

RESHAPING THE FUTURE OF RETAIL MARKETING THROUGH “BIG DATA”: A REVIEW FROM 2009 TO 2022

Tanzeela AQIF

FAST School of Management, FAST-NUCES, Islamabad, Pakistan
i202157@nu.edu.pk

Abdul WAHAB

FAST School of Management, FAST-NUCES, Islamabad, Pakistan
abdulwahab@nu.edu.pk

Abstract

Technological revolutions have brought drastic changes in every field of life and Big Data is one of them. At the same time marketing function in retail organizations is also getting more sophisticated and personalized. Big Data has driven the digital transformation by gaining the faster insights from faster data. The increasing speed of data generation has made it very difficult for the organizations to extract useful data and take decisions accordingly. Organizations are using data driven decisions which not only help them to deal with industry challenges but also help them to take decisions based on the valuable data. There has been increasing emphasis in literature on big data but still it remains rather less explored area. The objective of this review article is to give readers an overview of work done in the field of big data especially in context of retail marketing. Thematic analysis has been used in the following review while using PRISMA framework to improve transparency in systematic review. Findings have been presented in the respective themes. Big data has emerged after 2008, keeping that in mind data from 2009-2022 is reviewed from good impact factor journals. The following reviewed paper address definitions, types of big data, different techniques, and methods used to extract information about customers and businesses from big data and key benefits of big data in retail marketing. In the end, future directions are stated from reviewed articles. As big data is in the initial stages of its development, for the enrichment of big data studies, different domains of business studies should be applied to big data. It will open new avenues for future research and lay the basic foundations

Keywords: big data; data analytics; retail marketing; marketing analytics; data science; customer analytics.

1. INTRODUCTION

The rapidly advancing technologies have caused drastic changes in every field and increased competitive pressures on firms. The large amount of data also termed as ‘Big Data’ is being generated from computers, mobiles phones and sensor technologies, hence forcing the firms to take timely and right decisions. Retail organizations face immense pressures while taking right decisions due to high investment costs, the decisions include selection of store openings, location selections, renovations, expansions, promotions and collections. As the retail industry is very dynamic and consumer behaviors are also continuously changing, therefore the organizations need to take decisions based on customer driven data which obtain from various sources.

Retail organizations invest their valuable time and assets to understand customer behavior and gain competitive advantage, now big data has changed the whole viewpoint with data coming from different sources in unparalleled volume, velocity and variety about individual customer is believed to be “data revolution”. As it will open new ways to understand consumer behavior, ways which are not used before (Erevelles, Fukawa & Swayne, 2016). Every detail regarding customers or competitors holds the potential value and retail organizations thrive on it. Therefore, it holds immense significance for researchers and several efforts have been made in various fields to understand its potential and usage.

Usually new technology appears in technical and academic research and mature in the market in later phase but sudden emergence of big data has left many people unprepared and little work has been done in the academic research. Recently Big data has gained attention of scholars and practitioners and they are making efforts to explore its usage in various fields and industries. Few scholars have defined it as the “fourth paradigm of science” (Strawn, 2012), a “new paradigm of knowledge assets” (Hagstrom, 2012) or “the next frontier for innovation, competition, and productivity”. Chen, Chiang and Storey (2012) defined big data as the large data

sets coming from various sources (social media, smartphone applications, sensors, internet gadgets) in unstructured form and it requires advance technology to store, manage, analyze and extract critical information regarding customers. It is also defined as the data which is beyond the capability of machine's ability to store. On the other side described it as the ability to use different techniques and technology to handle data at extreme level as affordable.

Big data is collected on a daily basis but the important aspect is to extract the insight information from that data e.g., Facebook is getting data from customers in the form of pictures, videos, comments, and post in size of 500 terabytes, this huge data is of no value if it is not handled in a correct way. To make data meaningful, technology and different techniques can be used to extract the information and make it useful (Hu, Xie, lei, Zeng & Maybank, 2011). In conventional practices marketers used to do different techniques and observations to understand the product demand and what's customer point of view regarding the product, now big data has changed the whole practices and made things easy as customers give their feedback and create user-generated data which can be used to understand the value of product and marketers can modify in ways customers want the product (Chen et al, 2015).

The big organizations are using big data in strategies as they have understood the importance of big data and incorporating it in daily practices, it's obvious that big data can help in quick and better decision making as it will play a central role in the future (Fan, Lao & Zhao, 2015). Although literature on big data is continuously growing but there is no such study found which synthesized the literature about the usage of big data for retail industry and they are using it for shaping their decision to improve efficiency and remain competitive. Although the usage of big data is still in infancy stages in several industries but retail industry has shown immense growth through its effective utilizations and showed huge business growth. The research aims to provide synthesized view of all the studies exploring how adoption of big data has helped retail organizations to shape their future objectives and achieve growth objectives. Therefore, the research aims to answer the following research question

What is the key uses and challenges of big data adoption by retail organizations?

The research paper has made a contribution towards body of knowledge and for practitioners as well as it will address the role of big data for retail organizations and how they can drive their marketing efforts from customer's perspective. It has also contributed towards academia and it provides the summarized view of literature addressing the evolvement of big data, definitions of big data, characteristics of big data and various techniques used in big data and the importance of user generated data and discussions on the shortcoming of previous studies and research gaps for future studies.

2. METHODOLOGY

A systematic review has been conducted while including the most relevant literature regarding big data and its application in retail marketing industry. The literature has been extracted from different sources while trying to achieve the set objectives:

- Determine the definitions of big data in retail marketing
- Determine the sources of big data in retail marketing
- Identify the techniques for big analytics in retail marketing
- Identify the most potential benefits of big data within retail marketing sector
- Identify the threats or concerns regarding big data in retail marketing

Investigation of above objectives will be helpful to understand the big data and its understanding in the context of retail marketing. It will be significant contribution towards big data and provides summarized view of its applications used by companies globally.

Information Sources

Three search engines were used to download articles "Science Direct", "Emerald" and "Google Scholar". Data extraction techniques have been used to identify qualitative studies that have been included which presented different theories.

Selection criteria

The following selection criteria has been used for this review article:

IC 1: Articles that are relevant to the Big Data analytics in retail marketing

IC 2: Articles published between 2009 and 2022

IC 3: Articles which have been published in English language

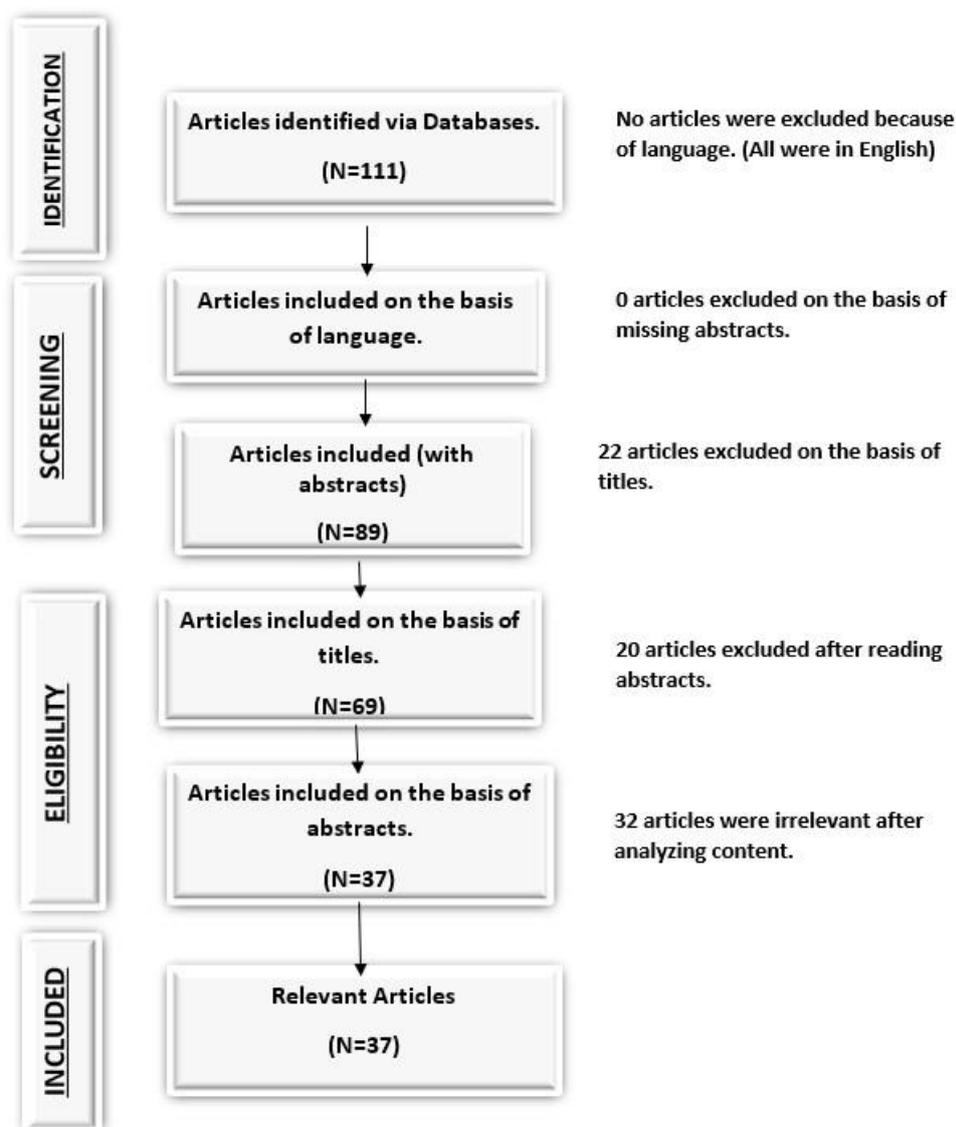


FIGURE 1 - PRISMA FRAMEWORK

The articles which have emphasized the use of big data in marketing and its future prospects in retail marketing have only been selected. The prima flow has been followed to search and select the relevant articles which have been included in this review article (Figure 1):

1: To conduct the literature review of "Big Data" research articles from the year 2009 to the year 2022 were chosen. Selection of articles was done in four steps, first of all, articles were downloaded by using different keywords on search engines. Keywords used to search articles were "Big Data", "Data Analytics", "Retail Marketing", and combination of these words e.g., "Big Analytics", "Big Data retail Marketing Analytics" and "Big Data Marketing".

2: Articles were refined on the basis of language and as there was no article found in other language therefore all the research articles were considered as eligible for review.

3: At next stage, the titles of articles were studied and only those articles were included which had key words in their titles and relevant to this research.

4: The abstract of eligible articles was read and only those articles were chosen which were within the scope of this review paper. At these stage 20 articles were excluded which had irrelevant abstracts.

5: Detailed content of the articles was scanned and read; 32 articles were eliminated at this stage which did not fit with research objectives.

All the empirical studies included in the review tested newly developed models, hypothesis or to get insight of the customer from different sources. The highest number of sources used for the collection of data is twitter, twitter data is known to be the opinion of the individual which can produce a realistic picture of individual intention. Facebook is used second most as source for data, brands use it as a tool for interaction with the customer. Email data is also used for the business-to-business communication and to bring significant change in business practices. Amazon is the largest online retail and its data is used numerous times as the customer feedback. Booking websites (go trip, expedia) for the customer hotel experience, other websites are used as a data source for customer satisfaction. Table 1 includes name of the journals in which the included articles have been published.

TABLE 1 - ARTICLE'S JOURNAL DISTRIBUTION:

<i>Name of Journal</i>	<i>Number of articles</i>
Decision Support Systems	1
6th International Conference-Cloud System and Big Data Engineering IEEE	1
Annals of operations research	1
Big data research	1
European Management Journal	1
Expert System with Applications	1
Fifth International Conference on Computing, Communications and Networking Technologies IEEE	1
Information Processing & Management	1
International Institute for Analytics	1
International Journal of Advanced Research in Computer Engineering & Technology	1
International Journal of Entrepreneurship	4
International Journal of Production Research	1
Journal of Advertising Research	1
Journal of business research	4
Journal of communication	1
Journal of computational science	1
Journal of Interactive Marketing	1
Journal of International & Interdisciplinary Business Research	1
Journal of Marketing Research	2
Journal of Research in Interactive Marketing	1
Journal of Retailing	1
Journal of Retailing and Consumer Services	3
Management Decision	1
Management science	1
Marketing science	1
New Perspectives on Critical Marketing and Consumer Society	1
NIM Marketing Intelligence Review	1
PLoS one	1
Total	37

Source: Authors

2.1. Definitions and Background

Big data is now available everywhere in the form of structured (data stored by organizations in a systematic way) or in unstructured form like pictures, videos and audio files. “Big Data” term first time came up in the 1998 in a Silicon Graphics (SGI) slide deck by John Mashey with the title of “Big Data and the Next Wave of Infra Stress” and first mentioned in the data mining book (Fan & Bifet, 2013). Big data is known as the large data set terabyte or zettabyte and that data is complex and unstructured in nature coming from different kind of sources and require advance technology to store and process (Chung, 2014).

TABLE 2 - DEFINITIONS OF BIG DATA

Author	Definition
Jacobs (2009)	Big Data: “Data that is too large to be placed in a relational database and analyzed with the help of a desktop statistics/visualization package—data, perhaps, whose analysis requires massively parallel software running on tens, hundreds, or even thousands of servers”
Madden (2012)	Too big, too fast and too hard for existing tools to measure
Johnson (2012)	Big Data: “extremely large sets of data related to consumer behavior, social network posts, geotagging, sensor outputs”
Boyd & Crawford, (2012)	Big Data: “A technological, and cultural and scholarly phenomenon that is based in interplay of maximizing the data computational power to gather, link, analyze large amount of data. It is encompassing the analysis of large amount of data to identify patterns to and make social, economic, legal and technical claims”
Fisher, Drucker & Konig (2012)	Big Data: data that cannot be handled and processed in a straightforward manner
Havens, Bezdek, Leckie, Hall, & Palaniswami (2012)	Big Data: data that you cannot load into your computer’s working memory
Hashem et al., 2015	“Big data is the set of large data sets which require new techniques and technology to make new form of integration, to disclose the valuable information from large data sets. It has complex and diverse characteristics, large in nature”
Gandomi & Haider, (2015)	“Big Data has three main characteristics: the data itself, the analytics of the data, and the presentation of the results of the analytics. Then there are the products and services that can be wrapped around one or all of these Big Data elements”
Mauro, Greco & Grimaldi (2016)	“Big Data is the information asset characterized by such a high volume, variety and velocity to require specific analytical and technology methods and transform it to make it valuable”

2.2. Theories in context of big data:

There have been different theories used by the researchers in their studies regarding use of big data. These theories support or propose new framework in studies examining big data in several aspects.

TABLE 3 - THEORIES USED BY DIFFERENT AUTHORS IN ARTICLES

No	Author, Year	Theory	Explanation
1	Erevelles, Fukawa & Swayne (2015)	Resource based theory (RBT)	The theory explains the importance and value of the organization for the resources it possesses and implies that these resources can’t be imitated and are rare for the organization. So, it’s important that organizations look within to identify and use these resources to gain competitive advantage
2	Xu, Frankwick & Ramirez (2015)	Complexity theory, Knowledge based view	It explains the complex and chaotic systems and how these systems can be used for the development of common patterns and structures
3	Wamba, Gunasekaran, Akter, Ren, Rameshwar Dubey, & Childe (2017)	Socio-materialism theory	Socio-materialism theory explains the connection between technology, work, and organization, describes the relationship between society, technology and their dependency
4	Shan, Luo, Zhou & Wei (2018)	Dynamic capability theory	Dynamic capabilities explain organization’s ability to incorporate, build, reconfigure internal and external competencies and address the changing environment challenge and adaptation

Source: Authors

2.3. Characteristics of Big Data

Big data have different dimensions through which data is available, some academic researchers indicated that it has three dimensions known as three V's; volume, velocity and variety. Gandomi and Haider (2015) added two more dimensions, value and veracity and highlighted their importance.

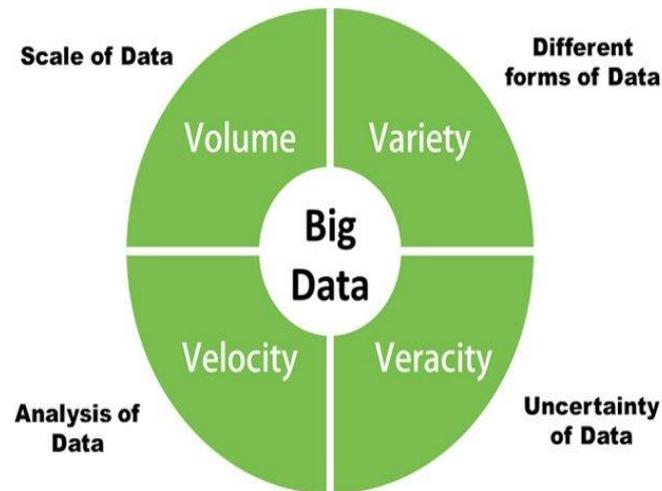


FIGURE 2 - CHARACTERISTICS OF BIG DATA
Source: Smith (2020)

Volume is measured in petabyte, zettabyte and Exabyte, for understanding one petabyte is equal to 20 million filing cabinets. Volume can be defined as the magnitude of the data; definitions vary as the volume is continuously changing as it is dependent and can change in future as the sources to store data will change (McAfee, Brynjolfsson, Davenport, Patil & Barton, 2012).

Variety is the type of data, as technology advancement help organizations to store data into the structured, unstructured or semi-structured form. Structured data is only 5% of all the data, rest is unstructured. Mostly unstructured data is captured from the social media and other sources similar to it (Erevelles et al., 2016).

Velocity is the speed at which data is generated, smartphones and sensors have led to extraordinary rate of data creation which highlights the demand for real time analytics. Velocity provides sound information about customers such as location, demographics or buying pattern. Marketers with rich, timely and insightful data of customers make better decisions than their competitors and make their business operations more effective (Lycett, 2013).

Veracity is referred as the data which is never in the same flow as it depicts different patterns, and makes it challenging for firms to collect, clear and extract the valuable insight regarding customers. As it is important to understand the data type required for the organization as the sources of data have increased.

2.4. How retail organization use big data for Customer Intelligence:

General consent regarding big data is that people think it's about data sets MBs, GBs or TBs but it's about extracting the most valuable information regarding customers and competitors. Social media and user-generated content (UGC) has created new means for businesses and marketers to get access to real-time data on consumers as well as competitors. Conventional practices for marketers to gather consumer insights were surveys, call complaints, etc. but now things have changed, real-time valuable information is available for marketers (Liu, Shin & Burns, 2019). On the basis of user-generated data different big data empirical researches are carried out to extract insightful intelligence regarding customers and businesses. Table 4 summarizes the key benefits of big data in retail marketing which could be helpful for companies to boast their sales and improve efficiency.

TABLE 4 - USE OF BIG DATA IN RETAIL ORGANIZATIONS

No.	Author	Uses and benefits of big data in retail
1	Berger, Jonah, Sorensen, Alan, Rasmussen & Scott (2010)	Big data analytics can be used to improve product awareness and also improve sales by targeting right audience
2	Bollen, Mao & Zeng (2010)	Big data analytics can be used to identify the moods of customers and companies can use social media to track the moods and take required steps
3	Archak, Ghose, Panagiotis, Ipeirotis (2011)	Big data analytics have made it possible to identify consumer preferences, therefore the companies can bring required changes in their products based on consumer choice
4	Rui, Liu & Whinston (2013)	Companies can keep track of e-WOM and improve their sales by spreading positive e-WOM
5	Sun, Gao & Xi (2014)	Retail organizations can boost sales by using effectively using big data analytics
6	Seshadri Tirunillai & Tellis (2014)	Big data analytics helps companies to identify satisfaction level of customers and brand quality. This information helps them in product designing
7	Fan, Lau & Zhao (2015)	Data mining helps retail organizations to identify marketing problems and improve them on the basis of information
8	Schivinski, Christodoulides & Dabrowski (2016)	Psychometric analysis can be used to observe recent online trends and customer choices
9	Avinash & Babu (2018)	Big data analytics helps companies in demand prediction, generation of recommendations while making strategic decisions, making forecasts for future and enhance customer experience it also helps in creating client profiles and identify the ROI opportunities
10	Ying, Sindakis, Aggarwal, Chen & Su (2021)	Social media analytics can be used by companies to predict future trends and incorporate them in their products

Source: Authors

To predict the customer's product demand Chong, Ch'ng, Liu and Li (2017) did an empirical study by using neural network analysis on data set of 35,203 customer reviews. Data was collected for electronic products on the Amazon website. The results of this study showed that online reviews and digital marketing strategies has a significant influence on the sales of a product, retailers must answer the queries of customers on the product web page and make answers visible to everyone. Chatting services 24/7 play an effective role in customer retention or a repurchase of products. Online reviews are important to predict the sales as positive reviews are more important as compare to big volume. Price strategies such as a discount or free deliveries don't influence customers strongly so discounts should be employed with reviews. This research clearly highlighted that manufacturer can predict customer demand and product reviews are the most important factor in the sale of a product.

To understand the customer engagement with luxury brands on digital platforms Liu et al., (2019) used 3.78 million tweets which were collected as data and transformed. Results indicate that luxury brand's investment in entertainment, interaction and trendiness pays off in positive customer engagement. Luxury brands should start with entertainment to create an environment where customers promote brand e.g., celebrities, influencers, sports personalities. For interactions brands use strategies to involve customers in different activities like social media campaigns, picture contests or content creation. Trendiness dimension is important to keep customers updated with up-to-date products or fashion trends by giving live streams of fashion shows or behind the scenes fashions or photo shoots. Research results also showed that customization dimensions didn't increase customer interaction on twitter, but conventional marketing strategies to communicate with customers is as important as social media strategies.

Researchers proposed the framework to score the brand image by testing the reviews posted by their customers. Researchers tested the correlation between ratings and sentiment value and its results indicated that the textual context contains more information regarding rating as customer highlights other factors regarding the product which becomes the deciding factor for another potential customer to buy product or not. It becomes easier for marketers and customers to do comparative analysis to evaluate products and top brands in different categories. The study also highlights that fake-reviews have significance on product.

By using customer-generated data Mestyan, Yasseri and Kertész, (2013) used Sample of 312 movies, with the help of Box Office Mojo. The proposed model predicted the movie's financial aspect through content generated

by individuals. Research successfully indicates that with the help of user-generated data (UGD) researchers can predict the outcome of the product. The study showed that marketers can use this model and apply it to different sources of user generated data like social media or wikipedia and use information in different decision-making activities.

Bradlow, Gangwar, Kopalle and Voleti, (2017) designed a study of 42 stores. They were chosen randomly having the same demographics, revenue, and size of store. Then stores were randomly divided into a pair of two groups, controlled vs test. In test stores, different strategies were applied in pricing, features, and display of a product. Results revealed that the gross margins of the test store products were significantly improved as compared to the regular stores by keeping in mind that unit sales were similar in both stores. Results showed that instead of increasing the volume, data from new sources, with the application of statistical tools and knowledge of the area can increase the quality of available data. And it can help in creating a competitive advantage over other retailing stores.

To identify the major marketing challenges for organization in the digital era, Leeflang, Verhoef, Dahlström and Freundt (2014) designed an online survey that was formulated on the basis of the most important marketing tensions and contacted the prominent marketers of the digital world. Out of 3743 participants, 777 usable responses were collected. After running tests on data, researchers came to the conclusion that major marketing challenges in the digital era for organizations are customer insights and social media.

To understand the methodology and usage of social media platforms of prominent pizza chains He, Zha and Li (2013) designed study. They collected text messages posted on Facebook and Twitter by company or customer. The purpose for textual mining was to understand the patterns and learn how these platforms are used by three pizza chains. Results showed that all three pizza chains have committed their technological and human resources in social media to make their customer experience more enjoyable but the level of commitment varies in these pizza chains. Facebook is used for customer engagement and promotional activities as compared to twitter. Results also direct that all three pizza chains have used their resources to interact with their customers to create a brand image on online platforms.

Social media is used for customer insights regarding needs, wants, concerns and behaviors to serve them better. With customer suggestions and complaints on online platforms, these pizza chains improved the quality of their product. By addressing customer's problems online, potential customers evaluate and turn become regular customers. Social media have become a platform for companies to monitor and track customer's conversations regarding their brand or product in order to address customer's complaints and issues in time to rectify the potential threat of a crisis in the company.

To understand the big data analytics capabilities (BDAC) on firm performance (FPR) with mediating variable process-oriented dynamic capabilities (PODC) Wamba et al., (2017) conducted a study. 297 useable responses were used in the research for analysis. Research main objective was to calculate the relation between BDAC and FPR which resulted in positive links. Results showed 65% of the variance is there with 30% of it is due to the effect of mediating variable PODC. It also shows infrastructure and personal capabilities are slightly important than management capabilities. All the dimensions of BDAC are important and require some attention. Overall, the results of the study indicated that big data analytics capability has a positive impact on firm performance.

By using the email data of the company's interaction with customers Yang, See-To and Papagiannidis, (2019) used_Data set of 39 employees containing 621,210 text emails in time span of 10 years. The research provides evidence regarding email significance in business-to-business activities by using data analytics. To monitor the demand trends by customers, research provides thematic clusters to be used in different businesses. Research also demonstrates the transformation of data into business value, by providing business analytics applications and knowledge discovery process. The use of email data extraction can solve problems for businesses as it is cost-effective and businesses can easily get trending insights.

He, Wang and Akula (2017) proposed framework which can be used to integrate big data analytics, social media and knowledge management to extract hidden insights. 882251 tweets related to top five retail companies Costco, Walmart, Kmart, Kohl's and The Home Depot were collected as data set. This research showed that with the help of proposed framework businesses can get competitor intelligence, as data is

available in open and external sources, companies can use this technique to gain competitive advantage. Different visualizing techniques were used in this research which can be used by companies on their competitors. Shan, Luo, Zhou and Wei (2019) conducted a study in which they got 219 valid responses for further tests and analysis. Results showed that all the resource dimensions have an indirect effect on competitive advantage through dynamic compatibilities. The idle resource has a significant impact on strategic flexibility. When the company has fewer resources it's difficult for organizations to improve on a strategic perspective. IT resources have the most significant role because its role is not just limited to create a relationship between enterprise and customers but also builds relationship between business and IT, which have a direct impact on the IT technology capabilities. Table 5 includes all the pertinent studies for this review article. The table also contains the relevant details, methodology chosen in each article, their results in addition to future research directions.

TABLE 5 - FACT SHEET

No	Author name	Journal name	Article title	Research methodology/sample	Research findings and future directions
1	Dhar & Chang (2009)	Journal of Interactive Marketing	Does Chatter Matter? The Impact of User-Generated Content on Music Sales	linear regression model of blog chatter on several independent variables. while 108 albums were including in sample statistics and data was gathered from publicly available information published on websites	The study found that user generated content should be taken seriously as the information hold great significance. This User generated content can be used by record labels to predict future sales. Similar statistical model can be used to predict future sales for other products. The research also provides direction for further development of regression models to obtain interesting results.
2	Berger, Jonah; Sorensen, Alan T.; Rasmussen, Scott (2010)	Marketing science	Positive Effects of Negative Publicity: When Negative Reviews Increase Sales	The research has used combination of experimental methods and econometric analysis while the data set consisted of weekly national sales for 244 hardcover fiction titles that were released from 2001 to 2003 and reviewed by the New York Times	The research has found that negative publicity can increase purchase likelihood and sales by increasing product awareness. It was also found that books which were positively reviewed showed higher sales. Future studies can be done for other products while examining other factors that shape how publicity and product reviews influence consumer choice
3	Bollen, Mao & Zeng (2010)	Journal of computational science	Twitter mood predicts the stock market	The study extracted six dimensions of mood (tension, depression, anger, vigor, fatigue, confusion) using an extended version a well-established psychometric instrument and 9,853,498 tweets posted by approximately 2.7M users	The study found that events in the social, political, cultural and economic sphere do have a significant, immediate and highly specific effect on the various dimensions of public mood. The research found that public mood state can be tracked with help of content obtained from large scale twitter feeds. Future research can be done into direct assessments of public mood states vs. those derived from online communities
4	Archak, Ghose, Panagiotis, Ipeirotis (2011)	Management science	Estimating the Helpfulness and Economic Impact of Product Reviews: Mining Text and Reviewer Characteristics	The research has used use text mining to incorporate review text in a consumer choice model by decomposing textual reviews into segments describing different product features	In future researchers should focus on finding innovative ways to turn businesses' social media fans from "like" to "buy". The study further suggested that how textual data can be used to learn consumers' relative preferences for different product features and also how text can be used for predictive modeling of future changes in sales

No	Author name	Journal name	Article title	Research methodology/sample	Research findings and future directions
5	Davenport (2012)	International Institute for Analytics	The Human Side of Big Data and High-Performance Analytics	In order to collect data and know about data scientists and their activities, researcher conducted interviews (primarily by telephone) 30 people in the first half of 2012 who described themselves as data scientists, and several more managers to whom data scientists reported	The research found that there is plenty of data available in most industries, and a substantial amount of technology is available to manipulate big data, all that is still required to make it useful is a qualified data scientist. In future, unstructured data can be converted into structured data and quantitative analysis could be performed on it, it will help organizations to think about what data sources to investigate
6	Hea, Zhab & Li (2013)	international journal of information management	Social media competitive analysis and text mining: A case study in the pizza industry	Social media competitive analysis has been performed for the analysis through text mining technique, SPSS Clementine text mining tool and NVIVO. The sample included Facebook and twitter pages of pizza chains	Results indicated that pizza chains used social media for services and online customer relationship. In future researchers should focus on finding innovative ways to turn businesses' social media fans from "like" to "buy"
7	Mestyán, Yasseri & Kertész (2013)	PLoS one	Early prediction of movie box office success based on Wikipedia activity big data	Model has been used to predict the financial aspects, further linear regression has been applied to model to forecast the first weekend box office revenue of a set of 312 movies, released in the US during the year 2010	The results have found that simple use of user generated data in a social environment like Wikipedia can enhance the ability to predict the collective reaction of society to a cultural product, Further research is required on less popular movies and sophisticated model needed to be tested
8	Arbelaitz, Gurrutxaga, Lojo, Muguerza, Pérez & Perona (2013)	Expert System with Applications	Web usage and content mining to extract knowledge for modelling the users of the Bidasoa Turismo website and to adapt it	The study was conducted through user navigation profiles which were obtained from usage information will be useful for link prediction. These profiles were enriched with different URLs using semantic information	System performed successfully, obtaining profiles which fit in more than 60% of cases with 38 the real user navigation sequences and in more than 90% of cases with the user interests. Knowledge provided to be very useful for future web design and marketing campaigns. The study used only single interest for profiles while there are Crisp-based 1136 approach to assign interest profiles to clusters which can be used in future studies
9	Rui, Liu & Whinston (2013)	Decision Support Systems	Whose and What Chatter Matters? The effect of Tweets on Movie Sales	63 movies and 4,166,623 tweets were analyzed through "Dynamic panel data model"	The research found that Positive Twitter WOM increases movie sales, further negative WOM. Future research can be done to refine the measurement of users' influence how to incorporate an improved influence measurement into the econometric model, which may potentially yield interesting and useful
10	Sun, Gao & Xi (2014)	Fifth International Conference on Computing, Communications and Networking Technologies IEEE	Big-data based retail recommender system of non-E-commerce	The study used retail recommender model based and used distributed computing algorithm on MapReduce	The study found that the system is effective for the estimation of retail sales for each store and product. Therefore, non-e-commerce enterprises could benefit from this novel way of precision marketing supports. Future studies can suggest more techniques to achieve similar objectives

No	Author name	Journal name	Article title	Research methodology/sample	Research findings and future directions
11	Colleoni, Rozza, & Arvidsson (2014)	Journal of communication	Echo chamber or public sphere? Predicting political orientation and measuring political homophily in Twitter using big data	The research has used using a combination of machine learning and social network analysis. After that it has classified users as Democrats or as Republicans based on the political content shared for analysis	Research successfully demonstrated the political alliance of the people who shared political tweets on their feed. It was also found that structures of political homophily differ strongly between Democrats and Republicans. For future research similar framework can be used in testing of people alliance in product industry or brands
12	Seshadri tirunillai & Tellis (2014)	Journal of Marketing Research	Mining marketing meaning from online chatter: Strategic brand analysis of big data using latent Dirichlet allocation	The sample of user-generated content consists of rich data on product reviews across obtained from 15 firms in five markets over four years. 350,000 consumers' data was collected	Online chatters provide insight regarding customer satisfaction about brand quality, dimensions differ at various markets. Study focused on product reviews further dimensions needed to be studied
13	Cao, Shitong Manrai & Ajay (2014)	Journal of International & Interdisciplinary Business Research	Big Data in Marketing & Retailing	The research is qualitative which provides a framework to define Big Data from technical and business perspectives.	The research has provided enormous value of big data in different fields, to share its applications in marketing and retailing, market segmentation, targeting and positioning as well in developing marketing mix future studies are required to develop proper policy measurements and controls, these drawbacks will not slow down the matching of Big Data to wider and deeper applications in all different types of industries
14	Erevelles & Fukuwa (2015)	Journal of business research	Big Data consumer analytics and the transformation of marketing	The qualitative research has used a resource-based view of the impact of Big Data on competitive advantage.	The study found reasons not to take full advantage of big data by marketing departments are that there is shortage of data scientists in the market and educational institutions and they haven't designed curriculum to generate the specialized individuals. In future cutting-edge technology and algorithms enabled researchers are required to identify patterns mathematically without formal hypotheses by taking advantage of these advancements; marketing researchers are encouraged to re-evaluate the research methods associated with Big Data.
15	Fan, Lau & Zhao (2015)	Big data research	Demystifying Big Data Analytics for Business Intelligence Through the Lens of Marketing Mix	The research has used data mining techniques through which it has extracted and detected patterns or forecasting customer behavior from large databases. Data mining is a common data mining methods include association mining, classification, clustering, and regression	The study showed how to select appropriate data source, use of particular method for data mining and integration of different problems to solve marketing problems. In future researchers should use marketing mix strategy in data mining techniques

No	Author name	Journal name	Article title	Research methodology/sample	Research findings and future directions
16	Xu, Gary & Ramirez (2015)	Journal of Business Research	Effects of big data analytics and traditional marketing analytics on new product success: A knowledge fusion perspective	The study has introduced the knowledge fusion taxonomy to understand the relationships among traditional marketing analytics (TMA), big data analytics (BDA), and new product success (NPS)	The research found that with more speed of information and increased volume from various stakeholders in digital economy, firms can build the strategy to use knowledge from both big data domains and marketing Future research should test the propositions to determine if firms actually fall into each of the four cells in the taxonomy, and if a difference truly exists in NPS for firms following the proposed strategies
17	Gandomi & Haider (2015)	International journal of information management	Beyond the hype: big data concepts, methods, and analytics	The research has used qualitative analysis to explain analytics techniques for text, audio, video, and social media data	This paper highlights the need to develop appropriate and efficient analytical methods to leverage massive volumes of heterogeneous data in unstructured text, audio, and video formats. The paper makes the case for new statistical techniques for big data to address the peculiarities that differentiate big data from smaller data sets. Most statistical methods in practice have been devised for smaller data sets comprising samples
18	Mnoney & Belle (2016)	6th International Conference-Cloud System and Big Data Engineering IEEE	Big Data capabilities and readiness of South African retail organizations	The paper has used theoretical models. Qualitative research was conducted in research in which Semi structured interviews were conducted with individuals from retail organizations, Big Data vendors and IT professional service providers.	The study found that South African retail organizations have the capacity of better adoption and implementation of Big Data, however, more efforts need to be placed from the organizational perspective and Big Data technology vendors need to provide more support to enable realization of more benefits of Big Data in South African retail organizations.
19	Schivinski, Christodoulides & Dabrowski (2016)	Journal of Advertising Research	Measuring consumers' engagement with brand-related social-media content: Development and validation of a scale that identifies levels of social-media engagement with brands.	Qualitative techniques were used in this research and quantitative data from a survey of 2,252 consumers across Poland then was collected in two phases to calibrate and validate the ensuing scale, measuring participants' engagement, with nearly 300 brands spanning a range of industries	The results of study confirmed the structure and psychometric properties of the scale. Researchers can follow trends online and adjust framework accordingly, and research in different countries needs to be carried out for generalizability
20	Chong, Ch'ng, Liu, & Li (2017)	International Journal of Production Research	Predicting consumer product demands via Big Data: the roles of online promotional marketing and online reviews	The study used neural network is to predict the factors influencing the customer demand of electronic products in an online environment. The research aimed to demonstrate how manufacturers can use online shops as predictors of customer demands.	Online reviews are the most important variables in the sale of a product. Research is limited to electronic products only; future research can be done on other categories of product and apply this model.
21	Bradlow, Gangwar, Koppalle & Volet (2017)	Journal of Retailing	The Role of Big Data and Predictive Analytics in Retailing	The research has presented a case study of field experiment conducted at a large national retail chain involving 42 stores, to illustrate the discussions around the big data in retailing and tie together different pieces of the puzzle	The research has built a case for why theory driven retailing should leverage, reconcile, and complement the use of big data and predictive analytics. Future research is required to address ethical and privacy issues that may arise from the use of big data in retailing

No	Author name	Journal name	Article title	Research methodology/sample	Research findings and future directions
22	Santoro, Fiano, Bertoldi & Ciampi (2018)	Management Decision	Big data for business management in the retail industry	Data has been collected through semi-structured interviews from marketing managers of four retailers in Italy	The research has identified specific aspects related to big data deployment, data gathering methods, required competences and data sharing approaches. Future studies can be done to understand big data deployment in organizations in various management field
23	Aloysius, Hoehle, Goodarzi, & Venkatesh (2018)	Annals of operations research	Big data initiatives in retail environments: Linking service process perceptions to shopping outcomes	The research is an exploratory study to while conducting an online survey (n = 442) to test the model	The research has found that customers' usefulness perceptions of emerging services positively affected their intentions to use medium, and that their privacy concerns about the amounts of personal information, being collected through emerging services, negatively affected their patronage intentions and store image. Future studies can be done by collecting data into two or more waves and use longitudinal designs
24	Avinash & Babu (2018)	International Journal of Advanced Research in Computer Engineering & Technology	Big Data Analytics—Its Impact on Changing Trends in Retail Industry	The research has used qualitative approach to explain emerging trends in retailing and what is impact of Big Data Analytics on changing trends in retail	The research has identified major trends in retail industry and how big data can change their business process. The areas where big data can make drastic changes include predicting demand, generating recommendations, making strategic decisions, forecasting and predicting trends, price optimization, tracking social media, enhancing customer experience, creation of client profiles and identify the highest ROI opportunities. Future studies can be done to identify potential areas where big data analytics can help
25	Shankar (2019)	NIM Marketing Intelligence Review	Big Data and Analytics in Retailing	The research has used quantitative research aimed to understand big data analytics and its impact on retailing.	Research has found that there is need for an integrated database as it critical to business success, so many retailers are investing in creating such database. The future research can be done to develop more such models to understand impact of big data analytics on retailing
26	Silva, Hassani & Madsen (2019)	Journal of Business Strategy	Big Data in fashion: transforming the retail sector	The research has discussed trending applications of Big Data in fashion retailing with the aim of concisely summarizing the industry's current position and status.	The research has found that main reasons for application of Big Data analytics in fashion are trend prediction, waste reduction, consumer experience, consumer engagement and marketing, better quality control, less counterfeits and shortening of supply chains. Future studies can further examine use of data in fashion retailing

No	Author name	Journal name	Article title	Research methodology/sample	Research findings and future directions
27	Johnson, Muzellec, Sihi & Zahay (2019)	Journal of Research in Interactive Marketing	The marketing organization's journey to become data-driven	The study has examined the experiences of managers while implementing big data analytics in the marketing function. 15 open-ended in-depth interviews were conducted with marketing and analytics executives in a variety of industries in Ireland and the USA	The study has found that managers consider marketing big data analytics to be a series of tools and capabilities used to inform product innovation and marketing strategy-making processes and to defend the brand against emerging risk. Future studies can be done with different methodological approach
28	Liu, Shinm & Burns (2019)	Journal of Business Research	Examining the impact of luxury brand's social media marketing on customer engagement: Using big data analytics and natural language processing	Data mining technique has been used while extracting 3.78 million tweets. The purpose was to understand the impact of social media marketing on consumer engagement	The study found that independent variable has positive impact on dependent variable and results showed 65 % of variance with 30% of mediator variance. Research is based on twitter accounts in future researchers can explore how luxury brands can change their customer engagement strategies with respect to platform and which dimensions need more attention in social media campaigns by luxury brands. Another aspect can be exploring by combining big data with traditionally customer information to get more accurate insight, consumer perception of traditional brand dimensions and its representation on social media can be studied
29	Ranjan & Faropan (2021)	International journal of Information Management	Big Data Analytics in Building the Competitive Intelligence of Organizations	Interviews were conducted from 22 countries	It was found that preference for a rather centralized informal process as opposed to a clear formal structure for CI, furthermore, the use of basic tools for queries, as opposed to reliance on dedicated methods. Cross-business market analysis of CI regarding the adoption of Big Data can be done in future
30	Mariani & Wamba (2020)	Journal of Business Research	Exploring how consumer goods companies innovate in the digital age: The role of big data analytics companies	20 interviews from 4 industries of UK were conducted	The study found that ecosystem of BDA companies seems to have the potential to support product and business model innovation by means of BDA. In future, conceptualization of the CGCI framework can be interesting tool to protect innovation. Moreover, there is need to build on the framework based on resource-based theory and conceptualization of BDAC
31	Rathod & Kumar (2021)	International Journal of Entrepreneurship	Analyzing the impact of big data and business analytics in enhancing demand driven forecasting in retailing	The study aimed to analyze the impact of big data and business analytics in enhancing demand-driven forecasting in retailing sector in the Indian context. The study used secondary source of data from different over views of bigdata impacting on retailing sector	The study has found that big data and business analytics are advanced technologies that help in predicting future performance, price, optimizing, and forecasting demand. Future studies can examine the similar relationships while using different methodological approach

No	Author name	Journal name	Article title	Research methodology/sample	Research findings and future directions
32	McColl & Ritch (2021)	New Perspectives on Critical Marketing and Consumer Society	The Evolution of Big Data in Marketing: Trust, Security and Data Ownership	The study aimed to highlight the importance of big data and it can be used in marketing decisions by the firms	The research has discussed resource-based view of the firm and dynamic capabilities as they relate to big data and how companies can use big data in marketing decisions. Future studies can be done to explore different business areas in which big data can be helpful
33	Ying, Sindakis, Aggarwal, Chen & Su (2021)	European Management Journal	Managing big data in the retail industry of Singapore: Examining the impact on customer satisfaction and organizational performance	The study aims to understand the usage of big data analytics to understand customer relationships and experience, amongst others. Quantitative research method was employed involving 500 participants from the retail industry of Singapore	The study found that amongst the different big data analytics utilized within the retail industry of Singapore, social media analytics had been majorly answered by the participants. Further studies could be about the upcoming retail trends in Singapore and how the effects of big data analysis changed in the past few years and deal with the unexpected future recessions in the retail industry
34	Aversaa, Hernandez & Doherty (2021)	Journal of Retailing and Consumer Services	Incorporating big data within retail organizations: A case study approach	The study has examined the incorporation of Big Data within retail organizations. In-depth case-studies was conducted in major retail-related organizations operating in Canada	The study reveals that although there was general awareness of the importance of Big Data, still it is evident that the adoption and development of Big Data decision support is heavily reliant on a data environment that promotes transparency and a clear corporate data strategy. Future studies can be done to investigate the degree to which BD and BD analytics affects the quality and outcome of retail location decisions made by companies
35	Youssef, Eid, & Agag (2022)	Journal of Retailing and Consumer Services	Cross-national differences in big data analytics adoption in the retail industry	Data of 2278 respondents were analyzed through structural equation modelling	The findings revealed that security concerns, external support, top management support, and rational decision-making culture have a greater effect on BDA adoption in developed countries UK than in UAE and Egypt. Future research is encouraged to take into consideration the interaction effects by examining the relationships between the independent variables
36	Zhang, Zang, Zhu, Uddin & Amin (2022)	Information Processing & Management	Big data-assisted social media analytics for business decision making system competitive analysis	Big-Data assisted Social Media Analytics for Business (BD-SMAB) model has been used to examine the awareness and affects decision-makers in marketing strategies	The study found that companies can use big data analytics to enhance management. As it can evaluate its competitors in real-time and change prices, make deals better than its competitors' sales, analyze competitors' unfavorable feedback and see if they can outperform that competitor. In future, same conceptual model can be used to validate past research findings and aims to assess and improve the framework

No	Author name	Journal name	Article title	Research methodology/sample	Research findings and future directions
37	Pascucci, Nardi, Marinelli, Paolanti, Frontoni, & Gregori (2022)	Journal of Retailing and Consumer Services	Combining sell-out data with shopper behavior data for category performance measurement: The role of category conversion power	The study has Examined the measurement of category performance based on sell-out data that are ill-equipped to fully address category management issues. Moreover, shopper behavior analytics system has been presented for category management performance monitoring	The study has provided consolidation of a data-driven approach that can be implemented thanks to the adoption of technologies capable of generating new data sources at support to retailers. For future research, similar studies can be done to verify the proposed scorecard's effectiveness in evaluating the categories' performance

Source: Authors

3. FUTURE RESEARCH DIRECTIONS

In all of the reviewed articles there are different future research directions regarding the use of big data in retail marketing, most of the studies have future directions for the generalizability of the model in different sample data or country. There has been continuous improvement in new analytical techniques in this area which is being examined by researchers. The studies have suggested that in future, testing of existing models should be done along with proposing new models and frameworks. Few of the important future directions which can be important for the development of the field are mentioned below in Table 4 below.

TABLE 4 - FUTURE RESEARCH DIRECTIONS

Authors, Year	Future Recommendations
Angella & Ko (2012)	Effective instrument needed to measure social media marketing and sample demographics differ with foreign consumers
Hea, Zhab & Li (2013)	Researchers should focus on finding innovative ways to turn businesses' social media fans from "like" to "buy"
Fan, Lau & Zhao (2015)	In data mining techniques marketing mix strategy should be used by researchers for better insight
Gandomi & Haider (2015)	The paper makes the case for new statistical techniques for big data to address the peculiarities that differentiate big data from smaller data sets. Most statistical methods in practice have been devised for smaller data sets comprising samples
Bae (2015)	Likes on Facebook are not actual expressions new model needs to be developed for the expression count
Sun et al., (2018)	BASOA testing is required in enterprise and e-commerce acceptability in Business Intelligence
Liu, Shinm & Burns (2019)	Future research can be done explore by combing big data with traditionally customer information to get more accurate insight, consumer perception of traditional brand dimensions and its representation on social media can be studied
Mariani & Wamba (2020)	In future, conceptualization of the CGCI framework can be an interesting tool to protect innovation. Moreover, there is a need to build the framework based on resource-based theory and conceptualization of BDAC
Ying, Sindakis, Aggarwal, Chen & Su (2021)	Future studies can explore the upcoming retail trends in Singapore and other countries and how the effects of big data analysis changed in the past few years and deal with the unexpected future recessions in the retail industry
Pascucci, Nardi, Marinelli, Paolanti, Frontoni, & Gregori (2022)	Future studies can be done while using the data-driven approach that can be implemented for successful adoption of technologies capable of generating new data sources at support to retailers. The studies would be able to examine the effectiveness in evaluating the categories' performance

Source: Authors

4. DISCUSSIONS AND CONCLUSIONS

Findings of the paper showed that big data is evolving quickly and it's become necessary for a business to embrace it. With big data, businesses can achieve their goals effectively and create a competitive advantage in the market. In this paper, researchers reviewed 37 articles from the year 2009-2022 regarding big data, articles were searched by using keywords "big data analytics, marketing analytics, and data analytics". In the academic perspective field of big data research was not enriched with different topics, from 2008 there is great interest in the topic and a number of researchers are working on the topic. Still, there is huge room for work in the big data field.

As reviewed articles showed that concepts are premature and every aspect is in building face. There are no prominent theories in the field. Data collection is done from the online sources, data from organization-level and big data practices in different countries need to be evaluated as an empirical study. As the field is developing and it is in its early stage, reviewed articles showed researchers used every online source for different purposes.

11 articles were based on the data from twitter, as twitter is prominent in the user generated content and data from twitter is purely based on opinions. Researchers used this source for different purposes e.g., customer intentions, luxury brands perception, customer engagement. 4 articles used Amazon as a data source, with customer direct buying and selling on the website there is a number of options available that give insight regarding product price, rating, customer feedback. Data from amazon is usable in product modification and marketing strategies for new products. Facebook is used by brands for interaction with customers and user-generated data, few articles used Facebook data to understand the level of interaction between top brands and customers. Email data is used by a few articles to get understand the priorities of customers and business to business interactions. With all these open sources of big data, businesses which aren't using big data for customer or business insight can imitate above strategies and learn about customer behavior and get valuable business insight. Apart from customer insight big data is used for business intelligence as retail companies use these tools to improve the flow of work and reduce the cost of business. To predict the customer demand through big data, the basic econometric model can be used in retail stores. It will help businesses grow in understanding customer needs and reduce business costs. The use of social media data can help in identifying trends and hot topics, which leads to modification in product or services. Social media data can help companies in different ways and it can play a pivotal role in decision making, for identifying the resources which have a significant impact on competitive advantage. There have been several benefits identified by authors for retail firms which includes digital revolution brought recently and how marketers can use individual customer data from customer relationship database with the flow of data from multiple sources. Organizations have to develop resources to store complex data which will result in the creation of more complex metrics to decode the insightful information regarding customers. Social media has also changed the marketing science as social media is in the center of attention as marketers are recognizing the impact of user-generated content on sales and firm value. Challenge for firms is to understand the usage of social media, risks surrounding social media, reaction to negative customer reaction, and metrics to evaluate social media.

This reviewed article showed that there is a room for conceptual framework in this field, as big data play an important role in businesses. Different concepts need to be applied with the topic like leadership, management, customer behavior etc. As big data is in its developing phase collaboration with different topics will enrich the field and set the foundation for future researches.

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