Economic Sciences
https://economic-sciences.com
ES (2025) 21(2S), 191-200 ISSN:1505-4683

Data Analytics for Business Decision-Making

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Abstract

In today's dynamic business landscape, the ability to make informed decisions is paramount for organizational success and competitiveness. With the advent of big data and advanced analytics techniques, businesses have access to vast amounts of data that can potentially provide valuable insights. This article aims to explore the role of data analytics in facilitating business decision-making processes.

Various data analytics techniques such as descriptive, diagnostic, predictive, and prescriptive analytics, are helpful in different stages of decision-making. Chapter also addresses the challenges and limitations associated with data analytics implementation, including data quality issues, privacy concerns, and organizational barriers. Strategies for overcoming these challenges are discussed to provide practical insights for data analytics effectively. Recommendations for businesses seeking to integrate data analytics into their decision-making processes are also given. Emphasizing the importance of a data-driven culture.

The insights generated through data analysis serve as a foundation for informed decision-making within organizations. Decision-makers use these insights to evaluate alternative courses of action, assess risks and opportunities, and make strategic choices that align with organizational goals and objectives. Data analytics thus empowers decision-makers with evidence-based insights and foresight, enabling them to make more accurate, timely, and effective decisions across various functional areas such as marketing, operations, finance, human resources, and supply chain management.

Key Word - *Data analytics, Business decision-making, Predictive Analysis, Data-driven insights, utility analytics, Gen Z and Millennial, Insurtech*

1. INTRODUCTION

The concept of data analytics in the context of business decision-making revolves around the systematic use of data-driven techniques and methodologies to derive actionable insights, inform strategic choices, and optimize operational outcomes within organizations. Data analytics begins with the collection of relevant data from various internal and external sources, including transactional records, customer interactions, market trends, social media, and sensor data. This data may be structured, semi-structured, or unstructured, and may exist in diverse formats such as databases, spreadsheets, text documents, images, and multimedia. Once collected, the raw data undergoes pre-processing steps to clean, transform, and prepare it for analysis.

Data analytics is not a one-time exercise but rather a continuous process of iterative analysis, learning, and adaptation. Organizations leverage feedback loops and performance metrics to monitor the effectiveness of their decisions and refine their analytical models over time. The concept of business decision-making refers to the process through which individuals or groups within an organization evaluate various alternatives and select the most appropriate course of action to achieve specific goals or objectives. Business decision-making involves a series of steps, considerations, and factors that influence the outcome of the decision.

1.1 Elements of business decision-making:

Identification of Decision Needs: The decision-making process typically begins with the identification of a problem, opportunity, or decision requirement within the organization. This may arise from changes in market conditions, technological advancements, competitive pressures, customer demands, or internal challenges. The decision needs to be clearly defined to ensure that the decision-making process is focused and aligned with organizational objectives.

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ES (2025) 21(2S), 191-200 ISSN:1505-4683

Gathering Information: Once the decision needs are identified, relevant information must be gathered and analysed to support the decision-making process. This may involve collecting data from internal sources (e.g., sales reports, financial statements, and operational metrics) and external sources (e.g., market research, industry trends, competitor analysis). The quality and accuracy of the information gathered are crucial for making informed decisions.

Analysis and Evaluation: With the necessary information at hand, decision-makers analyse and evaluate the available alternatives or courses of action. This may involve assessing the potential risks, benefits, costs, and implications associated with each alternative. Various analytical tools and techniques, such as cost-benefit analysis, SWOT analysis, scenario planning, and decision trees, may be employed to facilitate the evaluation process.

***Decision-Making Criteria*:** Decision-makers establish criteria or criteria weights to prioritize and rank the alternatives based on their alignment with organizational goals and objectives. These criteria may include financial considerations (e.g., return on investment, profitability), strategic objectives (e.g., market share, competitive advantage), operational efficiency (e.g., resource utilization, productivity), and risk management (e.g., risk exposure, compliance).

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Selection of Alternative: After thorough analysis and evaluation, decision-makers select the alternative that best meets the established criteria and addresses the identified decision needs. The chosen alternative should be feasible, effective, and aligned with the organization's strategic direction. Depending on the complexity and significance of the decision, this step may involve consensus-building among stakeholders or approval from higher-level authorities.

Implementation and Monitoring: Once the decision is made, it needs to be implemented effectively within the organization. This may require developing an action plan, allocating resources, assigning responsibilities, and establishing timelines. Decision-makers also need to monitor the implementation process closely to ensure that the desired outcomes are achieved and any deviations from the plan are addressed promptly.

***Review and Adjustment*:** Business decision-making is not a one-time event but rather an ongoing process that requires continuous monitoring, review, and adjustment. Decision-makers should regularly evaluate the outcomes of their decisions against the intended goals and objectives, identify lessons learned, and make adjustments as needed to improve future decision-making processes

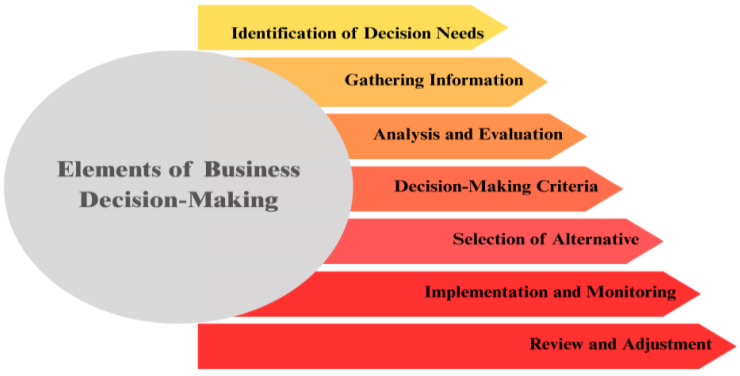

FIGURE 1.1 Strategic path for business decline

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ES (2025) 21(2S), 191-200 ISSN:1505-4683

1.2 DATA ANALYTICS IN BUSINESS DECISION MAKING ACROSS VARIOUS SECTORS

1.2.1 Retail Industry

In the retail sector, data analytics plays a crucial role in optimizing inventory management, pricing strategies, and customer engagement. Retailers use analytics to analyse sales data, forecast demand, identify trends, and segment customers based on their purchasing behaviour. AI examines consumer behaviour by analysing data, purchase pattern, browser history and even social media activity to convey personalised offer or product suggestion via email or social media. Amazon and Alibaba employs forward machine learning algorithms to propose product according to user preference. Fashion retailers such as ASOS allows shopper to view how clothes will fit on their virtual avatar. Automated replenishment in inventory management uplifts operational efficiency and reduces the possibility of over stocking and under stocking. AI can help retailer by analysing the sales and customer preference at individual store level which is more relevant to customer in a specific area. Retailer have an opportunity to utilize real time data. AI driven dynamic pricing strategy can change along with the fluctuation in demand, pricing of competitors and market conditions. Pricing tend to fluctuate in airline and hotels where dynamic pricing empower by AI algorithms can bring maximum revenue and profitability. Retailer might use AI to offer discount to individual customer on the basis borrowing history or previous purchase.

Predictive Analysis help retailer to make informed decision.Unlever and Procter and Gambler have implemented Predictive Analysis. Machine Learning model interpret data from varying sources such as weather forecast traffic pattern geographical events and relative supply chains risk. Predictive Analysis explores the opportunity for cost saving and efficiency improvement by evaluating the past data in ware house operation or transformation route.

1.2.1.1 Enhancing in Store Experience – Device such as smart mirror, interactive kiskos AI powered recommendation are enhancing store shopping experience. Smart mirrors allows customer to virtually try on clothing. Interactive kishoks support customer by providing product information suggesting complementary item.

1.2.2 Data Analysis and Finance

Data analytics techniques are widely applied across various finance sectors to enhance decision-making, improve efficiency, and provide personalized services. Financial Institution can enhance risk management improve customer experience and make more informed decision. Here are some key applications of data analytics in different finance sectors:

1.2.2.1 *AI in Debt Collection: Benefits and Uses*

AI technologies in debt collection include chatbots, predictive analytics, and automated communication systems.

Predictive analytics: Predictive analytics is a powerful tool by analysing patterns and trends in debtor behaviour, AI can forecast the likelihood of repayment. This information allows financial institutions to tailor their collection strategies.

Automated communication: AI can automate communication with debtors, sending payment reminders and notifications through various channels such as email, SMS, and phone calls. These messages can be customized based on debtor profiles.

Improved operational efficiency: One of the most significant advantages of AI in debt collection is improved operational efficiency. AI can automate repetitive tasks such as sending payment reminders and processing payments, reducing the need for manual intervention. This automation speeds up the process, reduces costs, and minimizes human errors, ensuring more accurate and timely collections.

Better decision making: AI collections leverage predictive analytics to assess debtor risk and provide data-driven insights. This information enables financial institutions to develop more effective collection strategies and prioritize high-risk accounts. By making informed decisions based on predictive models, institutions can optimize collections processes and increase their chances of successful debt recovery.

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Future Trends in AI and debt collection: The future of AI in debt collection looks promising, with emerging technologies poised to make a significant impact. Integration of AI with other technologies such as block chain and the Internet of Things (IoT) could further enhance the efficiency and security of debt collection processes.

1.2.3 Data Analytics and Utility Sector

Utilities today face a series of economic, regulatory, and operational hurdles that demand innovative solutions. Governments and regulatory bodies are tightening rules around emissions, sustainability, and grid reliability. Inflation, fuel price fluctuations, and supply chain disruptions are impacting the cost of delivering energy. Utilities must find ways to improve financial implications. With renewable energy sources fluctuating daily, accurate demand forecasting is critical. By leveraging utility analytics, providers can predict peak demand periods, optimize energy distribution, and reduce waste. Fraud and revenue leakage remain significant challenges. Utilities can use data and modelling to detect anomalies in energy usage, identify fraudulent accounts, and minimize losses.

1.2.4 Banking

Banks use machine learning algorithms to analyse transaction patterns and identify unusual activities that may indicate fraud. Anomaly detection helps in real-time monitoring and flagging suspicious transactions. Gen Z and Millennial have grown up with technology .Offering robust online and mobile banking platforms with features like digital account opening, real-time transaction alerts, and easy fund transfers is crucial.

Among Gen Z and Millennial, credit cards is the most in-demanded banking product· By pairing Demand Draft Account (DDA) offers with credit cards, bank can pave the way for DDA opportunities with credit card-only customers. Gen Z and Millennial value personalized experiences. Advanced data analytics can be offered customized financial products and services that meet individuals' needs and preferences. Personalized communication and tailored offers can significantly enhance customer satisfaction and loyalty.

Providing Financial Educational resources and tools to help manage finances can be a significantly draw Gen Z and Millennial. They will appreciate institutions that offer budgeting tools, financial literacy programs, and personalized financial advice. They are likely to stick with institutions that also act as a trusted advisor. Offering innovative features like integration with digital wallets, buy-now-pay-later options, and family banking tools can appeal to the tech-savvy nature of Gen Z and Millennial. Keeping up with the latest technology trends ensures that the institution remains relevant and attractive.

1.2.5 Insurance

Insurers use predictive analytics to assess risks and determine premiums. Actuarial models help in calculating the likelihood of claims based on historical data. Insurtech start-ups leverage artificial intelligence and block chain to create innovative risk assessment and claims processing solutions. Data analytics tools enable insurers to better understand customer behaviour and preferences, leading to more personalized offerings and improved pricing models.AI technology has the capacity to process massive amounts of customer data and enables the creation of personalized products for customers. AI technology, claim turnaround time can be greatly reduced. Claims can be approved in a few minutes. AI technologies can identify emerging risks for generating higher revenues for insurance companies by launching relevant products for their customers. Cashless cases can be handled with instant health insurance claims based on artificial intelligence.

In Machine learning machines process data and learn independently. Claims can be processed without human intervention. Inbuilt algorithms would analyze the claims data when the claim is received, and claim settlement would be quick and error-free. Consumers can share extra personal information if there is money saving on insurance policies. Insurers can use data from IoT devices, such as the various components of smart homes, automobile sensors, and wearable technologies, to better determine rates, mitigate risk. The customer's activities on social media can be analyzed. Insurance companies can use the analyzed data, for claims processing. Mining social media data

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improves risk assessment for P&C insurers, bolstering fraud detection capabilities.

Telematics devices fixed to the car will capture data related to the car's speed, location, accidents, etc. This data is analyzed, and a policy premium is calculated based on the customer's driving habits, terrain of operation, driving time, etc.

Chatbots will interact with the customers, for monotonous activities, and reduce the intervention of the insurance company employees. Insurance company's employees can focus more on complex activities.

1.2.6 Investment and Asset Management

Data Analytics can enable investor and fund manager to make decisions supported by evidence rather than assumptions. Investment firms use algorithms to execute trades at optimal prices by analysing market data in real-time. Machine learning models can predict market movements and inform trading strategies. Portfolio optimization can be another significant application of data analytics. It can help in evaluate asset performance investor goal and market condition. AI and Data Analytics made it easier to find investment goal. On the basis of past investment behaviour financial goals and risk tolerance AI can suggest long term or short term mutual fund.

1.2.7 Healthcare Industry:

Healthcare has always generated huge amounts of data. Proper use of the data will allow healthcare organizations to support public health management. In healthcare, data analytics is employed for clinical decision support, patient outcomes analysis, and operational efficiency improvement. Healthcare providers analyse electronic health records (EHRs), medical imaging data, and patient demographics to diagnose diseases, predict treatment outcomes, and optimize resource allocation. Analytics also helps healthcare organizations monitor patient satisfaction, reduce readmission rates, and identify opportunities for quality improvement, leading to better patient care and cost savings.Big Data Analytics can provide insight into clinical data and thus facilitate informed decision-making about the diagnosis and treatment of patients, prevention of diseases or others. The Big Data concept does not focus on huge amounts of data, but rather on the process of creating value from data. Big Data Analytics provide insight into clinical data and thus facilitate informed decision-making about the diagnosis and treatment of patients, prevention of diseases or others. Physicians can use predictive algorithms for more accurate diagnoses. It could be helpful in preventive medicine and public health with early intervention, many diseases can be prevented. *Medical Sciences use* longitudinal data where dependent variable is monitored or assessed repeatedly over different time points among the same study group.

1.2.8 Manufacturing Industry:

Data analytics is revolutionizing the manufacturing sector by enabling predictive maintenance, supply chain optimization, and product quality improvement. Manufacturers analyse sensor data, production logs, and equipment performance metrics to predict equipment failures, optimize production schedules, and ensure product quality. Analytics also helps manufacturers optimize inventory levels, reduce production downtime, and identify opportunities for process optimization, leading to increased efficiency and competitiveness.

1.2.9 Credit Risk Assessment: Data analytics helps the bank in assessing the creditworthiness of potential borrowers. Credit risk analytics turn historical and forecast data into actionable analytical insights. Financial institutions can use credit risk modelling tools in different ways. They can use the score card which is a tool to access the credit risk. It helps to determine whether to approve or deny an application. Risk modelling can also go beyond individual account management to help drive high-level portfolio and strategic decisions. Managing risk models is an ongoing task. As market conditions and business goals change, monitoring, testing and recalibrating models is important for accurately assessing credit risk.

Organizations have used statistical and mathematical tools to measure risk and predict outcomes for decades. But the future is advanced data analytics and increased computing power.

1.2.10 Credit Risk and Payment Management

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Economic uncertainty increases the risk of late or unpaid bills. AI help providers assess creditworthiness and develop more flexible payment plans, reducing bad debt while improving customer satisfaction. The pandemic create the need for credit risk models which are adjustable to unexpected events and changes in consumer behaviour. Machine learning credit risk models are especially helpful in evaluating credit risk. ML models can outperform traditional models by 10 to 15 percent. Lenders can remove biases from their lending decisions.

1.2.11Data Analytics and Operational Efficiency:

***Process Automation*:** Data analytics helps in identifying processes that can be automated, leading to cost savings and increased efficiency. For example, robotic process automation (RPA) can be used for routine tasks such as data entry and reconciliation.AI robotics and automation have increased the proficiency and reduce labour cost in warehouse. Robots have assigned task such as sorting, packing and transportation. Amazon has employed a fleet of robot to assign the task of order pricing and packing.

***Predictive Maintenance*:** In the context of IT infrastructure, data analytics can predict potential system failures and maintenance needs, thereby reducing downtime and improving operational reliability.

Cost savings: Automation through AI can lead to significant cost savings. Financial institutions can achieve higher profitability by reducing the need for human intervention and lowering operational costs. Additionally, increased recovery rates due to better cure strategies contribute to overall cost efficiency.

Enhanced customer experience: AI-driven chatbots and virtual assistants can provide personalized communication, enhancing the customer experience. These AI tools are available 24/7, allowing customers to get instant responses to their queries at any time.

1.2.11 Data Analytics and Marketing

Data analytics allows marketers to understand their customers deeply. By analyzing customer behavior, preferences, and trends, businesses can create more personalized marketing strategies. Now a days marketers have access to an immense amount of information, ranging from website traffic and social media engagement to customer demographics and purchase history. Data analytics convert this vast data pool of data to meaningful patterns and trends. Data analytics helps in optimizing marketing campaigns by identifying which strategies are working and which need adjustments. Data analytics tools provide marketers with up-to-the-minute data, allowing them to make swift decisions and capitalize on emerging trends or address issues promptly. Data analytics enables marketers to create highly targeted and personalized content, advertisements, and offers, increasing the likelihood of engagement and conversion. Data analytics can help identify areas of inefficiency and cost wastage within marketing strategies.

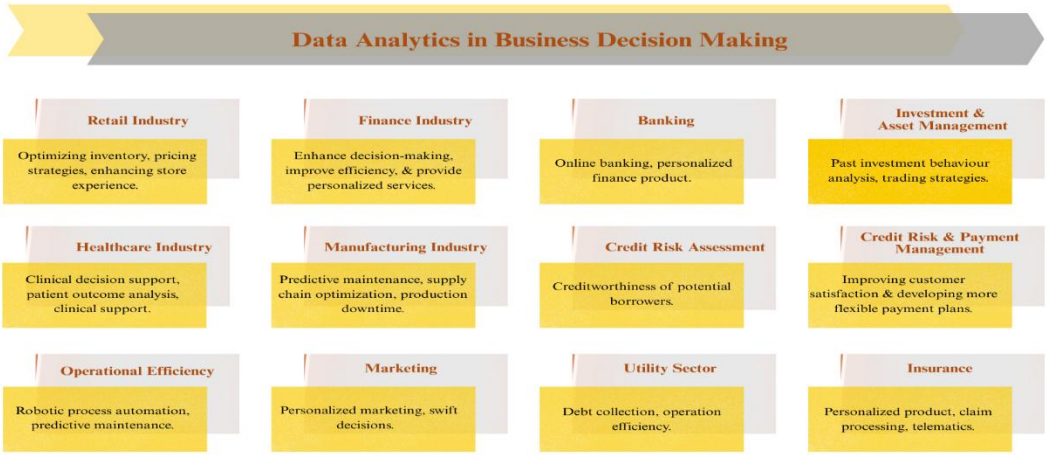

FIGURE 1.2 Business decision making at a glance

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1.2.12 HR Analytics

HR analytics is the collection and interpretation of Human Resources data to support evidence-based decisions. HR analytics is the driving force behind effective planning and decision-making in HR Different data analysis methods provide insight and identify trends for HR planning and decision making

***Descriptive HR analytics*:** It focuses on past data to account for what happened but doesn't make predictions for the future. It involves performing mathematical calculations, such as central tendency, frequency, variation, ranking, range, deviation, etc. This allows HR to see patterns and inconsistencies to improve planning. Descriptive analytics could be used to analyse to compare the annual turnover between two teams or two departments. HR can analyze the average number of paid time off days that employees use in one year. The simplest form of data analysis. Which requires only basic math skills, to present complex data in an easy-to-digest format.

***Diagnostic HR analytics*:** Investigates data to ascertain the causes of past occurrences and behaviours. It identifies patterns, variances, and causal relationships while also considering internal and external factors that could be influencing them. Diagnostic analytics can be used to improve employees' engagement. Digging into the data from internal surveys and exit interviews should make employees feel connected and satisfied in their work.

Predictive analytics- Explores current and historical data and uses statistical models and forecasts to predict future behaviours and events. These predictions furnish HR leaders with information that will improve decision-making in areas such as hiring the right candidates, bridging the skills gap, and retaining top talent. Predictive model that can identify who is leaving .

***Prescriptive HR analytics*:** Suggests potential future outcomes and scenarios and proposes recommendations for addressing them. Prescriptive analytics relies on big data and uses technical tools, including: Machine learning, Algorithms, Artificial intelligence, Pattern recognition. Prescriptive analytics can prepare for upcoming staffing needs.

1.3 CASE STUDY

The corporate and investment banking giant JPMorgan offers a wide range of financial products and services to meet the banking needs of individuals, financial institutions, governments and companies. JPMorgan uses Hadoop for processing of massive amounts of data which includes social media posts, phone calls emails or any other unstructured information. It is extensively using data analysis framework Hadoop for risk management in IT and detecting frauds. Hadoop's can store vast volumes of unstructured data.

JPMorgan is not only mining the trading data for analysis but is also tracking the phone calls and emails to identify the probabilities of any fraudulent activities that are impossible to detect.

JPMorgan uses analytics software developed by Palantir to keep a track of employee communications to identify any indications of internal fraud. JPMorgan analyses internal bank record to get clear perspective of their customer credit worthiness and prospective buyer of financial product and services. To get the clear perspective of customer credit worthiness internal bank record are related with other source of information by the analytics system at J P Morgan so that better insights can be drawn from the data to know about the prospective buyer of financial product.

JPMorgan Chase's use of data analytics spans across various aspects of their operations, from risk management and customer insights to operational efficiency and investment strategies. Their initiatives showcase the transformative power of data analytics in the financial sector, driving better decision-making, enhancing customer experience, and improving overall efficiency. By using machine learning algorithms, JPMorgan Chase can analyse transaction patterns and detect fraudulent activities in real-time. This not only helps in preventing fraud but also in reducing false positives. JP Morgan Chase optimizing the sales of foreclosed properties by using big data.

Bank is able to offer personalized financial products and services to its customers on the basis of understanding of customer behaviour through data analytics which enhance customer satisfaction and loyalty. Customers are segmented on the basis of their behaviour, demographics, and transaction

history. Product is offered according to the specific need of different segment. J P Morgan is the first financial institution which is using big data analytics for the benefit of public in terms of insight for employer, policymaker, and service provider to manage any kind of financial instability.

1.4 CHALLENGES AND CONSIDERATION

While AI offers numerous benefits, there are challenges and considerations to keep in mind. Data privacy and security are paramount, as financial institutions must ensure compliance with regulations such as General Data Protection Regulation (GDPR) and California Consumer Privacy Act (CCPA). Balancing automation with the need for a human touch is also crucial, as some customers may prefer interacting with human agents. Despite the increasing adoption of data analytics in business decision-making, organizations often face challenges in fully leveraging data-driven insights to inform strategic and operational decisions. These challenges may include data quality issues, organizational resistance to change, lack of skilled personnel, and difficulty in integrating data analytics into existing decision-making processes. Consequently, there is a need to address these challenges and optimize the use of data analytics to enhance decision-making effectiveness and organizational performance.

1.5 CONCLUSION

In summary, the concept of business decision-making encompasses a systematic and rational process of identifying, analysing, evaluating, and selecting alternatives to address organizational needs and achieve desired outcomes. Effective decision-making requires access to relevant information, critical analysis, careful consideration of criteria, and a commitment to continuous improvement. By integrating data analysis into various organizational roles, businesses can make more informed decisions, drive innovation, and achieve competitive advantages. Businesses that leverage data analytics gain a competitive edge. They can adapt quickly to changing market conditions, identify new opportunities, and outmaneuver competitors who rely solely on traditional methods. Data analytics for business decision-making highlights the profound impact of data-driven approaches on enhancing organizational performance in different area. Data analytics is extensively utilized in the finance industry for risk management, fraud detection, and customer relationship management. Financial institutions analyse transactional data, market trends, and customer profiles to assess credit risk, detect fraudulent activities, and personalize financial products and services. Analytics also helps financial firms optimize investment portfolios, assess market opportunities, and comply with regulatory requirements, leading to improved decision-making and profitability. Retail data analytics is the process of collecting and studying retail data (like sales, inventory, pricing, etc.) to discover trends, predict outcomes, and make better, more profitable business decisions . This information helps retailers make informed decisions about product assortments, promotions, and marketing campaigns, ultimately improving sales performance and customer satisfaction. Data becomes useful when it enhances decision making and decision making is enhanced only when analytical techniques are used.

REFERENCES

1. Attaran, M., & Attaran, S. (2018). Opportunities and challenges of implementing predictive analytics for competitive advantage. International Journal of Business Intelligence Research, 9(2), 1–26. https://doi.org/10.4018/IJBIR.2018070101
2. Bradlow, E. T., Gangwar, M., Kopalle, P., & Voleti, S. (2017). The role of big data and predictive analytics in retailing. Journal of Retailing, 93(1), 79–95. https://doi.org/10.1016/j.jretai.2016.12.004
3. Cao, G., Tian, N., & Blankson, C. (2021). Big data, marketing analytics, and firm marketing capabilities. Journal of Computer Information Systems, 62(3), 442–451. https://doi.org/10.1080/08874417.2020.1842270
4. Dai, H. N., Wang, H., Xu, G., Wan, J., & Imran, M. (2020). Big data analytics for manufacturing internet of things: Opportunities, challenges and enabling technologies. Enterprise Information Systems, 14(9-10), 1279–1303. https://doi.org/10.1080/17517575.2019.1633689
5. Devarapalli Chakradhār Avinash (2025) Artificial Intelligence: Revolutionizing the Future of Retail, Journal of Global Economy,

Business and Finance (JGEBF), Volume 7 Issue 4
6. Fan, L., & Lv, Z. (2016). The Application of Big Data Analytics in Market Segmentation and Targeting. International Journal of Database Theory and Application, 9(4), 39-48.
7. Frazzetto, D., Nielsen, T. D., Pedersen, T. B., & Šikšnys, L. (2019). Prescriptive analytics: A survey of emerging trends and technologies. The VLDB Journal, 28(4), 575–595. https://doi.org/10.1007/s00778-019-00539-y
8. Gupta, R., & Singh, R. (2016). Big Data Analytics in Marketing: A Review. Journal of Digital Marketing, 1(1), 39- 48
9. Green, M., & Davis, L. (2020). Data Analytics in the Era of Customer-Centric Marketing. Journal of Digital Marketing, 5(2), 110– 127.
10. Hamilton, R. H., & Sodeman, W. A. (2019). The questions we ask: Opportunities and challenges for using big data analytics to strategically manage human capital resources. Business Horizons, 63(1), 85–95. https://doi.org/10.1016/j.bushor.2019.10.001
11. Hanadi A. Salhab A Handi (2024) The use of data analytics in digital marketing for sustainable business growth , Journal of Infrastructure, Policy and Development. https://doi.org/10.24294/jipd.v8i8.4894
12. 12) 0Jones, B., & Wang, C. (2019). Data-Driven Decision Making in Digital Marketing: Evidence from a Survey Study. Journal of Marketing Research, 56(3), 345–362
13. Kash, B. A., Spaulding, A., Gamm, L. D., & Johnson, C. (2014). Leadership, culture, and organizational technologies as absorptive capacity for innovation and transformation in the healthcare sector: A framework for research. Change Management, 13(1), 1–13. https://doi.org/10.18848/2327-798x/cgp/v13i01/50740
14. Krishnamurthy, S., & Mathew, S. K. (2018). Business analytics and business value: A comparative case study. Information and Management, 55(5), 643–666. https://doi.org/10.1016/j.im.2018.01.005
15. Liu, K., & Shi, J. (2015). A systematic approach for business data analytics with a real case study. International Journal of Business Analytics, 2(4), 1–22. https://doi.org/10.4018/IJBAN.2015100102
16. Li, M. (2019). Personalization in Digital Marketing: A Data-Driven Approach. International Journal of Digital Marketing, 5(1), 12–25
17. Li, X., Zhang, M., & Zuo, M. (2018). Big Data Analytics for Customer Relationship Management. In Handbook of Research on Integrating Big Data into the Business Environment (pp. 165-186). IGI Global.
18. Liu Qing, Wan Hao, Yu Hongfang (2023) Application and Influence of Big data Analysis in Marketing Strategy, Frontiers in Business, Economics and Management Vol. 9, No. 3, 2023
19. Omar, Y. M., Minoufekr, M., & Plapper, P. (2019). Business analytics in manufacturing: Current trends, challenges and pathway to market leadership. Operations Research Perspectives, 6, 100127. https://doi.org/10.1016/j.orp.2019.100127
20. Ramanathan, R., Philpott, E., Duan, Y., & Cao, G. (2017). Adoption of business analytics and impact on performance: A qualitative study in retail. Production Planning and Control, 28(11-12), 985–998. https://doi.org/10.1080/09537287.2017.1336800
21. Ramasamy N, Raj R, Patel N, C Palanivel.(2023) Longitudinal data analysis methods – a primer. EFI Bulletin. 2023;4(1):12-17. https://doi.org/10.56450/EFIB.2023.v3i01.003
22. Raut, R. D., Yadav, V. S., Cheikhrouhou, N., Narwane, V. S., & Narkhede, B. E. (2021). Big data analytics: Implementation challenges in Indian manufacturing supply chains. Computers in Industry, 125, 103368. https://doi.org/10.1016/j.compind.2020.103368
23. Smith, A., Johnson, B., & Williams, C. (2018). The Impact of Data Analytics on Marketing Performance: A Comparative Study. Journal of Marketing Analytics, 6(3), 123–137.
24. Silaban Daniel Peterson (2022) Challenges in Business Analytics Implementation: A Comparative Review Using TOE Framework, Milestone: Journal of Strategic Management Vol. 2, No. 2,
25. Singh, N., & Srivastava, P. (2017). Big Data Analytics in Marketing: An Exploratory Study. Journal of Data Science, 15(2), 215-230.
26. Stjepić, A. -M., Pejić Bach, M., & Bosilj Vukšić, V. (2021). Exploring risks in the adoption of business intelligence in SMEs using the TOE framework. Journal of Risk and Financial Management, 14(2), 58. https://doi.org/10.3390/jrfm14020058
27. Thirathon Ursat et al (2017) **Big Data, Analytic Culture and Analytic-Based Decision Making Evidence from Australia,Procedia Computer Science** , Volume 121, 775–783
28. Verhoef, P. C., Kannan, P. K., & Inman, J. J. (2015). From Multi-Channel Retailing to Omni-

Channel Retailing: Introduction to the Special Issue on Multi-Channel Retailing. Journal of Retailing, 91(2), 174-181
29. Ward, M. J., Marsolo, K. A., & Froehle, C. M. (2014). Applications of business analytics in healthcare. Business Horizons, 57(5), 571–582. https://doi.org/10.1016/j.bushor.2014.06.003
30. Whitlock, V. (2018). Business analytics and firm performance: Role of structured financial statement data. Journal of Business Analytics, 1(2), 81–92. https://doi.org/10.1080/2573234X.2018.1557020
31. "Leveraging Analytics in Utilities: Navigating Market Challenges with Data-Driven Insights,"2025 Link Accessed 11August 2025,https://www.experian.com/blogs/insights/data-analytics-in-utilities/
32. What is Credit Risk Analytics and What Are the Latest Trends?"2023 Link Accessed 11August 2025, https://www.experian.com/blogs/insights/what-is-credit-risk-analytics/

/

33. **"How Technology Is Changing the Insurance Industry" 2024,** Link Accessed 11August 2025,https://www.cigniti.com/blog/latest-technologies-changing-insurance-industry/
34. "Benefits and Importance of Data Analytics in Manufacturing"2025, Link Accessed 11August 2025, https://lineview.com/en/benefits-and-importance-of-data-analytics-in-manufacturing
35. Mutual Fund In The Digital Era : The Role Of Artificial Intelligence And Data Analytics In Smarter Investment , Link Accessed 11August 2025,https://barcelona.tbs-education.com/news/why-data-analytics-is-crucial-in-marketing/
36. "The use of Big Data Analytics in healthcare" , Link Accessed 11August 2025,https://pmc.ncbi.nlm.nih.gov/articles/PMC8733917/#_ad93_
37. 37) "Data-Driven Decisions: Applications of Data Analytics in Hospitality Industry" Link Accessed 11August 2025, https://www.quantzig.com/blog/data-analytics-applications-hospitality-industry