

# Leveraging Big Data through Knowledge Management Processes

Fariza Hanim Rusly

Tunku Puteri Intan Safinaz School of Accountancy, Universiti Utara Malaysia

**Abstract:** Knowledge represents a critical source of organizations survival and competitiveness. From a process perspective, knowledge management refers to a structured process for effective acquisition, creation, application and dissemination of knowledge. The aim is to enhance organization's competitiveness and sustainability. Recent development on big data has potential to revolutionize the way data and knowledge are managed. Big data comprises of advanced technologies and architectures with enormous dataset with 5Vs varieties, velocity, voluminous, valuable and veracity of data for decision making. Big data and KM intersects on their objectives of creating and using knowledge for informed decision that benefits the organizations. Advancement of technology is however less beneficial if there is limited understanding of effective ways to identify, extract and utilize relevant and useful data to use for decision making. Therefore, the challenge is to understand how big data values can be realized through KM processes. Despite the potential impacts of big data on organizations' KM processes, scarce of study have look into integration of KM perspective into big data research. This paper proposes conceptual understanding of knowledge management to leverage big data potentials. Theoretical and practical implications of KM and big data integration, and suggestions for future research in the area are also provided.

**Keywords:** Big data, knowledge management, decision making

## 1. INTRODUCTION

This paper proposes conceptualization of knowledge management process to leverage big data technology. Very limited studies incorporate big data and knowledge management despite the opportunity to enhance data value, particularly for decision making purposes. First, this paper introduces knowledge management processes. Then, it discusses big data concepts, benefits and challenges. Next, the paper suggests integration of big data and knowledge management processes and provides a conceptual understanding of the integration, which contributes towards enhancing organizational decision making. It concludes with suggestion for future study and further works in the field.

## 2. LITERATURE REVIEW

### 2.1 Knowledge Management Processes

From the knowledge-based view of the firm, knowledge is a source for competitive advantage that supports sustainability of the firm in the marketplace (Grant, 1996; Erickson & Rothberg, 2015). From a process perspective, knowledge is managed through a structured process to ensure knowledge delivery. Knowledge flows through different ways and across different levels in organizations, and the process consists of various activities that should be performed in line with the organization's goals (Heisig, 2009). Through streamlining of the process, people could access, gain, share and act on information to produce knowledge that is used to make informed decision (O'Dell & Hubert, 2011). Thus, managing knowledge involves effective acquisition, creation, application, sharing and utilization of knowledge for competitive advantage (Chan, 2014).

\* Corresponding author.  
E-mail: hanim@uum.edu.my

## 2.2. Big Data

There are various definitions for big data given by scholars. From a technical perspective, big data is described as enormous and complex datasets that requires a greater scale than a common database capacity, and a powerful tools and techniques, including visualization technology, to enable data collection, management, storage and analysis (Izhar & Shoid, 2017; Chan, 2014).

Looking back at its early stage, the term big data was introduced by the Gartner Group in 2001, which describes big data according to volume, velocity and variety characteristics of data, known as 3Vs (Sumbal, Tsui & See-to, 2017). Depending on types of industry, the vast volume of data are measurable in terabytes (10<sup>12</sup> bytes), petabytes (10<sup>15</sup> bytes), or exabytes (10<sup>18</sup> bytes). Velocity refers to the fast speed in which these data or transactions are created, while variety reflects the multiple forms these data exists and diverse sources where these data originate. In other words, big data produces structured, semi-structured and unstructured data that are generated in high volume at a very quick pace. In 2011, the International Data Corporation emphasizes big data comprises of new technologies and architectures that enables extraction of value from the 3Vs characteristic of data generated (Sumbal, Tsui & See-to, 2017). In 2016, the Gartner enhanced definition of Big Data to encompass "high volume, high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision making, and process automation" (Janvrin & Watson, 2017; Kuurila, 2016). This definition is seen more comprehensive as it reflects not only data characteristics, but also the management of it to improve organization processes.

In relation to that, recent studies added another two characteristics describing data associated with Big Data technology, which are veracity and value (Janvrin & Watson, 2017). Veracity emphasizes on quality of data captured, including accuracy and reliability, to improve decision making (Sumbal, Tsui & See-to, 2017). Further, value focuses on the benefit of data captured and generated in comparison to the cost invested. This value of data generated also can be evaluated in terms of its

contribution to the organization processes, in particular decision making.

Literature suggests big data emerged as a result of high capacity for processing power, high accessibility to data with the above-mentioned characteristics (5Vs) and the shift towards open-sourced technologies and pool of shared hardware (Chan, 2014). Data generated from big data technologies could be useful in various business processes and affect different levels in organization: operational, tactical and strategic (Pauleen & Wang, 2017; Kuurila, 2016). Most commonly, data is captured for operational purposes involving transactional data to support day-to-day operations, and analyzing marketing and customer trends (Erickson & Rothberg, 2015).

The advent of big data affects and benefits most sectors and industries, including investment services, banking, communications, utilities, manufacturing, transportation, retails, education, professional services and construction (Erickson & Rothberg, 2015). Analysis from big data could provide insights about the external environment and put new perspective on the existing business environment. It offers understanding of existing and prospective customers, contributes towards creation of new products and services, provides immediate feedback and results, supports forecasting, supplies data for more precise analysis of market and customer segmentation and algorithms for objective decision making (Pauleen, 2017; Erickson and Rothberg, 2015). For some scholars, analysis of big data produces predictive knowledge to organizations. These valuable insights if put in action and exploited in positive means could contribute towards business performance, decision making, value creation and competitive advantage for organizations (Intezari & Gressel, 2017; Khan & Vorley, 2017; Kuurila, 2016; Chan, 2014).

Despite opportunities that big data offers, the vast volume and variety forms of data possesses challenges for organizations, including in terms of identification of relevant data and avoidance of redundant data (Izhar & Shoid, 2017; Khan & Vorley, 2017). This view is supported by IBM's view that states huge proportion of data available for organizations to capture is in unstructured form. Data from big data could be captured in many diverse forms including from databases, offline

documents, websites, mobile platforms and social media. The various formats in which these data exists makes it difficult to understand the existing relationship between these data. The complexity and huge volume of data complicate the effort to harness the true value of data capture. The concern relies on the organizations ability to capture relevant data out of massive pool that can be turned into useful extracted information. This extracted information from relevant data should able to support decision and add values to the existing business process.

Therefore, big data is not solely about technology to collect and analyze data, it is more than that. The major issue that is being discussed in the literature concerns about leveraging the value of relevant data for organizational benefits. Variety and vast data could lead to accurate analysis; nevertheless, changes in structural, architectural, technological and even skills and knowledge are required to enable organizations manage big data effectively.

### **2.3 Leveraging Big Data through Knowledge Management Processes**

The objective of this paper is to conceptualize integration of big data and knowledge management (KM) to leverage its benefits through application, which involves some degree of analytics. Big data analytics is seen as "systematic use of data and analysis to drive decision making and action" (Pauleen, 2017). Providing solutions to existing problems/queries, venturing into new opportunities and supporting decision at a strategic level, are among the reasons for involving big data analytics initiative in organizations at a higher level of decision (Pauleen & Wang, 2017). In order to leverage big data at a higher level of decision process involves/requires some knowledge processes, in which data captured will be analyzed, applied and utilized along with human interpretation and reflection. This is align with study by Erickson & Rothberg(2015), which claims that data that is put in context to become information will be most useful if being transformed to knowledge through some analytical process that requires human experience for a deeper understanding.

Big data and KM intersects at the aim of producing insights that is imperative for

informed decision making (Pauleen, 2017; Sumbal, Tsui & See-to, 2017). Equipped with right technology and sufficient skills, big data analytics is useful when it add values to decision making and improves business processes (Intezari & Gressel, 2017; Khan & Vorley, 2017). While scholars suggest there is opportunity to integrate big data with KM to perform more accurate analysis to support decision (Erickson & Rothberg, 2015), there is lack of awareness on how this two concepts can be linked together to contribute towards better decision making (Pauleen, 2017). There is still little debate about how big data play it roles in knowledge management for efficient decision-making (Izhar & Shoid, 2017). One argument that critiques integration of big data and KM is due to the distinctive nature of personality type involves in big data and KM practices. Big data seems to involve statistical analysis of numerical and visual data, from unstructured to unstructured, fast moving data. Whilst, KM is seen to focus more on the text-based or image-based knowledge that is properly recorded, captured and utilized as needed (Pauleen, 2017).

Despite the arguments, as mentioned by Pauleen & Wang (2017), knowledge is an important aspect in big data discussion due to the fact that knowledge is the basis for developing big data capabilities. Additionally, knowledge management system allow organizations to create and consolidate data and transform it into actionable insight through KM processes of creation, dissemination and utilization, which then used for decision making and analysis purposes (Izhar & Shoid, 2017; Chan, 2014). In relation to that, bridging management needs and technology capabilities to improve decision making and create values from big data should be the main focus in the integration of KM and big data.

Pauleen & Wang (2017) in their among earliest work of big data and KM integration proposed that data captured from big data needs to be put in the context of the organization to become contextual knowledge. Contextual knowledge is non-codified, experience-based and unique in different organizational setting; it encompasses tacit knowledge held by employees and implicit knowledge embedded in processes, activities, products and services. This contextual knowledge that is produced from data and undergone KM processes helps

in various types of decision including operational, tactical or strategic.

### 3. CONCEPTUAL MODEL

In line with Sumbal, Tsui & See-to (2017) and Pauleen & Wang (2017), this paper argues although different nature of data exists in big data and KM environment, there are processes that need to be performed on data captured to enhance its value in the decision making process. Data analytics could transformed data into information with some meanings by producing trends and patterns. However, further analysis maybe required, for instance using business intelligence tools or by data analysts, in order to gain interpretation of the condition. This interpretation requires some degree of human experience to produce actionable and contextual knowledge that is considered meaningful and add values to the organization's decision. Thus, the true meanings and value of data is only realized with involvement in a certain KM processes.

Figure 1 below presents the conceptual model to leverage big data through KM processes. KM could contribute in big data by providing a basis in identifying relevant data needed to improve organizational effectiveness and efficiency; this reflects knowledge acquisition. To make acquired knowledge useful, knowledge conversion process, which involves transformation of tacit and explicit knowledge is needed to enhance its value in the organizational process. Knowledge and experience of human determines analysis to be performed in big data analytics, including in the development of algorithms that reflects knowledge application. Further, knowledge utilization process support the way information derived from big data analytics to be utilized in the context of business processes. Finally, knowledge produced from big data analytics is then disseminated for organizations' operational, tactical or strategic decision making.

Therefore, it is proposed that establishment of processes for managing knowledge is vital to leverage big data analytics in organizations.

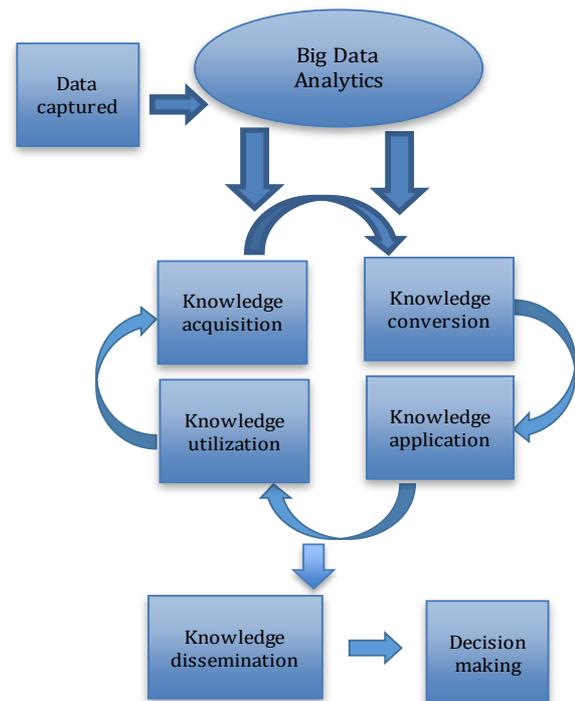


Figure 1: Conceptual Model for Leveraging Big Data through Knowledge Management Processes

### 4. CONCLUSION

Despite possibility of big data and KM integration to improve decision making, until recently there is no consensus about how best to incorporate big data and knowledge management in the organizations to improve business processes. This paper argued that values of data captured from big data technology could be enhanced through integration with organizational KM processes. Research works in the area is evolving that requires further research contributions to understand the effective way to leverage true value of data from big data to create value for organizational decision making process. Technological challenges, cultural and structural changes at the organizational level, as well as individual elements involve in both environments could be crucial to be considered for an effective integration of big data and knowledge management in organizations.

Big data technology offers huge opportunity for organizations to enhance operational and relational performance. Nevertheless, leveraging big data technology should be done with proper strategy and capability, and one of it is integration with KM. Future work will focus on assessing integration of big data

and KM in the professional service industry to examine how big data technology can be

leveraged through KM in the knowledge intensive environment.

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