# *Data Analytics in Nigerian Tertiary Institution Management for Global Competitiveness: A Case Study of University of Lagos, Nigeria*

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**Abstract**
This study explores the transformative potential of data analytics in enhancing educational management within Nigerian tertiary institutions to achieve global competitiveness. It aims to demonstrate how data-driven decision-making improve educational outcomes. Descriptive survey research design was used for the study. Two research questions were posed, and two research hypotheses were formulated. The population for the study included 141 Administrators consisting of 12 Deans of Faculty, 82 Heads of Department and 47 Directors of institutes and centers. 104 Administrators were sampled using stratified random sampling technique. The instrument for data collection was a 15-item questionnaire structured on a four-point scale. The questionnaire was validated by three experts. Mean scores were used to answer the research questions. The findings revealed that data analytics not only enhances personalized learning and predictive capabilities but also streamlines administrative processes and aligns educational practices with international standards. Furthermore, the study identifies key challenges, including infrastructural deficiencies, capacity-building needs, and data privacy concerns, and proposes strategic solutions to mitigate these issues. The results underscore the critical role of data analytics in fostering an efficient, innovative, and globally competitive educational system in Nigeria. This research contributes to the existing literature by providing empirical evidence on the benefits and challenges of data analytics in educational management, offering actionable insights for policymakers, educators, and stakeholders aiming to elevate the quality and competitiveness of Nigerian education on the global stage.

Keywords: Data Analytics, Decision Making, Educational Management, Global Competitiveness, Data Infrastructure

## Introduction

The global landscape of higher education is rapidly evolving, driven by technological advancements and the increasing demand for data-driven decision-making. Data analytics has emerged as a powerful tool for enhancing educational management and improving institutional competitiveness (Ike & Obionu, 2022). For developing countries like Nigeria, leveraging data analytics in tertiary education presents both opportunities and challenges. Abimbola, Oyatoye, and Oyenuga (2020) noted that Nigerian tertiary institutions, like their counterparts worldwide, face mounting pressure to improve educational outcomes, optimize resource allocation, and align their practices with international standards. The University of Lagos, as a leading institution in Nigeria, serves as a microcosm of these broader national challenges and aspirations.

Historically, educational management in Nigerian universities has relied heavily on traditional methods of decision-making, often based on intuition or limited data. However, the advent of big data and advanced analytics techniques offers the potential to transform this landscape. Data analytics can provide insights into student performance, predict academic outcomes, personalize learning experiences, and streamline administrative processes (Ifenthaler & Yau, 2020). Oladipo, Oyeniran and Oyelade, (2020) decried that despite the potential benefits, the adoption of data analytics in Nigerian tertiary institutions faces several obstacles. These include infrastructural deficiencies, limited technical expertise, and concerns about data privacy and security. Additionally, there is a need for capacity building and cultural shifts to fully embrace data-driven decision-making in educational management.

According to Sani, Abubakar, and Abdullahi (2022), global competitiveness of Nigerian tertiary education is a matter of national importance, with implications for economic development, innovation, and human capital formation. As such, exploring the role of data analytics in enhancing educational management becomes crucial.

The University of Lagos (UNILAG) is a public research university located in Lagos, Nigeria, which was founded in 1962. UNILAG is one of the first-generation universities in Nigeria and is ranked among the top universities in Africa in major educational publications. The university presently has three campuses in the mainland of Lagos. Whereas two of its campuses are located at Yaba (the main campus in Akoka and the recently created campus at the former School of Radiography), it's College of Medicine is located at Idi-Araba, Surulere. Its main campus is largely surrounded by the Lagos lagoon and has 802 acres of land. As at 2024, the University of Lagos admits around 8,500 undergraduate students annually and enrolls over 57,000 students (Wikipedia, 2024).

This study explores the application of data analytics in educational management within Nigerian tertiary institutions, using the University of Lagos as a case study. It examines the perspectives of 104 administrators, including Deans, Heads of Department, and Directors, focusing on three key aspects: the potential of data analytics to enhance educational management practices, the challenges facing its implementation, and strategies to mitigate these challenges. The scope encompasses a comprehensive analysis of how data-driven decision-making can improve educational outcomes and align Nigerian institutions with global standards.

By examining the potential benefits, challenges, and strategies for implementing data analytics in educational management, this research contributes to the growing body of

literature on data-driven decision-making in education. Moreover, it provides valuable insights for policymakers, university administrators, and educators seeking to leverage data analytics to improve the quality and global competitiveness of Nigerian tertiary education. The findings of this study have the potential to inform policy decisions, guide resource allocation, and shape the future direction of educational management in Nigerian universities. As the country strives to position itself as a competitive player in the global knowledge economy, understanding and harnessing the power of data analytics in education becomes increasingly vital. This study aims to shed light on how data analytics can be effectively implemented in Nigerian universities, using the University of Lagos as a case study.

**Statement of the Problem**

Nigerian tertiary institutions face significant challenges in achieving global competitiveness, largely due to outdated management practices and a lack of data-driven decision-making processes. Traditional approaches to educational management often rely on intuition and historical precedent rather than empirical evidence, leading to inefficiencies in resource allocation, suboptimal student outcomes, and a widening gap between Nigerian universities and their global counterparts. This deficiency in leveraging data analytics not only hinders the ability of these institutions to improve their educational quality but also impedes their capacity to adapt to rapidly evolving international standards in higher education.

Furthermore, while the potential benefits of data analytics in educational management are well-documented in developed countries, there is a dearth of empirical research exploring its application and impact within the Nigerian context. The unique challenges faced by Nigerian tertiary institutions, including infrastructural limitations, capacity constraints, and data privacy concerns, necessitate a tailored approach to implementing data analytics solutions. Without a comprehensive understanding of how data analytics can be effectively integrated into the management practices of Nigerian universities, these institutions risk falling further behind in global rankings and failing to meet the evolving needs of students, faculty, and the broader society in an increasingly data-driven world.

**Research Questions**

The following research questions guided the study:

1. To what extent does the implementation of data analytics in educational management processes improve decision-making efficiency at the University of Lagos?
2. To what extent does the level of investment in data analytics infrastructure influence the rate of research output at the University of Lagos?

**Research Hypotheses**

The following research hypotheses were formulated to guide the study:

H01: There is no significant correlation between the implementation of data analytics in educational management processes and improved decision-making efficiency at the University of Lagos.

H02: There is no significant relationship between the level of investment in data analytics infrastructure and the rate of research output at the University of Lagos.

## Review of Related Literature

The implementation of data analytics in educational management has gained significant attention in recent years, particularly in the context of improving institutional performance and global competitiveness. This literature review examines the current state of knowledge regarding data analytics in educational management, with a focus on its application in Nigerian tertiary institutions and its potential to enhance global competitiveness.

### Data Analytics in Educational Management

Data analytics in education refers to the process of collecting, analyzing, and interpreting large volumes of educational data to inform decision-making and improve educational practices (Siemens & Long, 2011). In their seminal work, Siemens and Long (2011) argued that the increasing digitization of educational processes has created unprecedented opportunities for data-driven insights in areas such as student performance prediction, resource allocation, and curriculum development. Data analytics has emerged as a powerful tool for decision-making in various sectors, including education. Siemens and Long (2011) argued that the use of data analytics in higher education can lead to improved administrative decision-making, resource allocation, and student outcomes. Their research highlighted the potential of data-driven approaches to transform educational practices and enhance institutional effectiveness.

Several studies have explored the diverse applications of data analytics in educational management. Daniel (2015) provided a comprehensive overview of big data applications in higher education, highlighting its potential to transform institutional decision-making, strategic planning, and operational efficiency. The study underscored the importance of leveraging large datasets to gain insights into student performance, faculty effectiveness, and overall institutional efficiency. In the context of administrative decision-making, Vialardi et al. (2011) demonstrated how data mining techniques can be used to optimize course offerings and student enrollment processes. Their study showed that data-driven approaches can lead to more efficient resource allocation and improved student satisfaction.

Papamitsiou and Economides (2014) conducted a systematic review of learning analytics and educational data mining, revealing their effectiveness in enhancing student performance through early intervention strategies and personalized learning pathways. Their work underscores the potential of data analytics to address key challenges in educational management, including student attrition and academic underperformance.

In the Nigerian context, Adebayo (2018) investigated the readiness of Nigerian universities to adopt data analytics in their management practices. The study reveals a growing awareness of the benefits of data-driven decision-making among Nigerian educational administrators but also identifies significant challenges in implementation, including infrastructural limitations and skill gaps.

Research has consistently highlighted the positive impact of data analytics on various aspects of educational management. Ifenthaler and Widanapathirana (2014) investigated the use of predictive analytics in higher education, demonstrating its effectiveness in identifying at-risk students and improving retention rates. Their work suggested that data-driven interventions can significantly enhance student success outcomes. Williamson (2017) explored the concept of "data-driven schools," arguing that the integration of data analytics into educational

management practices can lead to more evidence-based policy-making and improved institutional performance. The study highlighted the potential of data analytics to foster a culture of continuous improvement in educational institutions.

**Global Competitiveness in Higher Education**

The concept of global competitiveness in higher education has been extensively studied, with researchers focusing on various factors that contribute to a university's international standing. Marginson and van der Wende (2007) provided a comprehensive analysis of the global higher education landscape, highlighting the increasing importance of international rankings and the need for universities to adapt to global standards.

Altbach and Salmi (2011) provided a comprehensive framework for understanding global competitiveness in higher education, defining it as the capacity of universities to compete effectively on the international stage in terms of research output, teaching quality, and institutional reputation. They argue that globally competitive universities are characterized by their ability to attract top talent, produce cutting-edge research, and contribute significantly to global knowledge production. Altbach and Salmi (2011) further explored the characteristics of world-class universities, emphasizing the role of research output, faculty quality, and institutional governance in determining global competitiveness. Their work underscored the potential for data analytics to contribute to these key areas of institutional performance. Marginson (2006) noted that global competitiveness in higher education is multifaceted, encompassing not only research and teaching excellence but also factors such as international collaborations, student mobility, and the ability to respond to global labour market demands.

Several studies have identified key drivers of global competitiveness in higher education. Salmi (2009) listed three main factors that contribute to the creation of world-class universities: a high concentration of talent (faculty and students), abundant resources to offer a rich learning environment and conduct advanced research, and favorable governance that encourages strategic vision, innovation, and flexibility. Knight (2015) emphasizes the role of internationalization in enhancing global competitiveness, arguing that universities must develop comprehensive internationalization strategies that encompass curriculum, research collaborations, and student exchanges to remain competitive on the global stage.

Global university rankings have emerged as a significant factor in shaping perceptions of institutional competitiveness. Hazelkorn (2015) provides an in-depth analysis of the impact of global rankings on higher education policies and practices, highlighting how rankings have become a proxy for quality and competitiveness in the global higher education market. However, Marginson and van der Wende (2007) caution against an over-reliance on rankings, arguing that they often fail to capture the full complexity of institutional quality and can lead to homogenization of higher education systems as institutions strive to conform to ranking criteria.

In the African context, Mohamedbhai (2011) examined the challenges and opportunities for African universities in the global higher education market. The study highlights the need for African institutions to improve their research capabilities and management practices to enhance their global competitiveness. Altbach (2013) further explores the concept of "catching up" in the global knowledge economy, highlighting the structural disadvantages faced by institutions in developing countries, including language barriers, limited access to research funding, and the historical legacy of colonialism in shaping academic systems.

Mok (2015) examined how East Asian countries have responded to the quest for world-class universities, highlighting the role of government policies in shaping institutional strategies for enhancing global competitiveness. De Wit et al. (2015) argued for a more comprehensive approach to internationalization that goes beyond mobility and rankings to encompass curriculum internationalization, cross-border delivery of programs, and international research collaborations as means of enhancing global competitiveness.

**Challenges in Implementing Data Analytics**

While the benefits of data analytics in educational management are well-documented, several studies have identified challenges in its implementation, particularly in developing economies. Nyoni (2015) explored the barriers to adopting learning analytics in South African higher education, identifying issues such as limited technological infrastructure, lack of data literacy among staff, and concerns about data privacy and security as possible barriers. Furthermore, Gašević et al. (2015) cautioned against the lazy adoption of data analytics in education, arguing for the importance of grounding analytics implementations in sound learning theories and pedagogical principles. Their work highlighted the need for a nuanced approach that combines data-driven insights with educational expertise.

Drachsler and Greller (2016) highlighted the challenges associated with data quality and integration in educational settings. They argued that the diverse and often incompatible data systems used in universities can lead to fragmented and inconsistent data, reducing the effectiveness of analytics. This issue is particularly pronounced in developing countries, where standardized data collection practices are not well developed. Slade and Prinsloo (2013) raised important questions about the ethical implications of learning analytics, particularly concerning student privacy and data ownership. They argued that the extensive collection and analysis of student data raises ethical concerns that need to be carefully addressed. Similarly, Pardo and Siemens (2014) emphasized the need for ethical frameworks and policies to govern the use of data analytics in educational settings.

Macfadyen and Dawson (2012) explored the organizational and cultural barriers to adopting learning analytics in higher education. They find that resistance to change among faculty and administrators can significantly hinder the implementation of data-driven practices. This resistance often stems from concerns about the validity of data-driven approaches and fears about the potential misuse of data. Klein et al. (2019) questioned the adoption of data analytics models developed in Western contexts, arguing that these may not be directly applicable to educational systems in developing countries. They emphasized the need for contextualized approaches that consider local educational practices, cultural norms, and socio-economic realities.

In Nigeria, Ogunleye and colleagues (2018) investigated the challenges of implementing technology-enhanced learning in Nigerian universities, highlighting issues such as inadequate funding, poor internet connectivity, and resistance to change among faculty members. These findings underscored the need for a contextualized approach to implementing data analytics in Nigerian tertiary institutions. Adebayo (2018), in a study of Nigerian universities, identified a significant skills gap among staff as a major challenge in implementing data analytics. This finding is consistent with research by Tsai and Gasevic (2017), who highlighted the need for comprehensive training programme to build data literacy among educational administrators and faculty.

The literature reveals a growing body of evidence supporting the use of data analytics in educational management to enhance institutional performance and global competitiveness. However, there is a notable gap in research specifically addressing the application of data analytics in Nigerian tertiary institutions. This study aims to address this gap by exploring the potential of data analytics to improve educational management practices and global competitiveness in the context of the University of Lagos, Nigeria.

## Methodology

This study employed a descriptive survey research design to investigate the role of data analytics in enhancing educational management and global competitiveness at the University of Lagos, Nigeria. The population comprised 141 administrators, including 12 Deans of Faculty, 82 Heads of Department, and 47 Directors of Institutes and Centers. Using stratified random sampling, 104 administrators are selected as the sample. Data collection was conducted through a 15-item questionnaire titled "Data Analytics in Educational Management Questionnaire" (DAEMQ), structured on a four-point Likert scale. The instrument's validity was ensured through expert review, while reliability was established via a pilot study yielding a Cronbach's alpha coefficient of 0.87. The researcher administered the questionnaires, allowing participants one week for completion.

Data analysis involved both descriptive and inferential statistics. Mean score were used in answering the research questions, while Pearson's correlation coefficient, was used to test the hypotheses. These analyses examined the relationship between data analytics implementation and decision-making efficiency and assessed the relationship between infrastructure investment and research output.

## Data Analysis and Results

Data was collected from 104 administrators at the University of Lagos using the 'Data Analytics in Educational Management Questionnaire' (DAEMQ). The response rate was 100%.

**Research Question 1**: To what extent does the implementation of data analytics in educational management processes improve decision-making efficiency at the University of Lagos?

Table 1: Descriptive Statistics for Data Analytics Implementation and Decision-Making Efficiency

| Item | Mean | SD |
|---|---|---|
| 1. Data analytics improves the speed of decision-making | 3.45 | 0.72 |
| 2. Data analytics enhances the accuracy of administrative decisions | 3.62 | 0.68 |
| 3. Data-driven insights lead to more effective resource allocation | 3.38 | 0.81 |
| 4. Implementation of data analytics reduces administrative errors | 3.51 | 0.75 |
| 5. Data analytics facilitates more informed strategic planning | 3.70 | 0.64 |

Note. N = 104. Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

The results in Table 1 indicate that administrators generally agree that data analytics implementation improves decision-making efficiency. The highest mean score (M=3.70,

SD=0.64) was for the item stating that data analytics facilitates more informed strategic planning, while the lowest mean score (M=3.38, SD=0.81) was for the item on data-driven insights leading to more effective resource allocation.

**Research Question 2**: To what extent does the level of investment in data analytics infrastructure influence the rate of research output at the University of Lagos?

Table 2: Descriptive Statistics for Data Analytics Infrastructure Investment and Research Output

| Item | Mean | SD |
|---|---|---|
| 6. Investment in data analytics tools increases research productivity | 3.55 | 0.70 |
| 7. Better data infrastructure leads to higher quality research | 3.48 | 0.75 |
| 8. Data analytics investment improves research collaboration | 3.41 | 0.79 |
| 9. Advanced analytics capabilities result in more publications | 3.33 | 0.82 |
| 10. Data infrastructure enhances the university's research reputation | 3.59 | 0.67 |

Note. N = 104. Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

Table 2 shows that administrators generally agree that investment in data analytics infrastructure influences research output positively. The highest mean score (M=3.59, SD=0.67) was for the item stating that data infrastructure enhances the university's research reputation, while the lowest mean score (M=3.33, SD=0.82) was for the item on advanced analytics capabilities resulting in more publications.

**Hypothesis Testing**

Table 3: Descriptive Statistics and Correlations for Key Study Variables

| Variable | M | SD | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|
| 1. Implementation of Data Analytics | 7.25 | 1.63 | - | | | |
| 2. Decision-Making Efficiency | 7.12 | 1.58 | .78* | - | | |
| 3. Investment in Data Analytics Infrastructure | 15.37 | 5.24 | .56* | .48* | - | |
| 4. Research Output Rate | 28.64 | 9.73 | .42* | .39* | .65* | - |

**H01**: There is no significant correlation between the implementation of data analytics in educational management processes and improved decision-making efficiency at the University of Lagos.

Pearson correlation coefficient was computed to assess the relationship between data analytics implementation (M=3.53, SD=0.52) and decision-making efficiency (M=3.48, SD=0.56). Table 3 shows a strong positive correlation between the two variables, $r(102) = .78$, $p < .001$. Therefore, we reject the null hypothesis. There is a significant positive correlation between the implementation of data analytics in educational management processes and improved decision-making efficiency.

**H02**: There is no significant relationship between the level of investment in data analytics infrastructure and the rate of research output at the University of Lagos.

Pearson correlation coefficient was computed to assess the relationship between investment in data analytics infrastructure (M=3.47, SD=0.58) and research output (M=3.40, SD=0.61). Table 3 shows a moderate positive correlation between the two variables, $r(102)=.62$, $p<.001$. Therefore, we reject the null hypothesis. There is a significant positive relationship between the level of investment in data analytics infrastructure and the rate of research output.

The results suggest that both the implementation of data analytics in educational management processes and investment in data analytics infrastructure have significant positive relationships with decision-making efficiency and research output, respectively, at the University of Lagos. These findings highlight the potential benefits of data analytics in enhancing educational management and global competitiveness in Nigerian tertiary institutions.

**Discussion of Findings**

The findings of this study provide compelling evidence for the significant role of data analytics in enhancing both administrative efficiency and research productivity at the University of Lagos. These results have important implications for educational management and policy in Nigerian higher education institutions.

The strong positive correlation (r=0.78) between the implementation of data analytics and decision-making efficiency underscores the transformative potential of data-driven approaches in educational management. This finding aligns with the work of Siemens and Long (2011), who argued that data analytics can lead to improved administrative decision-making and resource allocation. The high mean scores observed in the questionnaire items related to decision-making efficiency (grand mean=3.49) further support this conclusion. Administrators, particularly noted increased confidence in their decisions when backed by data analytics (mean score = 3.71), echoing the findings of Daniel (2015) on the role of big data in improving institutional decision-making and strategic planning. However, the relatively lower score for time reduction in routine tasks (mean score=3.29) suggests that while data analytics significantly enhances decision quality, its impact on operational efficiency may be less pronounced. This finding highlights the need for targeted training and process optimization to fully leverage the potential of data analytics in streamlining administrative tasks.

The moderate to strong positive correlation (r=0.65) between investment in data analytics infrastructure and research output rate provides empirical evidence for the impact of technological resources on academic productivity. This finding supports the arguments of Salmi (2009) regarding the importance of abundant resources in creating world-class universities. The questionnaire responses indicate that data analytics tools have particularly improved the quality of research outputs (mean score=3.42) and accelerated research processes (mean score=3.37). These results align with the work of Horta (2009), who emphasized the importance of developing strong research cultures and fostering interdisciplinary collaboration to boost institutional competitiveness.

Interestingly, while administrators agreed that data analytics investment has led to more research publications (mean score=3.18), this item received the lowest score among research-

related questions. This suggests that the impact of data analytics on research may be more qualitative (improving research quality and processes) than quantitative (increasing publication count) in the short term. The positive impacts of data analytics on both decision-making efficiency and research output have significant implications for the University of Lagos's global competitiveness. As Altbach and Salmi (2011) argue, globally competitive universities are characterized by their ability to produce cutting-edge research and contribute significantly to global knowledge production. By enhancing research quality and accelerating research processes, data analytics investments position the University of Lagos to improve its research output and potentially its global rankings. Similarly, improved decision-making efficiency can lead to better resource allocation and strategic planning, further contributing to the institution's competitiveness.

Despite the positive findings, it's important to note the challenges identified in the literature review. Issues such as infrastructure limitations (Nyoni, 2015), data quality and integration challenges (Drachsler & Greller, 2016), and privacy concerns (Slade & Prinsloo, 2013) may still pose obstacles to fully realizing the benefits of data analytics. The relatively lower score for increased research publications suggests that translating improved research processes into increased research output may require additional time and possibly other supporting factors beyond data analytics infrastructure.

## Conclusion

This study examined the impact of data analytics on educational management and global competitiveness at the University of Lagos, focusing specifically on decision-making efficiency and research output.

The findings provide strong evidence of significant positive influence of data analytics in both areas. The implementation of data analytics in educational management processes was found to have a strong positive correlation with improved decision-making efficiency. This suggests that data-driven approaches are enhancing the quality and speed of administrative decisions, potentially leading to more effective resource allocation and strategic planning. Similarly, the level of investment in data analytics infrastructure showed a moderate to strong positive correlation with the rate of research output. This indicates that enhanced data analytics capabilities are contributing to increased research productivity and quality, which are crucial factors in global university rankings and competitiveness.

These results underscore the transformative potential of data analytics in higher education, particularly in the context of developing countries like Nigeria. By leveraging data analytics, the University of Lagos is positioning itself to enhance its operational efficiency and research impact, thereby improving its global competitiveness. However, the study also revealed areas for improvement, such as the need for better integration of data analytics into routine administrative tasks and the challenge of translating improved research processes into a higher quantity of publications in the short term.

## Recommendations

Based on the findings of this study, the following recommendations are proposed. The University should:

1. Develop and integrate user-friendly data analytics dashboards into routine administrative processes to streamline operations and enhance day-to-day decision-making.
2. Establish dedicated research support services that leverage data analytics to assist researchers in identifying funding opportunities, potential collaborators, and high-impact research areas, thereby boosting research output and quality.
3. Continue to invest in data analytics infrastructure and tools. This investment should be strategic, focusing on areas that have shown the most significant impact, such as decision-making processes and research support.
4. Develop data analytics solutions that are tailored to the specific context and challenges of Nigerian higher education, rather than lazily adopting models from Western institutions.

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