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The implications of Big Data analytics on Business Intelligence: A qualitative study in China

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Abstract

Social media has brought about a revolution and dictated a paradigm shift in the operational strategies of firms globally. It has resulted in collection of massive data from a variety of social media channels, necessitating use of this data for business intelligence purposes. Despite its importance, little research exists on the implications of the use of Big Data analytics for business intelligence purposes. This study fills this gap in knowledge by examining the role and implication of Big Data analytics on business intelligence for the data collected from Social media channels in China. Given the exploratory nature of the research, the study takes a qualitative approach to data collection and analysis. Based on an extensive literature review, the study has developed a robust semi-structure questionnaire. We plan to conduct approximately 35-40 interviews with respondents such as IT managers, IT consultants, and Senior Business managers among others from a wide range of industries including retail and manufacturing settings. The data will be analysed using Nvivo to identify issues that are critical for creating value through Big Data analytics for business intelligence purposes. The results have significant impact for both theory and practice to devise plans and strategies to optimise the benefits of social-media channels for business value.

Keywords: Social media, Big Data Analytics, Customer intelligence, Competitor intelligence, Business Intelligence., Facebook, Twitter, LinkedIn, Google+, Weibo, Wechat

1. Introduction

Business intelligence (BI) is the ability of a company to make meaningful use of data it collects in the course of its day-to-day business operations (Kimble & Milolidakis, 2015). The BI could play an important role in improving organizational performance by identifying new opportunities, highlighting potential threats, revealing new business insights and enhancing decision making processes among many other benefits (Xia & Gong, 2014; Kowalczyk & Buxmann, 2014). Currently, BI solutions mainly focus on structured and internal data of enterprise. As a result, a lot of valuable information embedded in unstructured and external data remains hidden, which could potentially lead to incomplete view of the reality and resultantly biased business decision making.

The advent of computing and internet technologies have facilitated collection of a large volume of heterogeneous data from multiple sources on an ongoing basis posing new challenges and opportunities for business intelligence.

This data involve both structured and unstructured, complex and simple information. For example, Wal-Mart can handle more than 1 million transactions per hour (The Economist, 2010). Twitter posts more than 500 million tweets every day (internettivestats, 2015). Weibo is reported to have over 766 million active users per day in 2014 (Weibo, 2015). The increasing use of social media such as YouTube, Twitter, and Weibo has contributed nearly 90% of the total data available today (Sharma et al., 2014). These unprecedented large and complex data have given birth to the concept of “Big Data” (Sharma et al., 2014).

Given its potential of creating business value, Big data has gained significant attention in recent years. According to a TDWI survey in 2009, 38% of the surveyed organizations have practiced advanced analytics and 85% reported that they would deploy it in three years (Russom, 2011). By using advanced analytics, enterprises can analyze big data to learn, both, the current state of business and the constantly evolving processes such as consumer behavior (Russom, 2011). Big data analytics is expected to handle many challenges that businesses face today (Marín-Ortega et al., 2014).

However, the existing research in use of Big Data for business intelligence is mainly focussed on the benefits and challenges of business intelligence and big data, while the practical implications of using big data analytics in enhancing business intelligence remains comparatively under-researched. Some research exist generally focused on the methods, technical problems and its possible solutions in utilizing big data analytics for business intelligence, but there is a dearth of studies on the practical implications of using big data analytics for business intelligence in general and particularly in Chinese context especially for data collected through social media. This research fills this gap in knowledge by examining the practical implication of big data analytics for business intelligence by using social media data in China, and assess the future developments. Therefore, the research questions are:

1. What are the implications of big data analytics on business intelligence in China especially for data collected from social media?
2. What are the future directions for further developments in use of big data analytics for business intelligence?

This study is significant as it investigates an issue in a largely unexplored research area. The study contributes in multiple ways: (1) it adds to the body of knowledge on the role Big Data analytics can play in BI and will help in understanding the implications of Big Data on BI. The results will help managers and business owners in putting place strategies to use Big Data analytics to understand their business better and improve their decision making and profitability. The ever increased use of Social Media in China provides a strong case for understanding how massive data collected from Social media can be used for furthering business productivity and customer service improvements in China.

2. Literature Review

2.1. Business Intelligence

Business intelligence (BI) is the ability of a company to make meaningful use of available data (Kimble & Milolidakis, 2015). Business intelligence includes a range of areas such as competitor intelligence, customer intelligence, market intelligence, product intelligence, strategic intelligence, technological intelligence and business counterintelligence (Kimble & Milolidakis, 2015). Xia and Gong (2014) cited a survey conducted by Thomson in 2004 suggesting that the major benefits of BI are generating faster and more accurate reporting (81%), improved business decision making (78%), improved customer service (56%) and increasing company revenue (49%).

2.2. Big Data

Big data is typically characterised by three important attributes, namely volume, variety and velocity. The three Vs signify massive data volume, data type variety and diverse data generation velocity (Russom, 2011). In terms of data volume, for example, Nielsen can generate around 300,000 rows of real-time data per second from live viewing and yield more than one billion records per month to do big data analysis (Prescott, 2014). In terms of data variety, big data analytics of, both, structured and unstructured data can help companies generate insights from various sources, including consumer transactions, inventory monitoring, store-based video, advertisement and consumer

relations, consumer preferences, sales management and financial data (Schomm, Stahl & Vossen, 2013; Kambatla et al., 2014). For data velocity, big data analytics can enable real-time access and information sharing through local to national governments for improved decision making (Wamba et al., 2015).

2.3. The role of Big Data in enhancing business value through business intelligence

Big data analytics can assist companies to better exploit big data for improving customer satisfaction, managing supply chain risk, generating competitive intelligence, providing business real-time insights to help make important decisions and optimizing pricing if appropriately utilized (Davenport, 2014; Erevelles, Fukawa & Swayne, 2015; Narayanan, 2014; Wang & Alexander, 2015). According to an investigation, a retailer that can use big data properly has the potential ability to increase 60% of operating margins by obtaining market share over its rivals and exploiting the detailed consumer data (Tankard, 2012).

Generally, there are five prime advantages of big data analytics. First, it increases visibility by making related data more accessible. Second, it facilitates performance improvement and variability exposure by collecting accurate performance data. Third, it helps in better meeting the actual needs of customers by segmenting the population. Fourth, it complements the decision making with automated algorithms by revealing valuable insights. Fifth, it yields new business models, principals, products and services (McKinsey, 2011). As Ahmad and Quadri (2015), Wang and Alexander (2015) claim, one of the most important applications of big data analytics is knowledge creation, new management principles cultivation and the economy based on this.

Big data analytics can improve the management of supply chain from various aspects, including supply chain efficiency, supply chain planning, inventory control and risk management, market intelligence and real-time personalized service (Wang & Alexander, 2015; Vera-Baquero et al., 2015). Meanwhile, big data can also support the supply chain to innovate new product and service development ideas and also understand how diverse sub-firms can collaborate together to optimize the operation process in a cost effective way (Tan et al., 2015).

Big data analytics can also help to support the decision making processes (Kościelniaka & Puto, 2015). The effective use of big data is based on an improved understanding of diverse decision contexts and the required information processing mechanisms. Companies that intend to implement big data analytics for the decision processes should attach great importance on reducing equivocality and data variety.

Collaboration among decision makers and data analysts can enhance the effective utilization of big data in decision making, however, the decision processes should be carefully managed in order to minimize the possible understanding gaps (Kowalczyk & Buxmann, 2014). In order to leverage the massive amount of heterogeneous data in unstructured text, audio and video formats (which form 95% of big data), it is important to develop proper and efficient analytic methods. Meanwhile, it is also meaningful to utilize new tools to do predictive analytics for structured big data (Gandomi & Haider, 2015).

2.4. Challenges of Big Data analytics in the context of Business Intelligence

Although big data can help companies achieve competitive advantage over its rivals through many aspects, big data analytics still face a variety of challenges (Assunção et al., 2015). The main challenge of big data analytics include lack of intelligent big data sources, lack of scalable real-time analytics capabilities, the availability of sufficient network resources for running applications, the demand in necessary expansion for peer-to-peer networks, the concerns about data privacy and information security regulations, the problems with data integration and fragmented data and lack of availability of cost effective storage subsystem of high performance (Ahmad & Quadri, 2015; Wang & Alexander, 2015). Also, the requirements of expensive software and huge computational infrastructure to do the analysis cause issues in the implementation of Big Data analytics for BI (Assunção et al., 2015).

Particularly, as Big Data involve storage of massive volumes of aggregated heterogeneous data from a wide range of sources, it remains the target of hackers. The compliance to regulatory requirements, especially the data protection laws becomes an important issue (Tankard, 2012). Additionally, since the big data analytics is still in its infancy, there are no clear regulations for safeguarding and protecting the privacy, and which may harm the public trust on big data storage and its analytics.

The challenge is to establish protocols to set contractual restrictions on exposing the data to unauthorised people

and revealing of the data, restricting the copy of the data, establishing personnel background check for those who are able to access to the data, and setting contractual restriction of the use of specific projects data. The establishment of privacy regulations is the most crucial areas for developments in Big Data for the next five years (Leonard, 2014).

Apart from the security and privacy issues of big data, the hardware-technology that supports big data analytics poses challenges (computation, networking and storage technology). First, the technology is unable to provide a single computing configuration to apply on both real-time and scalable analysis. Second, the networking technology cultivates growing void between bandwidth, which limits the network capability to support real-time applications. Third, there is no well-established rule to predict the growth in storage capacity of magnetic drives (Ahmad & Quadri, 2015).

3. Methodology

Given the exploratory nature of the study, the study uses a semi-structured interview to data collection. This method is used mainly due to two reasons. First, the two-way communication during the interview will help in seeking more detailed and in-depth information. Second, it will allow to ask questions outside the semi-structured questionnaire for seeking clarity and collecting robust data and asking follow-up questions. This flexibility in communication may help in generating unexpected insights. The entire research process is divided into four main stages: questionnaire design, data collection, data analysis and report writing.

The data collection will involve around 35 interviews with experts from diverse backgrounds. The respondents will be IT managers / Directors, Chief Information Officers (CIOs), IT consultants, Senior managers with involvement in BI, and Business Development managers. Interviews will be audio recorded with interviewees' permission and then transcribed verbatim. Given that this research is carried out in China and most of the respondents will use Chinese during interviews, so we will translate these Chinese transcriptions into English for data analysis.

The data will be analyzed using the NVivo 10 software, which is a useful analysis tool for qualitative data. Two coding cycles will be included in the analysis process to allow for new findings from the data (Saldaña, 2013). The answers can first be set to different themes based on the focus of the content. Then answers within the same themes will be compared and contrasted to identify the similarities and differences across the themes. The respondents profile data such occupation, age group and working experience of respondents shall also be considered in the analysis process to justify their opinions. For example, people who worked as IT managers and IT Consultants may have different perspectives on big data or business intelligence. Therefore, these factors should be deliberated in the analysis process to get deeper insights in relation to the proposed research questions.

4. Questionnaire development and Data collection

To develop a semi-structured questionnaire, an extensive literature review has been carried out to identify important issues that can help answer the research questions. The literature analysis resulted in identification of a number of issues that have been used to create questions. These include, but not limited to, implications of Big Data analytics for: developing online marketing strategies, combining Social media data with real-time sales data to analyze the influence of marketing campaign on consumer sentiment and purchasing behavior, identifying key opinion leaders to set marketing targets, analyzing social network to identify bottlenecks in company information flows, analyzing social network data to discover the reactions of different customer segments and stakeholders to company's products and actions, sentiment analysis of social media data to monitor the real-time response of consumer behavior and adjust marketing strategy accordingly, the application of using big data analysis of social media data to develop new products and new models, using data from social media to identify sales opportunities, and the application of Big Data analytics in personalization.

The questionnaire consists of two parts. The first part collects interviewees' details such as their title, organisation size, type and industry of the respondents' organisation. The second part of the questionnaire includes 20 questions covering a variety of issues to gather an understanding of the implications of Big Data analytics on business intelligence.

The data collection is presently ongoing and the study is using multiple methods including face to face and online interviews over skype and other Social Media communication channels.

5. Limitations and Future direction

The study has some limitations as well. First, despite the fact that qualitative data collection method has its advantages, it does have some limitations. The number of people interviewed in this research is limited and the location of interviewees cannot cover all the regions of China. Therefore, the conclusions derived from this research may be improved with more data collected in future study.

Second, given the qualitative exploratory study, any generalisation of results shall be done with caution.

The study opens up a number of new directions for further research. Future research can be done by involving industry specific respondents to unearth patterns from a specific industry perspective. The results can be further expanded by interviewing more respondents and senior managers. Further research is warranted in understanding patterns in Big Data from different Social Media channels and such patterns impact the business and decision making processes. How data collected from different Social Media channels can be contrasted and combined in more effective ways to help enhance business value and productivity. Next set of studies can also take a longitudinal approach to seek more insights on the drivers and inhibitors of use of Big Data analytics for BI and particularly from Social Media based Big Data. The results of qualitative study can be enhanced by a follow-up quantitative cross-section survey-based studies to help generalise the findings.

6. Conclusion

The Big Data analytics offers multitude of opportunities to enhance business value and productivity. One of the main applications of Big Data analytics is for business intelligence to improve decision making capabilities, faster decision making, understanding of customer needs, developing strategies for launching new products and services, exploring new markets, improving inventory turnovers, reducing customer complaints, and enhancing staff productivity and efficiency. To that objective, this study explores implications of Big Data analytics of data collected from Social Media for enhanced business intelligence within the context of Chinese businesses. Social Media in China and online business in China have grown exponentially over the last decade and therefore present an opportunity to look into the how data collected from these channels can be usefully utilised for further business enhancements.

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