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Factors of Big Data Analytics in Enabling the Knowledge Management Practice

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ABSTRACT
Knowledge management is more concerning on reflection and analysis than regarding architectures and taxonomies, as much regarding connecting people as gathering content, and more concerning on building communities than building databases. As knowledge is majorly kept in heads instead of hard disks, it is a lot tougher to manage than information. However, knowledge management must be developed on a foundation of excellent information management and data management. This paper aims to investigate the factors of big data analytics in enabling the knowledge management practice. Four major factors discovered are the storage factor, processing factor, security factor and quality factor. The theoretical framework is proposed for the future research on examining the significant relationship between the factors of big data analytics and the knowledge management.
KEYWORDS: Big Data, Big Data Analytics, Knowledge Management, Storage, Processing, Security, Quality

1.0 Introduction

Big data analytics facilitate to find the quickest route utilizing numerous mechanisms like smart card data and O-Sense. It analyses the information gathered from GPS traces on traffic patterns and congestion. Big data analytics facilitate urban designing by leveraging numerous kinds of sensors preparation such as surveillance objects, smart parking sensors, weather and water sensors, vehicular networking, and smart home sensors (Chauhan, Neetima Agarwal, & Kar, 2016). Within which enterprises use big data analytics to look for new patterns which will support strategic initiatives or result in new opportunities even if it may be the case that there's no clear organizational drawback to be resolved (Pauleen & Wang, 2017).

The article by Harris et al. (2015) discusses the potential of exploiting the big data analytics as the information and communication technologies (ICT) for the optimisation of the freight transport supply chain. The “predictive” nature of big data analytics might probably represent a game dynamic advantage for supply chains. As such, corporations might attain cost benefits through application of big data analytics as unplanned instrumentation downtimes may be reduced considerably, permitting the businesses to chop buffer inventories, so sanctioning the partners to work a leaner supply chain whereas eliminating supply risks. The emergence of big data analytics sanctioning higher exploitation of the growing quantity of data and represents a paradigm shift, as these systems are designed with attention to incorporate all information

sources available, regardless if the information originates outside or inside the focal business setting. Additionally, consultants have a rather broad set of knowledge across a variety of industries and purchasers, a good thing about the project kind of work that was expected to be useful so as to induce a holistic perspective on cross-industry aspects of big data analytics. Consequently, being the largest company advantage of big data analytics application, big data analytics-driven information availableness ends up in an improved perception of client intimacy, particularly in reference to the quality of perceived client behaviour. Over half of the specialists agree that big data analytics-driven information availableness includes a high impact on a company's better perception of client requirements by reflecting on the relevancy of client centricity. For the adaptation of big data analytics on a corporate level, underlining the potential of big data analytics in supporting client visibility may be seen as the key selling argument (Kache & Seuring, 2017). This article will cover about the significant relationship between the factors of big data analytics and knowledge management practice.

2.0 Literature Review

Knowledge management (KM) is currently approaching roughly the 25-year mark as a discipline. The researchers illustrate the role knowledge plays within the use of big data too as the analytic process. Even if big data could theoretically be analysed and collected with none specific objective in mind, the analysis and collection of big data are going to be initiated for an automatic response within the overwhelming majority of cases, to predefined existing drawbacks; supporting strategic decisions to attain corporate goals; or motivations to explore new opportunities with no clear problem definitions (Pauleen & Wang, 2017).

The first question is whether or not the insights we gain from data analysis converge into a consistent mental model in terms of consequences of cognitive big data in knowledge management. Furthermore, what implications will it wear decision-making if they do not? A mental model needs a human understanding of causative relationships. These relationships need to be plausible to the person making the mental model, for example they need to be in line with the person's former knowledge. They act as a filter for the interpretation of data and this can be the rationale why mental models tend to be stable (Lugmayr, Stockleben, Scheib, & Mailaparampil, 2017). A data storage technique appropriate for big data in personal knowledge management (PKM) should take several needs into consideration. One of them is the capability of the full-text search for knowledge management is crucial. Additionally, a straightforward combination of search functions is also provided to text search, particularly for content with different terminologies and from dissimilar sources. In general, people have to complete the subsequent tasks which are gradually refining individual knowledge structure when practicing knowledge management; collaboratively learning to exchange and share knowledge; adding new classes of learning resources and knowledge; deleting, modifying and updating some resources; and further enhancing the principles of PKM (Liu, Wang, & Lin, 2017).

Knowledge management (KM) has several positive aspects that have allowed organizations to reach higher performance however has continually been a relatively parochial discipline (Rothberg & Erickson, 2017). According one of the interviewees in the research by Sumbal, Tsui, and Eric (2017), "Organizations don't commonly brand the big data initiatives with knowledge

management, but big data may be connected to knowledge management so clearly around the process of making decision. It provides the idea for making decision or deciding. We analyze the data, we provide a prediction and we execute what the prediction means, then we analyze within the after action review if it went well and then we feed it back to the big data individuals to ensure prediction is better next time. Thus, big data may be vetted by the community of specialists and is purely the specific information provided for decision-making at the end, and you'll be able to place knowledge management personal component into there to provide feedback". Other informant reveals, "From big data, we acquire tacit knowledge and making decision by referring to this analysis" (Sumbal, Tsui, & Eric, 2017). Not much articles discuss about the relationship between big data analytics and knowledge management practice.

3.0 Methodology

The method applied to conduct this study is by reviewing the previous papers that are in the scope of big data analytics and knowledge management. At the first stage, the authors search for the factors on big data analytics generally and particularly like in the healthcare field. The second process is finding the previous papers that discuss big data analytics from the knowledge management perspectives such as the article entitled as "The Concepts of Big Data Applied in Personal Knowledge Management (PKM)". The total amount of articles that have be analysed for writing this paper is twenty-seven. From the review of the appropriate former researches, the authors point out the possible factors of big data analytics that might enable the knowledge management practice. The authors then construct the theoretical framework that may be used for future research on investigating the significant relationship between the factors of big data analytics and the knowledge management.

4.0 Findings

In this article, the authors reveal several factors of big data analytics in enabling the knowledge management (KM) practice, which are the storage factor, processing factor, security factor and quality factor.

4.1 Storage Factor

Storage is considered as one of the factors of big data analytics in enabling the knowledge management practice. For storing the big quantity of data that is being made by nearly everything, the storage available isn't enough. Social Media sites are themselves an excellent contributor together with the detector devices and etcetera due to the rigorous demands of the big data on storage, networks and servers outsourcing the data to cloud could seem a choice. There are two means that may avoid the transportation of data from storage point to processing point. One is to process within the storage place solely and results may be transferred or transport solely that data to computation that is vital (Katal, Wauzid, & Goudar, 2013). Every time we've made-up a new storage medium, the quantity of data has exploded. What's dissimilar regarding the most recent explosion is that there has been no new storage medium mostly due to social media. It might take longer time to transmit the data from storage

or collection point to a processing point than it might to truly process it (Kaisler, Armour, Espinosa, & Money, 2013).

Big data is no exception to the current policy and rule in real world data storage. Big data retention period might exceed and security and storage might become costly to implement. One should concentrate to the investment of storage for data. Storage is usually pricy and costly (Khan, Uddin, & Gupta, 2014). Nowadays, size of big data could be a major challenge. Initial big data has measurability in storage, as there are the increases in data density on the secondary storage devices (Sangeeta & Sharma, 2016). In order to deal with the cyber security, the big data analytic and visualisation techniques are helpful to analyse the large network traffic data available within the storage hub (Cárdenas, Manadhata, & Rajan, 2013). A post hoc forensic analysis is the analysis after the attack using big data analytics within the storage hub of an enterprise. Hadoop map reduce that consists Pig, Hive, Mahout, and RHadoop. These are the sole technologies that facilitate the storage (Jayasingh, Patra, & Mahesh, 2016).

4.2 Processing Factor

Processing is considered as the factor of big data analytics in enabling the knowledge management practice too. Assume that an Exabyte of data has to be processed in its totality. For simplicity, assume the data is chunked into blocks of eight words, therefore one exabyte = 1K petabytes. Assuming a processor expends a hundred directions on one block at five gigahertz, the time needed for end-to-end process would be twenty nanoseconds. To process 1K petabytes would need a complete end-to-end time interval of roughly 635 years. Thus, effective process of exabytes of data would need new analytics algorithms and extensive parallel processing so as to supply actionable and timely information. How to access terribly massive quantities of semi- or unstructured data, and the way to utilize so far unknown tool designs isn't well-known. It's clear the matter could neither be resolved by online analytical process (OLAP) and dimensional modelling, which can be slow or have restricted functionality, nor by reading all the data into memory merely (Kaisler, Armour, Espinosa, & Money, 2013). Processing of such great amount of data additionally takes great deal of our time. Whole of data set has to be scanned to seek out appropriate components that are somewhat impossible. Thus establishing indexes right at the starting point during assembling and storing of the data could reduce processing time significantly and may be a smart practice (Katal, Wauzid, & Goudar, 2013). Existing analytical techniques aren't adequate within the massive scale processing and analysis of big data events. Analytics is the science of processing huge volumes of data with the assistance of high finish performance computing devices and mining algorithms and generates results by taking acceptable amount of time or in no time (Jayasingh, Patra, & Mahesh, 2016).

According to several writers and researchers, big data could be a type of knowledge that exceeds the processing capabilities of ancient database engines or infrastructure. Distributing and parallel computing model has given ability to perform complex operations on terribly giant data sets. It deals with high velocity, high truthfulness and high volume of data by bringing computation processing nearer to data instead of bringing data to computation as happened before big data era, meaning that the vital factor is the speed of feedback loop that takes data

from input to the choice. Therefore, not velocity solely to incoming data, that matters, but to stream the fast moving data into huge storage for later analysis and processing. The researchers mention two vital reasons for such data processing concerns when speaking of that, one is to store input data since it's too quick at arrival that needs some special analysis at time of data occurrence on the fly and another one is application forces response to data as it arrives (Khan, Uddin, & Gupta, 2014). Big data involves the data sets that are having the big velocity, variety, and volume, and it's changing into hard to process this dataset using ancient data processing applications or management tools. The analytics results may be directly used for new revenue opportunities, better improved customer services and more practical marketing with none processing to the analytics results. As a result of the architecture looks so dissimilar, techniques for the parallel data processing that were employed in the traditional approaches aren't directly applied for the intra and inner node parallelism. New data processing techniques and systems are going to be needed to actively manage the power consumption of the processor as the power concerns in the future are seemingly to inhibit us from exploiting all of the hardware within the system endlessly. The whole of these changes force us to rethink the way data processing elements are designed, built, and operated (Sangeeta & Sharma, 2016).

The processing exhibits various characteristics like different locality and dissimilar data access patterns too. Data processing specifies the way data are parallelized and routed. As an example, it defines the parameters and the processing kind driving a map-reduce processing (Ardagna, Ceravolo, & Damiani, 2016). There is various software that provide visualisation for processing of big data like timeline, tableau, d3.js, and etcetera so as to form summaries, overviews and drill down to a level whereby we are able to extract correlation and patterns from the data sets (Nambiar, Bharadwaj, Sethi, & Vargheese, 2013). However, IT budgets are being shrunken with economy becoming worse. Approximately forty seven percent of IT budget to keep up IT infrastructure, thirteen percent to strategic IT investments and forty percent to transaction and information processing approximately (Tallon, 2013).

4.3 Security Factor

Security is also considered as the factor of big data analytics in enabling the knowledge management practice. The Community Comprehensive National Cyber Security initiated a data center, Utah Data Center (Director of National Intelligence Initiative and United States NSA) that stores data in scale of yottabytes. Its main task is to supply cyber security (Katal, Wauzid, & Goudar, 2013). In order to deal with the cyber security, the big data analytic and visualisation techniques are helpful to analyze the large network traffic data available within the storage hub (Cárdenas, Manadhata, & Rajan, 2013). Big data retention period could exceed and security and storage might become costly to implement (Khan, Uddin, & Gupta, 2014). Many domains whereby big data will build a true distinction like healthcare, transportation, energy, and even entertainment are extremely regulated for privacy and security (Eckhoff & Sommer, 2014; Lu, Zhu, Liu, Liu, & Shao, 2014). The unregulated accumulation of data by various social media corporations is perhaps the largest threat to personal security. Once many people very willingly surrender such info, this data represents a severe security concern. Clearly, some big data

should be secured with regard to security and privacy rules and laws (Kaisler, Armour, Espinosa, & Money, 2013).

Security is additionally the main concern in big data analytics. There are two sorts of attacks, which are attacks that occur throughout the training and execution part attack. Execution part attacks the data input streams that has been generated by the big data software and are added to influence the actionable intelligence. Let say training part attacks malicious attackers will produce data generators that have an effect on the dependability of the big data software analytics results (Sangeeta & Sharma, 2016). Privacy and security play a crucial role in preventing paradigms based on data outsourcing. Moving not just data but also computation to external infrastructures further increases the considerations of users regarding their privacy and security; knowledge breach, knowledge felony, and knowledge loss become important threats to organization assets. Compliance with legal aspects and owners' necessities then becomes paramount to support big data outsourcing, particularly in crucial privacy and security situations (Ardagna, Ceravolo, & Damiani, 2016).

The security vendors need to develop such a system that may aggregate the various data sets and correlate to present the data sets by utilizing statistics in the dashboard to data scientist. Hence, big data technologies are helpful though it facilitate a broad sort of establishments with a reasonable infrastructure for security monitoring. The samples of competent data process for security are reliant on MapReduce that's employed by the BotCloud2 and WINE. The privacy policy need to be enforced together with security policies for all the entities engaged within the process. Sometimes the private data may be utilized by the law enforcement agencies for national security. A number of the security problems in big data include storage of data and transaction logs in a secured manner, analyzing the data in real time, access controls at granular level and data place of origin. Since the unethical big data specialists could gather or analyze the data with no users notice, the security mechanisms that include decryption and encryption of data should be a part of analysis. Big data is changing the landscape of the security technologies for network monitoring and forensics. Hadoop is one among the tool used to process the data and we require tools to boost the security of systems. Former security mechanisms aren't enough to examine the large amount of data (Cárdenas, Manadhata, & Rajan, 2013). The security breaches could also be huge for big data because the data is coming from diverse sources. Various solutions for securing the big data is security at application level utilizing API, at the extent of file system and at the extent of columns in databases, maintaining log analysis and account monitoring. Big data poses serious threats with no right security and right encryption. The encryption techniques even don't defend or shield the log files because of the intelligence of the assaulter beyond the limitation of security (Jayasingh, Patra, & Mahesh, 2016).

4.4 Quality Factor

Quality is considered as the last factors of big data analytics in enabling the knowledge management practice. 5V model that includes Value, Volume, Veracity, Velocity, and Variety highlight the way big data technologies are orientated to the implementation of distributed analytics, that is, scalable analytics dealt in architectures that adapt computer resources to the

variety, velocity and volume of data, accepting the increasing difficulty in monitoring data trustiness (veracity) and quality, and creating potential to radically improve the value generated by providing results at runtime. Utility and accuracy of the leads to fact rely upon the origin and quality of data, that successively contribute to rise the trust of the final users within the process producing such results. In increasing the quality of the choice, feedback regarding the performance of previous deployments may play a role. A binding between pre-defined big data pipelines and situations of applicability may increase the quality of the retrieved results and of the analytics. However, the quality of big data analytics as-a-service (BDAaaS) powerfully depends on the preciseness and quality of the needs specified by the users. The higher the BDAaaS users have a transparent understanding of their goals and big data technologies, the greater the BDAaaS performance (Ardagna, Ceravolo, & Damiani, 2016). Value created from big data making transparency by creating big data overtly obtainable for business and functional analysis like quality, save time to market, and lower prices. A rising challenge for big data users is "quantity vs. quality". Conversely, a big data user could concentrate on quality that implies not having all the data obtainable but having very lots of abundance of prime quality data which may be utilized to draw high-valued and precise conclusions (Kaisler, Armour, Espinosa, & Money, 2013).

The quality and relevancy of big data analytics outcomes are a major concern to the organisational leaders in supporting them for strategic decision-making. In fact, once decision makers use big data in health care (Wang & Hajli, 2017; Kim & Park, 2016), processing real-time and prime quality data from numerous databases, and changing it into valuable info becomes vital issues. Inadequate analytics infrastructures to process fast, huge and the diversity of data has resulted in a longer time to analyse, generated poor info and data quality (Koronios, Gao, & Selle, 2014). Poor data quality is going to result in low data utilization efficiency and even bring serious decision-making errors (Halaweh & Massry, 2015; Cai & Zhu, 2015). As big data analytics is usually employed by decision makers in the decision-making process, its quality is a crucial component for effective decision-making in big data analytics implementation cycle. Commonly, data quality means the availableness of data that meets user needs. Meanwhile, info quality refers to the info made from analytics processed. The effects of quality in info processing-related big data analytics are crucial for institutional performance (Hou, 2013). System quality refers to the whole performance of the analytics application systems within the organizations used for supporting the decision-making process (Adrian, Abdullah, Atan, & Jusoh, 2017). Hadoop was created and organized to propel advanced monitoring of a substantial measure of data while unthinkably surpassing the quality or execution of normal databases. The respondents refereed to stresses over data quality, promise, trade off, and security as large deterrents to tremendous data selection (Jadon, Bhadoria, & Tomar, 2015).

Reliability is that the most tough to attain quality attribute. One among its most significant attributes is the quality of analytics system. Organizations are attempting to make sure highest quality for the systems being developed, however guaranteeing a similar is so hard because of the reasons like budget constraints, time constraints and increasing software size. The current scenario needs that the organizations be equipped with techniques that allow them to boost the quality of deliverables. There are ranges of factors that are utilized to measure the system

development quality and every attribute may be leveraged to measure the merchandise performance. These include integrity, efficiency, correctness, availableness, usability, security, dependability, and also the flexibility, reusability, testability and therefore the interoperability. Among the foremost necessary quality attributes for developed systems is dependability. There's a necessity to examine the quality factors related to these analytical results (Sangeeta & Sharma, 2016). Instead of having so massive unsuitable data, big data essentially focuses on quality data storage so more good conclusions and results are often drawn. Data quality must be perfect. Diverse tasks like cleansing, filtering, conforming, pruning, joining, diagnosis, and matching must be applied at the probable earliest touch points. Investment in metadata and data quality is additionally vital because it reduces the processing time (Katal, Wauzid, & Goudar, 2013).

5.0 Discussion

This study aims to examine the significant and relevant factors of big data analytics in enabling the knowledge management (KM) practice. The findings are going to be leveraged for facilitating the KM practitioners to fully utilize the big data analytics for the sustainable and successful KM implementation. The authors point out the possible factors of big data analytics in enabling the KM practice from the analysis of the previous studies. The factors are the storage factor, processing factor, security factor and quality factor. These factors are identified as the independent variables whereas the big data analytics is considered as a dependent variable for this study. The following figure is the theoretical framework that is specifically constructed for this study.

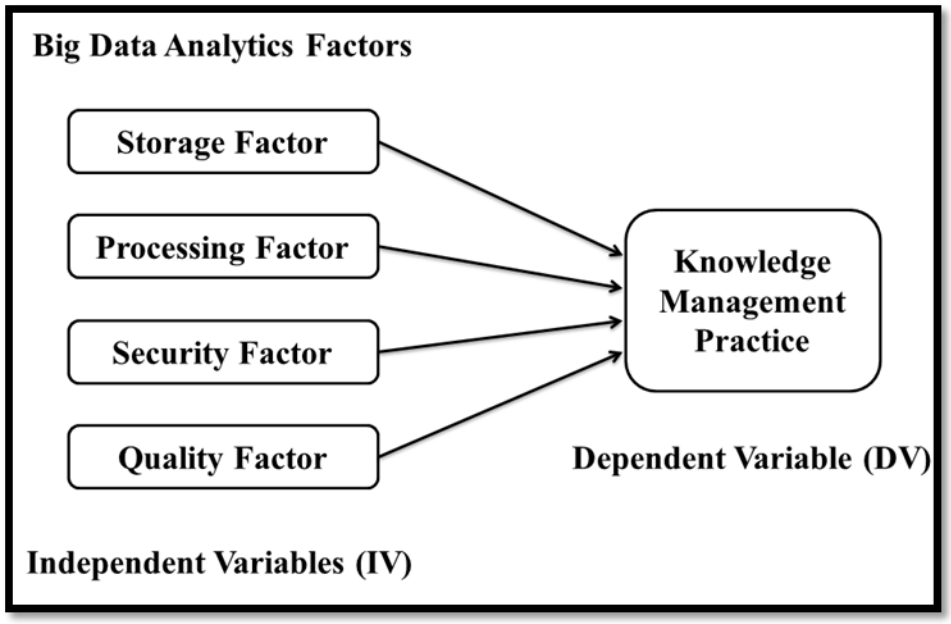

Figure 5.1: Theoretical Framework

Fewer authors write about the link or connection between big data analytics and KM in particular therefore more researches are welcomed. Above theoretical framework may be

utilized or leveraged for upcoming research in future that aim to examine the significant relationship between the factors of big data analytics and KM in order to discover and find out the relevant factors of big data analytics in enabling the KM practice.

6.0 Conclusion

For the aim of making value and meeting plan of action and strategic requirements, knowledge management is the systematic management of an organization's knowledge assets. It consists of the systems, strategies, processes, and initiatives that enhance and sustain the creation, storage, sharing, assessment, and refinement of knowledge. Knowledge management (KM) thus implies a powerful tie to structure strategy and goals, and it involves the management of knowledge that's helpful for several purposes and that create value for the organization. The analysis and gathering of big data are going to be generated for an automatic response to predefined existing drawbacks; supporting strategic decisions to attain corporate goals; or motivations to discover new chances (Pauleen & Wang, 2017).

Big data analytics is the use of advanced analytic techniques against so huge, various data sets from diverse sources that consist structured, semi-structured and unstructured data, and in distinguished sizes from terabytes to zettabytes. Big data is a term applied to data sets whose kind or size is above the capability of old relational databases to capture, process, and manage the data with low-latency and it possesses one or more of the characteristics like high volume, high variety, or high velocity. Big data comes from devices, sensors, video or audio, log files, networks, web, transactional applications, and social media where much of it generated in a so big scale and in real time. Analyzing big data permits analysts, business users, and researchers to form quicker and better decisions utilizing data that was formerly unusable or inaccessible. In order for obtaining new insights leading to quicker and better decisions, employing advanced analytics techniques like text analytics, predictive analytics, statistics, data mining, natural language processing, and machine learning, businesses may analyze formerly untapped data sources independent or along with their existing enterprise data. This study proposes a theoretical framework and welcomes more research in future to investigate the significant relationship between the factors of big data analytics and knowledge management practice.

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