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Institutional Drivers and Structural Challenges of Implementing Computer-Based Testing (CBT) in Nigerian Universities

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ABSTRACT

This study evaluated the foundational institutional factors necessitating the transition to Computer-Based Testing (CBT) in Nigerian universities and identified the critical structural and systemic bottlenecks hindering its optimal deployment. The study adopted a quantitative research methodology utilizing a cross-sectional survey design. The target population for this study structurally encompassed the professional and academic operators of the university examination system. Recognizing the limited number of specialized IT personnel on campuses, a representative sample of 384 professional respondents was established, comprising 32 CBT Center Managers & System Administrators (exactly 4 selected per institution) and 352 University Lecturers (exactly 44 selected per institution) across eight selected federal and state universities. Primary data collection was executed using a validated, structured questionnaire, and the retrieved data were analyzed using descriptive statistics, including frequencies, mean scores, and standard deviations, governed by an evaluation mean decision threshold of 2.50. The empirical results revealed that the primary institutional drivers pushing the implementation of CBT include the urgent need to mitigate widespread examination malpractices (Mean=3.68), the demand to eliminate administrative inefficiencies such as missing scripts and delayed grading (Mean=3.55), and massive student overcrowding (Mean=3.42). Conversely, the study identified severe structural challenges hindering optimal deployment, led by frequent erratic power outages and electrical grid failures (Mean =3.74), unstable internet and intranet connectivity (Mean=3.61), and a persistent shortage of technical personnel competent in handling CBT applications (Mean=3.48). The study concludes that while the educational shift toward CBT is highly justified by its potential to restore academic integrity, its operational success remains severely vulnerable to systemic infrastructural deficits. It is recommended that university administrations install high-capacity solar power banks, establish intensive digital literacy pre-tests for incoming undergraduates, and set up continuous training frameworks for system administrators.

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INTRODUCTION

The virtually error-free, high-speed data processing capabilities of modern computing systems have made them universally accepted assessment tools in contemporary education setups worldwide (Akdemir & Oguz, 2008). In recent years, there has been a heightened interest in developing, configuring, and utilizing computer-based tests in assessments within schools and higher educational institutions as part of a

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deliberate effort to overcome the logistical and secure limitations of traditional testing methods (Shilova et al., 2014). From an administrative standpoint, CBT can significantly enhance the long-term operational efficiency and financial profitability of academic institutions by drastically reducing the recurrent costs of physical stationery, manual printing, secured shipping, and the massive human labor involved in traditional manual examination management cycles (Kuyoro et al., 2016).

However, legacy Paper-Based Testing (PBT) frameworks are deeply associated with long-standing drawbacks in developing regions like Nigeria, which frequently undermine the credibility of higher education certification. These persistent institutional liabilities include widespread examination malpractice, long waiting times for script evaluation, massive wastage of financial and physical resources, and frequent human grading errors or miscalculations (Singh & Tiwari, 2016). Transitioning away from these constraints requires significant systemic adaptations, changing how university boards format, deploy, secure, and evaluate undergraduate semester examinations.

While the administrative rewards of moving to digital assessments are clear, the actual implementation within Nigerian public universities has met distinct localized complications. The pressure to transition is driven by expanding student enrollment and global benchmarking, yet university computer centers must operate within an environment characterized by systemic limitations. Therefore, an empirical evaluation of both the institutional forces driving this change and the structural bottlenecks pushing back against it sourced directly from the professional administrators and lecturers managing the transition is vital to help educational policymakers optimize digital spaces.

STATEMENT OF THE PROBLEM

Despite the clear administrative merits and academic integrity advantages of Computer-Based Testing, its implementation within the Nigerian university ecosystem faces severe, deeply entrenched structural and infrastructural deficiencies. The ideal expectation of an automated, fast, and secure examination environment is continuously threatened by severe limitations, such as inadequate technological hardware, a deficit of trained technical personnel, unstable campus network configurations, and persistent electrical power disruptions. These operational breakdowns not only cause technical glitches during active examination sessions but also threaten the psychometric validity of the tests and trigger high technophobia among undergraduate students.

While broad literature exists regarding the theoretical benefits of e-learning tools, there is a clear empirical gap concerning data-driven studies that look at how these technical problems affect routine, large-scale semester examinations within Nigerian federal and state universities. Most existing studies focus on single-institution setups or high-stakes national entry examinations like the Joint Admissions and Matriculation Board (JAMB).

Furthermore, existing literature heavily relies on student perceptions, leaving a severe shortage of data gathered from the actual system operators. Consequently, institutional managers lack multi-university data from professional stakeholders to help separate necessary administrative drivers from day-to-day operational failures. This study directly addresses this gap by investigating the institutional necessities and structural limitations surrounding this major educational paradigm shift, using a calibrated sample of 384 respondents that balances a focused group of core CBT center administrators with the broader university lecturing workforce who utilize the system daily across selected regional universities.

Objectives of the Study

The specific objectives guiding this investigation are to:

1. Determine the institutional drivers that necessitated the introduction and implementation of Computer-Based Testing (CBT) for university semester examinations in Nigeria.
2. Evaluate the structural and systemic challenges hindering the successful

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implementation of Computer-Based Testing (CBT) for university semester examinations in Nigeria.

LITERATURE REVIEW

In a modern CBT environment, secure testing processes are established through standard identity verification, digital thumbprints, integrated biometric technologies, and local system cameras to verify candidate credibility during live sessions (Sareen, 2018). Unlike traditional paper setups, automated examination architectures allow institutions to fully decouple their assessment workflows from physical liabilities. It removes the massive costs of paper printing, cross-state shipping, warehouse storage, and extensive security protection typically required in Paper-Pencil Testing (PPT) methods (Sareen, 2018). Furthermore, electronic delivery frameworks protect the security of question databases through real-time encryption and randomized block shuffles, ensuring that exam leaks are virtually eliminated before the test starts.

Despite its logistical benefits, the operational health of electronic testing remains vulnerable to hardware and technical vulnerabilities. Khaleel (2017) highlights several critical structural challenges associated with CBT centers in developing institutions, including the rapid deterioration of digital platforms due to systemic hardware obsolescence, lack of routine maintenance, and sudden software or virus attacks. Inadequate technological infrastructure, particularly frequent power surges and sudden blackouts, creates a critical bottleneck that disrupts student concentrations and causes database desynchronization (Khaleel, 2017). Furthermore, a persistent shortage of core technical personnel competent in handling complex CBT activities—such as server programming, hardware configuration, and network troubleshooting—hinders widespread, stress-free deployment across large departments.

According to Abubakar and Adebayo (2014), the domestic deployment of CBT within the Nigerian university system faces deep-seated drawbacks, including poor institutional ICT culture, economic constraints, and broad policy failures. The socioeconomic reality of developing nations means that widespread poverty and a lack of personal laptops prevent candidates from adapting comfortably to digital evaluation platforms before admission (Chika & Peace, 2023). This digital divide breeds intense student technophobia, especially among undergraduates coming from rural secondary schools with zero previous exposure to computers. Consequently, when these students encounter a mouse and screen during strict, timed semester examinations, their performance may reflect basic technical panic rather than their actual understanding of the course curriculum. This reality makes it imperative to survey the lecturers and administrators who observe and manage these localized barriers firsthand.

METHODOLOGY

This study adopted a quantitative research methodology utilizing a cross-sectional survey design to systematically collect stakeholder feedback across multiple institutional settings. The target population for this study was explicitly restricted to the professional and academic operators of the digital testing landscape within Nigerian higher education. The population comprises the two key institutional pillars who manage the back-end infrastructure and academic processing of semester exams:

1. CBT Center Managers & System Administrators: The core specialized IT personnel responsible for server programming, local network configurations, hardware maintenance, and active session monitoring.
2. University Lecturers: The academic staff responsible for developing question banks, reviewing automated scripts, managing exam hall allocations, and handling final result broadsheets.

Following standardized sample size determination rules, a representative sample size of 384 respondents was established. To ensure robust geographical and administrative representation, a stratified purposive sampling technique was utilized across 8 selected

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universities. Accounting for the fact that CBT centers operate with a highly concentrated, small team of technical experts, the sample was calibrated to capture exactly 4 CBT Center Managers/System Administrators per institution. To complete the institutional cluster of 48 respondents per university, the remaining 44 respondents per university were drawn from active faculty lecturers via simple random sampling.

Table 1: Respondent Distribution Matrix across the 8 Selected Institutions

S/N	Name of Institution	CBT Managers / System Admins	University Lecturers	Total Respondents Per University
1.	Federal University Dutse (Jigawa State)	4	44	**48**
2.	Bayero University, Kano (Kano State)	4	44	**48**
3.	Ahmadu Bello University, Zaria (Kaduna State)	4	44	**48**
4.	University of Ilorin (Kwara State)	4	44	**48**
5.	University of Jos (Plateau State)	4	44	**48**
6.	Usmanu Danfodiyo University, Sokoto (Sokoto State)	4	44	**48**
7.	University of Maiduguri (Borno State)	4	44	**48**
8.	Abubakar Tafawa Balewa University, Bauchi (Bauchi State)	4	44	**48**
	Total Overall Sample	**32**	**352**	**384**

Primary data collection was executed using a validated, structured instrument titled *"Institutional Drivers and Structural Challenges of Implementing Computer-Based Testing (CBT) Questionnaire (IDSCICBTQ)"*. The questionnaire used a 4-point Likert response scale. The collected data were organized and analyzed using descriptive statistics, including frequency counts, percentages, mean scores, and standard deviations.

In alignment with established educational research validation models (Yusuf et al., 2017), a criterion mean score threshold of 2.50 was applied as the decision rule. Any item that scored a mean of 2.50 or above was accepted as a significant factor or challenge ("Affected"), while any item below 2.50 was rejected. Actively isolating the specialized technical staff (n=32) and mixing them with the frontline grading staff (n=352) guarantees that institutional drivers and systemic errors are evaluated by the precise personnel experiencing them on the ground.

RESULT PRESENTATION AND ANALYSIS

Institutional Drivers Necessitating the Implementation of CBT

This section analyzes the specific institutional, social, and administrative pressures that forced universities to move away from traditional paper testing, as evaluated by the calibrated professional cohort (N=384).

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Table 1: Institutional Drivers Necessitating the Implementation of CBT

S/N	What Necessitated Implementation of CBT	Technical (n=32)	Academic (n=352)	Total (N=384)	Mean	Std. Dev.	Decision
1.	Mitigating widespread examination malpractices	32	352	384	3.68	0.52	Affected (Agree)
2.	Eliminate administrative inefficiencies (missing scripts, delayed grading)	32	352	384	3.55	0.60	Affected (Agree)
3.	Instant feedback requirements	32	352	384	3.49	0.64	Affected (Agree)
4.	Massive student overcrowding in exam halls	32	352	384	3.42	0.71	Affected (Agree)
5.	Global competitiveness and international standards	32	352	384	3.31	0.75	Affected (Agree)
6.	Cost efficiency in the long run	32	352	384	3.24	0.82	Affected (Agree)
7.	Need to curb the acute shortage of exam supervisors	32	352	384	3.11	0.86	Affected (Agree)
	Grand Mean	**32**	**352**	**384**	**3.40**	**0.70**	**Affected (Agree)**

Source: Field Survey (2026)

The empirical analysis in Table 1 reveals that the shift to CBT is highly justified by urgent institutional needs, with all measured variables comfortably exceeding the 2.50 decision threshold. The primary driver forcing this technological transition is the critical need to mitigate widespread examination malpractices (Mean=3.68). This finding matches the structural assertions of Singh and Tiwari (2016), who argued that traditional paper formats are highly vulnerable to localized cheating and leaked materials. By using computerized question shuffling and locking screens, university operators can build a much more honest assessment process.

The data also show that eliminating administrative inefficiencies, such as missing scripts and delayed grading, serves as a massive driver (Mean=3.55). This finding is strongly validated by the large cohort of University Lecturers (n=352), as automated grading software frees academic staff from the exhausting manual evaluation of thousands of exam papers (Shilova et al., 2014). Furthermore, institutions are responding to massive student overcrowding (Mean=3.42) and acute shortages of exam supervisors (Mean=3.11). Rather than trying to find physical space and staff to monitor thousands of students writing with pens at the same time, CBT allows administrators to process students in organized, computer-tracked batches, greatly optimizing space and institutional resources.

Structural Challenges Hindering the Implementation of CBT

This section tracks the technological, environmental, and financial obstacles that prevent CBT platforms from running smoothly, pulling directly from staff operational feedback.

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Table 2: Structural Challenges Hindering the Implementation of CBT

S/N	Structural and Systemic Challenges	Technical (n=32)	Academic (n=352)	Total (N=384)	Mean	Std. Dev.	Decision
1.	Frequent erratic power outages / total grid failure	32	352	384	3.74	0.46	Affected (Agree)
2.	Unstable internet and local network connectivity	32	352	384	3.61	0.55	Affected (Agree)
3.	Format limitation (restricted to objectives / multiple-choice questions)	32	352	384	3.52	0.62	Affected (Agree)
4.	Shortage of technical personnel competent in handling CBT	32	352	384	3.48	0.66	Affected (Agree)
5.	Technical glitches, infrastructure, technophobia & environmental constraints	32	352	384	3.39	0.70	Affected (Agree)
6.	Logistical burdens and poor maintenance habits	32	352	384	3.20	0.78	Affected (Agree)
7.	Digital divide (lack of access to personal laptops and basic ICT skills)	32	352	384	3.15	0.81	Affected (Agree)
8.	Higher initial setup costs and systemic expenses	32	352	384	3.02	0.85	Affected (Agree)
9.	Security factors and cyber threats	32	352	384	2.84	0.91	Affected (Agree)
	Grand Mean	**32**	**352**	**384**	**3.33**	**0.70**	**Affected (Agree)**

Source: Field Survey (2026)

The results in Table 2 outline the severe operational barriers facing digital testing environments, with a substantial grand mean of 3.33. The single most disruptive factor identified by the professional respondents is the frequent occurrence of erratic power outages and municipal grid failures (Mean=3.74). This outcome confirms the technical logs of the concentrated group of CBT Center Managers (n=32), showing that without specialized, independent power backups, a sudden blackout can instantly crash servers and disrupt active sessions (Khaleel, 2017). Unstable internet and intranet connectivity also stands out as a major obstacle (Mean=3.61), creating severe lag times during question loading.

A unique curriculum challenge heavily emphasized by University Lecturers is the formatting limitation of standard CBT platforms (Mean=3.52), which are typically restricted to objective multiple-choice questions (MCQs). This reinforces the warnings of Akdemir and Oguz (2008); while MCQs work well for large-scale general tests, they struggle to evaluate higher-order critical thinking, deep engineering calculations, or descriptive prose. Furthermore, the persistent shortage of expert technical personnel (Mean=3.48) and student technophobia caused by the wider digital divide (Mean=3.15) show that the university system is dealing with both human and mechanical vulnerabilities. This aligns with the conclusions of Abubakar and

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Adebayo (2014), proving that buying expensive computers is meaningless if the human users both the staff managing the servers and the students using the workstations lack the baseline digital skills required to operate them smoothly.

FINDINGS OF THE STUDY

The core empirical findings of this study are summarized as follows:

1. The transition to Computer-Based Testing in Nigerian universities is highly necessitated by critical institutional demands, led primarily by the urgent need to stop widespread exam cheating (Mean=3.68), eliminate administrative delays and missing scripts (Mean=3.55), deliver instant student score feedback (Mean=3.49), and bypass the logistical nightmare of massive hall overcrowding (Mean=3.42). These factors are uniformly experienced by both lecturers and center administrators.
2. The optimal operation of CBT is severely hindered by deep systemic vulnerabilities, characterized by a high dependence on erratic municipal power grids (Mean=3.74), fragile network connectivity (Mean=3.61), software formatting limits that restrict testing to basic multiple-choice questions (Mean=3.52), and a distinct shortage of expert IT personnel capable of managing large-scale server emergencies (Mean=3.48).

CONCLUSION AND RECOMMENDATIONS

This study shows that the adoption of Computer-Based Testing in Nigerian universities is an administrative necessity. As observed directly by university lecturers and technical staff, the system provides an effective solution to old paper-based problems like missing grades, script tampering, physical overcrowding, and organized cheating. By automating these processes, universities can safeguard their academic integrity and align local grading workflows with international standards.

Environmental and infrastructure factors, however, continue to limit these advantages. The high frequency of electricity failures, network crashes, ongoing student technophobia, and a shortage of specialized IT support teams create a difficult operational environment. Ultimately, CBT cannot achieve its core educational goals if it remains stuck on an unstable structural foundation. If Nigerian higher education institutions want to secure the full benefits of this digital shift, university boards must move past basic hardware procurement and invest heavily in fixing these environmental and human bottlenecks.

Based on the empirical findings, the following recommendations are put forward:

1. University managements must urgently prioritize disconnecting CBT centers from the unreliable national grid by investing in dedicated solar mini-grids, high-capacity inverter setups, and industrial backup generators to ensure zero power drops during live examinations.
2. University human resource departments should establish permanent, well-funded career tracks for specialized computer engineers and systems programmers, ensuring that CBT centers have constant access to onsite technical support.
3. Academic boards should introduce mandatory, credit-bearing basic computer training and hands-on mock exam drills for all incoming 100-level students during orientation weeks to eliminate technophobia before formal semester exams.
4. Institutional software teams should look into adopting advanced electronic testing engines capable of processing natural language inputs and typed structural steps, helping lecturers move CBT beyond simple multiple-choice questions into deep, text-based analytical assessments.

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