Application of Big Data in Promoting Sustainable Solutions for Business - A Review

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Abstract

This review article focuses on scholarly literature pertaining to the field of the application of big data in solutions for business. With the emergence of big data as the next frontier in technological evolution, there has been a significant attempt to study how businesses may use it to improve their performance and profits. In order to conduct a search of relevant literature with regard to this, a protocol was designed. The open source website Google Scholar was used to maximise results, with a final total of 210 research works being examined before a final list of 5 were selected using a set of filters and parameters devised based on the original intention of this systematic review. The final five works that were further analysed showed that four out of five focused on improving specific aspects of businesses using big data, such as improving overall performance, customer behaviour and experience, designing business intelligence solutions, and traditional versus improved marketing. One article focused on a specific industry, i.e. healthcare. As the search methodology and parameters in this systematic review were aimed to find works that were solutions-based, many of the authors of the final five works made proposals or recommendations to industries and business managers on how big data could improve their practices or their operations in very concrete and specific ways.

Keywords: Big Data, Application, Sustainability, Business, Review

Introduction

The emergence of big data in recent years as a field has led to its application in multiple sectors, from technology and government to business. In fact, the application of big data in solving the pressing issues of today and the coming years is a much-discussed topic.

In this regard, the aim of this review article is to focus on available literature on the subject of the application of big data in business. To this end, a search was conducted on available open source online search engines. The results generated by the search were filtered based on certain parameters. These research articles were then examined further to understand the methods used by the authors, as well as the conclusions derived by them on the subject of application of big data in business.

Observations and patterns evident from this analysis have been presented and, as a conclusion to this article, some suggestions for further avenues of research have been made.

What is Big Data?

Before proceeding, it is important to understand what big data exactly is. To put it simply, big data is a field where vast quantities of data are dealt with that may not otherwise be able to be analysed or understood.

One widely used definition states that big data refers to high volume, high velocity and/or high variety data that requires effective method of information processing in order to enable

extracting meaningful results that may aid in decision-making, creating insight and process automation. (Gartner, n.d.)

The three 'V's mentioned above are inherent and important to the understanding of big data. These are Volume, Velocity and Variety. (Oracle, n.d.)

Volume refers literally to the 'big' in big data, meaning that enormous quantity of structured or unstructured information needs to be processed. Velocity can refer to either the speed at which the data is received or the speed at which the data is processed or acted upon. Last, Variety refers to the sheer variety of datasets that do not fit into traditional structured types of data. (Oracle, n.d.)

In the field of business, there has been an enormous push to incorporate big data and any solutions that it may provide in creating new streams of revenue, reducing costs, streamlining processes and increasing automation. There have been several reports in recent years touting the economic impact of big data, with some stating that it could generate between USD 3 trillion every year in just seven industries, to other reports claiming that big data analytics can improve productivity in companies by 5-10 per cent. (Kennedy, n.d.) (Claros & Davies, 2016)

However, privacy experts have also sounded the alarm with regard to the impact that the emergence of the field of big data could have on the privacy of citizens, many of whom have vast online presences. With the use of big data analytics, an individual's online habits, such as social media postings, search histories, purchase histories and location histories could be used by both corporations and governments to create a detailed picture of that individual's characteristics, behaviour, and relationships. Previously thought to be too vast a data quantity to analyse, the online activities of average citizens can now be analysed much more easily and thoroughly by corporations and governments, to the detriment of the privacy of individuals. (Wood, O'Brien, & Gasser, 2018)

The aim of this article is to focus on the aspect of big data that has applications to the field of business. With this in mind, a search was conducted to generate results. The methodology of conducting the search and then filtering the results is described in the next section.

Search Methodology

In order to find results on scholarly works on big data, it was decided that the open source search engine Google would be used. Within Google, there is a search engine that allows search for only scholarly works. This scholarly work search engine, Google Scholar was used for proceeding with this review. Through Google Scholar, search results present in several different dedicated databases can be searched in one shot; therefore, this search engine was chosen for the convenience it represents as well as the maximisation of finding a wide array of search results without having to go through individual databases.

Then, a series of search terms were formulated and entered into the search engine Google Scholar.

Before proceeding, it is important to understand the parameters that were used to both formulate the search terms, and then used to filter down the results to a small and manageable number. The parameters are:

- Business – This review looks for works that focus on the use of big data in business processes, rather than in any other field

- Application – This review also focused on work that described or discussed the application of big data and big data analytics in business practices
- Solutions/Advantages – Where possible, this review attempted to look for works that focused on the benefits, advantages or solutions that big data can provide to businesses, i.e. focused on the positive side of big data application in business

With these parameters in mind, the following compound search terms were formulated and subsequently entered into Google Scholar.

"Application of Big Data in Business"

"Solution of Big Data in Business"

"Big Data + Business"

"Big Data + Business + Sustainability"

"Big Data + Business + Sustainable Solutions"

"Big Data + Business + Benefits"

"Big Data + Business + Advantages"

Each page of the results contained ten search results. As there were a fair number of search results, in order to stay within the scope of a brief review article, it was decided that no more than three pages of results for each search term would be considered. Given the seven total compound search terms, a total of 210 search results were considered. The above-mentioned parameters were then judiciously applied to these results, to filter the total number of research works to be analysed for this paper to be five. These final works are outlined and analysed further in the next section.

Results

Of the aforementioned 210 results examined, five are presented below that were studied further.

1. Speiss et al (2014) focus specifically on the issue of how customer experience and business performance can be enhanced by the utilization of big data. The authors state that in a crowded market, a business can distinguish itself by providing a better customer experience than its competitors; thus, this is a valuable area for improvement. The work examines how big data can be used to generate insights on how improvement can be brought to customer touchpoints that involve automated and assisted processes. In particular, the authors focused on Alcatel-Lucent and Bell Labs' innovations in this regard, and how these innovations can be used to improve communications service providers' business models with big data. The authors conclude that Alcatel-Lucent and Bell Labs have unique methodology that help predict customer behaviour and help what factors influence this the most, ultimately resulting in an improved customer experience and a higher customer value. (Spiess, T'Joens, Dragnea, Spencer, & Philippart, 2014)
2. Wang et al (2018) approach big data from the point of view of healthcare organizations, and how big data analytics can bring benefits and advantages to them. The authors used content analysis to better understand the historical development, architectural design and component functionalities of big data analytics. In order to this, the authors studied 26 cases where big data was implemented in the healthcare field and content analysis was conducted on these 26 cases. By conducting this content analysis, five capabilities that

big data could bring to healthcare organizations were identified, namely, analytical capability for patterns of care, unstructured data analytical capability, decision support capability, predictive capability, and traceability. The authors also mapped the advantages that big data analytics could bring to healthcare organization, such as helping in information technology infrastructure and improving operations. The aim of the research is to help healthcare organizations recognize the specific benefits that big data analytics could bring to their field, and use these strategies to improve their performances through a data-driven approach. (Wang, Kung, & Byrd, 2018)

3. Ervelles et al (2016) focus on how marketing can be transformed and improved by the usage of big data analytics of consumer data. The authors contend that consumer analytics, i.e. studying data about consumer behaviour, is at the very core of the big data revolution and its application to business. As evolution of technology allows the capture of large amounts of consumer data in real time, there is an unprecedented amount of volume, velocity and variety of data on the behaviour of individual customers. As explained in previous sections, these are the three central factors of big data. The authors discuss the physical, human and organizational resources required to collect and store the consumer data as big data, then the process by which insights are extracted through big data analytics, and finally the process through which these insights on consumer behaviour can improve the adaptive capabilities of businesses. (Erevelles, Fukawa, & Swayne, 2016)
4. Marin-Ortega et al (2014) focuses on the application of big data analytics in creating a new approach to business intelligence solutions. The work aims to address how a data-centric business intelligence solution can be built in a timely manner, as well as help create business intelligence solutions for the usage of big data. In order to this, the research aims to examine how the amount of time spent on business intelligence solution design can be lessened. Next, it aims to examine how flexibility can be created in business intelligence solutions, through the removal of problems that come when new data sources are added. Last, the work examines how business intelligence solutions can be created by using big data concepts. In conclusion, the authors propose a new variation of an existing data processing model, i.e. Extract, Load and Transform or ELT. Through the addition of big data, the authors propose that this model could be remade as the ELTA approach, i.e. Extract, Load, Transform and Analyse. (Marín-Ortega, Dmitriyev, Abilov, & Gómez, 2014)
5. Akter et al (2016) focus on how firms can improve their performance by using big data analytics. At the outset, the authors state their intent to create a big data analytics capability (or BDAC) model to address the challenge of why many companies are unable to improve firm performance through the usage of big data. In order to create this model, the authors rely on two factors; one, the resource-based theory and two, the entanglement view of socio-materialism. The authors state that their research findings showed that big data analytics capability or BDAC is a hierarchical model, consisting of three facets or dimensions. These three dimensions are management, technology and talent capability. The authors also showed several sub-dimensions within these three. Apart from constructing this model, the authors also conducted two Delphi studies and conducted online surveys from 152 business analysts from the United States. The results from these studies and surveys showed that the analytics capability and business strategy had a

moderating impact on the relationship between big data analytics capability and the firm performance enhancement. (Akter, Wamba, Gunasekaran, Dubey, & J.Childe, 2016)

Observation and trends from these results are discussed further in the following section.

Discussion

At the outset, it is important to note that many of the research works examined stated that using big data was an inevitability for business practices, especially if they intended to keep up or evolve with the times. With rapid technological development, big data is considered by many of the authors to be the next big thing, and businesses need to adapt and change in order to keep up with market realities. Big data was mentioned as vital way of achieving this.

All five of the works examined, focused either on a different industry that can use big data to its advantage, or a different aspect of business practices that can utilize the application of big data to enhance performance. The first work focused on customer experience, while the third focused on marketing, the fourth on business intelligence and the last on enhancing firm performance. These four can be stated to be focused on different aspects of business, i.e. improving overall performance, customer behaviour and experience, designing business intelligence solutions, and traditional versus improved marketing. The second article alone focused on a specific business type that could use big data, namely healthcare organizations.

Notably, all of the five works were recommendation-focused. Perhaps due to the fact that the search methodology and parameters in this systematic review were aimed to find works that were solutions-based, many of the authors made proposals or recommendations to industries and business managers on how big data could improve their practices or their operations in very concrete and specific ways.

All of the researchers also called for more research to be conducted to further improve understanding of this new and complex field. As the field of big data, and indeed its applications in business practices, is still emerging, there is plenty of research that can be conducted and more scholarship that is required for the field to be better understood.

Some observations from conducting the search are also worth mentioning here. One, since big data is a relatively recent field, a majority of the scholarly works in this regard were from recent years, i.e. post 2010. This is to be expected as the field is still nascent. Second, big data is a highly used term in scholarly works. It is only by narrowing the field by using additional descriptors, such as business practices, benefits or solutions, etc. that the list of scholarly works became more manageable to parse through. This suggests that this is a field that is being investigated heavily. The implications of big data in fields such as governance, policies, privacy, etc. are being studied due to the mention of several of these aspects in the works associated with big data. Thus, business is only one of the aspects relating to big data that is being studied further by experts and scholars.

Limitations of this Review

There are some limitations to this review that bear mentioning.

Due to the limited scope of a brief review article, only five articles were analysed further. It is likely that with a wider scope, more articles can be included.

Moreover, as mentioned in the methodology section, this article only included a narrow purview of articles, i.e. articles that included elements of big data, business, and solutions or benefits or

advantages. By expanding these parameters, or altering them, different articles may have been included.

Conclusion

It is evident that the application of big data for solutions in business is a topic that is being currently researched. The systematic review's search protocol revealed a fair number of articles before they were filtered down to a manageable number using specific parameters. It is likely that more scholarly works will be released in the coming few years as this field is still nascent and work on the issue is still emerging.

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