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The Impact of Big Data Analytics on Customers' Online Buying

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ABSTRACT

Big data ultimately provide assistance in the security of online different processes like payments. It can also integrate many related payment functions into a centralized platform that enable the simple descriptive analytics. It is important to evaluate the regular organizational activities regarding collection and distribution of large amounts of data from many different sources to support organizations managers' knowledge and perspectives. A lot of e-commerce business in different sectors believe that Big Data Analytics (BDA) is the most effective method provide and reveal new insights and effectively formulate the business activities. Big data in th e e-commerce is a form leverage the BDA to enhance the consumer engagement, personalize the customer experience, and increase the sale volumes. Big data e-commerce also engages the customers in two ways: personalized recommendations and increased availability of the product information. The key objective of this study is to explore the effects of BDA on customers' online behaviours to examine whether the BDA is important as stated by firms.

1. INTRODUCTION

The world is largely changing, and it has an instantaneous effect on consumers' purchasing patterns. When compare the purchase decision process of consumers in last decades, the purchasing decisions of the consumers recently has conducted through various phases. The main differentiation is not a change in the consumer preferences, moreover how the customer receives the desired products or services (Shishan et al., 2021; Al Kurdi & Alshurideh, 2023). The recent trend revealed a rapidly rising numbers of online consumers, in addition to the proportion of customers who make their payments in different ways other than cash, even when they purchase from a local retailer (Alshurideh et al., 2021). The customers nowadays are well aware of the avliable options, they also owe to the proliferation of digital information, and want elevated items rates (Al-Dmour et al., 2021; Al kurdi et al., 2023). The customer behaviours from product enquiry to transactions, have frequently used some shopping platforms. They also enhance their shops usefulness by weigh the available choices (Joshi et al., 2018). The new buying trend presents some obstacles and possibilities to enhance the customer service and increase revenues. Every customer make their purchases online and use funds transfers within a digital footprint, and this is a data trail created when completing online operations (Ghimire et al., 2020).

Businesses may now acquire large amounts of data in real time due to modern Point Of Sale (POS) systems, According to Alshurideh (2024) and Al Kurdi (2024), the IoT, user-generated data from social media sites, and cloud computing. In this study, the enormous data sets are similar to real-world in origin and provided with a variety of disorganized formats which referred as "big data." The massive volumes

of data collected and processed in a close and real time have the possibility of improving the existed comprehension of the customer activity and request forecasting (Boone et al., 2019). In fact, the big data enables the business owners and managers to create BDA, which is distinct as "a comprehensive approach that entails the collecting, evaluating, using, and synthesis information for diverse operational activities and departments with the aim of gaining better understanding, making business value, and found a significant position. BDA has been shown to increase the business intelligence, help the organizations to recover customers satisfaction, optimize inventory, efficiently achieve supply chain risks, simplify processes, and classify target consumer groups. Such acts promote greater organizational performance, adaptability, and other benefit (Mariani and Fosso Wamba, 2020).

Data from many sources (e.g., online transactions, search history, and social media) may be evaluated and provided to business managers by e-commerce businesses. According to many e-commerce companies, BDA is the most excellent method that help to extract insights and design specialized strategies for the business so far (Loshin, 2013; Williams, 2016). As a result, the current research study would contribute the relevant literature by focusing on the impact of BDA on existing marketing and how BDA impacts consumers' online activities. In recent years, the e-commerce process has entered a new level of competition (Sahin, 2012). With the huge amount of user data provided by social networks and the use of the Internet, the first concern of e-commerce giants has become how to stay competitive at various levels. On the one hand, the companies need to promote their goods, and this requires knowledge of the needs of customers, and on the other hand, they need to offer their goods at competitive prices at the same time assuring them a large profit margin.

2. LITERATURE REVIEW

The majority of study has focused on big big data analytics to improve the customer experience while purchasing online. The most academic works have concentrated on leveraging big data and corporate analytics for information retrieval objectives, as well examining the factors that contribute to the acceptability and application of such technologies in the business environments. The results indicate that the thoughts of authoritarian power, facilitate the conditions of online use and perceive the utility impact on the behavioral intentions and text mining usage. The findings of a study highlighted the position of senior management involvement in the use of data mining methods (Demoulin and Coussement, 2020). Using a sample of 628 among European and American enterprises, is conducted to examine the value of BDA and capabilities of Internet of Things (IoT) may provide from a strategic management viewpoint. Their findings highlighted a significant precedent into great performance which can be created through a strong data quality across important aspects and potentially reveal the promise of the innovation (Mikalef et al., 2020).

According to the experts, the organizations should be competent with translating the key data into evidences to develop insights and resolve emerging challenges at workplace. Data mining, actionable insights, machine learning, and text analytics are modern forms of BDA. It is thought that just having a huge amount with diversity sources information did not provide a long-term significant position; nevertheless the ability to collect, evaluate, and analysis is performed to inform the organizations' activities and provide extra advantages (Ullah et al., 2022).

The individuals' engagement in online shopping is shifting from physical to digital. According to the literature, the online commerce is rapidly shifting to portable devices, for example 54.8% of online customers shop on mobile in China, towards the end of 2015, it had 410 million internet clients. There are various online procedures conducted by the consumers include browsing, inquiring, purchasing, processing payments, monitoring delivery, and so on. Further, the amount of people who pay and purchase online is rapidly expanding. They are also pay online by using a QR code instantly through their official accounts. All of online activities are conducted through the sharing of data among customers and businesses (Zhou et al., 2018).

Online customers review the information as it refers to big data procedures due to the large size, speed, and diversity. Since the performance is a primary metric, the phase "big data" is meaningless. The issue of how much data is "big" still uncertain. Saboo et al (2016) demonstrated three well-known large data characteristics, the amount, pace, and diversity of online review data. Since the store's inception in 2008, the Apple App Store in the United States has received over 17.4 million app reviews for 3,101 game applications. With 2.2 million applications throughout all app groupings, the quantity of data analysis on this network alone is in the petabyte range. As smartphone has also become more widespread, the internet reviews are increasing with large rates than ever before. Additionally, around 3 million new reviews are added to the advanced applications in the United States monthly. This very same product is supposed to be assessed across various channels in many regions, with good feedback spreading more quickly (Rukanova et al., 2020). Moreover, the big data analytics is at the heart of revolutionizing the industries i.e retail purchases and supply chain, that is tracking the product flow and inventory levels in real time, and leverage the customer data to predict purchasing patterns (Le & Liaw, 2017). Even though, it uses the bots to tirelessly fill orders in vast automated warehouses. Businesses usually benefit from the Big Data that available on the Internet in many ways to improve the customer experience, stimulate their purchases, make smart decisions, and develop their performance (Rane, 2023; Aburub et al., 2024; Nuseir et al., 2024). Big data analysis has a significant impact on the results of companies in general and on the e-commerce industry in particular, in an industry whose number of digital customers has reached 1.9 billion customers in 2019, and Amazon alone has 120 million products in the same year (Wang et al., 2022).

“Businesses without data is like driving with closed eyes”. The big data helps design insightful marketing strategies, so e-store marketers can make the best use of this new quantitative landscape of customers, by extracting data from customer discussions. Or chat messages between them and the brand, online store owners can instantly get an idea of how much their customers are interested in certain products, what aspects of the product they are interested in, etc. Thus, they can discover the selling points of the products and adjust their marketing strategy (Erevelles et al., 2016).

2.1 Proposed method to enhance customer experience using big data

Big data enables excellent customer service (Arthur, 2013). The companies todays are able to use consumer feedback to improve the entire experience as they have the chances to collect key data through different sources like customer reviews, social platforms, and other product appearances by using the internet. The issues associated with this topic can be described in terms of data quality, storage, a shortage of data science expertise, verifying data, and aggregating data from many sources while implementing big data. In addtion, big data enables businesses to provide customized service (Anshar et al., 2019) at scale and reply to consumers more swiftly and efficiently. The customer care team capable to impress and support real-time customization. Additionally, the businesses may locate innovative, profitable product with simplicity opportunities. In this research, the recommendations are generated to understand well the impact of big data for customer’s online buying experience.

2.2 Big data analytics in E-Commerce

Big data analytics platforms and software can help the organizations to make decisions based on information and this enhance business outcomes (Ferraris et al., 2019). The benefits may include improved marketing effectiveness, new revenue possibilities, customer personalization, and operational efficiency (Spiess et al., 2014). E-commerce gives both of buyers and sellers a way to compare the effectiveness of a product's affordability to other suppliers' through big data analysis. Employing big data analytics, e-commerce businesses may improve the purchasing predictive analysis of the customers, customer service, expect the future operational plans, focus on micro-moments, and convenience of digital purchases. Nowadays, people use the internet to expand the knowledge, purchase items, and trade with one another. As seen in Figure (1), the e-commerce enterprises used the internet to offer items and services, generate revenues, and increase brand exposure.

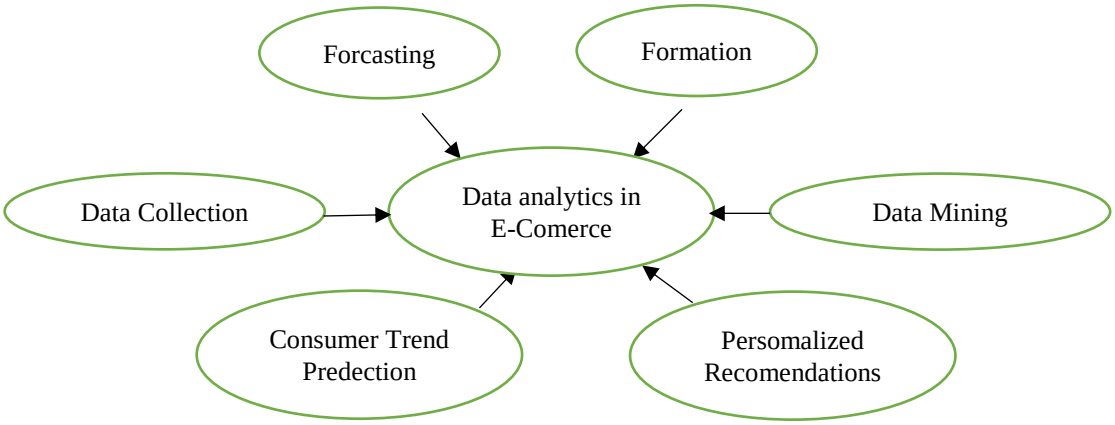

Figure (1) Data analytics for E-commerce.

Rukanova et al. (2020) recognized some kinds, and issues associated with big data analysis tools in e-commerce. The constraints of applying data analytics in e-commerce involve the need for corporate culture and possible changes to fulfil business goal. The importance of being able identify customer demands to provide personalized suggestions and consumables from enormous amounts of user data, and how to securer user data like bank and financial information, and how to decide whether a person has data and analytics skill (Li et al., 2017). It should be emphasized that at this time it is very difficult to quickly collect, clean, merge and obtain high-quality data. So that in the end it takes a long time to convert unstructured types into structured types and process that data (Mishra & Misra, 2017). As one of the most important aspects of its implementation in this category of the companies. On the other hand, no less important is the fact that the so-called big data is a concept closely related to the acquisition of user customers for the digital company. Until understand this issue better, the big data allows the firms to monitor their potential customers; learn about their behavior and expectations to attract more of them to company's online store (Akter & Wamba, 2016).

2.3 Online marketing status of big data

The social ecosystem has definitely transformed as a result of the proliferation in big data (Degli Esposti, 2014). With the simultaneous growth of the innovation and demands, an increasing number of government organizations, businesses, and individuals will recognize the data as a valuable asset class. The relative simple economic value generation of the big data happens in online ads and pinpoint marketing. Following the excitement and success of mass communication, standard marketing campaign began in a new era of transition, pinpoint marketing for particular online consumers. The internet advertising paradigm has been changed in the age of big data, and the latest design represented by Real Time Bidding (RTB) has also developed. RTB branding is a new service advertising marketing technique as well as a new item in advertising (Qin et al., 2017). Real-time bidding (RTB) is a novel style of promotion and it is conducted depending on the accessibility of each AD presentation. The four major differences in the effective promotional paradigm are indicated in Table (1).

Table (1) Different aspects of traditional marketing with RTB.

1st aspect	2nd aspect	3rd aspect	4th aspect
RTB altered the interaction between marketers and phone companies. Sponsors not only need to seek collaboration with this approach; otherwise, they may give one-on-one solutions in real time. In principle, ad agencies do not need to consider prior promotional	Previously, the standard effective advertising model was focused on volume, page visits, the number of individuals, and time. RTB adds free market principles. These statistics are imprecise, and there is the chance of error. Furthermore, the RTB framework incorporates a real-time bidding option. The	RTB directly tracks user needs that improve advertising efficiency to realize advertisers' bidirectional benign interactive logic. The consequence of this logic continuously brings a better delivery effect; as a result, each campaign is focused and relies on big data research and customer group traits tracking. This realistic, accurate promotion piqued	RTB minimizes the distance between advertising and customers, strengthens their interaction, and frequently interrupts watching TV underneath the conventional advertising model. The RTB approach, in contrast, is predicated on a precise knowledge of consumers and the connection of services.

location and network as long as they have a distinct advertising direction (Lo and Campos, 2018). Unfortunately, ad companies have few options outside typical Pay Per Click (PPC) advertisements, Charge Per Thousand Views (CPTV) ads, and Charge Per Click (CPC) ads.	most significant feature of RTB is transparency; if one advertiser wishes to market to a specific set of people and another ad company wants to promote to that same group, you must "bid." In the auction procedure, the business with the highest offer will receive the advertising.	the interest of many marketers. Even though proportion and scope of RTB system digital marketing may be lower when compared with the traditional marketing and advertising model, the RTB model is considerably superior than the prior advertising marketing model in terms of promoting efficiency, genuine effect, and level of precision.	Therefore, some products that precisely meet consumer needs are offered based on consumers' purchasing and interest preferences. In this scenario, the people would actually seek the information included in the advertising, which goes beyond the scope of standard marketing trading, or only inconceivable.

2.4 Online marketing effect based on multimodel fusion and artificial intelligence algorithm in the context of big data

Online marketing are common these days (Alshurideh et al., 2024) and digital learning is essential to fulfill this mission (Masa'deh et al., 2023). To add more, Parallelize learning is one of the exciting areas in machine learning today (Bian & Priyadarshi, 2024). Nevertheless, if machine learning is to build a high-performance, a huge amount of labelled data is crucial. As a traditional depiction of machine learning, each deep learning training network necessitates the acquisition of several attributes. Because of the high expense of hand labelling, the requisite training is not possible. To gain valuable knowledge in between processes, it has become more common to use the simultaneous learning strategy.

The evolution of artificial intelligence is highly dependent on data. This is to build an effective and continuous data bridge for all operations and procedures, which has become the most comprehensive link (Betty Jane & Ganesh, 2020). There is no doubt that there are many benefits and positives to the presence of real data in the process of improving, developing and improving the requirements and needs of life. This is done through machine learning and in-depth analysis of big data using various mathematical algorithms, which is one of the components of artificial intelligence linked to big data analysis, which contributes greatly to interaction with customers and the implementation of their behaviors and habits (Shang & You, 2019).

2.5 Recommendations for customers online buying using big data analytics

Big data may expose challenges with product delivery, customers satisfaction ratings, and even the brand's social media interactions. In reality, the big data analytics can determine the precise moments whenever customers satisfaction or impression changed (Mahajan, 2023). There are multiple domains where big data is being applied to improve capabilities. Table (2) provides a few vital recommendations while using big data to improve the customer experience.

Table (2) 5 ways big data can improve the customer experience.

Recommendations	
Directing the best leads	This method collects potential clients into a record in order to turn them later. The leads gathered during the early phase will be used to develop promotional and sales content to attract consumers. You might greatly improve your transition process if you would guarantee that you only collect relevant, high-quality leads. That's where big data comes in, analysing massive amounts of internet user data to obtain insight into the overall status of the marketplace, which gives assistance while highlighting the most interesting results. Rather than throwing advertisements into the ether and hope they locate their target by coincidence, big data may help tailored marketing strategies and campaigns bring in these leads.
Accomplishment sentiment analysis	Businesses may now undertake "sentiment analysis" thanks to big data. Typically, an AI will use machine learning techniques to gather empirical proof about what intuitively inspires people. With this type of sentiment data, the organisations may modify their communication to be more attractive on an intimate level, resulting in a more favourable client relationship.

Forecasting future trends	Big data allows the businesses to get information far beyond their past and present. Companies may now evaluate a certain customer's purchase behaviours, as an example of this capability in practice, and can forecast when the next transaction will occur, what item will be purchased, and what type of nudge will be required to make it occur.
Reducing friction during apps and website using	Big data, makes it simple to observe minor correlations as far as how users interact with the website and apps. Using heat maps, one may learn more about how much people commonly spend on different website pages, where they click, and where their interests are fixed.
Providing a personalized experience	Big data enables businesses to forecast each customer's desire and then autonomously produce appropriate information to be presented. For instance, businesses like Netflix and Amazon leverage big data to offer personalized content, unique purchase recommendations, and other personalized communication types.

The businesses acquire more information about their consumers, a conscious and customer-focused approach to data analysis will lead to better customer service practices and as a result, a superior customer experience. Knowing how to use big data to improve customer experience will therefore become critical for any forward-thinking company.

3. CRITICAL ANALYSIS

Businesses now have unprecedented potential to establish and sustain a competitive edge owing to the advent of "big data." This research specifically reviews the status of the big-data business model and pointed out shortcomings including big-data business model categories, dimensions, and deployment. The literature derives and explores five key research perspectives based on the supply chain, stakeholder, ethic, institutional, and process, making recommendations for more exploration and theory development in the field. These perspectives have also pragmatic implications for how to close the big data business model implementation gap that currently exists today. One of the biggest advantages of big data technologies is that make it less expensive for businesses to store, process, and evaluate huge amounts of data (El Khatib et al., 2023). Furthermore, Big data technologies may also help in the identification of cost-effective and effective business methods. A few of the advantages and disadvantages are given in table (3).

Table (3) Advantages and disadvantages using big data

Advantages	Disadvantages
Optimised customer experience: Customers are undoubtedly a company's most valuable asset. Having large data at their disposal enables to conduct advanced analytics and build special offers and communications, as well as design individual strategies that are tailored to each client.	**Increased costs:** Big data may help businesses find more cost-effective ways to do things, it can also have drawbacks.
Increased productivity: Businesses can analyze huge amounts of information more rapidly due to big data solutions, which encourages more visibility within the organisation and better consumer insights.	**Data quality:** The quality of the data a business collects has a significant impact on the value of the testing process it generates.
Improved decision-making: Big data allows business intelligence and advanced analytical insights, which greatly simplifies decision-making.	**Security & privacy concerns**: Customers frequently object to big data and the idea it is readily capable of collecting and store detailed information on their identity.
Business agility: Big data analysis enables businesses to solve customer issues more successfully and gain access to market insights before rivals. As a result, it helps them are becoming more innovative and nimble in their markets.	**Cultural change:** Companies fundamentally need to be information in order to succeed in today's digital market. Using big data to change the business strategies is what it means.

4. DISCUSSION

Big data is utilized by businesses to enhance operations, deliver enhanced customer service, develop individualized marketing strategies, and conduct key other activities that can ultimately increase profits and sales. BDA has a significant impact on online consumer behaviour in regards to customer

satisfaction and impulse purchase. Big data analytics, on the other hand, could perfectly capture the purpose and preference of customers as well as provide suggestions which matched their needs. Big data analytics also allows advertisers fully comprehend customers, allow the different businesses to develop more personalized promotional strategies to boost sales and encourage more control. The main objectives of big data gathering and analysis data to improve customer experiences, accelerate the time it takes for items to arrive on the market, and manage effectively the key resources.

E-commerce has affected the traditional business methods, reducing the importance which represents a data-driven revolution in the all sector. An efficient big data analysis, the optimized movement of products from the suppliers to warehouse to customers, is critical to every business. Therefore, the BDA is at the heart of revolutionizing the retail supply chain, i.e. tracking product flow and inventory levels actually to tirelessly fulfil orders in vast automated warehouses. BDA for the retail business is expected to grow significantly over the forecast period, following the manufacturing and energy sectors. As a result, predictive analytics and artificial intelligence and machine learning are also expected to revolutionize the marketing aspects and customers behaviors.

5. CONCLUSION

The era of big data has offered new opportunities for scholars to accomplish high relevance and effect amid upheavals and transformations as far as how the researchers examine social science phenomena. The introduction of new data collection platforms, powerful data collection, and analytical support is causing fundamental changes in the questions that surveys can ask and the research methods can be used.

This research looks over how BDA affects customers' behavioral patterns and how it influences the current marketing. An online poll has been conducted to assess consumer attitudes and behaviour in light of the different marketing efforts carried out by e-commerce companies. This essay examines the impact of the data on product prediction and how it has enhanced it. While the time series data will be a major focus of this analysis, the study also will look at how such information may be utilized to provide light on consumer behaviour.

6. LIMITATIONS AND FUTURE DIRECTIONS

In addition to the limitations of data storage, there are constraints to using computers as well as other technologies to evaluate data. The truth is that machines are becoming capable of carrying out activities and analysis as the humans do. The following are only a few of the regulation is the area:

- Finding meaningful correlations .
- Figuring out which questions to be asking.
- Data security.
- Data transferability.
- Discrepancies in data collection.

In the future, data mining will improve customer experience and assist companies in more effective product sales and marketing. Through tailored media, big data enables customers to engage with innovative items they wouldn't have otherwise found. The mining operation use the data mining techniques to reduce costs across the operational tasks, allow the companies to operate more efficiently. This could help the firms’ owners to identify cost bottlenecks and improve decision making. Data mining is used in the most companies to convert the raw data into useful information. Basically, the companies learn more about their customers by using software to look for trends in huge data sets. This allows them to design more successful marketing campaigns, improve sales, and reduce costs with effective computerized data collection, storage and processing.

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