The Magnitude of Big Data 5vs in Business Macroclimate

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Abstract: This paper discusses and features the age of Big Data in business macroclimate. The systematic review of influences the rapid changing business world today. This research explores Big Data and today's business literature is used in this research to further understand the concepts of Big Data and how Big Data processes, models and the Internet way of utilizing data for breakthrough innovation to acclimate for the age of technology. This paper also examines the depth understanding Big Data and what will Big Data bring to our society and businesses is essential for managers and top management to fully utilize the Big Data for competitive advantage. Big Data 5V are discussed in context of business macroclimate and the Big Data influences towards business processes. The garnered interest of researchers on Big Data in business over the years is evaluated to understand the need to grasp an understanding of 5V and the conceptual framework of big data analytics in business decision making is formed. As a conclusion, the Big Data phenomenon is illustrated in business concepts and intelligence and utilizing Big Data for competitive advantages in the competitive business world with advance information age in this millennium

Keywords: Big Data, Business, Business Intelligence

I. INTRODUCTION

The age of Big Data has approached the fast pace moving business world today. In the fast pace of development in economics and technologies of the twentieth century, infinite changes has brought to our lives, education, career, and just about everything in the world by the Internet. As contemplated by Emani et al. [1] the Internet will exceed the brain capacity of everyone living in the world. With the current trend of utilizing Internet as a platform for businesses, social networking and education purposes, the data accumulated by the World Wide Web has been increasing ever since. The Big Data definition by Bello-orgaz et al. [2] describes Big Data as high-volume, high- velocity and high-variety information resources that mandate cost-effective, inventive forms of information processing for enriched decision making. Simultaneously, Krishnan [3] de- fines Big Data as datasets whose size is beyond the capability of typical database software tools to capture, store, manage and analyze. In a typical work task or our daily life, we may be dealing with Big Data all day long, but we may not recognize Big Data as the Big Data defined in the previous paragraph.

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We may be aware of the storage capacity of our flash drive, our phone internal memory and our laptop memory capacity which goes by as 8 gigabytes (10^9 bytes), 32 gigabytes (10^9 bytes), 1 terabytes (10^{12} bytes), and often gets frustrated if our files are unable to be stored due to capacity of the flash drive or our phone memory has exceeded. Furthermore, what more of the data storage capacity on the Internet which is expected to increase to exabytes (10^{18} bytes) and zettabytes (10^{21} bytes) as illustrated in Luckow et al. [4]. Our daily lifestyle that is dependent on the Internet and machines to work wonders for us by just a click from our fingertip will eventually strain the web with an exponential production of gigantic amount of data [5]. The data may include sensitive bank data, shopping cart lists and favourite fashion websites, YouTube videos that we have watched, webpages that we have visit frequently, and just about everything that we do on the Internet is recorded and monitored. Other than that, data generated by manufacturing sectors [6] and business companies also contributes to the generation of Big Data. Big Data values are seen to be generating superfluous values for companies, end users and third parties [6]. This paper also discusses Big Data characteristics and sources of Big Data in the present rising high technology evolution. In the competitive business age of the twentieth century, data is presently in a steadfast speed development due to innovations in digital sensors, communications, computation and storage [1]. In an average company, massive amount of data is needed by top management to propose the best decision making and forecasting for sales and marketing projections. From the production floor operations to the shipment of goods, data generated by machines or humans either on paper or the computer is crucial and critical as if one of the goods is a defect or the goods are sent to the wrong customer, data is needed to trace where and how did the problem happened. Sharma et al. [7] discussed how organizations use data in the business operation process for innovative aspects in their business models. As data continues to grow, technologies to support the data utilization has to be further improve to accommodate the data generation by our economy and lifestyle. Big Data has changed the information systems technologies to be more dynamic and enhanced to a higher technology to constitute the massive amount of data by generated daily in the current competitive business platform and the unlimited usage of social networking to connect and communicate. Literature of the past five years have been collected from various literature publications and digital libraries to conceptualize

the understanding of Big Data dimensions as they evolve and its influence towards business management processes and management's effort in investing towards the Big Data hype. Section two discusses the Big Data 5V in the business macroclimate. Followed by section three that talks about the build in interest on Big Data and illustrates the conceptual framework of big data in business decision making process. The fourth section then examines how Big Data influences the business model and the propitiousness in Big Data for Managers. Ultimately, the conclusion of this research is highlighted in section five.

II.   BIG DATA 5V IN BUSINESS

Characteristics of Big Data began with three Vs, which are volume, variety, and velocity [8]. The three Vs of Big Data characteristics; Volume, Variety and Velocity were originally presented by Gartner, Kwon, Sim, McAfee and Brynjolfsson from year 2012 to year 2013 [9]. The three Vs were the big issue of Big Data when Big Data was brought into topic of business organizations in year 2012 due to the hectic development of increasing users of the Internet and social networking. However, up to date, the three Vs of Big Data has grew to four Vs and now up to five Vs that adds the Value and Veracity characteristics into Big Data. Volume denotes the amount of scale of data size. Moyne et al. [10] describes Big Data Volume is expressed to be in multiple terabytes and petabytes. The massive volume amount of data is so huge that traditional information systems may be dysfunctional to be able to store and analyze the data. According to Wilschut et al. [11], the volume attribute of Big Data is classified as the great volume of data that either consume vast storage or entail of large number of files. The volume of Big Data originally generated from business enterprise when operating its business. Data volume measures the amount of data available to an organization, which does not necessarily have to own all of it as long as it can access it. As data volume increases, the value of different data records will decrease in proportion to age, type, richness, and quantity among other factors [12]. Wamba et al. [9] illustrated that Tesco produces more than 1.5 billion new-fangled entries of data monthly, Wal-Mart's data warehouse incorporates 2.5 petabytes of information and Dell has introduced an improvement a database that comprises 1.5 million reports related with sales transactions and commercial advertisements. The volume of Big Data exceeds the capacity of traditional information system due to the source of Big Data not only comes from the data accumulated during operating in an organization, but in the modern world today, just anybody can generate data through their smartphones and from the computer they uses. For example, users of Facebook and any other social media applications generate data with every single click from their fingertips. Moreover, when the data from individuals combines with the data generated from organization when operating their business, the volume is said to be massive and uncountable. This is due to not only numerical data are stored, but also organic data generated from users of Internet. Data volume maybe in any format from any source as for example, videos may have multiple types of format and as well as photos which can be in png or jpg. According to Chen et al. [8] one terabyte of data is sufficient to pile at least 1,500 CDs or 220 DVDs, and corresponding to 16 million Facebook photographs by users from the Internet.

Variety aspect of Big Data is described by the type of structured, unstructured or semi-structured data. Variety of Big Data refers to the multiple format type of data sources as per discussed earlier in volume segment. Unstructured records are data of text, images, audio and video that is not simply not easy to be assessed by machineries [13]. Semi-structured data contains the word-based linguistic for substituting data on the Web entitled the Extensible Markup Language (XML). XML is machine-readable since it encompasses user-defined data tags. Structured data are data in worksheets and relational databases, which are easily read by machines and other types of information system software. Arun and Jabasheela [12] categorized Big Data variety is the degree of the lushness of the data exemplification such as text, images video, and audio. In addition, from an analytic viewpoint, it is perhaps the major complication to successfully using sizeable volumes of data. However, Emani et al. [1] describes Big Data variety as these data do not have a static configuration and hardly exist in a flawlessly systematic form and prepared for processing. As per described earlier, data generated in the world today includes data from the users of social media applications and the users of Internet, thus the data generated comes in many different forms from users with the goal of sharing the data to their acquaintance. As agreed by Bello-orgaz et al. [2], social media has developed to become one of the greatest expressive and significant data foundations for Big Data. Thus, this phenomenon has created the Big Data variety aspects. According to Samal and Mishra [14], variety comprehends the data produced from larger variety of sources and formats, and contain multidimensional data fields. Big Data variety would benefit organization if it is analyzed all together to have a greater view of the data and what the data is trying to tell the organization. Sharma et al. [7] emphasis that one of the core purposes that enterprises desire to work with Big Data is to ascertain new-fangled visions when all such data types are evaluated together. Also as discussed by Wamba et al. [9], Tata Motors examines 4 million text messages every month, spanning everything from product criticisms to mementoes about service schedules to declarations about new models and also attached with customer gratification balloting. It can be concluded that data variety may seem to be tedious to be analyzed, but if organization manage to analyze the organic data accurately and recite the data comprehensively, it will be a competitive advantage and creating a very strong sustainability capability for the organization.

In addition, Variability which adds to another V to the Big Data characteristics along in the same category as variety highlights on the semantics which are variability of connotation in language and communication procedures [1]. In other words, variability is the complexity of the data. Gandomi and Haider [15] discussed the variability component of Big Data is presented by Statistical Analysis System (SAS), alongside with variability conveying the importance of barrier as the two additional dimensions of big data.

Complexity denotes to the fact That Big Data are produced over uncountable of sources. Complexity also brings additional challenge to organization due to the necessity to associate, match, cleanse and convert data received from numerous dissimilar sources [7].

The third V is the Velocity of the Big Data. Velocity is the speed of data that can be delivered to the user or machine instantly when extracting data from a particular source. Velocity also incorporates the streaming of rapid data into mass storage for latter batch managing [16]. Active users of social networking and Internet have unknowingly become a spectator of Big Data velocity characteristics. Searching information and data via Google by keying in the keyword and hitting the search button, and the time spent when waiting for the results of the search is similar to the velocity characteristics of Big Data. The degree of which data are produced and the rate at which it should be examined and acted upon as described by Chen et al. [8]. is the velocity characteristics of Big Data. Sharma et al. [7] explains that data is being gathered at a very fast speed. Occasionally even the interval of a minute may cause inconsistency in the examined output especially for time-sensitive methods such as fraud detection, Big Data must be analyzed as it is produced to attain the elite results. The velocity of Big Data is measured by the frequency of the data being delivered to the user when the user type in the search box of the user clicks on the web application of the Internet. Wamba et al. [9] also discussed on the velocity of Big Data in the business world today. Amazon administers a continuous flow of new products, suppliers, customers, and promotions exclusive of compromising promised conveyance dates. Retailers can also track individual customer's data including clickstream data from the Web and revising such progressively granular data in immediate real time to track fluctuations in customer behavior and personalities [14].

The fourth V, named Value, was presented by International Data Corporation (IDC), Oracle and Forrester back in year 2012 [17]. The fourth characteristic of Big Data comes into picture due to how does the data serve as the value when the data is uncountable, having a massive amount of volume. For any research, or any forecasting methods it is often said that the more data, the better, but how the data contributes to becoming a value is the main concern of the business organization today. Arora et al. [18] categorized Big Datas worth as the degree to which Big Data produces economically well-intentioned insights and or profits through mining and conversions. Sharma et al. [7] also agreed that principal cautious investigation of the value of the Big Data may help in constructing competitive advantage. Furthermore, Gandomi and Haider [15] reflected that Oracle introduced Value as a crucial attribute of Big Data. Based on Oracles classification, Big Data are often categorized by comparatively low value density. That is, the data received in the novel form usually has a low value comparative to its volume. However, an extreme value can be acquired by exploring large volumes of such data. Thus, it is important to investigate the value in Big Data, as the accumulative data generated by users and organizations operating process would bring a significant change in the society today. Data needs be analyzed with the accurate technique to gain insights of the data, thus evaluating what the data wants to communicate with us as

a business organization in the highly challenged world this millennium. Wamba et al. [9] illustrated that Match.com testified more than 50% growth in revenue in the last two years' time, with additional 1.8 million paid subscribers in its central business, most of which propelled through data analytics.

The fifth and final V for Big Data characteristics is the Veracity proposed by White in year 2012 [19]. Veracity, in layman terms is the conformance of the truth. Data veracity is much associated with the value of the Big Data as per discussed earlier. May it be massive amount of data, collected data used for forecasting, customers data, any data that could be found, the trustfulness of the data remains on the person whom will analyze and investigates the data. Sharma et al. [7] insisted that if somebody does not have faith in the input, that person cannot trust the output and will not build judgments because of it. As Big Data develop in size and variety every day, investing assurance in it poses greater encounters. Data collected are mainly used for decision making in the organization, thus veracity is dependent on the decision maker. Furthermore, Kim [20] describes veracity as the characteristic of impulsiveness of some data obliges analysis of Big Data to achieve trustworthy forecast. However, the trust on data remains challenges due to replication and existence of false data collected. In addition, Arun and Jabasheela [12] explains that data veracity signifies the biases, commotion and irregularity in data. It is also the data that is being accumulated, and extracted of its significant to the problem being evaluated. Due to data are collected mainly by humans, or input by humans, the error margin remains as a false data collected. Data generated by computers tend to also have discrepancies due to error in software or hardware that causes the error. Thus, it is important to have clean data and filtered data so that the data contains value that organization seeks for. Wamba et al. [9] illustrated that eBay Inc. challenged a massive data duplication problem, with between 20 and 50 fold versions of the identical data dispersed throughout its various data marts. Then, eBay established an internal website (data hub) which allows managers to filter data duplication.

The five Vs discussed earlier are interconnected to the age of Big Data characteristics. Thus, it is important for manufacturers and business organization to fully understand the characteristics of Big Data before embarking on efforts to fully utilize Big Data in their business process and operations. Volume, variety, velocity, value and veracity is the outmost element in describing Big Data. Big Data is defined as a huge amount of volume data that comes in variety form influencing the velocity of retrieving the data from the information system. Defining data practicality from data collected must have value and veracity towards the decision maker to read and analyze the data for further understanding and making a better decision for the organization. Emani et al. [1] outlines dealing meritoriously with Big Data involve one to generate significance against the volume, variety and veracity of data while it is still in action (velocity), not just subsequently it is at rest.

III. "BIG DATA" AND BUSINESS RESEARCH PATHWAY

3.1 Search Engine on "Big Data" and Business at Scopus.com

Big data is making big changes across industry. Understanding and harnessing the power of big data is vital for today's business. Based on the latest Scopus online search carried out on 14th June 2017 by using Boolean "and" to conjoin the two singular words "big data" and business, number of research material published on Scopus from year 2004 to 2017 is summarized in Table 1. A total of 3,408 materials were found on this area. The first article on "Big Data" and business was published in 2004. Following, a slight interest build on "Big Data" from year 2009 to 2011 as the number of published research material increases. However, in year 2012 there is a boom in attention given to this area of study as the number of research materials published increased from seven to 79. By 2016, a drastic rise in interest on "Big Data" and business as published materials increases to 1,141. The upward trend in this study area is illustrated in Figure 1.

Table 1: Boolean used "Big Data" and Business keyword search in Scopus

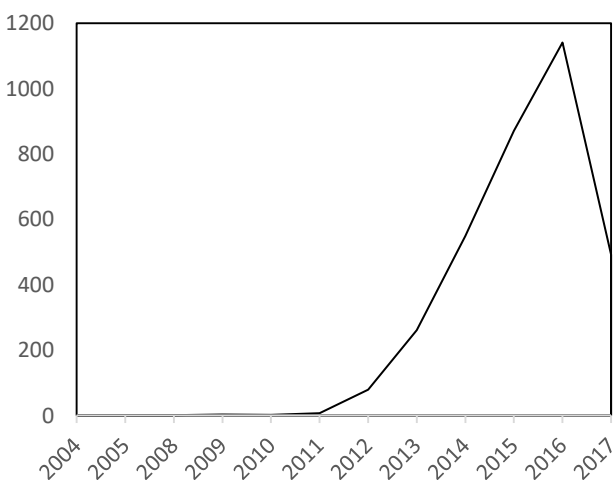| Year	Number
2004	1
2005	1
2008	1
2009	3
2010	2
2011	7
2012	79
2013	261
2014	549
2015	871
2016	1,141
2017	492

Figure 1 "Big data" and business keywords search in Scopus

3.2 Big Data Analytics for Business Decision Making Framework

The data analytics process in making decisions for business purposes is illustrated clearly in Figure 2. The sources of data can be classified into unstructured, semi-structured and structured data sources. Data from any source is made up of five dimensions, namely; volume, variety, velocity, value, veracity. The five dimensions pose challenges in the process of data analytics. The process of data analytics begins with data access, then comes data transformation, followed by feature selection, model building, model evaluation and finally ending in visualization. In order to visualize the data, the analytics process must undergo the process mentioned. The outcome of data analytics will provide supporting information to generate idea innovation for business decision making.
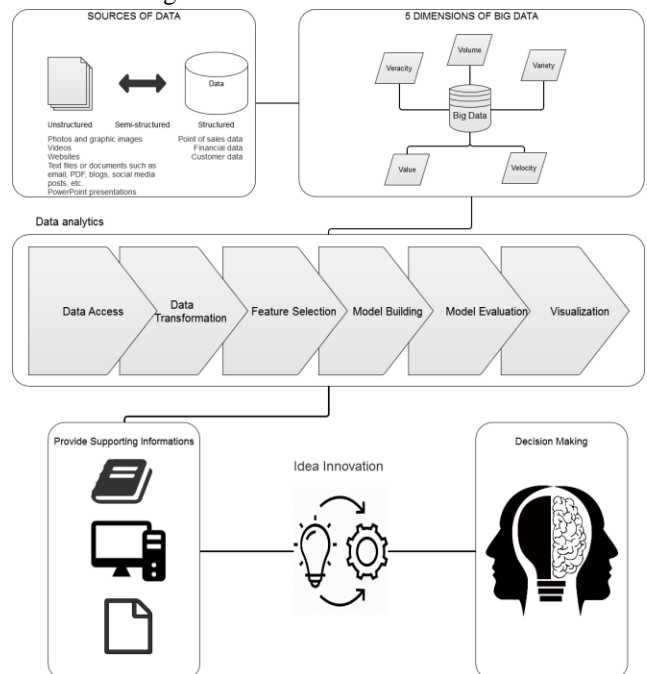
Sources: B. Marr [21] and Poleto et al. [22]

Figure 2: Conceptual framework of big data in business analytics to generate idea innovations for decision making.

3.3 Big Data Business Analytics Preparation

The fast pace growing of technologies have generated IoT devices such as smartphones, tablets, Global Positioning System (GPS), and Virtual Reality (VR). These devices present enjoyment that lead millennials to be technology savvy [23]. The enthusiasm that magnifies the users' ambition has generated a tsunami of data. Therefore, this presents a great opportunity for businesses to unlock the hidden potential that lies in the big data to create business opportunities [24]. Big Data business analytics preparation is needed to unlock the Big Data business information to reveal actionable insights for organisation gain. In order to achieve desired outcomes, the analysts should know about machine learning, advance statistical techniques, and other predictive analytics to make sense of the various type of data such as structured, unstructured, text, numbers, images, and others [21]. Machine learning will be further explained but advance statistical techniques and other predictive analytics will not be discussed in this paper. There is a variety of software available to analyse big data such as R, Statistical Analysis System (SAS), Hadoop and Python.

R is open source. Python is managed by non-profit Python Software Foundation. Meanwhile, Hadoop and SAS are commercial software

The following are some of the technology directions that make big data possible and will make many of the things in big data easier to accomplish. Firstly, Data Stream Management, the velocity associated with big data often result in the influx of data from widely distributed sources that has more of the characteristics of a stream than of discrete transaction. A set of parallel algorithms is applied, to quickly determine what to do with a particular piece of data, before it is passed on to a database or data warehouse for storage and further processing [24]. Second, cloud is the technical and economic structure of cloud services that have made it possible for many organisations to use and publish large amounts of data and analysis. Next, NoSQL Database, the non-relational databases which are more flexible and storing simple key-value pairs on the premise that simplicity leads to speed [25]. Besides that, Bandwidth is the ability to move large amounts of data, especially video data that is dependent on the huge increases in bandwidth available, not only in core networks but also in access to most endpoints, including mobile endpoints. Moreover, Wireless which is a mobile access to all forms of data, with high bandwidth, anywhere, anytime, dramatically increases both the supply and demand for data and information. Last but not least, New forms of data which are availability of new type of technologies to manipulate and analyse them and allowed the exploitation of a variety of data [24].

IV. PROPITIOUSNESS IN BIG DATA FOR MANAGERS

As deliberated in earlier sections of this paper, the characteristics of Big Data and its influence to the business environment has been tremendously affected the society and many of the business process and operations, especially business operations via the Internet. Wielki [26] suggests that the successful enactment of Big Data initiatives necessitates an undertaking of suitable organizational activities, including safeguarding organizations are provided with all the essential resources to facilitate analysis of the ever developing data sets to which they have access and permission. Managers needs to ensure business and organizational goals are aligned together with the Big Data initiatives to achieve maximum utility of Big Data processes. Also, Jin et al. [27] has concluded that growing number of conventional enterprises have reassigned their concern form local data to Big Data on Internet, desiring to uncover information of boundless worth. Managers needs to collaborate with the Information Technology (IT) department for coordination of the organizational goals with Big Data benefit due to the developments that capture, store and analyze Big Data are primarily accomplished by IT [28]. Moreover, Kim [20] suggests that IT upkeeps the enactment of a business strategy. However, Big Data may bring several challenges to managers as the characteristics of Big Data includes veracity and value, that would result in discrepancies if data are not analyzed in an accurate manner for decision making. Thus, as agreed by Rajpurohit [29], a virtuous understanding of analytics will assist managers to use the reports produced by analytics in an enhanced way, while offering improved directions to analytics team to meet organization goals. However, the massive volume of Big Data may be challenging for users to visualize the data for further handling. Xu et al. [30] has emphasized that users are submerged in the ocean of excessive information and are stressed to make good choices, which refer to information surplus drawback.

There are several methods to analyze Big Data as confirmed by Wielki [26] in custom, organizations use numerous techniques and technologies to aggregate, manipulate, analyze, and visualize Big Data. The fundamentals of Big Data includes data analytics which involves statistical methods to visualize the data, software from Information Technology to run and retrieve data needed, and economics knowledge to process and make sense of the data gathered. As corresponded by Wielki [26], the several fields such as statistics, computer science, applied mathematics, and economics simultaneously combines its understanding of data to foresee the data for enhancement exploration. Rajpurohit [29], has developed a seven step of Big Data analytics procedure that is iterative and interactive. The seven step of Big Data analytics includes first step as developing an understanding of the application domain, second step of selecting data and building input dataset, third step of pre-processing and cleansing, fourth step of transforming data, fifth step of Data Mining, sixth step of evaluating and interpreting patterns and seventh step of visualization and feedback. Wamba et al. [9] has further elaborated that the significance establishment from Big Data has the competence of substituting and supporting human decision making with computerized algorithms. Rajpurohit [29] also insisted that in implementing the seven steps of Big Data analytics, managers must possess compact business understanding to make the right evaluations for these trade-offs. There are several methods in gaining beneficial elements from Big Data, thus it is important for managers to fully exploit the precise technique so that the data acquired can assist in decision-making. However, as debated by Vera-Baquero et al. [32], business managers need to fully understand that no matter which profitmaking analytics tool they select, it can seldom be a sustainable competitive advantage for the organization. The tool selected by managers for Big Data analytics must suit the need and the organizational goals in real-time. Due to decision-making are often done in real-time situation, thus it is vital for managers to make the accurate selection of tool to assist in visualizing the data conceptually. Wamba et al. [9] has also confirmed that undeniably, refining the decision making procedure within organizations is at the principal of the present-day hype around Big Data. As agreed by Rajpurohit [29], managers that apprehend their business and use the analytics kits professionally and meritoriously will definitely be a sustainable competitive power. Simultaneously, Vera-Baquero et al. [32] has also highlighted the importance of investigation of presentation data with the goal of refining the performance and effectiveness of enterprise business systems is a vital part of running a competitive business.

The practice of Decision Support Systems (DSS) for Big Data is further explained by Vera-Baquero et al. [27]. DSS is a software that aids managers in a more precise decision making in real time. Fisher et al. [28] describes DSS as a valued asset for analysts since it converts presentation of data into useful information, and in turn, such information is converted into knowledge in order to aid decision-making [33]. Moreover, the DSS approach has the competency to support business users to access performance analytics data competently in a timely fashion, availing of performance dimensions on a satisfactory response time foundation [29]. According to Wielki [21], the conclusion of a survey piloted in summer 2012 by New Vantage Partners, among C-level executives and function executive heads from several of America's prominent companies, there are seven basic groups of benefits associated with Big Data ingenuities. Improved, fact-based decision making (22%) and an enhanced customer experience (22%) are the most significant of these benefits, combined with the whole message that the expectation is to build better decisions quicker. The added groups of benefits include: amplified sales (15%), new product innovations (11%), low risk (11%), extra effective operations (10%) and sophisticated quality products and services (10%). The DSS approach was discussed in detail by Chiang et al. [30] that includes five steps of business process improvement lifecycle, with a start off by defining, configuration, execution, controlling and lastly, diagnosis [34]. Bello-orgaz et al. [2] has examined the use of DSS to analyze crime trends allowing to catch suspects. It can be further concluded that managers needs to be very sceptical on the selection of tools to analyze Big Data for better decision making that aligns with the organizations goals. Arora et al. [18] further conclude that the extraordinary development in data in practically every sector delivers businesses an exceptional opportunity to utilize analytics to decode buried visions [35] that can be used for making better decisions by managers.

V. CONCLUSION

This paper discusses and features the age of Big Data in business macroclimate. The systematic review of literature is used in this research to further understand the concepts of Big Data and how Big Data influences the rapid changing business world today. Furthermore, this research explores the need to comprehend the concept and role of Big Data as it continues to expand due to the fast-paced growth of technology. Originally the dimensions started with three Vs that became the defining properties of Big Data. The three Vs has now evolved into five Vs that further scrutinize the prospects of Big Data. The five Vs comprise of volume, velocity, value, variety and veracity. The intensive explanation of five Vs has magnified understanding on the implications of Big Data in the business decision-making process. The increasing attention given to Big Data calls for in-depth explanation for enhanced understanding. Expanding on that, a conceptual framework of big data analytics in the business macroclimate is constructed for clearer view on its implications in the business decision-making process. Big

Data analytics software and models are also highlighted and discussed to augment apprehension. Perusing Big Data in the business microclimate provides multitudinous possibilities for managers in the business decision-making process. Managers are advocated to comprehensively grasp the five Vs, increase knowledge on data analytics models and be aware of the opportunities that follow them to fully utilize the potential of Big Data.

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