

Business Analytics

Analysis of an Emerging Concept

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Abstract: The purpose of this paper is to present the results of a scientometric research on Business Analytics concept aiming to analyze the literature in a quantitative and descriptive way. In order to develop this research, it was conducted a literature review considering all papers that had the term "Business Analytics" in the title and which were published from 2002 to 2012. The findings presented in this paper are based on 155 papers found, being 137 identified as publications in IT and business magazines and just a few number of articles a total of 23 articles were published in academic journals. The findings corroborate that BA is becoming very well known among a large number of companies worldwide, being applied in order to improve business process performance. Since BA concept is in an embryonic state, more researches should be conducted in order to build a more robust literature under the realm of business administration considering the scarcity of empirical articles in reputable academic journals.

1 INTRODUCTION

The decision-making processes have historically been subject of several studies, both within and outside the business administration field. Several authors have contributed significantly to enrich the analysis of this issue. An important landmark on this field was provided by Simon (Simon, 1947; 1955; 1956), who offered a remarkable contribution discussing about the limits of rationality in decision making.

Companies are always looking for more intelligent solutions for their businesses in order to improve their processes and achieve superior results. According to (Davenport and Harris, 2007), when companies adopt business analytics they are taking advantage of solutions to their business problems, by transforming data into knowledge for decision making.

The process of decision making in organizations requires that managers have not only advanced knowledge about the conditions of both internal and external environment, but also the capability to evaluate the results of their decisions and their consequences for the company.

According to (Isik et al., 2011), in response to a growing amount of data to be analyzed in companies

and due to increasing pressure to respond better and faster to customers, companies have turned to the adoption of Business Intelligence (BI) as means to improve organizational decision making. For (Zeng et al., 2012), BI is the process of collecting correct information in the right format at the right time for delivery of the results for decision making in order to have a positive impact on business operations, tactics and strategies in companies.

In this context, "Business Analytics" (BA) concept emerged as an approach that takes advantage of a set of BI tools for business enabling managers to obtain real-time access to predictive information. According to (Varga and Vukovi, 2007), BA enables organizations to go beyond traditional BI by providing an integrated system, a corporate vision of information and a higher level of knowledge about forecasting and optimization of processes.

According to Varshney and Mojsilovic (2011), BA concept represents a framework that encompasses many solutions such as demand forecasting, capacity planning of resources, manpower planning, optimization and modeling of the sales force, forecasting revenue, better customer understanding and products, among other solutions.

However, this great interest in Business

Analytics among worldwide companies is still at the beginning in the academic world, so due to these reasons, this paper aim to provide a diagnosis of how this matter is being treated in the academic environment.

The scientometric (Raan, 1997) was applied taking into account some indicators related to a general bibliometric research, including the number of papers per year, the journals where such publications occurred, the nationality of the main authors, the number of participants per article, the impact factors and a citation analysis.

In addition, an analysis was done in the perspective of the content of the selected papers, regarding the context of the papers (Business or Technology environment), the academic or non-academic orientation of the publication (Business, IT), and the relationship of BA with other constructs (e.g. decision-making process, strategy, BI, supply chain, planning and others) as well as the methodology applied in each empirical work (e.g. case studies, survey, conceptual articles, multiple methods).

2 PUBLICATIONS ABOUT BUSINESS ANALYTICS

There are no doubts that publications on BA topics have become more common in both management and IT magazines. The most important moment of BA literature occurred when it acquired more visibility through the publication of Davenport's paper "Competing on Analytics" in the Harvard Business Review. Later on in a book, (Davenport and Harris, 2007) additionally described BA as the extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions.

(Davenport and Harris, 2007) proposed that companies must consider two distinct domains regarding BA: i) Internal Analytics: Financial, Manufacturing, Research & development, Human Resources; and ii) External Analytics: Customer and Supplier. In order to approach such domains, companies must "get the data in shape" preparing large amounts of high-quality data to build prosperous analytical environments. Analytical competition requires a clear business strategy in which executives should consider what key processes and strategic initiatives would be advanced based on the right analytics.

Besides Davenport's publications, there are some relevant papers that should be highlighted. (Oliveira et al., 2012), in the paper *Business analytics in supply chains – The contingent effect of business process maturity*, analyzes the effect of the use of business analytics on supply chain performance, investigating the changing information processing needs at different supply chain process maturity levels.

Another relevant publication is *The impact of business analytics on supply chain performance* by (Trkman et al., 2010) that analyze the relationship between analytical capabilities in the plan, source, make and deliver area of supply chains and their impact on organizational performance, taking information system support and business process orientation as moderators. The authors conclude that the moderation effect of information systems support is stronger than the effect of business process orientation, highlighting the importance of a company's use of its databases, explicative and predictive models and fact-based management to drive its decisions.

Another relevant paper that provides a new perspective of BA is *The Talent and analytics: new approaches, higher ROI* (Jeanne et al., 2011). In this paper, authors correlate BA to Human Resources processes and propose one ladder of analytical HR applications. In this sense, some approaches have more impact than others, and can be envisioned as a ladder of analytical sophistication.

Additionally, the paper *Integrating business analytics into strategic planning* (Klatt et al., 2011) provided a relevant contribution by showing that the effective use of business analytics is achieved by combining three different application perspectives: i) the IT Based applications; ii) the management accounting applications; and iii) the analytical methods applications.

More recently, it can also be cited a paper developed by (Loukis et al., 2012) entitled *Transforming e-services evaluation data into business analytics using value models* *Transforming e-services evaluation data into business analytics using value models*. In this paper the authors emphasize how the websites have been evaluating large amounts of data nowadays, suggesting that transforming these data into useful business analytics requires a better understanding of the strengths and weaknesses of the e-service, providing guidance for its improvement and optimization. The authors propose and validate a methodology for transforming user evaluation data into useful business analytics and define value model for e-

services.

Despite of the scarcity of papers published in ranked management journals about BA, they collaborate for building the concept, presenting BA as an emerging subject both for practitioners and academicals.

3 BIBLIOMETRIC RESEARCH

Even though it was possible to locate only 23 published scientific articles in the period 2002-2012, it is important to highlight a quite remarkable evolution starting in 2006. As can be seen in Figure 1, after a peak in 2008, there is an increasing number of publications on the topic year by year since 2009, with other peaks in 2011 and 2012.

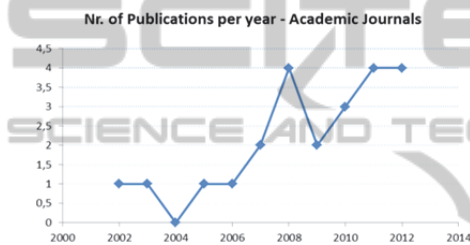


Figure 1: Evolution of BA publications.

It is important to point out that the majority of the articles in BA have appeared in unranked journals. Empirical research in BA has reached top-class journals only to a moderate extent so far. Out of 23 papers found, only 5 papers were published in journals listed at Journal of Citation Reports. In this sense, it suggests that an increase of articles in ranked journals can be expected with growing popularity and proceeding maturity of the research field in the future.

There is a considerable amount of magazines that have already published BA reports. It was possible to find 137 publications in IT and Business specialized magazines in the last 10 years (e.g. eWeek, InformationWeek, Computer World, and so on.).

Such evidences position Business Analytics as an emerging field that it is attracting much interest from practitioners' community but still embryonic as an academic research subject. In this sense, it can depicted from this that Business Analytics is a excellent opportunity as a research field for academicals since practitioners are demanding more info and knowledge about it.

The prevalence of American authors in BA publications is quite notable. Considering the

authorship of the scientifically grounded papers, 46% of researchers are from universities in United States. It is relevant also to point out that researchers from different countries (India 17%, Singapore 7%, Germany 6%, Greece 6%, Israel 6%, Croatia 4%, Brazil 2%, Slovenia 2%, Serbia 2% and Switzerland 2%) have been publishing also, even though in a lower percentage.

Table 1 summarizes the research publications descriptive data considering 3 perspectives: Meta perspective, Content-based perspective and methodological perspective (Houy et al., 2010).

Table 1: Papers classified by research perspectives.

Meta-perspective			
Contributions per year	Number 2,1		
Contributions per journal	1,0		
Contributions per country/region	2,2		
Contributions per researcher	0,4		
Participating authors per article	2,3		
Content-based perspective Context		Nr.	%
Technology oriented	6	27%	
Business oriented	9	41%	
Technology /Business oriented	9	41%	
Methodical perspective Research method		Nr.	%
Survey	5	23%	
Theoretic	11	50%	
Case study	8	36%	
Action research	0	0%	
Multimethod	0	0%	

From the meta-perspective, once there are just a few BA empirical papers, the values of the indicators are low in general, especially regarding contributions per journal and per year. The average of 2.3 authors per article is in accordance to most part of articles published in academic journals.

From the methodological perspective, as BA researches are fairly new in the academic environment, most publications are theoretical (43.48%) or based on case studies (34.78%). Survey methodologies are represented by 21.74% but almost all of the Surveys were published in ranked journals. The use of case study for BA research is explained by (Trkman, 2010) as a way of tackling areas that are still in the understanding, discovery and description stage, being strongly recommended as a research strategy in an emerging area.

From the content-based perspective, empirical BA approaches are more often applied in the Business context and a mixed Business/IT orientation context. Nevertheless, the interest in BA and the practical application in the administration context have increased in recent years, even though BA is well known in the IT context. The chart below shows the issues that were related to BA in the 23

academic articles. The occurrences were distributed in Supply Chain (13%), IT (13%) and Management Performance (21%). Such distribution shows that BA subject is being embraced for different knowledge areas in a multidisciplinary context.

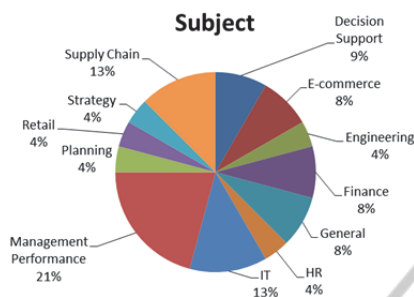


Figure 2: BA publications by subject.

This research identified that most part of the authors that published BA articles have a common vision that Business Analytics focuses on the development of new insights for improving business performance and may be used as input for human decisions or may drive automated decisions.

4 FINAL REMARKS

The presented article has introduced business process empirical research as an emerging field in BA. By evaluating a reference framework to support a comprehensive analysis of BA articles and identifying interesting trends in BA research from a meta-perspective, a content-based and a methodological perspective (Houy et al., 2010), the results open rich possibilities of scientific research in the area.

In fact, BA is becoming an important issue among competitive companies. In other side, in regards to academic issues, it has a long and fertile way ahead. This demand can be identified when we look to the amount of publications in non scientific magazines showing how attractive BA is for practitioners. In order to achieve a relevant position in the academic environment, researchers from all over the world should be encouraged to develop new scientific researches regarding BA.

If more academic articles in BA are required, it means that it will be highly relevant for research as well as for practice in organizations. It can provide important information for companies regarding how to apply existing methods, process models, best practices as well as BA tools in an effective and efficient way.

This paper noticed that it is extremely necessary to have more accuracy in regards to the procedure and methodology employed in BA scientific researches. Concerning the quality of publications, it was found that some problems like lack of methodological rigor, especially for the low percentage of papers that state clearly the methodology applied in the research. This fact is confirmed by the low percentage of papers in ranked journals. Even though some papers should be improved, there are some relevant ones that should be highlighted and that really promoted relevant contributions to the field.

The analysis of the 23 scientific articles published in the period between 2002-2012 presented an overview of the prevailing research methodologies, indicating the notable “few” but growing number of articles published in the area of Business Analytics. It is important to point out that majority of these papers are related to the management area. However, there is a great amount of no academic articles (137) which were published in specialized IT magazines.

The predominant number of American researches (46%) in comparison to other countries, indicates that USA dominates the “BA environment”, even though other countries have been growing in this field (e.g. Brazil, India, Germany, Singapore, Greece, Israel). In regards to research methodologies, the results present the preference for descriptive and theoretic research (50%) followed by case studies (36%) and survey research (23%).

In fact, new researches should be developed about Business Analytics, in order to make this emerging field more explored and mature. It would be expected that those prominent qualitative and theoretical studies could serve as a basis on which further quantitative and conclusive works can be developed, testing hypothesis and validating models. A more balanced research agenda, in this case, will be of much value, advancing our knowledge and understanding of such relevant topic on operations and business management theories and practices.

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