**A Study on Impact of BI Tool on Quality of Decision Making and Organizational Growth**

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## ABSTRACT

The Manfacturingorganizations are generating huge amount of business data and the data volume is expected to be doubled by next decade. This data needs to be processed and analysed and to be made available to the management for efficient and quality decisions. With the help of business intelligence (BI) tool the organizations can quickly generate insights enabling them to take quality decision and enabling management to drive operational efficiencies, identify newer opportunities and differentiate them in the competitive market. The review of the literature reveals the existence of gap with respect to whether BI tool impact quality of decision-making and organizational growth.

The focus of the study is to determine the impact of business intelligence tool on quality of decision-making and organizational growth in manufacturing organizations. The study also focuses on determining the impact of BI tool-based quality decision-making on decision categories (operational, tactical and strategic) and development of leadership traits in managers. The study also focuses on identifying the areas of usage of BI analytics and important BI analytics in manufacturing organizations. The study also focuses on identifying relationship between importance and usage of BI analytics.

**Keywords: Business Intelligence tools, Decision making, Manufacturing Organisation, Organizational growth.**

## Introduction to The Study

Organizations are generating huge amount of business data and the data volume is expected to be doubled by next decade. This data needs to be processed and analyzed and to be made available to the management for efficient and quality decisions. With the help of business intelligence (BI) tool the organizations can quickly generate insights enabling them to take quality decision and enabling management to drive operational efficiencies, identify newer opportunities and differentiate them in the competitive market.

The focus of the study is to determine the impact of business intelligence tool on quality of decision-making and organizational growth. The study also focuses on determining the impact of BI tool-based quality decision-making on decision categories (operational, tactical and strategic) and development of leadership traits in managers. The study also focuses on identifying the areas of usage of BI analytics and important BI analytics tools. It also focuses on identifying relationship between importance and usage of BI analytics in service industry.

The impact on quality of decision-making and organizational growth for before and after BI tool implementation situation can be analyzed.

Business Intelligence (BI) has its roots in the decision support technologies and decision-support domain have expanded over the years with the development of various decision-support applications - business information system, on-line analytical processing (OLAP) & predictive analytic. The [BI t](https://en.wikipedia.org/wiki/Data_warehouse)ools started getting popularity both in the business world and the academia around 2000.

The business insight generated by BI tools can help service sector in following ways:

* Optimizing the resource utilization for the services
* Optimizing the bench (unutilized employee) cost
* Increasing the revenue per employee
* Improving the quality of service
* Reducing the operational costs such as travel, administration etc.
* Identification of the up-sell and cross-sell opportunities
* Optimizing global risks
* Compliance and regulatory reporting
* Planning for resource hiring and training

Over the last decades business data volumes have increased tremendously due to rise of business information systems such as ERP, CRM etc. and is going for further explosive growth. International Data Corporation (IDC) highlighted in sixth annual study that the digital universe comprising of structured and unstructured data will grow 300 times to 40,000 exabytes from 130 exabytes by 2020 and the size of data will double every two years from 2012 onwards.

As a result of data explosion organizations will be creating and storing more business data in digital form and will have to process the same into useful information to improve their quality decision-making capabilities. The useful information will need to be provided in right-time, in right formats and on demand that enable business leaders to take decisions for optimizing & improving business performance. Good and quality decision in organization leads to sustainable organization growth and organizations should be better equipped with tools and processes for meeting the short- and long-term goals.

With such vast amounts of data that are amassed and available, it is imperative to provide the timely & correct information to the decision-maker to ensure business decisions success. A natural dilemma is how businesses can make sense of all the data without wasting time and resources as the amount of data captured continues to soar. With the increased reliance on the e-commerce and mobile based platforms for business operations the marketplace conditions will further complicate, accelerate and intensify the need for Business intelligence (BI) tool-based analysis.

## Objectives of the study

The objectives of the study are as follows:

* To study the impact of business intelligence tool onorganizational growth (business performance).
* To study the impact of BI tool-based quality decision-making and decision categories (operational, tactical and strategic).
* To study the areas of usage of various kinds of BI analytics in manufacturing organizations.

Review of literature

This chapter presents a review of business intelligence tool literature to understand the importance & benefits of the BI tool and to understand the relationship between business intelligence tool, quality of decision making and organizational growth. Many research portals (SHODHGANGA, IEEE, PROQUEST, GOOGLE SCHOLAR) were referred for studying the articles and research papers so as to gain a deep insight into the developments which have already taken place in the field.

 Impact of BI Tool on Quality of Decision-Making and Organizational Growth

Bartram (2013) in his study has highlighted 8 ways of using BI tools for getting optimized results - (i) develop an analytical culture in the organization ,(ii) deliver information wherever it's needed, (iii) make use of unstructured data to get better insights,(iv) implement predictive analytics rather than analysing too much of historical data,(v) view information pictorially in the form of dashboards for quicker decision-making,(vi) keep information up to date to address current/future business problems,(vii) extract intelligence from social sites to give full picture of the competition,(viii)ensure that managers use the information for decisionmaking. The article is conceptual in nature and does not provide details on how above practices can be implemented for efficient use of BI tool.

Bhatia (2013) has highlighted in her article that the business data volumes have increased tremendously in last decade which has increased the complexity in processing and analysis. The author has highlighted that traditional BI tool approach is not meeting the current needs of high volume/big data processing. The author has highlighted that big data analytics enables organization to take advantage of totality of their information (internal & external) in real time and enables fast decision-making for serving the customer & society in unique and innovative way. The author has highlighted some of the use cases of big data analytics like better understanding customer needs, making process more efficient, and further reducing costs. The author has also highlighted that there is need to educate the organizations on the available big data opportunity to ensure they are not missing the competitive advantage.

According to Najibeh Abbasi Rostami (2014), in today’s world, data are so numerous that technology is needed to cope with this knowledge. Business Intelligence (BI) is a process that involves sorting all the collected information and select those that are relevant. BI provides critical insights that help organizations make right decisions. Knowledge management (KM) is a key approach to solving current problems. KM can be defined as a systematic process of finding, selecting, organizing, distilling and presenting information in a way that improves an employee's comprehension in a specific area of interest. BI and KM play an important role in improving the qualitative and quantitative value of information available for decision making. KM and BI can also benefit from each other. It seems that integration of BI and KM can help organizations achieve wider benefits. Integration of BI and KM will not only help to promote and enhance knowledge for better decision making, but also improve an organization’s performance. Therefore, it is imperative for organizations to have both BI and KM as an integrated system to get full value from both. This paper shows the importance of BI and KM Integration through a series of models.

In his opinion, Lawten (2006), businesses continue to use computer systems for a growing number of functions, they face the challenge of processing and analyzing huge amounts of data and turning it into profits. In response to this, vendors are trying to upgrade their business intelligence (BI) products, which are sets of tools and technologies designed to efficiently extract useful information from oceans of data. If successful, upgrading the technology would not only help users but could also let BI vendors widen their products' audience. However, despite the recent improvements, widespread adoption still faces several key challenges, such as high costs and the need for BI systems to integrate and interoperate with the many heterogeneous corporate data sources.

According to Vikas Khurana (2015), in today’s business environment, the organization needs insightful information to make decisions for gaining competitive advantage in the industry. The data analysis has become a priority activity in all organizations for proper decision-making and the data is available in multiple sources & formats within the organization. The Business Intelligence (BI) tools convert the data from multiple sources & formats into insightful information enabling organization to make better & quicker decision and thus provide competitive advantage. The study proposes a conceptual model of organizational growth with the use of business intelligence tools. The study also identifies emerging trends in business intelligence tools. Here it suggests that, organizations need to conduct further exploration for use of BI tools in several business functions (supply chain, purchasing, and human resource). Further studies are required for analyzing the impact of BI tools on quality decision-making and organizational growth.

### Inferences from the reviews

The findings from the literature reviews depicted that business intelligence tool information have significant influence on quality of decision-making and quality of decisionmaking has significant influence on organizational growth. It is depicted that there is significant difference in the quality of decision-making after BI tool implementation. Some of them reveals that there is significant improvement in the organizational growth after BI tool implementation.

In today’s global, complex, complicated, competitive and continuously changing business, political and technological environment, the management need to respond swiftly to market dynamics in order to survive and to stay competitive which in turns demand for taking effective, efficient, timely, speedy and quality decisions.

It is known fact that sustainable practices and decisions lead to profitability, growth and success of the organization. Organizations are getting new set of challenges and they must deliver results with both effectiveness and efficiency in current business environment. The managers spent lot of time to manage and sustain the health and performance of their organization and the decision-making process is further complicated as organizations need to consider information beyond its boundaries with the progression of technology and our ability to engage in more streamlined business, the role of decision-making in today’s organizations became even more critical.

The ability to optimize company performance typically depends on decision-maker’s skills to analyse & measure business performance and to take timely action based on the information. The complexity of today’s business operations, competition and regulations has made the job of the manager increasingly difficult and numerous factors affects the manager’s decision and manager requires the analysed and summarized information in timely manner for effective decision-making (Arsham,n.d.).Due to the improvements in technology, innovations in communication and globalization of workforce, management has to consider numerous alternatives and dimensions when making a decision. The information needs of management have changed and they require new, reliable and quality information at speed to support quality decision-making within organizations.

The decision speed is recognized as a critical factor of organization performance in dynamic and volatile environments (Kownatzki et al., 2013) and the organization performance deteriorates when decision-makers are not able to respond quickly to the business situation due to lack of information and the decisions related to revenue and profitability, compliance and risk management should be taken faster as the outcome of the same results in competitive edge (Wilson, 2011).

According to Arif et al. (2012) success of any organization depends on its strategic decision and has defined the decision-making process as the identification of best plan of action from alternatives and process consists of four steps namely developing premises, identifying alternative, evaluating alternative and decision implementation.

According to Rodrigues and Hickson (1995) a decision-making process in which information and means of implementation were readily available most likely result to a successful decision. The decision-making process requires accurate, complete information at each step for quality decision. GE and Helfret (2013) highlighted in their study that information accuracy and completeness affect decision quality significantly.

The decision-making in management is an essential skill required at all level and the quality of decision impacts the performance of the organization. The top management has to take strategic and complex decisions which affect the long-term direction of the business based on the organization's vision, goals and values, the middle management have to take tactical and less complex decision to meet the strategic objective and finally the front-line management is responsible for operational and routine decision as depicted below:


#### Figure 2.1: Organizational level and impact of decision making (Taylor, 2009)

Operational decisions are high in volume but have relatively low economic impact/value on the organization, tactical decision has middle volume and middle impact on the business and strategic decisions are of high value and low volume in nature.

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With such vast amounts of data that are amassed and available, it is imperative to provide the timely & correct information to the decision-maker to ensure business decisions success. A natural dilemma is how businesses can make sense of all the data without wasting time and resources as the amount of data captured continues to soar. With the increased reliance on the e-commerce and mobile based platforms for business operations the marketplace conditions will further complicate, accelerate and intensify the need for Business intelligence (BI) tool-based analysis.

### Findings:

This chapter contains major findings, suggestions and scope for further research of the study.

The findings of areas of usage of BI analytics in the organization are:

* Most of the respondents agree to high usage of following analytics:

Sales/revenue analytics. (Mean = 4.08, Std. Deviation = 0.829)

Utilization analytics. (Mean = 4.02, Std. Deviation = 1.104)

Profitability analytics. (Mean = 3.88, Std. Deviation = 0.949)

Bench analytics. (Mean = 3.51, Std. Deviation = 1.157)

Quality analytics. (33.3% respondents agree high usage and 23.5% strongly agree)

* Most of the respondents agree that following analytics are not deployed/used:

Sales & general administrative expense analytics. (Mean = 3.33, Std. Deviation = 0.977)

Training analytics. (40.8% respondents agree)

Hiring analytics. (37.5% respondents agree)

Attrition analytics. (35.4% respondents agree)

The findings of importance of BI analytics in the organization are:

* Most of the respondents agree that following analytics are important in the organization:

Sales/revenue analytics. (Mean = 4.42, Std. Deviation = 0.647)

Utilization analytics. (Mean = 4.33, Std. Deviation = 0.595)

Profitability analytics is important. (Mean = 4.15, Std. Deviation = 0.759)

Bench analytics. (Mean = 3.59, Std. Deviation = 0.884)

Sales & general administrative expense analytics. (Mean = 3.59, Std. Deviation = 0.923)

Quality analytics. (Mean = 3.90, Std. Deviation = 0.778)

* Most of the respondents agree that following analytics are somewhat important in the organization:

Training analytics. (Mean = 3.19, Std. Deviation = 0.699)

Hiring analytics. (Mean = 3.38, Std. Deviation =0.716)

Attrition analytics. (Mean = 3.38, Std. Deviation = 0.0806)

* Most of the respondents agree to usage of BI tool in following decision-making categories:

Operational decision-making. (Mean = 4.45, Std. Deviation = 0.541) Tactical decision-making. (Mean = 4.09, Std. Deviation = 0.905) Strategic decision-making. (Mean = 4.06, Std. Deviation = 0.978)

* 17.65% respondents are taking 0-20% quality decision based on BI analytics ,15.69% respondents are taking 21-40% quality decision based on BI analytics, 23.53 % respondents are taking 41-60% quality decision based on BI analytics,31.37% respondents are taking

61-80% quality decision based on BI analytics and 11.76% respondents are taking 81-

100% decision based on BI analytics

The findings of quality of decision attributes before BI tool implementation in the organization are:

* Most of the respondents neither agree nor disagree to the following:

On-time decisions were taken before BI tool implementation. (Mean = 2.86, Std.

Deviation = 0.917)

Faster decisions were taken before BI tool implementation. (Mean = 2.71, Std.

Deviation = 0.855)

Appropriate decisions were taken before BI tool implementation. (Mean = 3.08, Std.

Deviation = 0.891)

Effective decisions were taken before BI tool implementation. (Mean = 3.06, Std.

Deviation = 0.925)

Right amount of effort was utilized before BI tool implementation. (37.3% respondents neither agree nor disagree and 27.5% respondents disagree).

Informed decisions were taken before BI tool implementation. (Mean = 2.94, Std.

Deviation = 0.925)

* Most of the respondents disagree that inputs for multiple problems were provided at the same time before BI tool implementation. (31.4% respondents neither agree nor disagree, 29.4% respondents disagree and 11.8% respondents strongly disagree).
* Most of the respondents agree to the following quality of decision attributes after

BI tool implementation in the organization:

On-time decisions are taken after BI tool implementation. (Mean = 4.12, Std. Deviation

= 0.653)

Faster decisions are taken after BI tool implementation. (Mean = 4.20, Std. Deviation = 0.633)

Appropriate decisions are taken after BI tool implementation. (Mean = 4.16, Std. Deviation = 0.579)

Effective decisions are taken after BI tool implementation. (Mean = 4.08, Std. Deviation = 0.659)

Right amount of effort is utilized after BI tool implementation. (Mean = 4.02, Std. Deviation = 0.787)

Informed decisions are taken after BI tool implementation. (Mean = 4.20, Std. Deviation = 0.775)

Inputs for multiple problems are provided at the same time after BI tool implementation. (Mean = 4.00, Std. Deviation = 0.849)

The findings of improvement in business benefits before BI tool implementation in the organization are:

* Most of the respondents neither agree nor disagree to the following:

Revenue was increased before BI tool implementation. (Mean = 3.16, Std. Deviation = 0.738)

Customer satisfaction was improved before BI tool implementation. (Mean = 3.06, Std. Deviation = 0.890)

Cost was reduced before BI tool implementation. (Mean = 2.67, Std.Deviation = 0.792) New opportunities were identified before BI tool implementation. (Mean = 2.94, Std. Deviation = 0.867)

* Most of the respondents disagree that efficiency was increased before BI tool implementation. (29.4% respondents neither agree nor disagree, 35.3% respondents disagree and 5.9% strongly disagree)

The findings of improvement in business benefits after BI tool implementation in the organization are:

* Most of the respondents agree to the following:

Customer satisfaction is improved after BI tool implementation. (Mean = 3.98, Std.

Deviation = 0.915)

Efficiency is increased after BI tool implementation. (Mean = 4.33, Std. Deviation = 0.653)

Cost is reduced after BI tool implementation. (Mean = 3.94, Std. Deviation = 0.785)

New opportunities are identified after BI tool implementation. (Mean = 3.50, Std. Deviation = 1.147)

* Most of the respondents neither agree nor disagree that revenue is increased after BI tool implementation. (Mean = 3.44, Std. Deviation = 0.907)

## SUGGESTIONS

Organizations should consider surveying of BI users to measure user satisfaction and to meet new business requirements on periodic basis. Based on the study following are the recommendations for manufacturing organizations:

1. Few of the organizations have multiple BI tools and custom analytics; organization can optimize their landscape to a single BI tool and can reduce license and operational cost.
2. The result of the study clearly indicates BI tool has positive impact on quality of decision-making and organizational growth. The manufacturing organizations not having BI tool should consider implementing the same in order to stay competitive in the global business environment.

The conclusion of usage and importance of BI analytics in Manufacturing organization is summarized below:

1. The IT organization has high usage of following analytics

Sales/Revenue Analytics

Utilization Analytics

Profitability Analytics

Bench Analytics

Quality (Project Delivery) Analytics

The mini project result confirms that the above five analytics and sales & general administrative expense analytics are also important to the Manufactruing organization.

The Friedman (χ2) test result confirm that utilization analytics, sales/revenue analytics and profitability analytics are top 3 analytics used in the organization and are also top 3 analytics important to the Manufacturing organization.

1. The most commonly used features of BI analytics in the organization are

* 1. Standardized reporting & scorecard/dashboard are the most commonly used feature in sales/revenue analytics, profitability analytics and bench analytics.

* 1. Standardized reporting & KPI are the most commonly used feature in utilization analytics and quality analytics.

* 1. Standardized reporting & ad-hoc analysis is the most commonly used feature in training analytics.

* 1. Standardized reporting is the most commonly used feature in sales & general administrative expense analytics.

3)The mini project result confirms that changing business requirement and data integration are the two key challenges faced during BI tool implementation in the organization. The project result confirms that the best practices followed during the implementation of BI tool are:

* + Business analytics are designed keeping future needs in mind.

* + Availability of design and Technical Templates to capture the design and technical aspects.
	+ Availability of data standards such as naming standards, data modelling standards, reporting and other data architecture standards.
	+ Policies & procedure to govern the creation, standardization and dissemination of data.
	+ Identification of data steward/ owners for managing the data Data/Information quality is addressed as part of the project

4) The conclusion of objective, challenges and best practices of BI tool implementation are summarized below:

The IT organization has achieved following objectives after BI tool implementation

Standardized Reporting & Analytics

Timely Report availability

Improving quality of decision-making

Improved Efficiency

Organizational Growth

Optimized internal process

Platform enabling data driven decision-making culture for future organizational strategies

Competitive advantage

## References

1. Abukari, K., & Jog, V. (2003, Mar). Business intelligence in action: Three examples of how it really works.*CMA Management*, 77(1),15-19.
2. Ahmad, A., & Shiratuddin, N. (2010, May). Business intelligence for sustainable competitive advantage: Field study of telecommunications industry. *International* *Conference on Business Intelligence & Data Warehousing*, *Singapore, (BIDW 2010),* 96102.
3. Airinei, D., Berta,D.A .(2012).Semantic Business Intelligence - a New Generation of Business Intelligence.*Informatica Economică* ,16(2),72-80.
4. Almeida, M. S., Ishikawa, M., Reinschmidt, J., & Roeber, T. (1999, Aug). Getting Started with DataWarehouse and Business Intelligence. *www.redbooks.ibm.com* ,1-14.
5. Bara, A., Botha, I.,Diaconita, V., Lungu, I., Velicanu, A.,& Velicanu,M.(2009). A model for business intelligence systems’ development. *Informatica* *Economica*,13(4) , 99 -108.
6. Bartram, P. (2013, Sep). 8 Ways to... use business intelligence better. Financial *Management*.ABI/INFORM Global, 42-43.
7. Barakat, S.,Al-Zu,H.A.,& Al-Zegaier,H. (2013).The role of Business Intelligence (BI) in Knowledge Sharing sharing: a Case Study at Al-Hikma Pharmaceutical Manufacturing Company. *European Journal of Business and Management*, 5(2),237-242.
8. Bhatia, N. (2013, Oct 1). The Big Gain. *The Economic Times*. New Delhi.
9. Bucher, T., Gericke,A., & Sigg, S. (2009).Supporting Business Process Execution through Business Intelligence: An Introduction to Process-Centric BI. *Business* *Intelligence Journal*, 14(2), 7-15.
10. Bunata, E. (2013, Aug). Using business intelligence to manage supply costs. *Healthcare Financial Management*, 67(8), 44-47.
11. Chan, L.K., Yeoh, W.,Choo,W.O.,& Lau,P.Y.(2012).Technical Factors for Implementing SOA-Based Business Intelligence Architecture: An Exploratory Study. *Communication of the IBIMA*,2012(2012),1-10.
12. 24. Chen, H. (2010, January/February). Business and Market Intelligence 2.0. *IEEE* *intelligent Systems*,25(1),68-71.
13. Cody, W. F., Kreulen ,J. T., Krishna, V.,& Spangler, W. S. (2002). The Integration of Business Intelligence and Knowledge Management. *IBM Systems* *Journal*,41(4), 697 -713.
14. Curko, K.,Bach,M.P.(2007,June).Business intelligence and business processmanagement in banking Operations.*29th* *Int. Conf. on Information Technology* *Interfaces*,57-62.
15. Custis,C.(2012).The Role of Business Intelligence within the Hospitality Industry’s Information Systems Strategy: Historical Concepts and Future Trends.*Journal of Management Policy and Practice*, 13( 3) , 82-94.
16. Eckerson, W. (2011).BI Market Evolution.Retrieved from [http://www.b-eyenetwork.com/blogs/eckerson/archives/2011/03/bi\_market\_evolu.php.](http://www.b-eye-network.com/blogs/eckerson/archives/2011/03/bi_market_evolu.php)
17. Gupta, M.P. (2004, Jan-March). Information technology usage: The Indian experience. *VIKALPA*, 29(1), 83-91.
18. Hall, J. L. (2004, June). Business Intelligence: The Missing link in your CRM strategy.*DM Review*, 14(6),36.
19. Havenstein, H. (2005, Jun). New Tools Aim to Extend Business

Intelligence.*Computerworld*,14.

1. Jai, S. (2013, Mar 25). STATE Discoms eager to emulate private Cos’ forecasting skills. *The Economic Times*. New Delhi.
2. Jourdan, Z., Rainer, R. K., & Marshall, T. E. (2008). Business intelligence: An analysis of the literature 1. *Information Systems Management*, 25(2), 121-131.
3. Karami, M., Fatehi, M., Torabi, M., Langarizadeh, M., Rahimi, A., & Safda, R. (2013, Sep). Enhance Hospital Performance Intellectual Capital to Business Intelligence. *Radiology Management*,30-34.
4. Khan, A. (2013, Sep). Status of BI Solutions at Selected Branches of Banks in Rajasthan. *International Journal of Research In Commerce, IT & Management,* 2(9), 66-70.
5. Lawton, G. (2006, Sep), Making Business Intelligence More Useful. *Computer,* *IEEE Computer Society*, 14-16.
6. Negash, S. (2004). Business Intelligence. *Communications of the Association for* *Information Systems*, 13(4),177 -195.
7. Neo, B.S. (2011, feb). Innovative decision making: driving triple loop thinking. Retrieved from [www.cimaglobal.com/Thought-leadership/Newsletters/Regional/The-CIMA-EdgeSouth-Asia-and-Middle-East/20111/January--February-2011/Innovative-decisionmaking-driving-triple-loop-thinking/.](http://www.cimaglobal.com/Thought-leadership/Newsletters/Regional/The-CIMA-Edge-South-Asia-and-Middle-East/20111/January--February-2011/Innovative-decision-making-driving-triple-loop-thinking/)
8. Ortiz Jr., S. (2010, July). Taking business intelligence to the masses. *Computer,IEEE* ,12-

15.

1. Panian,Ž. (June, 2006). Business Intelligence and Human Resource
2. Management.*3rd International Conference proceedings "An Enterprise Odyssey:* *Integration or Disintegration"*, *University of Zagreb, Faculty of Economics and Business*,1018-1028.
3. Popescu, S. (2012 Mar). Business intelligence solutions - a way of general improvement of efficiency and effectiveness. *Review of International* *Comparative Management / Revista de Management Comparat International*,13(1), 88-95.
4. Tyagi, B., & Shrivastav, U.S.S. (2011, Jan-June), Issues and challenges in business Intelligence Tools Integrations with ERP. *Vision International Journal*, 1(1).
5. Watson, H. J., & Marjanovic, O. (2013). Big data: The fourth data management generation.

*Business Intelligence Journal*, *18*(3), 4-8.