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A Review of Strategic Driving Decision-Making through Big Data and Business Analytics

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Abstract

Purpose: The paper's goal is to investigate how big data may be used in various domains to improve decision-making. In this article, we examine the use of big data to facilitate timely, informed decision-making that enhances business outcomes.

Materials and methods: To give a conceptual overview of the possible applications of big data in decision-making, the study conducts a literature analysis and analyses secondary data.

Findings: The notion of big data, its application in decision-making, and its competitive benefit for various businesses are all covered in this article. A methodology for handling data in decision-making is also covered in the article. In order for businesses to make better decisions and produce higher-quality information, the problem has to be addressed.

Implications to Theory, Practice and Policy: The research will explore the potential of analytics in the continuous flow of high-speed, high-volume data production in various industries, offering special research opportunities in corporate, scientific, and governmental sectors in future.

Keyword: *Big Data, Big Data Analytics, Data Analytics, Strategic Marketing, Data-Driven Decision-Making*

1.0 INTRODUCTION

The amalgamation of big data and analytics with marketing strategies in the age of digital transformation signifies a fundamental change in the way companies interact with their customers and formulate long-term plans [1]. Over time, information systems have changed from being tools for documenting transactions to being tools that assist various levels of company decision-making. For the purpose of making business choices, traditional information systems relied mostly on internal data sources, such as enterprise resource planning systems (ERPs). Businesses are collecting more data than required for any use [2].

Relational database management systems were employed to organize these datasets (RDBMS). These served as assistance for internal company choices on pricing, inventory control, detecting loss-making items, and determining which customers were the most important. Additionally, a data warehouse was constructed using this data for mining and analysis. The study also discusses the difficulties that come with working with big data, such as concerns about security, privacy, and the need for qualified personnel [3]. This review's main goal is to investigate how big data and analytics are revolutionizing marketing strategy decision-making. Thanks to the rapid growth of data creation and sophisticated analytics tools, companies can now foresee market trends, understand intricate customer behavior, and customize marketing campaigns with never-before-seen accuracy. In order to provide a competitive advantage and propel corporate expansion, this article aims to explore the ways in which big data and analytics act as catalysts for creativity and effectiveness in strategic marketing choices.

It would be impossible to exaggerate the importance of using big data and analytics in strategic marketing choices. The capacity to utilize data-driven insights for strategic decision-making in a fiercely competitive and quickly changing marketplace is a crucial factor in determining a company's performance [2]. Through this connection, businesses may gain a more sophisticated knowledge of consumer preferences, market dynamics, and the efficacy of marketing initiatives, allowing them to adjust and stay relevant over time. Additionally, analytics' predictive capability aids in foreseeing consumer demands and market developments, enabling proactive strategy modifications. In the end, incorporating big data and analytics into strategic marketing choices improves market share, increases customer happiness, and increases return on investment, highlighting the critical role of these [4].

The introduction of the internet significantly facilitated business partners' integration of companies in the subsequent wave that began in the early 1990s. Over the last ten years, the combination of information systems, cloud computing, mobile devices, and the Internet of Things has resulted in vast amounts of data, which are sometimes referred to as big data [4-6]. It comprises real-time, structured, semi-structured, and unstructured data that is part of information, data warehouses, OLAP, and ETL. Large amounts of heterogeneous datasets may now be processed and stored using statistical approaches thanks to advancements in computer science. Scholars and business organizations have created original strategies for maximizing the value of big data. This study aims to investigate the role of big data in enhancing decision-making and the ways in which big data might be applied to create timely and intelligent judgments that enhance business outcomes.

We examine the body of research on big data and its growing importance to society and industry in the next section. Several definitions of big data from prominent big data and analytics experts have been discussed here. We also discuss several classification schemes for analytics

applications. The third segment covers the advantages and uses of big data. Here, we examine the many ways in which organizations, such banks or commercial enterprises, have been able to gather, examine, and apply big data to improve their operational efficiency.

For some of the top businesses, the use of big data and analytics to inform decision-making is nothing new. Nonetheless, a lot of small and medium-sized businesses may still benefit from this developing industry. We provide a big data framework that these firms may employ in the fourth part. This framework could serve as a basis for fine-tuning the model that works best for their companies. In the final section, we offer our conclusions from the study and make recommendations for future lines of inquiry.

2.0 LITERATURE REVIEW

This section examines the body of research that shows the several ways businesses are utilizing big data for analysis and decision-making. Following the definition of our study's goals, we came up with terms like "big data," "big data and decision making," and "big data analytics." We identified pertinent publications by conducting a thorough search across scholarly journals, conference proceedings, and online resources. Excellent research publications have been chosen using the databases Scopus, Science Direct, and Google Scholar. We identified pertinent publications by conducting a thorough search across scholarly journals, conference proceedings, and online resources. Excellent research publications have been chosen using the databases Scopus, Science Direct, and Google Scholar. After entering the indicated keywords into the database, articles that are pertinent to the subject have been chosen. The annual number of papers published in different journals is displayed in Figure 1.

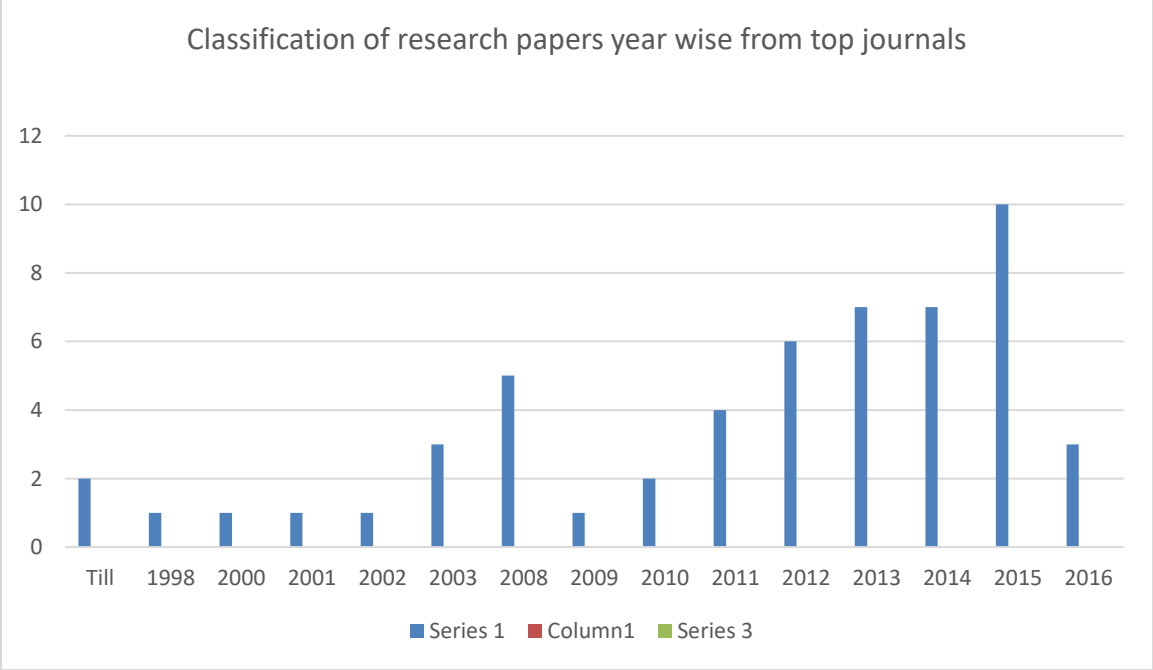

Figure 1: Classification of Research Papers Year Wise from Top Journals

Big data refers to the vast volumes of data generated from various sources, including social media, transaction records, web logs, sensors, and more [7]. Big data, which is defined by its volume,

velocity, diversity, accuracy, and value, offers opportunities as well as difficulties. It provides a thorough understanding of customer behavior, market dynamics, and competitive environment in marketing [8].

Big data has a crucial function in marketing. Marketers may get profound insights into customer preferences, habits, and trends by utilizing big data. This makes it possible to create highly targeted and individualized data-driven initiatives [9]. Large data makes it easier to comprehend the customer journey in detail, from awareness to purchase, giving marketers the ability to maximize touchpoints for engagement and conversion. Additionally, it facilitates trend research, market segmentation, and campaign performance measurement—all essential for developing tactics that connect with and benefit the target audience [10].

According to Dyché [11], millions of data that can be evaluated using technology are what many people think of when they think of big data. In its purest form, big data refers to the appropriate use of technology to data in any given field. The first companies to adopt big data in the first ten years of the twenty-first century were internet and startup businesses. Voice, text, log files, photos, and videos are among the various types of data that have emerged [12]. When big data is used properly, it may be applied in various ways to aid in decision-making.

The process of compiling and preserving vast volumes of data for later analysis is not new, even though the phrase "big data" is not. Early in the new millennium, industry analyst Doug Laney popularized the idea by defining big data as having three Vs: volume, velocity, and variety. Big data is currently defined by five V's after more refining, as seen in Table 1 below.

Table 1: Five V's of Big Data

Characteristics	Description
Volume	Large amount of Data in terabytes or petabytes has been doubling every forty months [12].
Velocity	Rate of Data accumulation is increasing in every business or organization
Variety	There are a multitude of Data Sources like enterprise systems, social media, text, video, audio, email, RFID, web applications and other digital devices.
Veracity	Quality of Data is very essential for the accuracy of the decision.
Value	Economic & Social Outcomes can be improved by obtaining value from the heterogeneous data.

Big data comes from a variety of sources in addition to traditional information systems, including social media platforms, cloud apps, software, social media influencers, Data Warehouse appliances, open technologies, network technologies, old documents, business apps, and sensor and meteorological data. A few cited sources are discussed below.

Transactional data: Statistical methods like regression analysis and decision trees, when combined with transactional data, can aid in the development of a model that forecasts a result, such as sales or the degree of success for a new product introduction. With historical data as input, the model can forecast the dependent variable. With statistical software like SAS or SPSS, these models are simple to design. Any historical data that includes independent variables is referred to as a transaction, and the system used to monitor these transactions is sometimes called a "transactional processing system." A transaction processing system's primary goal is to gather and update data for use in an organization's operational decisions. Transactions can be handled in two different

ways: batch processing, which handles data as a single unit over time, and real-time processing, which handles data right away. Any business may use one of these approaches to aid with operational decision-making.

Social media data: Due to social media's recent surge in popularity, data is being gathered anywhere it can be found worldwide. Reports on events are released as they happen. Within minutes, internet users are glad to offer their opinions, critiques of products or services, and reviews of movies on Facebook, Twitter, or WhatsApp. Decision-makers now have a rare chance to obtain market intelligence. Social media users exchange information, which aids in the decision-making process for consumers by allowing them to quickly review reviews, customer complaints, and other extra services offered with a product. Social media platforms allow consumers to voice their sentiments, which aids businesses in decision-making about manufacturing. Competitive information regarding the company's products and services that rivals in a certain market category are offering is another use for social media analytics. Additionally, it encourages fresh concepts for enhancing the company life cycle. As a result, social media analytics are crucial for strategic, operational, and tactical marketing decision-making.

Internet Applications: As the internet has developed, millions of people have been browsing via different websites, which has resulted in a large number of click streams and web searches for goods and services. Millions of people use a variety of online banking apps, e-commerce websites (like Amazon, Flipkart, Alibaba, eBay, Paytm, bookmyshow.com, etc.), and search engines (like Google, Yahoo, Bing, etc.) every day. A variety of click streams and logs are created throughout their searches and transactions, some of which may be useful. *Data from electronic instruments:* Many electronic devices, including smartphones, RFID tags, GPS sensors, network-connected machinery, scanners, and cameras, produce large amounts of data. These are further big data sources. Generally speaking, analytics may be divided into three groups according to their intended uses: prescriptive, predictive, and descriptive. With reports and dashboards, descriptive analytics uses historical data to describe a phenomena and make sense of what has transpired. The sources of data have a significant impact on how they might be utilized for analysis. Depending on the data source, analytics can be further divided into Text, Audio Video, Web, and Network analytics. We go into further depth about them in the section that follows.

Text Analytics: Document representation, enterprise search systems, search engines, user models, feedback relevance, query processing, and billions of consumer searches on Google and Amazon.com for specific products indicate whether or not a buyer intends to buy the product. This function is used by Amazon, Jet Airways, and many other e-commerce companies to suggest items or flights to customers when they are exploring their website for the first time, increasing the likelihood that they will make a purchase.

3.0 MATERIALS AND METHODS

Corporate leaders face a number of challenges in the modern corporate world, including shorter product lifecycles, increased labor and material prices, fierce rivalry, and high consumer expectations. National borders are becoming less distinct due to globalization. The distance and location from the market no longer prevent people from accessing them. Businesses must constantly look out for dangers and possibilities in such a turbulent climate, and they must act fast to make choices based on the information at hand. The use of both traditional "small data" and "big data" in corporate decision-making is covered in this section.

The ability to manage the three Vs: volume, velocity, and variety; as depicted in figure 2 is fundamental to big data analytics. Scalable processing and storage solutions are necessary due to the enormous amount of data that is produced every day. Real-time analytics skills are required due to the rapid rate of data production. Additionally, the variety of data, including structured and unstructured formats, necessitates flexible processing methods. The tools for navigating and analyzing these enormous datasets are provided by big data platforms, such as Apache Hadoop and Spark.

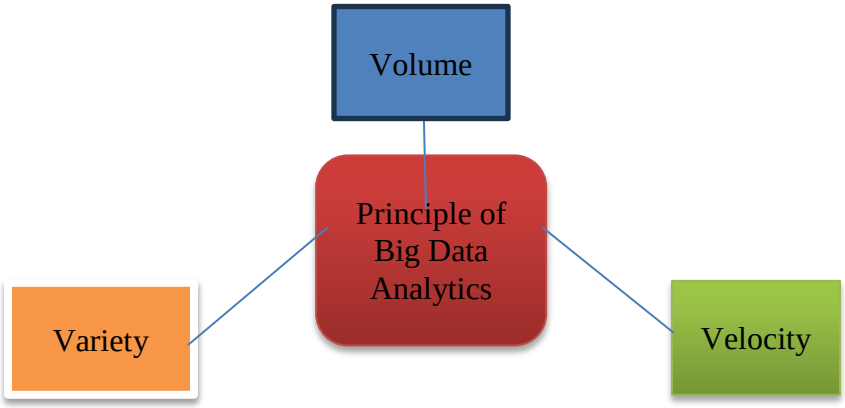

Figure 2: Foundational Principles of Big Data Analytics

Authors have examined many ways in which big data plays a crucial part in analytics, which in turn provides insights for decision making, based on the literature review. One major subject is the revolutionary impact of big data analytics on decision-making. Businesses use data-driven insights to manage risks and plan strategically. Businesses may use predictive analytics to foresee market trends, spot possible hazards, and make well-informed decisions that are in line with their overall goals. Big Data analytics improves risk assessment and fraud detection in the financial sector. Predictive analytics, it enhances patient outcomes and allows for individualized medication in the healthcare industry.

Data deployment is the first process of data analysis which is followed by business understanding, data exploration, and data preparation as shown in Figure 3. Data preparation is followed by data modeling and finally data evaluation.

Figure 3: Schematic of the Data Analytic Process

Authors have examined many ways in which big data plays a crucial part in analytics, which in turn provides insights for decision making, based on the literature review. The process of moving from large data to decision making is outlined in Figure 4. Below is a detailed discussion of the constructions. Five conceptions are portrayed in connection to one another in the conceptual framework displayed in Figure 4.

Figure 4: Conceptual Framework on Big Data and Decision Making

When association rules are mined from business transaction data, decision makers can get important insights about products purchased together or anticipate demand for particular things. Gaining insight into trends enables businesses, like Wal-Mart, to reorganize their product placement and isles, improving sales [13]. Demand forecasting for certain goods aids in better preparation for large-scale natural catastrophes like hurricanes [13]. By analyzing terabytes of data from aircraft engines, maintenance and safety are improved by identifying part failure signs [11]. The steps involved in generating information, predictions, and choices that may be taken immediately are outlined in Table 2 below.

Table 2: Role of Big Data in Making Decisions

Big data source	Big data driven Insights	Actionable Decisions	Reference
Google search for a product or brand	• Customer intention to buy a particular product • Identify customer preference for a particular brand		
Google search by specific key words	What particular information citizens are looking for or concerned about	Predict spread of flu by geography by regions	[14]
Amazon search	Customer intention to buy a particular product	Reminder to customer next time she/he visits the site leading to chances of sale	Amazon.com website
Amazon Purchase history	Using association rules mined from billions of records, identify which different products are bought by customers	Product recommendation (customer who bought this also bought)	Amazon.com website
Walmart POS data	• Using association rules mined from billions of records, identify which products customers buy together (market basket analysis) • Facing disaster such as hurricanes people buy some unusual things like pop-tarts etc. in addition to usual water, batteries, shovels etc.	• Store layouts redesign to place such products together • Inventory planning based on buying patterns prior to disasters such as hurricanes	• Waller & Fawcett, 2013[3] • Dyché, 2014[11]
Competitive intelligence from social media	Comparative analysis between competing products	Plan product strategy	[15]
Data from telematics sensors used by UPS vehicles	Information about speed, routes, direction, braking, drive train performance	Redesign Routes leading to saving of millions of gallons of fuel	[12]
Call center logs, online usage of accounts	Create complete profile for customer journey	Design future strategies for improved customer service	[12]

Understanding Customer Journeys: Prominent financial institutions like Wells Fargo, Bank of America, and Discover leverage big data collected from several sources to get insights into their

client relationships. Using a combination of structured, semi-structured, and unstructured data from contact center logs, internet clicks, transaction records, ATM transactions, clickstreams, etc., they build comprehensive profiles of client journeys. This profile links journeys with customer opportunities and issues, assisting them in understanding the causes of customer attrition.

Competitive Intelligence: Numerous research endeavors aim to comprehend customer feelings, attitudes, and views through the utilization of social networking sites (SNSs). Business leaders also need to know what customers think of their competitors' products in addition to their own. This information will be useful in planning future product advancements and creating a marketing plan. Through social media data mining, businesses and their rivals may compare their sales success and customer opinions.

Cost and Time Reduction: Reduction of Expense and Time Big data offers a multitude of ways to save costs and save time. When compared to traditional databases, big data solutions like Hadoop clusters are starting to show up as much more affordable options. It may be taken into consideration when making judgments in real time about offering deals and services to clients based on where they are at that moment. Through the collection and analysis of data from telematics sensors put on its 46,000 trucks, UPS is able to save millions of dollars on fuel costs by rearranging its vehicle routes utilizing this vast dataset.

Optimization and Simulations of Supply Chains: Supply chains with a large number of suppliers and business partners are becoming more and more complicated. Supply chain participants have been using corporate systems that log every transaction for the past 20 years. Information sharing between business partners, including suppliers and customers, has increased with the growth of EAI. In order to transfer commodities throughout supply chains efficiently, technology is essential. Inventory movement causes a lot of data to be stirred up by scanning equipment like sensors and RFID, position tracking systems like GPS, video recordings, etc. Decision makers are better able to make decisions thanks to supply chain analytics, which provides an integrated picture of the data inside the chain. Within the supply chain system, we are able to collect, transform, analyze, and perform analytics on data in order to obtain information. Advanced features offered by supply chain analytics include dashboards, drill-down views, predictions, knowledge bases, scenario and what-if analysis, simulations, and optimization tools [9, 16].

Data-Driven Insights: Data-derived insights are increasingly driving marketing decisions in the age of big data and analytics. These insights change the way tactics are developed by enabling marketers to find trends, preferences, and behaviors across big customer datasets. Marketing teams can now depend on evidence-based tactics that are more likely to resonate with the target audience and move past intuition thanks to data-driven decision-making. For example, analytics may show when and how best to begin a campaign, greatly increasing engagement rates. Furthermore, data-driven insights facilitate more effective resource allocation, guaranteeing that marketing dollars are allocated to tactics that provide the best return on investment [17].

Utilizing big data and analytics strategically can provide a substantial competitive edge. Utilizing data-driven insights may help a firm stand out in an environment when consumers' attention is fractured and marketplaces are becoming more crowded. Businesses can quickly adjust to changes, analyze market dynamics in real-time, and scale up customer experience personalization with big data and analytics. These qualities boost operational efficacy and efficiency as well as client happiness and loyalty. Companies that successfully leverage data and analytics are better

positioned to spot and seize new market possibilities, outsmart rivals, and experience long-term growth [18].

4.0 FINDINGS

This section outlines the conceptual foundation for businesses looking to implement analytics methods to assist various business choices. Big data and analytics may be revolutionary, but incorporating them into strategic marketing choices is not without its difficulties and moral dilemmas. As companies work through the challenges of utilizing massive volumes of data, issues related to data security, privacy, and moral application become more pressing. In the below Figure-5 shows some important questions and offers solutions for resolving the underlying difficulties.

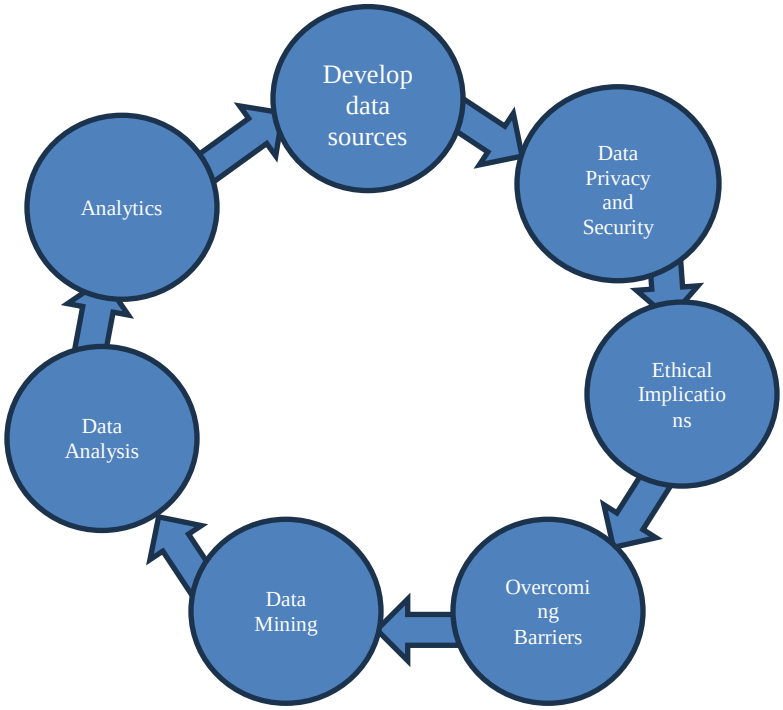

Figure 5: Shows Some Important Question and Offer Solution

Develop data sources: Traditional data sources include corporate systems, supplier, customer, and social media data, as well as logistics trajectories and other data. A company's information systems infrastructure and procedures must be in place before it can begin gathering data from various sources in accordance with its business plan. A product firm that designs and assembles new items, for instance, will gather information on logistics, supply, and distribution. A logistics business will gather information on its goods, routes, and fleet movement, among other things.

Data Privacy and Security: Large data collecting and utilization give rise to serious privacy and security issues. Businesses and consumers alike are increasingly concerned about the possibility of data breaches and unauthorized access to sensitive information due to the processing and analysis of huge volumes of personal data. Additionally, compliance efforts for multinational corporations are complicated by the disparate and even contradictory data privacy laws across multiple jurisdictions. Businesses need to invest in strong cybersecurity and data protection

procedures to reduce these risks. To maintain data integrity and confidentiality, this also entails access limits, encryption, and routine security assessments. In addition, it is crucial to follow industry best practices and legal standards for data protection. Organizations may handle data more responsibly, ensure compliance, and prevent breaches by putting in place thorough data governance frameworks.

Ethical Implications: Beyond only following the law, big data and analytics should be used ethically in marketing. It includes concerns about customer permission, openness, and the possibility of bias in data processing. Making ensuring customers understand and give their consent for data collection and use is essential. Furthermore, establishing and preserving customer trust depends heavily on the transparency of the processes by which data is utilised to inform marketing decisions. Companies may resolve these moral dilemmas by implementing open rules for the use and gathering of data. Obtaining informed permission is aided by providing customers with clear information about the advantages and hazards of how their data will be used. Furthermore, by putting policies in place to identify and lessen bias in data analysis, unethical marketing practices may be avoided and inclusion and justice can be promoted.

Overcoming Barriers: Overcoming organizational, cultural, and technological obstacles is necessary to incorporate big data and analytics into strategic marketing choices. Businesses need to promote a culture of data literacy and continual improvement to address these issues learning. Putting money into training and development initiatives may provide teams the tools they need to successfully use analytics and data. Choosing the appropriate technological tools and platforms that complement the goals and capabilities of the company is essential. Large data sets may be processed and analyzed more quickly and effectively while maintaining data security and privacy with the help of scalable and safe data analytics systems. Increasing cross-functional cooperation and dismantling departmental silos within an organization can improve the incorporation of analytics and big data into strategic decision-making. Promoting transparent communication and information exchange within teams guarantees that data-driven insights are efficiently utilized to shape marketing tactics.

Data Mining: Finding patterns in huge datasets via a variety of statistical methods, computer programs, and database systems is known as data mining. It facilitates the extraction of useful information from the data. A data warehouse will be created to hold multi-dimensional data for query and analysis purposes once data sources have been identified in accordance with analytics needs from various departments. Finding patterns, connections, and associations between various variables that were previously unknown is made easier by mining these databases.

Data Analysis: Having a wide range of datasets in huge quantities is important yet insufficient. For a company to extract insights from data, analytics capabilities must be developed. The organization must assemble a group of analytics experts with a variety of multidisciplinary competencies, including: a) familiarity with and expertise with statistical software, including R, SAS, and SPSS. B) familiarity with programming; C) domain expertise in business operations; D) proficiency in SQL data management; E) prior experience in data analysis. Numerous prospects for analytics initiatives may be found with the use of subject expertise and data analysis.

Analytics: As previously said, companies may benefit from three different kinds of prescriptive, predictive, and descriptive. A company may formulate its needs in response to potential for new client acquisition, customer retention, or risk assessment. Applications of business analytics a

collection of guidelines, computer programs, and statistical instruments for drawing conclusions from data. Tools for data analysis and model construction have previously been created by IBM, SAP, Oracle, SAS, SPSS, and R software. Hadoop offers a platform for creating models from many data sources.

Organizations may expand their options for data-driven decision-making, strengthen security and privacy protocols, and foster trust in the age of abundant data by adopting these trends. Being aware of these changing trends is becoming not just a strategic advantage but also a need for success and innovation as Big Data Analytics remains a major driver of modern business intelligence.

5.0 CONCLUSION AND RECOMMENDATIONS

Since the digital revolution altered the way businesses operate, we have made significant progress. By utilizing various analytics methodologies, big data is assisting businesses in gaining a competitive edge. These methods assist us in gaining insights, patterns, correlations, and relationships that traditional small data analysis was unable to provide. With the use of social media data, competitive intelligence, time and cost reduction techniques, supply chain analytics, web analytics, etc., these assist corporate leaders in making judgments. Businesses who understand the importance of big data and are creating products based on it have benefited greatly in recent years. Additionally, analytics are essential to product development because they help companies better match their offers to the wants of their customers. By allowing real-time strategic choices and predictive capabilities, the implementation of big data and analytics not only improves operational efficiency but also gives a major competitive edge. Big Data analytics has a significant influence on a wide range of businesses, from risk management and strategic planning to operational efficiency and customer-centric initiatives. Its capacity to transform enormous information into useful insights changes how decisions are made and moves businesses closer to a day when data is a strategic asset rather than just a commodity. In addition, there will be a continuous flow of high-speed, high-volume data production as society and industry continue to digitize in every way. This offers a good chance to take use of the field of analytics for commercial decision-making across various industries. Everywhere there is a constant generation of data, there are several special research possibilities in the corporate, scientific, and governmental areas.

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