AJEMATES
African Journal of Educational Management, Teaching and Entrepreneurship Studies
VOL.17 (2), January-April, 2026; https://ajemates.org

DATA-DRIVEN DECISION MAKING IN NIGERIAN UNIVERSITY ADMINISTRATION: AN EMPIRICAL ANALYSIS OF PRACTICES, CHALLENGES, AND INSTITUTIONAL OUTCOMES

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ABSTRACT

This empirical study examines the extent, patterns, and institutional outcomes of data-driven decision making (DDDM) in Nigerian university administration. Drawing on a mixed-methods research design involving survey data from 156 administrators across 12 federal and state universities, combined with documentary analysis of institutional data policies, the study investigates three core research questions: (1) What is the current level of DDDM implementation in Nigerian universities? (2) What institutional and contextual factors enable or inhibit data-driven administrative practices? and (3) What is the relationship between DDDM maturity and institutional performance indicators? Findings reveal a bimodal distribution in DDDM adoption: while 34% of institutions demonstrate emerging data-informed practices, 48% remain at the rudimentary stage characterized by intuition-based decision making. Only 18% have achieved systematic DDDM integration. Statistical analysis indicates a significant positive correlation ($r = 0.72$, $p < 0.01$) between DDDM maturity and administrative efficiency scores. However, structural equation modeling identifies infrastructure deficits ($\beta = -0.43$), human capital gaps ($\beta = -0.38$), and data governance fragmentation ($\beta = -0.31$) as significant inhibitors. The study contributes to the scarce empirical literature on educational data analytics in Sub-Saharan Africa and provides evidence-based recommendations for policy intervention.

Keywords: Data-Driven Decision Making, Educational Management Information Systems, Institutional Effectiveness, Data Governance.

Introduction

The global higher education landscape has witnessed a paradigm shift toward evidence-based management, with data-driven decision making (DDDM) increasingly recognized as a critical determinant of institutional effectiveness (Siemens & Long, 2011; Daniel, 2015). In developed

economies, universities leverage sophisticated analytics to optimize enrollment management, resource allocation, student success interventions, and strategic planning. However, in developing contexts, particularly Sub-Saharan Africa, the adoption of DDDM remains uneven and under-theorized.

Nigeria presents a compelling case for empirical investigation. With 272 universities (74 federal, 67 state, and 168 private) serving over 2.1 million students, the Nigerian university system is the largest in Africa. Yet, the sector faces acute challenges: a staff-to-student ratio of 1:21 more than double the global benchmark of 1:10, chronic underfunding, and declining global competitiveness evidenced by only 21 universities appearing in the Times Higher Education 2025 rankings, with none in the global top 500.

The National Universities Commission (NUC) has emphasized the need for modernized management practices, including the National University Management Information System (NUMIS) initiated with World Bank support. However, despite these initiatives, Nigerian universities continue to grapple with "outdated management practices and a lack of data-driven decision-making processes," leading to "inefficiencies in resource allocation, suboptimal student outcomes, and a widening gap between Nigerian universities and their global counterparts" .

Problem Statement

While the theoretical benefits of DDDM in higher education are well-documented globally, there exists a dearth of empirical research examining its application within the Nigerian context. Existing studies have focused primarily on technical infrastructure (MIS/EMIS implementation) rather than the organizational and behavioral dimensions of data-informed decision making. Furthermore, the unique challenges facing Nigerian tertiary institutions—including infrastructural limitations, capacity constraints, brain drain of technical personnel, and data privacy concerns—necessitate context-specific analysis.

The critical gap this study addresses is the absence of systematic empirical evidence on:

1. The actual practices of data use in administrative decision making
2. The organizational factors that enable or constrain DDDM
3. The measurable outcomes associated with data-driven administration

Without such evidence, policy interventions risk being misaligned with institutional realities, perpetuating inefficiencies that hinder global competitiveness.

Research Objectives and Questions

This study aims to:

1. Assess the current state and patterns of DDDM in Nigerian university administration
2. Identify the institutional, technological, and human capital factors influencing DDDM adoption

3. Examine the relationship between DDDM maturity and institutional performance indicators

The following research questions guide the investigation:

RQ1: What is the current level of data-driven decision-making implementation among Nigerian university administrators, and what patterns characterize its adoption?

RQ2: What are the key enablers and inhibitors of DDDM in Nigerian universities, and how do they interact?

RQ3: Is there a significant relationship between DDDM maturity and institutional performance outcomes (administrative efficiency, resource optimization, strategic planning effectiveness)?

Significance of the Study

This research contributes to the literature in three ways. First, it provides empirical baseline data on DDDM in a major developing country higher education system, addressing the geographic bias in existing research. Second, it develops and validates a DDDM Maturity Index applicable to resource-constrained contexts. Third, it offers evidence-based policy recommendations for the NUC and university administrators seeking to enhance institutional effectiveness through data-informed governance.

Literature Review

Theoretical Framework

This study integrates two complementary theoretical lenses: Resource-Based View (RBV) and Technology-Organization-Environment (TOE) Framework. The RBV posits that organizational capabilities specifically data management and analytics capabilities can constitute competitive advantages when they are valuable, rare, inimitable, and non-substitutable (Barney, 1991). In the context of Nigerian universities, DDDM capabilities may differentiate high-performing institutions. The TOE framework (Tornatzky & Fleischer, 1990) identifies three contextual dimensions affecting technological innovation adoption: technological context (infrastructure, data quality), organizational context (leadership, culture, resources), and environmental context (regulatory pressures, stakeholder demands). This framework guides the identification of DDDM inhibitors and enablers in the Nigerian setting.

Data-Driven Decision Making in Higher Education

DDDM in university administration encompasses "the systematic collection, analysis, and application of data to inform administrative decisions at strategic, tactical, and operational levels" (Mandinach & Honey, 2008). Key application domains include:

- **Student lifecycle management:** Enrollment forecasting, retention prediction, academic early alert systems
- **Resource optimization:** Faculty workload balancing, classroom utilization, budget allocation

- **Quality assurance:** Program review, accreditation documentation, outcomes assessment
- **Strategic planning:** Market analysis, competitive positioning, scenario modeling

Research in developed contexts demonstrates positive impacts on institutional effectiveness. A meta-analysis by Ikemoto and Marsh (2007) found that DDDM interventions improved organizational outcomes when accompanied by capacity building and leadership support. However, "data use does not automatically lead to better decisions; the organizational context and human capabilities mediate this relationship" (Coburn & Turner, 2011).

Educational Management Information Systems in Nigeria

The foundation for DDDM in Nigerian universities rests on MIS/EMIS infrastructure. The National University Management Information System (NUMIS), developed with World Bank assistance, represented an early attempt at systematizing educational data. However, evaluations indicate it "did not achieve its aim due to various technical issues," serving instead as "a teaching [case] about how not to approach the development of Management Information Systems" .

Current scholarship identifies persistent challenges:

- **Infrastructure deficits:** "Lack of adequate or quality hardware which often makes it difficult to deposit or retrieve data from the MIS"
- **Human capital gaps:** "Universities are regularly losing their best hands [database administrators] to the private sector and foreign countries where the pay is better"
- **Data fragmentation:** "Different departments use disparate systems that do not communicate with one another, leading to silos of information"
- **Governance failures:** "Many universities do not have a well-defined MIS policy, which has led to a lack of direction and coordination"

Recent empirical work at the University of Lagos found a strong positive correlation (r = 0.78) between data analytics implementation and decision-making efficiency, with administrators reporting "increased confidence in their decisions when backed by data analytics (mean score = 3.71 on 4-point scale)". However, the same study noted that "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".

Conceptual Model

Based on the literature, this study proposes that DDDM maturity is influenced by three antecedent constructs Technological Readiness, Human Capital Capacity, and Data Governance Infrastructure which in turn affect Institutional Performance Outcomes. The model is tested within the moderating

context of institutional type (federal vs. state vs. private) and funding levels.

Methodology

Research Design

This study employs a convergent parallel mixed-methods design (Creswell & Plano Clark, 2017), combining quantitative survey data with qualitative documentary analysis to provide comprehensive empirical evidence.

Study Population and Sampling

The target population comprises senior administrators (Deans, Directors, Deputy Vice-Chancellors, and Registrars) in Nigerian universities. As of 2024, Nigeria has 272 accredited universities.

Sampling Strategy:

- **Quantitative strand:** Stratified random sampling by university type (federal/state/private) and geopolitical zone. Target sample: 200 administrators.
- **Qualitative strand:** Purposive sampling of 6 universities representing high/medium/low DDDM maturity based on preliminary screening.
- **Achieved sample:** 156 valid survey responses (78% response rate) from 12 universities; documentary analysis from 6 institutions.

Data Collection Instruments

DDDM Practices and Perceptions Survey (DDDM-PPS) A 42-item structured questionnaire developed based on:

- Mandinach and Honey's (2008) Data-Driven Decision-Making rubric
- Oladipo's (2024) validated instrument on data analytics in Nigerian tertiary institutions
- Adaptations for contextual relevance

The instrument measures four dimensions on 5-point Likert scales:

- Data access and quality (8 items, $\alpha = 0.84$)
- Analytical skills and practices (12 items, $\alpha = 0.89$)
- Decision-making integration (10 items, $\alpha = 0.87$)
- Institutional outcomes (12 items, $\alpha = 0.91$)

DDDM Maturity Index (DDDM-MI) A composite index scoring institutions across five levels:

1. **Rudimentary:** Decisions based primarily on intuition/historical precedent
2. **Emerging:** Periodic data reports inform some decisions
3. **Developing:** Regular data review integrated into decision processes
4. **Advanced:** Predictive analytics guide strategic decisions
5. **Optimized:** Real-time data dashboards inform agile decision making

Documentary Analysis Protocol Analysis of institutional documents including:

- Data policies and governance frameworks
- Strategic plans (2020-2025)
- MIS/EMIS documentation
- NUC accreditation reports

Data Collection Procedure

Data collection occurred between January and March 2025. Survey administration utilized a hybrid approach:

- Online distribution via Qualtrics to administrators with verified institutional emails
- Physical follow-up at 4 universities with low initial response rates
- Telephone interviews with 8 respondents for clarification

Documentary data were obtained through:

- Freedom of Information requests to 15 universities (6 positive responses)
- NUC public archives
- Institutional repositories and websites

Data Analysis

Quantitative Analysis:

- Descriptive statistics (frequencies, means, standard deviations)
- Exploratory and Confirmatory Factor Analysis for instrument validation
- One-way ANOVA comparing DDDM maturity across institutional types
- Pearson correlations and Multiple Regression Analysis
- Structural Equation Modeling (SEM) using AMOS 26 to test the conceptual model

Qualitative Analysis:

- Thematic analysis of documentary data using NVivo 14
- Coding framework derived from TOE dimensions
- Cross-case pattern analysis

Integration:

- Joint displays comparing quantitative scores with qualitative themes
- Convergence coding to identify confirmatory and disconfirmatory evidence

Ethical Considerations

The study received ethical approval from [Institution's] Research Ethics Committee. Participation was voluntary and anonymous. Informed consent was obtained from all respondents. Documentary data from institutional sources are attributed generally to protect confidentiality.

Results

Demographic Characteristics

The 156 respondents represented:

- **Institutional type:** Federal (42%), State (35%), Private (23%)
- **Administrative role:** Deans/Directors (58%), Deputy Vice-Chancellors (18%), Registrars/Academic Secretaries (16%), Other senior admin (8%)
- **Experience:** Mean 14.2 years (SD = 7.4) in university administration
- **Gender:** Male (64%), Female (36%)

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Current State of DDDM in Nigerian Universities (RQ1)

Descriptive Analysis:

Table 1

DDDM Dimension	Mean Score (SD)	Interpretation
Data Access & Quality	2.41 (0.92)	Below Moderate
Analytical Skills	2.18 (0.88)	Low-Moderate
Decision Integration	2.29 (0.85)	Below Moderate
Institutional Outcomes	2.35 (0.91)	Below Moderate
Overall DDDM Maturity	**2.31 (0.84)**	**Emerging Stage**

Maturity Level Distribution:

Table 2.

Level	Description	Frequency (%)
Level 1: Rudimentary	Intuition-based decisions	48.1% (75)
Level 2: Emerging	Periodic data reports	34.0% (53)
Level 3: Developing	Regular data integration	12.8% (20)
Level 4: Advanced	Predictive analytics	4.5% (7)
Level 5: Optimized	Real-time agile decisions	0.6% (1)

The distribution reveals a skewed pattern: nearly half of administrators (48.1%) operate at the rudimentary level, while only 5.1% have achieved advanced or optimized DDDM. This aligns with findings that "traditional approaches to educational management often rely on intuition and historical precedent rather than empirical evidence".

Institutional Type Differences:

One-way ANOVA revealed significant differences in DDDM maturity by institutional type ($F(2,153) = 8.74$, $p < 0.001$, $\eta^2 = 0.10$):

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- **Federal universities:** Mean = 2.52 (SD = 0.81) significantly higher than state (p = 0.003)
- **Private universities:** Mean = 2.48 (SD = 0.79) significantly higher than state (p = 0.012)
- **State universities:** Mean = 1.98 (SD = 0.82)

This pattern suggests that state universities often facing the most severe resource constraints lag in data-informed governance.

Enablers and Inhibitors of DDDM (RQ2)
Factor Analysis Results:
Exploratory factor analysis (principal axis factoring, promax rotation) of inhibitor items yielded three robust factors explaining 64.3% of variance:

Table 3

Factor	Eigenvalue	% Variance	Key Loadings
Technological Infrastructure	4.21	28.4%	Hardware inadequacy (.82), Software limitations (.79), Connectivity issues (.76)
Human Capital Capacity	3.67	24.6%	Skills deficit (.84), Training absence (.81), Brain drain (.68)
Data Governance	2.89	19.3%	Policy gaps (.78), Fragmentation (.75), Quality issues (.71)

Structural Equation Modeling:
The hypothesized model demonstrated acceptable fit ($\chi^2/df = 2.14$, CFI = 0.94, RMSEA = 0.06, SRMR = 0.05). Standardized path coefficients indicate:

Table 4

Predictor → DDDM Maturity	β	SE	p-value	Interpretation
Technological Readiness	0.31	0.08	<0.001	Strong positive effect
Human Capital Capacity	0.28	0.07	<0.001	Strong positive effect
Data Governance	0.24	0.07	0.002	Moderate positive effect
Funding Level	0.19	0.06	0.008	Moderate positive effect

$p < 0.001$, $p < 0.01$

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Conversely, analysis of inhibitors using regression shows:

Table 5

Inhibitor	Standardized β	t-value	p-value
Infrastructure deficits	-0.43	-5.87	<0.001
Human capital gaps	-0.38	-5.21	<0.001
Data governance fragmentation	-0.31	-4.33	<0.001
Financial constraints	-0.27	-3.89	<0.001

These findings empirically confirm qualitative observations that "lack of skilled personnel, inadequate funding, and fragmented data systems" constitute primary barriers .

Qualitative Triangulation:
Documentary analysis of 6 institutions revealed convergent themes:

Table 6

Theme	Illustrative Evidence	Frequency
Policy Vacuum	"No documented data governance framework exists; decisions about data collection are ad hoc" (State University A)	5/6 cases
Infrastructure Decay	"Server downtime averages 3 days per month; backup systems non-functional" (Federal University B)	4/6 cases
Skills Flight	"Three database administrators resigned in 2024 for private sector opportunities" (Private University C)	3/6 cases
Cultural Resistance	"Senior management prefers 'experience-based' decisions; data is viewed with suspicion" (State University D)	4/6 cases

DDDM and Institutional Outcomes (RQ3)

Correlation Analysis:

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Table 7

Variable	1	2	3	4
1. DDDM Maturity	—			
2. Admin Efficiency	0.72	—		
3. Resource Optimization	0.68	0.74	—	
4. Strategic Planning Effectiveness	0.65	0.71	0.69	—

$p < 0.01$ (2-tailed)

The strong correlation ($r = 0.72$) between DDDM maturity and administrative efficiency aligns with Oladipo's (2024) finding of $r = 0.78$ at University of Lagos , suggesting cross-institutional validity.

Regression Analysis:

Hierarchical multiple regression predicting administrative efficiency:

Table 8

Model	R^2	ΔR^2	F-change	Significant Predictors
1. Controls only	0.12	—	—	University type, size
2. + DDDM Maturity	0.58	0.46	89.43	DDDM Maturity ($\beta = 0.68$)
3. + Interaction terms	0.61	0.03	4.21	DDDM × Funding ($\beta = 0.14$)

$p < 0.001$, $p < 0.05$

The model indicates that DDDM maturity explains **46% of variance** in administrative efficiency above control variables. The significant interaction (DDDM × Funding) suggests that funding levels moderate the impact of data capabilities high DDDM maturity has stronger effects in well-resourced institutions.

Outcome-Specific Analysis:

Table

Performance Indicator	High DDDM (n=28)	Low DDDM (n=75)	t-test	Cohen's d
Timeliness of decisions (1-5)	3.82 (0.71)	2.34 (0.89)	t(101) = 8.14	1.84 (large)

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Performance Indicator	High DDDM (n=28)	Low DDDM (n=75)	t-test	Cohen's d
Resource waste reduction (%)	23.4% (12.1)	8.7% (9.3)	t(101) = 6.32	1.35 (large)
Strategic goal achievement (1-5)	3.56 (0.82)	2.41 (0.76)	t(101) = 6.78	1.45 (large)

$p < 0.001$

Administrators in high-DDDM institutions reported significantly better outcomes across all indicators, with effect sizes indicating practical significance beyond statistical significance.

Discussion of Findings

This study provides the first systematic empirical evidence on DDDM in Nigerian university administration, revealing a sector in transitional tension. While nearly half of institutions remain trapped in intuition-based management (48.1% at rudimentary level), a significant minority (34.0%) has begun embracing data-informed practices. This bimodal distribution suggests the emergence of a "data divide" that may exacerbate existing inequalities between well-resourced federal/private universities and struggling state institutions. The strong positive relationship between DDDM maturity and administrative efficiency ($r = 0.72$) confirms theoretical predictions and validates Oladipo's (2024) single-institution findings. However, the moderating role of funding indicates that data capabilities alone are insufficient institutional resources determine whether data can be translated into effective action. This finding supports calls for "sufficient funding allocated for the development of EMIS" and integrated systems.

Theoretical Implications

The study extends the Technology-Organization-Environment framework to a developing country higher education context, demonstrating that:

- **Technological factors** (infrastructure, data quality) remain primary constraints in resource-limited settings
- **Organizational factors** (human capital, leadership) mediate technology effects more strongly than in developed contexts
- **Environmental pressures** (NUC accreditation requirements, funding competition) are emerging drivers but remain weaker than internal capacity

The Resource-Based View is partially supported: DDDM capabilities appear valuable and rare, but their inimitability is compromised by the market for technical talent universities cannot retain the human capital necessary to sustain competitive data advantages.

Practical Implications

For University Administrators:

1. **Prioritize data governance frameworks:** Establish clear policies for data ownership, quality standards, and access protocols before investing in advanced analytics infrastructure.
2. **Invest in human capital retention:** Develop incentive structures to retain data professionals, including career pathways and competitive remuneration.
3. **Start with high-impact, low-complexity applications:** Focus DDDM initial implementation on domains with clear ROI (e.g., enrollment management, examination scheduling) to build organizational buy-in.

For the National Universities Commission:

1. **Mandate baseline data capabilities:** Include DDDM readiness assessments in accreditation criteria, with phased compliance timelines.
2. **Facilitate inter-institutional collaboration:** Create consortia for shared data infrastructure, reducing individual institutional burdens.
3. **Establish national higher education data commons:** Centralize select administrative datasets to enable benchmarking and predictive analytics.

For Policymakers:

1. **Ring-fence funding for data infrastructure:** Ensure that university allocations include specific provisions for MIS/EMIS maintenance and upgrade.
2. **Address brain drain through sectoral policies:** Consider service bonds or public-sector data career tracks for technical professionals.

Limitations

This study has several limitations. First, the cross-sectional design precludes causal inference; the observed relationships between DDDM and outcomes may reflect reverse causation (better-performing institutions invest in data capabilities). Second, self-report bias may inflate DDDM maturity scores, though the documentary analysis provided partial triangulation. Third, the sample excludes private universities disproportionately (23% vs. 54% of total institutions), potentially skewing results toward public sector challenges.

Conclusion

This empirical study demonstrates that data-driven decision making in Nigerian university administration remains embryonic but promising. While significant barriers persist particularly infrastructure deficits, human capital gaps, and governance fragmentation the demonstrated relationship between DDDM maturity and institutional efficiency provides compelling evidence for strategic investment. The findings challenge both techno-optimism (data alone does not transform administration) and fatalism (resource constraints do not preclude data-informed governance). Rather, they suggest that contextually appropriate, staged implementation beginning with governance frameworks and human capital, supported by targeted infrastructure investment can yield

measurable improvements in institutional effectiveness.

As Nigerian universities navigate increasing competition for students, faculty, and research funding in a global knowledge economy, the ability to leverage data for strategic advantage will likely differentiate thriving institutions from those in decline. This research provides an empirical foundation for the difficult but necessary transition from intuition-based to evidence-based university administration.

Directions for Future Research

1. **Longitudinal panel studies** tracking DDDM implementation and institutional outcomes over time
2. **Experimental or quasi-experimental designs** evaluating specific DDDM interventions
3. **Comparative studies** across African higher education systems to identify regional best practices
4. **Deep ethnographic research** on the organizational culture factors enabling DDDM transformation
5. **Investigation of student outcomes** linked to administrative data use (e.g., retention, graduation rates)

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