Derivatif: Jurnal Manajemen Ekonomi dan Akuntansi
Volume 1 (1) 2025, 1-9
E-ISSN 3150-3210

The Application of Data Analytics in the Current Era and Its Impact on Optimizing Business Effectively

Abdul Kholik Nasution[1], Muhammad Irwan Padli Nasution[2]
[1,2]Universitas IsIam Negeri Sumatera Utara, Indonesia

Corresponding author e-mail: abdulkholikk206@gmail.com

Article History: Received on 11 Sepember 2025, Revised on 11 Okober 2025, Published on 31 November 2025

Abstract: In an increasingly competitive digital era, data has become a strategic asset for companies in making smarter and more timely decisions. This study aims to systematically examine the application of data analytics in the context of modern business and its impact on operational effectiveness as well as strategic decision-making. The method used is a literature study by reviewing various scientific articles, industry reports, and relevant publications over the past two decades. The analysis results indicate that the application of data analytics, ranging from descriptive analytics to predictive and prescriptive analytics, significantly contributes to optimizing the supply chain, enhancing customer experience, identifying market opportunities, and reducing business risks. In addition, the adoption of technologies such as big data, artificial intelligence (AI), and machine learning strengthens companies' capabilities to process data on a large scale in real time. This study emphasizes the importance of data literacy, adequate digital infrastructure, and a data-driven culture as the main foundation for the effective and sustainable implementation of data analytics. These findings are expected to serve as a reference for business practitioners and researchers in developing digital strategies that are responsive to current market challenges and dynamics.

Keywords: Business Optimization, Business Strategy, Decision Making, Digital Technology

A. Introduction

In the digital era marked by exponential data growth, information has become an invaluable strategic asset for the business world (Umi Kalsum, 2024). Companies from various sectors are now required not only to collect data but also to be able to process, analyze, and interpret that data to generate valuable insights that support decision-making (Cut Nurul A'la, 2020). This is where the role of data analytics becomes crucial. Data analytics enables companies to understand consumer behavior, predict market trends, improve operational efficiency, and optimize overall business strategies.

Digital transformation driven by technologies such as big data, artificial intelligence (AI), machine learning, and cloud computing is also accelerating the adoption of data analytics across various business lines (Nurbaiti, 2023). With the ability to process a

very large volume of data in a short time, companies now have a greater opportunity to gain a competitive advantage (Nizar Hamdun, 2022). Not only that, predictive and prescriptive analytics capabilities also enable organizations to design proactive strategies and significantly reduce business risks.

However, the effective use of data analytics does not rely solely on technology. Factors such as the readiness of digital infrastructure, human resource competencies, and an organizational culture that supports data-driven decision making are key elements in the success of implementation (Rumapea, 2024). Therefore, it is important to examine how data analytics practices are applied in today's business world and the extent of their impact on optimizing company performance.

Along with the increasing attention to digitalization and the use of data analytics in various industry sectors, many studies have been conducted to examine the contribution of data analytics to improving business performance. Several studies, such as those conducted by (Wamba, 2022) emphasizes that big data analytics capabilities contribute positively to competitive advantage and organizational performance. Meanwhile, research by (Akter, 2021) stating that data-driven companies have a higher probability of achieving superior financial performance compared to their competitors.

However, the majority of previous studies have focused more on technical approaches in the implementation of data analytics, such as system integration, the selection of machine learning algorithms, or data processing in specific contexts like e-commerce or manufacturing. (Ashari, 2024) emphasizing big data system architecture without extensively exploring the relationship between strategic aspects and organizational culture in supporting the effectiveness of data analytics implementation.

Furthermore, some research also indicates a lack of integration between the dimensions of technology, people, and business strategy in a holistic manner. This creates a research gap in understanding how data analytics comprehensively affects business optimization in the context of dynamic digital transformation. As stated by (Nisa, 2024), There is still a limited understanding of how organizations strategically adopt analytics and how it affects managerial decision-making in the long term.

The novelty of this literature review lies in its integrative approach, combining the dimensions of technology (tools and techniques), organization (leadership and culture), and strategy (decision-making impact) in evaluating the influence of data analytics on business optimization. Additionally, this study also examines current trends such as the use of predictive analytics, real-time dashboarding, data governance, and AI-driven business intelligence in managerial practice, which have not been comprehensively discussed in previous literature.

This research contributes to enriching the scientific discourse by presenting a synthesis of literature from various sectors and cross-industry case studies, thereby providing a broader and more practical perspective for business practitioners,

policymakers, and academics. Thus, the results of this study not only address existing theoretical gaps but also provide a foundation for formulating effective and sustainable data analytics implementation strategies in today's digital era.

This study aims to conduct a literature review on the application of data analytics in the modern digital era and analyze its impact on optimizing business processes effectively. By examining literature from various scientific journals, industry reports, and relevant publications, this study seeks to map the trends, benefits, challenges, as well as strategic implications of using data analytics in contemporary business practice.

B. Methods

This study uses a descriptive qualitative approach with a literature review method. The literature review was chosen as the primary method because the focus of the research lies in the collection, analysis, and synthesis of information from various relevant scientific sources to comprehensively understand the application of data analytics in the context of modern business (Iskandar, 2021). The first step in this method is the collection of secondary data from reliable sources such as scientific journals indexed in Scopus and SINTA, industry reports from international research institutions like McKinsey & Company, Gartner, and Deloitte, as well as academic books and conference proceedings discussing related topics. The inclusion criteria include publications released between 2020 and 2025, using keywords such as data analytics, big data, business intelligence, digital transformation, and business optimization.

The process of searching and selecting literature was carried out systematically by utilizing databases such as Google Scholar, ScienceDirect, and IEEE Xplore, as well as national journal portals (Putri Nurhida Harahap, 2024). The articles that met the inclusion criteria were then analyzed using content analysis techniques to identify main themes such as the benefits of data analytics, implementation challenges, impacts on decision-making, as well as technological and organizational aspects that affect the success of analytics integration in business.

Next, a narrative synthesis process is carried out to combine the findings from the various studies that have been reviewed (Rahmad Hidayat, 2022). This technique allows researchers to compare, categorize, and draw conclusions based on thematic patterns that emerge in the literature. The goal is to provide a deep understanding of how data analytics is strategically applied and how it impacts business effectiveness and efficiency across various industry sectors.

The validity of the study is maintained by performing source triangulation, which involves comparing results from various highly authoritative publications, as well as ensuring that the data used is up-to-date and relevant (Amanda Afriza Putri, 2024). In addition, the analysis process is conducted repeatedly to avoid interpretative bias and ensure consistency of the synthesis results. With this method, the research is expected to provide a comprehensive scientific contribution and serve as a strategic reference

for business practitioners, researchers, and policymakers in optimizing the effective and sustainable application of data analytics.

C. Results and Discussion

Results

The research findings indicate that the implementation of data analytics in the current era of digital transformation has undergone a fundamental shift in meaning, from merely a technical function of data processing to a strategic pillar in business management and development. Data analytics serves as the primary foundation for creating a knowledge-based organization, in which every business decision is formulated based on systematic, objective, and measurable data analysis. These findings confirm that a company's ability to manage and utilize data optimally has become a key determinant of business competitiveness amid increasingly complex and dynamic global competition.

Substantively, the application of data analytics enables companies to extract strategic value from large volumes of data (big data) generated through operational activities, digital transactions, and cross-platform customer interactions. Data that was previously fragmented and unstructured can now be processed into meaningful information through comprehensive analytical approaches. The results show that the use of descriptive analytics helps management understand business performance in real time, while diagnostic analytics plays a role in identifying the root causes that affect the achievement of business targets. Furthermore, the application of predictive and prescriptive analytics contributes significantly to projecting market trends and formulating the most effective and efficient alternative business strategies.

Empirical findings also reveal that data analytics has a direct impact on the overall optimization of business processes. In operational aspects, data analysis allows companies to identify process bottlenecks, minimize production costs, and improve supply chain efficiency. In the context of marketing and sales, data analytics plays an important role in gaining deeper insights into consumer preferences and behavior, enabling companies to implement more precise segmentation, targeting, and positioning strategies. This data-driven approach encourages the creation of product and service personalization, which significantly increases customer satisfaction and strengthens long-term loyalty.

Moreover, the findings indicate that the implementation of data analytics affects not only technical and operational aspects but also drives a transformation in organizational mindset and culture. Companies that successfully integrate data analytics into their decision-making processes tend to develop a data-driven culture, in which managerial intuition and experience are still considered but reinforced by empirical evidence generated from data analysis. This culture makes organizations more adaptive, responsive, and innovative in dealing with business environment uncertainties, including changes in consumer behavior, technological disruption, and global economic fluctuations.

The study also highlights that the success of data analytics implementation is strongly influenced by the readiness of the supporting ecosystem, including information technology infrastructure, the quality and competence of human resources, and top management commitment. Companies that invest in integrated information systems, data literacy development, and cross-functional collaboration tend to be able to maximize the potential of data analytics sustainably. Conversely, limited analytical capacity, poor data quality, and resistance to change remain the main challenges that hinder the optimization of data analytics benefits.

Therefore, these findings affirm that the implementation of data analytics in the current era plays a strategic role in optimizing business performance effectively and sustainably. Data analytics functions not only as a decision-support tool but also as a catalyst for business transformation that drives efficiency, innovation, and competitive advantage. Accordingly, the integration of data analytics into long-term business strategy is an inevitable necessity for organizations seeking to survive, grow, and excel in an increasingly competitive and data-driven digital business landscape.

Discussion

In the era of the Industrial Revolution 4.0 and now entering a more mature digital era, businesses are required to be increasingly adaptive to changes driven by technological advancements. One important aspect of digital transformation is the use of data analytics in strategic and operational decision-making. Companies no longer rely solely on intuition or experience, but instead use a data-driven approach to analyze consumer behavior, predict market trends, and optimize business processes comprehensively.

According to research by (Mawarni, 2024), The implementation of big data analytics has made a significant contribution to improving efficiency and the speed of decision-making within organizations. In the context of modern business, data analytics is not only a technical tool but also a foundation for building sustainable competitive advantage. This indicates that competence in managing and analyzing data has become a strategic element in organizational management.

The application of data analytics has a very broad spectrum across various industry sectors. In the retail sector, for example, data analytics is used to understand consumer preferences, design personalized promotions, and manage the supply chain more efficiently. As explained by (Ashari, 2024), Companies like Amazon and Walmart have successfully integrated data analytics into their business strategies, enabling them to respond to market demand very quickly and accurately.

In the field of finance and banking, analytics is used to detect potential fraud, evaluate credit risk, and personalize financial product offerings. Research from (Salim & Yunus, 2024) It shows that the use of data mining and machine learning in the financial sector allows financial institutions to process millions of transactions in real-time, while also reducing operational risks.

The manufacturing sector has also widely adopted predictive analytics to optimize production processes and machine maintenance (predictive maintenance). According to (Nisa, 2024), The integration of the Internet of Things (IoT) and data analytics allows for continuous monitoring of equipment conditions and predicting when a machine will fail, thereby minimizing downtime.

In the logistics and supply chain sector, data analytics plays an important role in delivery route planning, warehouse management, and demand forecasting. By utilizing historical data and predictive models, logistics companies are able to reduce distribution costs and increase customer satisfaction due to faster and more timely deliveries (Riani & Firdaus, 2024). Equally important, in human resource management (HR), the concept of people analytics is becoming increasingly popular. Data is used to analyze employee performance, predict potential turnover, and design training programs that better meet individual needs. (Arjiansyah, 2024) stating that organizations that consistently implement HR analytics can increase employee productivity and create a more adaptive work environment.

The impact of implementing data analytics is not limited to operational efficiency but also encompasses business model transformation and product innovation. (Bloemhard, 2024) In their report in the Harvard Business Review, they revealed that data-driven organizations are twice as likely to become market leaders compared to companies that do not adopt a data-driven approach. Furthermore, with the emergence of technologies such as real-time analytics, streaming data, and artificial intelligence, organizations can turn data into actionable insights within seconds. This creates an exceptional competitive advantage, particularly in highly dynamic industries such as e-commerce, fintech, and digital services.

Although the benefits are significant, the implementation of data analytics also faces various challenges. One of them is data quality. According to a report from (Asrul, 2025), Organizations can lose up to 15–20% of their potential revenue due to poor data quality, such as incomplete, inaccurate, or duplicate data. In addition, the lack of experts in data science and analytics is also a major obstacle. Many companies are not yet able to maximize the data they have due to limitations in interpreting analysis results and mastering technology. Therefore, sustained investment in human resource training and information technology infrastructure development is needed.

Based on a review of the literature and various empirical studies, it can be concluded that the implementation of data analytics has a significant impact on the effective optimization of business. Data analytics not only strengthens operational functions but also becomes a key to sustainable business transformation in the digital era. Therefore, every organization that wants to survive and compete effectively must start building a data-driven culture, enhance human resources competencies in analytics, and invest in technology systems that support integrated and sustainable data processing.

D. Conclusions

The research concludes that the application of data analytics in the era of digital transformation has evolved from a technical function into a strategic instrument in business management. Data analytics plays a crucial role in enhancing the quality of evidence-based decision-making, optimizing business processes, and fostering the development of an adaptive and innovative data-driven organizational culture. The integration of data analytics enables companies to accurately understand performance, project trends, and formulate more effective strategies, thereby strengthening competitiveness and business sustainability. The implications of these findings underscore the importance of integrating data analytics into long-term business strategies through strengthening technology infrastructure, enhancing human resource competencies, and securing top management support. However, this study is still limited in cross-sector generalization and has not specifically measured quantitative impacts or aspects of data governance and ethics. Therefore, future research is recommended to examine the application of data analytics in a more contextual and empirical manner, taking into account performance, regulation, and sustainability aspects.

E. Acknowledgement

The author expresses gratitude to the State Islamic University of North Sumatra and all parties who have provided academic support, scientific references, and contributions of thought so that this research could be completed successfully. Appreciation is also extended to previous researchers and writers whose works have become important references in the preparation of this study.

References

Akter, W. G. (2021). How to improve firm performance using big data analytics capability and business strategy alignment? *International Journal of Production Economics, 18*(2), 113–131.

Amanda Afriza Putri, L. R. (2024). ANALISIS PERILAKU MAHASISWI SEBAGAI KONSUMEN MUSLIM TERHADAP DAYA BELI PRODUK ONLINE DI E-COMMERCE SHOPEE. *ESENSI: Jurnal Manajemen Bisnis, 27*(2), 8-24. Retrieved from https://esensijournal.com/index.php/esensi/article/view/33

Arjiansyah, M. S. (2024). Analisis Peran Big Data Dalam Meningkatkan Efisiensi Operasional Di Industri E-Commerce. *JRIIN: Jurnal Riset Informatika dan Inovasi, 10*(2), 1796–1799. Retrieved from https://jurnalmahasiswa.com/index.php/jriin/article/view/2123

Ashari, L. H. (2024). Peran Big Data Dalam Pengambilan Keputusan Strategis Perusahaan. *EKOMAN: Jurnal Ekonomi, Bisnis dan Manajemen, 32*(2), 401–422. doi:https://doi.org/10.61930/ekoman.v2i3.159

Asrul, A. W. (2025). Pemanfaatan Big Data Analytics dalam Proses Manajemen Teknologi untuk Prediksi Permintaan Pasar. *Jurnal Minfo Polgan, 13*(2), 2433–2438. doi:https://doi.org/10.33395/jmp.v13i2.14516

Bloemhard, P. E. (2024). Penerapan Data Mining Dalam Strategi Bisnis Menggunakan Algoritma Apriori. *Jurnal Transformatika, 22*(1), 142-155. doi:https://doi.org/10.26623/transformatika.v22i1.10194

Cut Nurul A'la, A. S. (2020). Determinant Perception Ease of Use, Effectiveness and Risk on The Interest of Transacting Using Financial Technology (Fintech) in Medan City Community. *Journal of Management and Business Innovations, 2*(1), 41-46. doi:http://dx.doi.org/10.30829/jombi.v2i1.9421

Iskandar, T. (2021). Pengembangan Sumber Daya Manusia Universitas Islam Negeri Sumatera Utara. *PENDALAS: Jurnal Penelitian Tindakan Kelas dan Pengabdian Masyarakat, 1*(2), 174-197. doi:https://doi.org/10.47006/pendalas.v1i2.80

Mawarni, S. B. (2024). Optimisasi Proses Bisnis dengan Menggunakan Metode Six Sigma Berbasis Teknologi Informasi. *Jurnal Sistem Informasi, Teknik Informatika dan Teknologi Pendidikan, 4*(1), 24-35. doi:https://doi.org/10.55338/justikpen.v4i1.137

Nisa. (2024). Penerapan Data Mining terhadap Data Transaksi sebagai Pendukung Informasi Strategi Penjualan menggunakan Algoritma Apriori. *Jurnal Teknik Informatika UNIKA Santo Thomas, 8*(1), 54-65. doi:https://doi.org/10.54367/jtiust.v6i2.1454

Nizar Hamdun, M. M. (2022). Strategi pelaku bisnis electronic commerce (e-commerce). *Jurnal Locus Penelitian Dan Pengabdian, 1*(5), 60-67. doi:https://doi.org/10.58344/locus.v1i2.13

Nurbaiti, A. A. (2023). Behavior analysis of MSMEs in Indonesia using fintech lending comparative study between sharia fintech lending and conventional fintech lending. *JPPI (Jurnal Penelitian Pendidikan Indonesia), 9*(4), 92-99.

Putri Nurhida Harahap, I. T. (2024). Manajemen Pengembangan Sumber Daya Manusia Bank Syari'ah Indonesia Kota Medan. *Jurnal El Rayyan: Jurnal Perbankan Syariah, 3*(1), 11-25. doi:https://doi.org/10.59342/jer.v3i1.511

Rahmad Hidayat, T. I. (2022). Strategi Meningkatkan Penghasilan untuk Kesejahteraan Keluarga Pedagang. *Inovatif: Jurnal Ekonomi, Manajemen, Akuntansi, Bisnis Digital dan Kewirausahaan, 1*(4), 305-315. doi:https://doi.org/10.55983/inov.v1i4.197

Riani, & Firdaus. (2024). Pengaruh Sistem Informasi Akuntansi terhadap Efektivitas Transaksi E-Business di Indonesia. *Profit: Jurnal Manajemen, Bisnis dan Akuntansi, 21*(1), 1-15. doi:https://doi.org/10.58192/profit.v3i4.2671

Rumapea, N. (2024). Pemanfaatan Big Data dalam Mendukung Strategi Bisnis pada Perusahaan Retail. *Jurnal Ilmiah Ekonomi, Manajemen, Bisnis dan Akuntansi, 8*(2), 89-111. doi:https://doi.org/10.61722/jemba.v2i2.714

Salim, & Yunus. (2024). Pengaruh Big Data Analytics Capability Terhadap Performa Rantai Pasok dan Efek Moderasi Dari Kemitraan. *Jurnal Aplikasi Bisnis dan Manajemen (JABM), 10*(1), 328–340. doi:https://doi.org/10.17358/jabm.10.1.328

Umi Kalsum, Z. Z. (2024). Strategi Ketua Jurusan PAI Kampus Universitas Ahmad Dahlan dalam Mengembangkan Kampus Merdeka untuk Mutu Lulusan. *Journal of Education Research, 5*(1), 76-83. doi:https://doi.org/10.37985/jer.v5i1.764

Wamba, A. E. (2022). How 'big data' can make big impact: Findings from a systematic review and a longitudinal case study. *International Journal of Production Economics, 16*(1), 234–246.