A Literature Study of Big Data Analytics in Marketing

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

Review Article

ABSTRACT

Marketing competition is fierce in today's business environment. In order for a company to succeed in the market, it is necessary to find valuable information in the market and make a correct business decision. On the other hand, business decisions are usually carried out by management after research, but this step requires accurate data information as a support, and the decision-making plan will be more effective only with the support of effective information. However, big data can be used to conduct scientific analysis of the market data, as well as a comprehensive analysis of the enterprise. So big data analytics is the most critical part of marketing nowadays. This study aims to review the significant and recent research about the applications of big data analytics in marketing and to provide insights to practitioners the necessary analytics in marketing.

1. INTRODUCTION

With the development of science and technology and information circulation, communication between people is getting closer and life becomes more convenient. Big data is a kind of information asset which requires new processing approach for stronger and powerful in making

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decision, insight and discovery ability and process optimization of ability so as to cater with massive, high growth rate and diversified data. Its scale is so large that it exceeds the capability of traditional database software tools in acquisition, storage, processing, managing and analysis. And the strategic significance of analytics of big data is not only to handle huge amount of data but also to discover more meaningful insights of the data. In other words, the key to the competitive advantage of an industry or an organization is to improve the ability in processing data and understand the added value of data through analysis of a set of big data.

Big data gives three revolutionary changes. First the data concerned is not from random but the whole set of data which is the population. Big data means more and more data is going to be analysed and sometimes all data related to a purpose is going to be proceeded but not just replying on the sample data drawn no matter what sample approaches were used. Second, the data used does not concern about accuracy but hybridity. There are so much data that no longer keeping accuracy. As there were few data that need to be analysed before so the data must be quantified as accurately as possible for processing and analysis. As the scale expands, the obsession with accuracy will be weaker but with larger scale of data available, if accuracy was neglected in the micro level properly, the insight found will be better at the macro level. Furthermore, it's not causality, but correlation. We should look for the correlation between things instead of focusing on the causality between things in using big data. Correlation may not give insights exactly why something had happened but it will tell us what is happening.

Contemporary business management needs data, and more and more situations need the data to be quantified. All aspects of a person's life could be measured, stored, proceeded, calculated and analysed, and subsequently valuable conclusions could be drawn from the big data. The rapid growth of personal data is unprecedented. Consumers' behavior is becoming more and more visible, which brings business opportunities for marketers. This article analyzes the importance of big data in marketing. The use of big data is the current business trend and big data will undoubtedly bring huge benefits to company. Recent research are studied carefully to provide contemporary applications and insights to practitioners in marketing.

2. LITERATURE REVIEW

2.1 Co-innovation by Big Data Analytics Capability

In order to enhance innovation, intensive use of big data analysis especially in data capture, storage and analysis which become the daily operation and an everyday processes for companies. Current focus of big data analytics is on the methods in acquisition and storage of large amount of data with the aim in strengthening the decision making process for better business value [1-3].

Tindall et al. [4] commented that great corporations, such as Facebook, Microsoft and even WhatsApp and Linkedin have not invested a large amount of money in the acquisitions of information in social networks before. It might be due to the fact that millions of users using their platforms actually contribute the data to them, however, they recognize that the large accumulation of data in their platforms not their data but will initiate much valuable insights if the data is accurately proceeded and analysed.

Lozada, Arias-Perez and Perdomo-Charry [5] explained that co-innovation has two approaches which are open innovation and collaborative innovation. Open innovation relies on the development of new products or services from the results of knowledge found inside a company and from external stakeholders whilst collaborative innovation focuses on the innovation process conducted with partners and alliances. Successful marketing depends on innovation but innovation is not possible to be generated from nothing. So co-innovation is based on different factors in which analyzing the data of consumers' behavior, environment factors and more different sources of data are necessary in order to understand what kind of innovation is acceptable by customers.

Hence the analysis of big data becomes a top priority of issue both for marketers and senior executives. It can help an organization to improve performance and also a research topic in academic in investigating and proposing different conceptual models, the implication and future direction [6-8]. Innovation as a competitive advantage could be leveraged by deploying big data analytics strategies [9-12].

At the same time, this review believes that a good analytical approach has a great impact on

the application of big data. People also need to study the rational use of big data in achieving competitive advantages.

2.2 Big Data, Knowledge Co-creation and Decision Making

This research is significant as it reviews that big data is seen as the next big thing and can bring about major reforms. It can be fully utilized in the business environment. The commercial use of big data will be a big trend.

Acciarini, et al. [1] commented that term "big data" has been labelled as the next generation of technological and managerial issues that related to innovation. Big data can bring the business into a transformation of ecosystem to improve business performance in various areas [13]. The applications of big data analytics has been applied in retailing in analyzing customers' behavior [14], such as customer's preferences, purchase behavior, how much their spending according their different demographic information, and more important, those data analysed together will give more calculated patterns about consumers and their spending. Besides pattern found, big data analytics can give insights about association, for example the results found from big data analysis show that customers bought product A also bought product B, so if a customer with similar demographic background bought product A, marketers or website can recommend this customer to buy product B, the probability buying product B by this customer will be higher and hence increasing the sale volume [15].

2.3 Big Data and Internal Business Decisions, Discovery and Production

Over the years, data is important in supporting of executives' decision, and also has been applied in online analytical processing, up to business intelligence in recent years, now the big data and analytics [16].

The first question in using big data approach in strategic management is whether big data approach is different to the existing analytical systems, such as management information system, decision support system and executive information support system. Traditional systems support manager's decision by using their own set of data (small data), for example what their customers had purchased before and what they want in next purchase. What will be the behavior

if one customer is going to stop doing business, how much inventory to keep, pricing, product development, etc. These decisions will be based on the insights found from the internal data which are the past transactions. However, big data approaches promise a new perspective to discover new opportunities to offer more value-added advice to customers [16].

Big data is different from traditional information management systems which focus on generating reports and representing information and give advice to senior executives on internal business decisions whilst systems using big data approaches can create more valuable insights in terms of widespread of data collected from different sources, internal and external by deploying more scientific analysis [16]. This research reviews that that using big data is not only to help management deal with business issues, it also has a huge advantage in discovering new opportunities.

2.4 Big Data Analytics in E-commerce

There has been an increasing emphasis on big data analytics in e-commerce in recent years. E-commerce firms deal with both structured and unstructured data. Whereas structured data focuses on demographic data including name, age, gender, date of birth, address, and preferences, unstructured data includes clicks, likes, links, tweets, voices, etc. The challenge in the big data analytics environment is to deal with both types of data in order to generate meaningful insights to increase conversions with customers. Big data focuses on three main characteristics: the data itself, the analytics of the data, and the presentation of the results of the analytics that allow the creation of business value in terms of new products or services.

The ultimate challenge of big data analytics is to generate business value from this explosion of big data [17]. By integrating analytics into e-commerce, managers could derive overall business value by serving customer needs by 79%; creating new products and services by 70%; expanding into new markets by 72% and increasing sales and revenue by 76% [18]. These findings show that the value of big data is its significant analysis of huge amount of data by extraction and transformation to generate economically valuable insights and benefits.

Many companies use big data in their marketing to bring benefits such as Amazon, a famous

online retailer giant, is a typical example to enhance their business value and firm performance using big data analytics. Amazon has shown that they could generate 35% more of sales through analytics through their recommender system [19]. In addition, by using the huge amount of structured and unstructured data, Amazon has developed a very sophisticated recommender system for providing automatic customer service to enhance superior customer satisfaction and offering very competitive price against competing websites by using dynamic pricing.

Another classic example is Netflix which is an online movie provider. They continuously analyse over 1 billion reviews on the online environment to find out customers' preference, most profitable customers, optimal price for determination of the inventory status [17,20].

Many electronic commerce firms like Amazon, eBay, Expedia, and also firms in traditional industry, like using Fintech in commercial banks, have been using massive volume of data available in social media to tap into the opportunity of providing real time marketing and promotional offers to customers based on the data collected and analysed in different online platforms [21].

E-commerce companies like Amazon have taken full advantage of big data to find customers and sell products to them in a more strategic way and occupies a leading position in the market. In China, Alibaba is also using the same approach to develop their e-commerce services, using big data for marketing to maximize the use of big data to create benefits.

2.5 Application of Big Data in Marketing

Big data has become an important strategic resource concerned by enterprises and society in collection and use of data from different sources. Enterprises must make use big data analytics in developing more strategic marketing plan in advance to discover the market opportunity [22].

Big data is usually collected and collated through public information, such as data from the statistics of market survey, annual reports of company, research reports from market research institutions, or collated according to public scattered information, or purchased records in database, which have many productized databases in the market, such as Bloomberg,

Onesource, wind, etc. Powerful companies build their own databases in which consumer information or habits are saved once they signed up in platform account and provided relevant personal information, such as age, gender, occupation and income. Another way to collect it is to record everyone's browsing records and habits, and to promote products that they are interested in.

After collection of these information the seller will be ready to use them in an intelligent system to classify the customers into different segments, such as gender, age, income level or more complicated segmentations in terms of combination of different demographic variables with matching to their purchase behavior based on their transactions made before.

3. THE CHALLENGE OF APPLICATION OF BIG DATA

Over the years, the growth rate of data leakage events may reach 100%, unless the data can be secured at its source. It is estimated that in the future, every fortune 500 enterprises will face data attacks, no matter whether they have done a good job in security. All enterprises, regardless of their size, need to re-examine today's definition of security. More than 50% of Fortune 500 companies will have the position of chief information security officer in overseeing the planning and implementation of security measures. Enterprises need to ensure their own and customer data from a new perspective. All data needs to be secured at the beginning of creation, rather than at the last link of data preservation [23]. It has been proved that only strengthening the latter security measure will not be sufficient.

3.1 Information Leakage

Due to the large number of end users and the large number of audience types in the big data environment, the authentication of customer identity needs a lot of processing power. Due to the strong pertinence and long attack time of apt attack, once the attack is successful, the terminal data output by big data analysis platform will be obtained which is easy to cause large information security risks.

3.2 Invasion of Privacy

However, some businesses, as the owners of data, not only fail to protect the privacy of

consumers, but also over collect or even sell customers' data to obtain benefits. Some businesses want to collect more comprehensive customer information so as to establish a more complete big data, which will easily violate the user's personal privacy.

4. EVALUATION OF APPLICABILITY OF BIG DATA ANALYTICS

4.1 The Pros and Cons of Big Data

A company can learn from analytics of big data about consumer needs and offer the products the customers want. In addition, a company can have more specific and target marketing by pinpointing the customers who are interested in specific types of products with more cost effective promotion plan.

Big data analytics let companies know their target audience more and build up customer loyalty, enhance interaction with better and more effective communication with target customers, ultimately persuade the customers having better impression of the company.

If big data is used in marketing, the privacy of customers will be compromised. In this era of big data, a company needs to know the name and mobile phone number for providing more personalized service, however, it also a big privacy leak. Even more, it is also possible and real cases that some companies or staff inside the company sold customer information. If the information is leaked, customer may have a bad impression of the brand and therefore refuses to buy products again which will hurt the brand image.

Because of the problem of information leakage in the era of big data, some people may provide false information. Sometimes when they need a name and mobile phone number, they will fill in false information, causing data to be abnormal and not useful.

4.2 Evaluation of Application of Big Data

Big data analytics is very important in different business areas, especially in marketing. It will bring huge profits to the company. Customers' tastes, buying preferences, and levels of spending are important factors used to analyse and predict customers' likelihood of purchasing. Using big data not only can help management deal with business issues and generate competitive advantages, but also can discover new opportunities to provide customers with high-value products and services. Besides in recommendations of products or services to customers, it also lets management know better deployment of inventory level with lower operation costs.

5. CONCLUSION

Big data analytics can improve company's management decision and productivity, and also competitiveness, management quality and operation efficiency. More and more enterprise decision makers are aware of the need for big data analytics to maintain and enhance the competitiveness of enterprises. In the future, big data analytics will certainly become a major trend in different business areas, especially marketing. This study provides critical and recent ideas and concepts to not only practitioners, but also scholars the contemporary issues in big data analytic in marketing field.

6. RECOMMENDATION

Practitioners need to aware of the strategy in planning and implementation of big data analytics projects. In addition to understand the significance and value of big data analytics, it is also necessary to protect the privacy of customers' information from being leaked. A company should aware that the information are for analysis instead of sharing with other companies. Taking full advantage of the insights brought by big data analytics, a company can provide customers with the best purchase combination, price, and best-selling product recommendations. This method can not only bring more benefits, but also reduce some unnecessary losses. Big data applications have more applications in marketing in future so a company needs to make good use of this new technology for high potential of profits. Technical architecture in using more sophisticated database, such as data warehousing is needed for analysis as the fastest analysis is required in terms of speed, complicated and diverse data to ensure timely, correctness and higher accuracy of the data.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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