufficient resources and organizational support are often barriers to the appropriate execution of analytical initiatives (SOURCE).

This case study explores a physician specific CRM which is given the name docRM (this scenario was established in part 1 of COMP602). The docRM platform was designed to capture service and support interactions between physicians (customers) and staff at a physician-based member organization (hereafter called MORG). The short-term goal for docRM is to streamline the engagement process for the customers, while the long-term goal is to analyze the data to establish member-insight metrics, trends, and dashboards.

The docRM scenario includes four over-arching objectives. The first objective relates to traditional CRM capabilities and was fulfilled in part 1 of COMP602. The remaining three objectives relate to Data Analytics and are the primary focus of this paper. The objectives are:

- Streamline customer engagement - implement a CRM platform to support a central point of contact. The platform must be specific to physician needs and designed to capture support service interactions between staff and customers (i.e. physicians).
- Leverage docRM data - identify metrics, key performance indicators (KPI's), and explore data analytics (e.g. trending, prediction) to develop a better understanding of physician members and ultimately provide decision support.
- Integrate other data sources - combine docRM metrics with other data sources to provide a holistic member view.
- Develop in-house technical competency - develop an analytics core competency within the MORG organization.

Research Methodology

In order to meet the stated objectives, this paper uses a qualitative meta-analysis (sections 1-3) to examine Data Analytics strategies, approaches, techniques and tools. This information is then applied to the docRM case study (section 4). The discussion is structured in the following sections:

- (1) Literature Review – explores past and current research related to the study objectives.
- (2) Data Analytics Strategies and Techniques – overview of Data Analytics implementation strategies and techniques.
- (3) Data Analytics Approaches – explores organizational approaches to implementing analytics initiatives.
- (4) Case Study – recommendations for implementation of analytical techniques in docRM.
- (5) Conclusion – summarizes study and recommendations.

Literature Review

Multiple studies (Nemati, Barko, & Moosa, 2003; Brancheau, 1995) have stated that Information Management is seen as a top priority for most organizations and Chief Information Officers (CIOs). Data Analytics is positioned to fundamentally change the way organizations deal with Information Management. Legacy data systems were built primarily for transactional functions with little to no thought of future analytical reporting. Modern day CRM's can, from the ground up, be designed to both capture transactional data while also considering future analytical processing needs. CRM's have shifted data from being product-centric to customer-centric (Brancheau, 1995) and can be used as a key enabler for future analytical initiatives. CRM's built with future analytics in mind are referred to by researchers as 'CRM Analytics' (Ranjan & Bhatnagar, 2008).

Academia and research literature has struggled to formally define CRM. The work by Rababah, Mohd, and Ibrahim (2011) unifies a number of definitions into the following: "CRM is the building of a customer-oriented culture by which a strategy is created for acquiring, enhancing the profitability of, and retaining customers, that is enabled by an IT application; for achieving mutual benefits for both the organization and the customers" (p. 223). This definition implies that CRM's are more than just transactional data repositories and are intended to be used to further

leverage the data collected. In other words, CRM's are meant to be constructed with the goal of Data Analytics in mind.

Data Analytics is a field that involves many tools, techniques, and approaches. For example, analytical techniques may include predictive analysis, visualization, forecasting, or optimization (Chen, Chiang, & Storey, 2012; Frederiksen, 2009, Matta, n.d.). Analytical projects in some cases included purpose-built Online Analytical Processing (OLAP) databases to address performance and data transformation concerns. Additionally, 'Big Data' analytics is becoming more prevalent using techniques/tools tailored to large unstructured datasets (Chen, Chiang, & Storey). Licensing analytics tools is open source (Lumify, DRUID), proprietary (IBM Cognos, SAS, Tableau) or some combination of the two. Most studies refer to business-driven Data Analytics as Business Intelligence (BI); this paper uses these terms interchangeably.

Research studies also show that efforts to implement analytics programs differ greatly amongst organizations. Organizations begin analytical initiatives with the general understanding that there is value to be gained by going down this path. The path, however, is not linear and is unique to the particular organization (Frederiksen, 2009, Bennet & Evelson, 2013).

Successful Implementations

CVS Health, a pharmaceutical company, implemented a predicative routing model to assign customer support-center calls (Collins, 2014). The ultimate goal of the project was to reduce response time and increase customer satisfaction. Incoming calls are mapped to pre-defined 'behavior' groups based on customer profiling information. The staff is also divided into pre-defined behavior groups using a second customer service profile. The analytics mapping algorithm makes decisions (predictive analytics) to determine which agent is 'suited' to the customer. The project utilized a tool called Mattersight, an analytics tools specially geared

towards call center analytics. The implementation had benefits of decreasing average talk time by approximately 12% and had a net 8.4% positive impact (Collins, 2014).

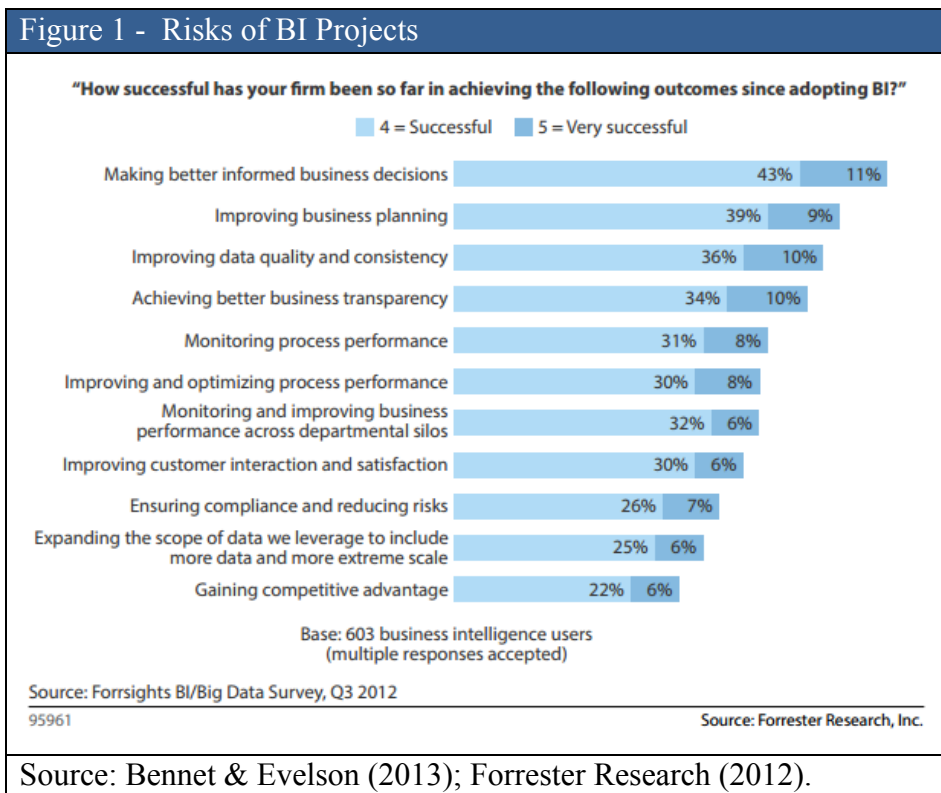
Another successful example is Kraft foods and their SAP Business Objects implementation. This initiative was not a point solution but rather an organization-wide framework (Hannon, 2012). Kraft's implementation added visualizations (drill down, dashboards), self-service reporting, and increased query performance. "Users went from reports that took weeks to create, to reports that take minutes to create" (Hannon, 2012). The project is credited with positively changing the staff's view of reporting performance, "It changes users' perception when we can take 500 million rows of data and render it graphically in less than three seconds" (Hannon, 2012).

Challenges to Implementation

It is important to consider potential downsides of Data Analytics initiatives. Hamel (n.d.) states that "59% of BI projects aren't successful. And fewer than 30% of business intelligence projects meet the objectives of the business". Analytics project failure rates can be mitigated through a thorough analysis of organizational needs as well as evaluating organizational readiness.

Defining and measuring success in analytics projects can be difficult. Bennet and Evelson (2014) discuss a qualitative survey conducted by the research firm Forrester. Figure 1 shows responses to questions relating to project success. The study indicates that in most cases, greater than 50% the responders answered that their project was *less* than successful. The authors further state that there are three key items for success (Bennet & Evelson, 2013):

- Initiative must need to align with business readiness and goals.
- Agility is the most important characteristic of all processes.
- Change Management and training are integral.



Two additional challenges relate to privacy and performance. Analytics projects often deal with privacy or ethical challenges. Access and consented use of data must be carefully addressed early on in the project. Performance must also be carefully considered to ensure adequate response times for end users. As an example, highly normalized databases (generally OLTP) can have costly joins when used for reporting and analytical processing. OLAP databases can be implemented to address this concern.

Key Points of Literature

- In order to fully leverage organizational data, analytical processing is required.
- The approaches to Data Analytics initiatives are quite varied. Efforts should be made to identify tools and techniques that suit organizational needs.
- Analytics projects have a high degree of failure. Mitigation steps should be considered including ensuring objectives are aligned with organizational maturity.

Data Analytics Strategies and Techniques

Analytical strategies involve more than just evaluating technology and tools. As indicated in the literature review, there is a high degree of failure in BI projects, most of which are tied to a lack of organization readiness or failure to meet business objectives. The process of implementing a Data Analytics program begins with assessing the organization’s needs and maturity level taking into account culture, resources, tools, size, etc.

Organizational Readiness

Success of Data Analytics analytical projects begins with evaluating the organization’s resources, culture, and leadership. These factors help to define the level of organizational maturity with respect to analytics (Table 1). Increasing an organizations maturity should be managed to ensure initiatives are not overly ambitious. For the purposes of this paper we can assume that MORG resides in the Level 2 – Limited maturity.

Table 1 - Levels of Analytical Organizations		
Level	Type of Analytics	Organizational Description
1 - None	Transactional/ Operational Reporting	Little to not BI or analytical reporting/metrics. Focused on operational reporting.
2 - Limited	Localized Analytics	Narrow view focus with pockets of isolated analysts (CRM, Finance Systems, etc.). Little to no support resources allocated.
3 - Minimal	Aspirational Analytics	Recognition and support from the Executive team of the desire to move to level’s 4 or 5. Understanding of some of benefits of analytics. Programs developed for early metrics and basic analytics. Start of BI tool adoption and analytics.
4 - Moderate	Integrated Analytics	Enterprise BI principles in place and supported by C-suite. BI team exists however culture of curiosity (fact-based) does not yet exist. Programs underway to move attempt to move to level 5.
5 – High	Enterprise-wide Analytics	Enterprise wide BI initiative fully implemented with support or CEO and all levels of management. Fact based culture supported by highly skilled BI team. Analytics used for deep strategic and insightful changes.
Source: Adapted from Frederiksen (2009)		

Analytics Techniques

As previously mentioned, analytical techniques are quite varied. The most commonly used techniques (Bennet & Evelson, 2013; Hahmann, Schröder, & Grosse, n.d.) are outlined below. A true implementation of docRM analytics initiative should include a more thorough review and consider the complexity of implementation.

Text analytics – discovers patterns in text. Usually involves building a catalog of patterns, although the patterns themselves can be generated by algorithms.

Predictive analysis – analyzes the data to predict future trends. This method allows you to give a predictive metric to variables.

Visualization – represent data in a form that humans can derive quick meaning. This includes techniques to search out answers (reporting, drill downs and dashboard widgets). Note that this technique is usually ‘on top’ of other techniques.

Correlation – a statistical measure that indicates how close two variables are related. Can be used assist in trending and prediction.

Aggregation – is the process of summarizing data for reporting or analytical needs. . This technique allows for rapid (or preloaded) aggregation and joining of data. This technique powers a lot of drilldown reports and grouping.

Regression – used to determine how changes in variables affect one another. Can be used assist in trending and prediction.

Cluster Analysis – statistical algorithm that divides large groups into a number of smaller groups of similar type. Allows for grouping of like individuals and reveal patterns that may not have been previously known.

Classification – determines, through examining data, categories and taxonomies.

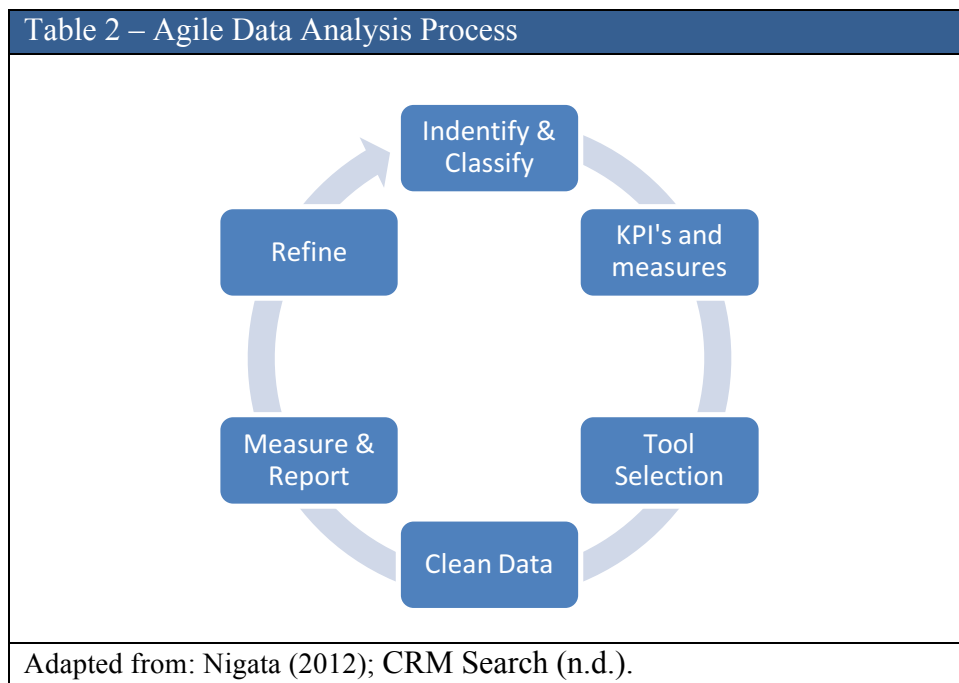
Natural Language Processing (NLP) – analyzes human speech/text and derive user sentiment.

Can be used on structure or unstructured text and or speech and include health care specific language mapping databases (to read short hand physician notes).

Optimization – can be used to examine and improve complex processes, suited to scheduling, project management and routing.

Data Analytics Approaches

Research indicates successful BI projects utilize agile methods as well as deeply involved business users. Quick wins and rapid delivery assists with end-user adoption. An agile Data Analysis process (see Table 2) is proposed, it is expected a similar process would be applied to the docRM analytics initiative. Each level of analytical maturity should undergo at least one process cycle. Certain steps require significant change management, the details of which are out of the scope of this paper.



Identify and Classify

This step identifies the source of data and then classifies data by type (see Table 3). It is important to make these distinctions classification will drive decisions in future steps (tools and techniques). Data type is particularly import as in most organizations, 80 percent business information resides in unstructured data (Grimes, 2008). The docRM analytics initiative contains both structured and unstructured data.

Table 3 – Data Classification		
Data Type	Data Source	Data Examples
Structured	Internal Sources	Transactional systems, CRM, Finance, HRIS, etc., Document management/SharePoint meta-data, etc.
	External sources	Government census data, government demographics data.
Unstructured	Internal Sources	Email, File text data, Event logging, Free form database ‘comment’ fields.
	External sources	Website Links, Twitter responses, web pictures.
Adapted from: Kudyba (2014); Nigata (2012).		

Develop KPI’s and Measures

Developing measures and KPI’s requires involvement from the business. KPI’s are ultimately owned by the business, with IT being an enabler. KPI’s selection will somewhat drive tool selection as well as the analytical techniques used. DocRM example KPI’s would be initially be focused on interaction data (type, number, etc.).

Tool Selection

This step involves selecting the proper tool for the initiative. There are three major factors considered with selecting toolset:

- Organizational data sources (type and number of) and overall objectives
- Organizational maturity, resources (both people and technology) available
- Cost and Administration overhead of tools and resources

There are several vendors in the analytical market space involving a both of open source and proprietary solutions. Table 4 provides a summary of the common vendors.

Table 4 – Data Analytics Vendors		
Type	Description	Vendors
Giants	Large and long-established BI players.	IBM Cognos, Microsoft, Oracle OBIEE, and SAP Business Objects.
Established	Focused on BI software and services, decades or more in the business.	Actuate, Information Builders, MicroStrategy, IBM SPSS, SAS.
Challenging	Gaining market and are growing at an extremely high rate.	Qliktech, Tableau, Tibco Spotfire.
Emerging	Younger startups offer unique business models, technologies and/or services.	Datawatch, Druid, Mattersight, OpenNLP, Jedox, Pentaho, Jaspersoft, Yellowfin, R.
Adapted from: Gartner (2015); Yellowfin. (n.d.).		

Clean Data

This step is optional and involves going through the steps of cleaning up data in preparation for analytical process. This step is intended to get rid of garbage data and in some cases transform the data. The transformation step can move data from a traditional OLTP model to an online analytical processing (OLAP) star-schema model. OLAP databases are intended for analytical processing and are generally initiatives for maturity level 4 and 5 organizations. As such OLAP databases will not be further explored in this paper.

Measure and Report

This step uses the KPI’s (step 1) and configures the tool (step 2) to capture and report on those metrics. The analytical processing and reporting (e.g. visualizations, prediction) techniques must also be chosen at this stage.

Refine

This is an iterative step where you examine and reflect on what you have learned from the previous steps and then continue the cycle. This is a key step to moving organizations into higher levels of maturity in Data Analytics.

Case Study: Data Analytics in docRM

This section evaluates the original problem statement and makes recommendations on how to implement a Data Analytics in the context of the docRM scenario. Recall the original problem statement:

‘Data analytical techniques can be used to improve member satisfaction with docRM’.

By applying what is learned in the previous sections, three techniques are recommended:

- (1) *Data visualizations* – this technique would be utilized to present real-time measures of docRM interactions. The measures could include (active calls, number of calls per hour/day/week, mean time to closure, etc.). This reporting would be highly visualized to in a dashboard and drill down approach and would allow for ad-hoc ‘human analytics’ and decision making.
- (2) *Predictive analytics* – this technique would assist in predicting future workload of service interactions. That measure would allow the organization to set and reporting compliance on target goals (KPI’s) for support satisfaction. Decisions to add or train support staff could me made based on the analysis.
- (3) *Text analytics (mining)* – this technique would allow the organization to leverage large amounts of unstructured data (email, docRM interaction comments fields). This technique also makes use of Natural Language Processing (NLP). Text analytics has potentially the most value of the three initiatives and may allow the organization to score sentiment as a part of the satisfaction score.

In addition to the three recommended techniques, Table 5 summarizes suggestions for a strategy, approach and tools for the docRM analytics initiative.

Table 5 – Case Study Recommendation Summary		
Areas	Recommendation	Description
Analytical Strategy & Approach	Phase the project with an initial goal of moving from maturity level 2 to 3.	This recommendation introduces moderate organization change and cost. Additional maturity steps should be considered at close of the project. Additionally, this allows an agile, quick win approach.
Analytical Technique	(1) Data Visualization (2) Predictive Analytics (3) Text Analytics	See description on Page 13.
Analytical Tool Suggestions	Tableau, Qliktech, OpenNLP, SAS. See Appendix A for Tableau mockup.	These tools are suited to organizations needs and provide visualizations and analytical processing needs. Additionally, all data sources will be harvested directly as opposed to setting up a complete data warehouse. OLAP ruled out due to complexity.
Data Source(s)	docRM (CRM), internal data sources (email).	Internal data sources included are unstructured email (external source). Data in the analysis consists of both structured and unstructured data.

Looking to the Future

There are several initiatives that could be included in future Data Analytics initiatives. The following areas should be pursued:

- Further integration of external data sources - such as survey results, website commenting, website traffic/usage logs.
- OLAP Database – implementation of a full standalone data warehouse. This would address potential performance concerns and allow data transformations that are required (ETL).
- Cloud analytics – Microsoft, Amazon and IBM are all heavily investing in their cloud analytics platforms. This could allow for an easy transition into more advance capabilities.

Conclusion

This paper followed a systematic approach in identifying and evaluating Data Analytics strategies, techniques and tools. This approach uncovered many of the variables and challenges

involved in Data Analytics initiatives. The information learned in the Literature Review and discussion was applied to recommendations put forth in the docRM scenario. The paper also provides valuable insight into how and organization can properly size the solution to fit their needs, culture and resources. The paper addresses the original problem statement and puts forth three docRM analytical recommendations. Finally potential future initiatives are considered. The paper concludes that there are many viable Data Analytics techniques tools and strategies that can be used on docRM data. To fully leverage data within docRM, all of the papers recommendations should be adopted.

References

- Bennet Martha, & Evelson, B. (2013). Best Practices: Maximize Your Chances Of Business Intelligence Success. Retrieved November 19, 2015, from http://dataconomy.com/wp-content/uploads/2014/06/IBM-WP_BPs-Maximize-Chances-BI-Success.pdf
- Bigus, J. P., Chitnis, U., Deshpande, P. M., Kannan, R., Mohania, M. K., Negi, S., ... Pednault. (2009). CRM Analytics Framework. In *15th International Conference on Management of Data COMAD 2009, Mysore, India, December 9–12, 2009*.
- Brancheau, J. C. (1995). Key Issues in Information Systems Management : A Shift Toward Technology Infrastructure Key Issues in Information Systems Management : A Shift Toward Technology Infrastructure Abstract, *80309*(303).
- Chen, H., Chiang, R. H. L., & Storey, V. C. (2012). Business Intelligence and Analytics: From Big Data To Big Impact. *Mis Quarterly*, *36*(4), 1165–1188.
<http://doi.org/10.1145/2463676.2463712>
- Clarix Analytics. (n.d.). Tableau helps people see and understand data. Retrieved November 30, 2015, from <http://www.clarixanalytics.com.au/wp-content/uploads/2013/09/Visualization.png>
- Collins, S. (2014). Personality Matters in Customer Service. Retrieved from <http://www.cmswire.com/cms/customer-experience/personality-matters-in-customer-service-027314.php#null>
- CRM Search. (n.d.). 10 Steps to Successful Business Intelligence. Retrieved December 2, 2015, from <http://www.crmsearch.com/bi-approach.php>
- Cuzzocrea, A., Song, I.-Y., & Davis, K. C. (2011). Analytics over Large-scale Multidimensional Data: The Big Data Revolution! In *Proceedings of the ACM 14th International Workshop on Data Warehousing and OLAP* (pp. 101–104). New York, NY, USA: ACM.
<http://doi.org/10.1145/2064676.2064695>
- DeFelice, A. (2005). CRM Analytics. *CRM Magazine*, 42–43.
- Forrester Research. (2013). Forrsights BI/Big Data. Retrieved from http://solutions.forrester.com/Global/FileLib/webinars/Big_Data_Webinar.pdf
- Frederiksen, A. (2009). Competing on analytics: The new science of winning. *Total Quality Management & Business Excellence*. <http://doi.org/10.1080/14783360902925454>
- Gartner. (2015). Magic Quadrant for Business Intelligence and Analytics Platforms. Retrieved November 18, 2015, from <http://www.gartner.com/technology/reprints.do?id=1-2AD809T&ct=150223&st=sb>

- Grimes, S. (2008). Unstructured Data and the 80 Percent Rule. Retrieved November 17, 2015, from <http://breakthroughanalysis.com/2008/08/01/unstructured-data-and-the-80-percent-rule/>
- Hahmann, M., Schröder, G., & Grosse, P. (n.d.). Data Analytics Methods and Techniques. Retrieved from https://wwdb.inf.tu-dresden.de/misc/WS1112/FK/01_data_analytics.pdf
- Hamel, P. (n.d.). Why Do So Many BI Initiatives Fail? Retrieved November 18, 2015, from <http://www.silvon.com/blog/bi-initiatives-fail/>
- Hannon, D. (2012). Kraft Foods' Recipe for Successful Business Intelligence. Retrieved from <http://sapinsider.wispubs.com/Assets/Case-Studies/2012/April/Kraft-Foods-Recipe-For-Successful-Business-Intelligence>
- Intuitive Business Intelligence. (2014). A value-added approach to rapid-fire business intelligence success. Retrieved from http://www.intuitivebusinessintelligence.com/uploads/2/9/4/5/29450621/how_to_avoid_the_pitfalls_reduce_risks_and_maximise_roi_with_your_bi_project.pdf
- Kudyba, S. (2014). *Big Data, Mining, and Analytics: Components of Strategic Decision Making*. CRC Press.
- Matta, K. (n.d.). Smart Analytics. Retrieved from http://www3.nd.edu/~kmatta/MGT30660/Lectures/Smart_Analytics.ppt
- Nemati, H. R., Barko, C. D., & Moosa, A. (2003). E-CRM analytics: the role of data integration. *Business Intelligence in the Digital Economy: Opportunities, Limitations and Risks: Opportunities, Limitations and Risks*, 251.
- Nigata, T. (2012). Qualitative data analysis. Retrieved November 17, 2015, from <http://www.slideshare.net/tilahunigatu/qualitative-data-analysis-11895136>
- Rababah, Khalid; Mohd, Haslina; Ibrahim, H. (2011). A Unified Definition of CRM Towards the Successful Adoption and Implementation. *Academic Research International*, 1(1), 245–262. <http://doi.org/10.1007/s10699-010-9177-8>
- Ranjan, J., & Bhatnagar, V. (2008). Principles for successful aCRM in organizations. *Direct Marketing: An International Journal*, 2(4), 239–247.
- Yellowfin. (n.d.). News & Blog. Retrieved November 18, 2015, from <http://www.yellowfinbi.com/YFCommunityNews-Download-Dresner-s-2012-Wisdom-of-Crowds-Business-Intelligence-Market-Study-114810#sthash.CGOG2Dzk.dpuf>

