IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN QUALITY MANAGEMENT IN HIGHER INSTITUTIONS OF LEARNING IN NIGERIA

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CERTIFICATION

We, the Undersigned, certify that this study was conducted by Isioma Favour AZU, Mat. No. EDU20016111 in the Department of Educational Management, Faculty of Education, University of Benin, Benin City, Nigeria. It is adequate in contents and context to meet the requirements for the award of Bachelor of Science of Education BSc. (Ed) in Economics and Statistics Education.

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DEDICTATION

I dedicate this project to my parents, Mr. Sunday Azu and Mrs. Joy Azu for their sponsorship of this programme as well as their loving kindness.

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ABSTRACT

This study investigated the Impact of Facilities Utilization on Motivation of Student Learning in Ikpoba-Okha Local Government Area with a case of Army Day Secondary School, Ikpoba Hill, Benin City. Five research questions were raised and answered

The research employed a survey research. The population of the study comprised 301,447 inhabitants of various villages and towns of Ikpoba Okha Local Government Area in Edo South Senatorial District.

The research instrument titled "Impact of Facilities Utilization on Motivation of Student Learning" was used for the collection of data for this study. The instrument carried questions for oral interviews and brainstorming. The instruments were scrutinized by the research supervisor and validated by an expert in measurement and evaluation in the Faculty of Education University of Benin, Benin City. The instruments were not subjected to reliability test because they

contained items for oral questions, brainstorming, interviews and surfing the internet.

The findings of the revealed It was revealed that the findings on working environment in the Army Day Secondary School, Ikpoba Hill, Benin City was found to be very deplorable at the time of this research.

It was found that the inside and outside view of classroom blocks were badly damaged by students. Especially when they engage in fighting between students of Western Boys Secondary School and Army Day Secondary School, Ikpoba Hill, Benin City.

Moreover, it was found that there is no access to Army Day Secondary School, Ikpoba Hill, Benin City. Both staff and students have to manage to pass through alternative pathway at the back of the school buildings because the former road which has the security post was blocked by erosion.

Furthermore, the study also discovered It was found that students hardly settle comfortably in their classrooms due to dilapidation. Hence, they have opportunity to troop out to Lucky Way Road across to Western Boys Secondary

School to engage in fighting and destruction of property. Sometimes they stone passerby and moving vehicles with reckless abandon.

It was also found that the school authorities were overwhelmed by indiscipline of the student in this school in 2022. It was compelled to close down and moved JSS1 to JSS 3 to Army Children School Located within the Army Barracks.

Based on the findings of the study it was be concluded that there is Impact of facilities utilization on motivation of student learning in Ikpoba-Okha Local Government Area especially in Army Day Secondary School, Ikpoba Hill, Benin City in Edo South Senatorial District which was studied. The school environment inundated with antiquated facilities could not motivate students to settle down and learn. Rather, they were prune to misbehaviours.

It was recommended that there should be parameter fencing of this secondary school to ensure control; the environment of the school should be made conducive for teaching and learning; the Nigerian Army should ensure the provision of access roads to the school.

CHAPTER ONE
INTRODUCTION

Background to the study

Overtimes there has been aspersion about the quality of higher education in Nigeria. For instance, in the Universities, Polytechnics, Monotechnics, Colleges of Education, Schools of Nursing, Schools of Health Technology and Colleges of Agriculture there were incidence of closures arising from industrial disputes and strikes. Central in industrial disharmony was poor conditions of service and meagre salaries and fringe benefits. In majorly of cases pensions were not paid on time. All these exacerbated the level of hardships and protests in the country (Adepegba, Odeniyi and Ikokwu, 2024). Things have not been going on smoothly even in Nigeria's universities which constitute the zenith in educational management in the county. When the top sneeze, the periphery will shiver.

On account of frequent shut down of institutions because of industrial crises, management processes. Even researches and community service will be put on hold. The aftermath will heavy backlogs of workloads of which the disenchanted workforce will required to execute for continuation of the system. Policies have been made but flaunted with reckless abandon. So, Nigerian universities and other higher institutions are always complaining of paucity of funds to run the myriad of programmes. Government institutions catered for became the worst hit. This goes a long way to inhibit the quality of education.

It was observed that in Nigeria, education has been adopted as instrument per excellence for national development. In this country it is believed that education is capable of fostering socio-political, economic and technological transformation of the nation the education systems aims at providing knowledge, skills and competencies to all Nigerians so that individuals will be capable of working and contributing to national development. The Nigeria's Government position is stated in the National Policy on Education (2014) is that education is compulsory for every Nigerian citizen and it is qualitative, comprehensive, functional and relevant to the needs of the society (Federal Republic of Nigeria

(FRN)-2014. By implication education of high quality should be comprehensive, functional, qualitative and relevant to the needs of the society as encapsulated in the National Policy Objectives [Fasasi and Ijaiya (2017) in Ilubor, Abdulkareem, Alabi, and Adeyanju, (Edition), 2017].

Howbeit, Nigeria is plagued by quality challenges in its educational system of 9,3,4. Over the last few years, poor academic performance, poor skill acquisition and production of incompetence of Nigeria's graduates prevailed. The major cause of mass failure was attributed to lack of quality teaching, research and community service. Lack of qualified lecturers (especially as many professors and a poor teaching were retiring with no immediate replacement), and a poor teaching and learning environment accentuated the ugly situation. To deal with quality challenges, Obanya (2008) in Olubor et al (2017) stated that Nigeria would need to build Quality Management Mechanism (QQM) in educational delivery services. Quality Management Mechanism is a process which involves both higher institutions and Nigerian Government at three levels. When quality dwindles, the educational systems becomes dysfunctional.

There is a tendency that the mobilization of resources towards qualitative education delivery as well as achievement of educational aims and objectives are the functions of high-quality supervision and inspection. Quality management in education calls for upholding the fundamentals and eliminating anomalies of School Supervision and inspection on the one hand. On the other hand, mobilizing Information and Communication (ICT) resources. Howards achievement of education quality and objectives is a panacea for poor performance in higher institutions of learning in Nigeria. ICT are versatile and powerful technologies. They can assist individuals, groups and organizations in many different ways to attain high quality.

Statement of the Problem

It appears that overtimes, education managers could not make use of ICT to drive their functions. To make effective use of these versatile and powerful technologies, educational organisations need to understand their capabilities. For example, Lucy (2014) was of the view that ICT can assist an organization with its data storage, and processing, with the flows of information in and around the

organization, in the control and management of the organization and in establishing internal links with business partners, students, customers, government agencies and suppliers. Broadly, ICT can be viewed as facilitating, replacement and enhancement technologies. As facilitating technologies, the Internet and World Wide Web (WWW) facilitate people in communicating and accessing remote information from worldwide sources and hence remove the constraints of time and distance. ICT also facilitate human in the analysis of complex information. Besides, they have the potential to facilitate the emergence of virtual forms of business operations (e.g. as in commerce as well as e-learning).

Example of ICT impact as replacement technologies include robots in car assembly line tasks and computer automation in universities and banking institutions (where computers replace people in certain business processes). ICT can be programmed to automate certain routine mechanical, business and administrative operations, thus replace human, totally or partially.

In a nutshell, ICT based Computer systems enhance the effectiveness of managers and administrators through enabling effective information management,

business coordination, control, decision making and strategic planning ICT also enhance organizational communication through email, video conferencing and chatroom facilities on the internet. In addition, they enhance the ability of humans to access and analyse data efficiently.

Very regrettably, ICT and technology in general are not always used in benign and progressive ways. For example, the internet has been widely used for the illegal downloading of Copyrighted Music, Research and Yahoo Plus and it is in danger of being clogged by so called Spam, which is the term for unwanted and junk emails.

This problem is becoming so acute that in 2004, Yahoo, AOL and Microsoft joined in a class action to try to put the Spam Sender out of business. Also, in 2004 the United Kingdom (UK), Trade Union Congress (TUC) reported on the problems in the workplace caused by electronic monitoring of employees which it is claimed causes stress and loss of productivity. Universities in Nigeria were of the opinion whether they should employ Information Technology (IT) to monitor illicit activities of employees during official hours.

Research Questions

The following research questions were raised and answered directly:

1. Are ICT employed to carry out business operations in higher institutions of learning in Nigeria?
2. Are ICT employed to carry out accreditation exercises in higher institutions of learning in Nigeria?
3. Does Nigeria's Government in conjunction with National Universities Commission (NUC) use ICT at any time to check fraud in higher institutions of learning in the country?
4. Has Nigeria's Government utilized ICT to check ghost workers in the payrolls of higher institutions of learning in the country?
5. Have the authorises of the higher institutions in Nigeria ever used ICT to check examination malpractices in commonplace?
6. Has ICT been used in Nigeria's higher imitations of learning to check sexual immorality in commonplace?

7. Has ICT been used to conduct virtual meetings in higher institutions of learning in Nigeria?
8. Does NUC empowered higher institutions to utilize e-learning in teaching?

Purpose of the Study

The main purpose of the study is to investigate the impact of ICT on quality management in higher institutions of learning in Nigeria. Specifically, the study was undertaken to find out: -

1. The extent ICT are employed to carry out business operations in higher institutions of learning in Nigeria.
2. Whether ICT are utilized in accreditation exercises in higher institutions of learning in Nigeria.
3. Whether regulatory authorities utilize ICT to check fraud in higher institutions in Nigeria.

4. The extent the government in conjunction with NUC and other regulatory bodies use ICT to check ghost workers in the payrolls of higher institutions in the country.
5. The extent of application of ICT to curb examination malpractices in higher institutions of learning in Nigeria.
6. Whether ICT are used to curb incidence of sexual misconduct in higher institutions in Nigeria.
7. The extent virtual meetings are conducted in higher institutions of learning in Nigeria.
8. Whether e-learning is utilized to teach in higher institution of learning in Nigeria.

Significance of the Study

The study tried to establish the crucial role of ICT in supporting quality management and administration in higher institutions of learning in Nigeria. This is a digital era. This is critical because it will cover all areas of school administrator's responsibilities carried out to ensure quality management. These

responsibilities include student personnel management, staff personnel management, community-school relationship, instruction and curriculum development, school plant management and general tasks (Peretomode, 2008). None of these areas that does not need the application of ICT to ensure quality management of the institutions to accomplish organizational objectives ever exists.

Critical as it appeared, ICT has gained popularity over the past 50 years globally and this has led to changes in the ways and manner higher institutions carry out their activities and processes in teaching, research and community service. ICT help the administrators to monitor staff and students' progress and it has great impact on the educational administration processes in the institutions. ICT has been defined as technology that supports activities involving the creation, storage, manipulation and communication of information. The application and usage of ICT has led to the emergence of different tools and forms of microelectronics and tele-communication such as computers of different types, internet, digital printers, mobile technology which enable school administrators to create, record, store, process, retrieve and transmit information effectively and efficiently.

In higher educational administration, ICT is employed for the development of electronic applications for the management of administrative transactions, records and the rendering of well-organized and prompt information services (i.e. electronic register, electronic curriculum, digital lesson materials, electronic monitoring of school progress and other administrative functions (Adebayo, 2013).

Further researcher will benefit from the findings of this study because it would add to existing literature on the capabilities of ICT and how they could be employed to support quality management in higher institutions in Nigeria.

Scope and Delimitation of the Study

The study covered impact of ICT on quality management in higher institutions in Nigeria. Such higher institutions range from universities, polytechnics, monotechnic, colleges of education, schools of nursing, schools of heath technology and colleges of agriculture in Nigeria. But the study will be delimited to universities, polytechnics and colleges of education in Akwa Ibom State of Nigeria.

Definition of Terms

The following terms were defined operationally as used in this study:

1. ICT (Information and Communication Technology): ICT refers to the various technologies used to handle telecommunications, broadcast media, audio-visual processing and transmission systems, intelligent building management systems, and network-based control and monitoring functions. It encompasses all technologies that enable the processing, storage, retrieval, transmission, and exchange of information.
2. Quality: Quality refers to the standard or degree of excellence of something, often measured against established benchmarks. In products or services, quality typically involves meeting specific criteria such as functionality, reliability, durability, and customer satisfaction.
3. Quality Assurance: Quality Assurance (QA) is a systematic process designed to ensure that products or services meet specified quality standards consistently. It involves planning, monitoring, and reviewing activities to prevent defects and ensure the quality of output meets the requirements set by the organization or industry.

4. Quality Management: Quality Management is the process of overseeing all activities and tasks needed to maintain a desired level of excellence. It includes the determination of a quality policy, creating and implementing quality planning and assurance, quality control, and quality improvement. It is a comprehensive approach that involves everyone in the organization, from top management to the workforce.
5. Communication: Communication is the process of exchanging information, ideas, thoughts, or feelings between individuals or groups. It can occur through various means such as spoken or written language, body language, or digital media, and is essential for collaboration, decision-making, and building relationships.
6. New Technologies: New Technologies refer to the latest advancements and innovations in technology, often involving the development of new tools, systems, and processes that improve or transform existing ways of doing things. These can include breakthroughs in fields such as artificial intelligence, biotechnology, nanotechnology, and renewable energy, among others.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter dealt on review of related literature and theoretical framework of the study under the following sub-headings:

- Theoretical Framework
    - Theory of Quality Management
- Concept of Information and Communication Technology (ICT)
- Quality
- Quality Assurance in Nigeria's Universities
- Higher Education in Nigeria
- Accreditation of Higher Educational Institutions in Nigeria

- Capabilities of ICT in Business Management
- Contemporary (New) Technologies
- Summary of Review Literature

Theoretical Framework

The Theory of Quality Management (TQM) represents a cornerstone in contemporary business management, emphasizing the continuous enhancement of organizational processes to boost product and service quality, elevate customer satisfaction, and drive overall business performance (Hackman & Wageman, 1995). Over time, this theory has evolved, incorporating ideas from various quality management experts and adapting to the changing business landscape.

Historical Context

The origins of quality management can be traced to the early 20th century, with significant advancements emerging after World War II. W. Edwards Deming, Joseph Juran, and Philip Crosby are frequently cited as the pioneers of the quality

movement (Powell, 1995). Deming, in particular, made a substantial impact with his 14 Points for Management, which underscored the importance of continuous improvement, leadership commitment, and employee empowerment (Deming, 1986). His contributions, particularly during the 1950s in Japan, were instrumental in Japan's economic resurgence and industrial success (Walton, 1986).

Core Principles of Quality Management Theory

The Theory of Quality Management encompasses several foundational principles:

1. Customer Focus: Organizations should prioritize meeting and surpassing customer expectations, recognizing that customer satisfaction is vital for long-term success (Dean & Bowen, 1994).
2. Continuous Improvement: Known as Kaizen in Japanese management, this principle advocates for relentless efforts to enhance products, services, and processes (Imai, 1986).

1. 3.Total Employee Involvement: Quality is a collective responsibility, highlighting the need to empower employees at all levels to contribute to quality enhancement efforts (Wilkinson et al., 1998).
3. Process-Centred Approach: TQM emphasizes improving processes rather than merely focusing on end results, understanding that consistent quality stems from well-designed and controlled processes (Oakland, 1989).
4. Integrated System: Quality management should permeate all facets of an organization, from strategic planning to daily operations (Flynn et al., 1994).
5. Strategic and Systematic Approach: Quality initiatives should align with the organization's strategic objectives and be implemented in a systematic manner (Garvin, 1988).
6. Fact-Based Decision Making: Decisions should be grounded in data and analysis rather than conjecture or intuition (Hackman & Wageman, 1995).
7. Communication: Effective communication at all organizational levels is essential for the successful implementation of quality management (Kaynak, 2003).

Key Methodologies and Tools

To apply the principles of quality management, several methodologies and tools have been developed:

1. Six Sigma: A data-driven method aimed at eliminating defects and reducing process variability (Schroeder et al., 2008).
2. Lean Manufacturing: Focuses on minimizing waste while maximizing productivity (Womack & Jones, 1996).
3. Total Quality Management (TQM): An all-encompassing approach that integrates all quality-related functions and processes within an organization (Powell, 1995).
4. ISO 9000 Series: International standards for quality management systems (Casadesús & Karapetrovic, 2005).
5. Quality Circles: Small groups of employees who regularly meet to address and resolve work-related issues (Ishikawa, 1985).
6. Statistical Process Control (SPC): Utilizes statistical methods to monitor and control processes (Montgomery, 2007).

Impact on Organizational Performance

Research has demonstrated the significant impact of quality management practices on organizational performance. Kaynak (2003) found that TQM practices directly and indirectly influence various performance metrics, including financial results, market performance, and inventory management. Powell (1995) contended that the economic benefits of TQM are less about the tools and techniques themselves and more about intangible aspects such as organizational culture, employee empowerment, and executive commitment.

Challenges and Criticisms

Despite its widespread acceptance, TQM has faced criticism:

1. Implementation Challenges: Many organizations encounter difficulties in practically applying quality management principles (Beer, 2003).
2. Excessive Focus on Process: Some critics argue that an overemphasis on processes can lead to rigidity and hinder innovation (Sitkin et al., 1994).
3. Cultural Barriers: Practices developed in one cultural context may not easily translate to others (Kull & Wacker, 2010).

4. Measurement Difficulties: Quantifying the impact of quality management efforts can be challenging, complicating the justification of investments (Harari, 1993).

Future Directions

The Theory of Quality Management continues to adapt to new business realities:

1. Integration with Digital Technologies: TQM increasingly incorporates digital technologies, big data analytics, and artificial intelligence (Wamba et al., 2015).
2. Sustainability: There is a growing emphasis on integrating sustainability principles into quality management practices (Siva et al., 2016).
3. Service Quality: As economies shift toward service-oriented models, TQM is expanding to address service quality issues more effectively (Parasuraman et al., 1988).
4. Global Supply Chains: TQM is evolving to tackle the challenges of managing quality across complex global supply chains (Foster, 2008).

The Theory of Quality Management has profoundly shaped modern management practices, offering a framework for enhancing processes, products, and services. While it faces challenges and criticisms, its core principles remain relevant in today's dynamic business environment. The ability to effectively adapt and apply TQM principles will continue to be crucial for achieving a sustainable competitive edge.

Concept of Information and Communication Technology (ICT)

Information and Communication Technology (ICT) is a broad term encompassing all technologies used for processing and communicating information. It represents the integration of audio-visual and telecommunication networks with computer networks through unified cabling or connectivity systems (Zuppo, 2012). ICT has become essential in contemporary society, transforming how we live, work, and interact.

Historical Context

The concept of ICT began to take shape in the mid-20th century with the development of electronic computers. It gained prominence in the 1970s with the rise of personal computers and the internet (Melody et al., 1986). The term "ICT" became widely used in the 1980s, particularly in the UK, to emphasize the importance of communication alongside information technology (Stevenson, 1997).

Key milestones in ICT's evolution include:

1. 1946: Development of ENIAC, one of the first electronic general-purpose computers.
2. 1969: Creation of ARPANET, the precursor to the internet.
3. 1971: Invention of the microprocessor.
4. 1981: Introduction of the IBM Personal Computer.
5. 1989: Invention of the World Wide Web by Tim Berners-Lee.
6. 1993: Release of the first web browser, Mosaic.
7. 2007: Launch of the iPhone, marking the beginning of the smartphone era.

Core Components of ICT

ICT comprises several key components:

1. Hardware: Physical devices like computers, smartphones, servers, and network equipment (Laudon & Laudon, 2021).
2. Software: Programs and applications running on hardware, including operating systems, productivity tools, and specialized applications (O'Brien & Marakas, 2011).
3. Networks: Systems that connect devices and facilitate data exchange, including the internet, local area networks (LANs), and wide area networks (WANs) (Tanenbaum & Wetherall, 2011).
4. Data: Information processed, stored, and transmitted by ICT systems (Laudon & Laudon, 2021).
5. People: Users, developers, and managers who interact with and maintain ICT systems (Hevner et al., 2004).
6. Processes: Procedures and policies governing the use and management of ICT resources (Ward & Peppard, 2002).

Key Areas of Application

ICT has diverse applications across various sectors:

1. Business: E-commerce, enterprise resource planning (ERP), customer relationship management (CRM) (Turban et al., 2018).
1. 2.Education: E-learning, educational software, learning management systems (LMS) (Anderson, 2008).
2. Healthcare: Electronic health records (EHR), telemedicine, medical imaging (Haux, 2006).
3. Government: E-governance, digital public services, smart cities (Yildiz, 2007).
4. Entertainment: Digital media, video streaming, online gaming (Flew, 2014).
5. Communication: Social media, instant messaging, video conferencing (Boyd & Ellison, 2007).
6. Transportation: GPS navigation, traffic management systems, autonomous vehicles (Dimitrakopoulos & Demestichas, 2010).

Impact on Society and Economy

The rise of ICT has profoundly impacted both society and the economy:

1. Globalization: ICT has facilitated global communication and trade, enhancing economic integration (Castells, 2010).
2. Digital Divide: While ICT has opened up new opportunities, it has also underscored disparities in technology access (van Dijk, 2006).
3. Employment: ICT has reshaped labor markets by creating new jobs and automating others (Brynjolfsson & McAfee, 2014).
4. Privacy and Security: The growth of ICT has raised concerns about data privacy and cybersecurity (Solove, 2011).
5. Knowledge Society: ICT

Future Trends in Information and Communication Technology (ICT)

Several emerging trends are set to redefine the future landscape of ICT:

1. Internet of Things (IoT): The widespread integration of everyday objects with the internet, enabling seamless communication between devices (Atzori et al., 2010).
2. Artificial Intelligence and Machine Learning: The advancement of intelligent systems capable of learning from data and making decisions autonomously

(Russell & Norvig, 2016).

3. 5G and Beyond: The upcoming generations of wireless communication technologies promise faster speeds and more reliable connections (Andrews et al., 2014).
4. Cloud Computing: The provision of computing services via the internet, allowing for scalable resources and enhanced flexibility (Armbrust et al., 2010).
5. Blockchain Technology: A decentralized system for secure and transparent record-keeping, revolutionizing areas such as finance and supply chain management (Tapscott & Tapscott, 2016).
6. Quantum Computing: A breakthrough in computing that leverages quantum mechanics to solve complex problems at unprecedented speeds (Nielsen & Chuang, 2010).

ICT has fundamentally reshaped modern society, revolutionizing communication, work, and daily life. As these technologies continue to evolve, they promise to bring even greater transformations across all sectors. However, as ICT becomes more ingrained in society, it is essential to address the challenges it

poses, ensuring equitable access to its benefits while mitigating any potential drawbacks.

Concepts of Quality and Quality Assurance

The concept of quality has been defined in numerous ways. According to Hornby (2004), quality refers to "the standard of something when compared to other similar things, whether it is good or bad." Similarly, Ijaiya (2001) describes quality as "something everyone perceives as good and desires to possess."

In the context of Nigerian university education, quality is a multifaceted concept that should encompass all aspects of the institution's functions and activities. This includes teaching and academic programs, research, grants, student services, staff, facilities, equipment, buildings, community engagement, and the academic environment as a whole (UNESCO, 1998).

Quality in education signifies the degree to which an educational system meets established standards and effectively utilizes available inputs to deliver the desired outcomes (Fadipe, 1999). Achieving high-quality education, particularly in tertiary institutions, is crucial for thriving in today’s globalized world. This

requires continuous assessment and improvement to meet world-class standards. The quality of education is vital to the development of any society, and for this reason, it is prioritized by developing nations. The Nigerian government, like others worldwide, places significant emphasis on ensuring quality assurance at the university level, with the aim that graduates will be confident in their skills and well-prepared for the workforce.

Quality Assurance, therefore, is the process of consistently meeting the necessary standards. In the context of education, it involves ensuring that institutions produce graduates with the skills required by the workforce. The quality of an academic program is crucial, as graduates often become employees in other academic or industrial settings (Ijeoma & Osagie, 2005). Okebukola (2004) sees quality assurance in Nigerian universities as an ongoing process of enhancing teaching and learning. This is achieved through both internal and external mechanisms that ensure universities meet, maintain, and exceed the Minimum Academic Standards (MAS) guidelines.

Quality assurance refers to a planned and systematic evaluation process

carried out by institutions to ensure that they meet acceptable standards. It fosters confidence that educational programs adhere to and improve upon required standards (UNESCO, 2006).

Overview of Quality Assurance Issues in Nigerian Universities

Higher education is the foundation of any society, and the quality of a nation's higher education system determines the calibre of its human resources. Recognizing this, the Nigerian National Policy on Education (FGN, 2004) outlines several objectives for university education. These include:

- Expanding and diversifying programs to foster the development of high-level manpower.
- Designing course content that reflects the country's national priorities.
- Incorporating general education courses, such as the history of ideas, philosophy of knowledge, and nationalism, into university curricula to foster well-rounded graduates.

However, these objectives have largely gone unrealized. Babalola (2001) notes that insufficient funding for teaching, research, and community service has

hindered progress. Nigerian university libraries often lack adequate and relevant books, laboratories are under-equipped, and classrooms are overcrowded. Furthermore, there is a shortage of qualified lecturers in many universities, which negatively impacts the quality of education. Employers have frequently reported dissatisfaction with Nigerian university graduates, citing concerns that many are not adequately prepared for the workforce and are perceived as "half-baked" (Ajayi, 2004).

One of the most significant challenges facing Nigerian universities is the issue of over-enrolment. The National Universities Commission (NUC, 2006) reports that student enrolment increased from over 2,000 in 1962 to 720,235 in 2006, straining the existing infrastructure and resources.

While Nigerian universities are tasked with producing skilled graduates who can contribute to national development, they face significant quality assurance challenges. These challenges include inadequate funding, a shortage of resources, and a growing student population that has outpaced the expansion of facilities. Addressing these issues will be critical to improving the quality of higher

education in Nigeria and ensuring that universities can meet their educational objectives.

Table 1: Enrolment Growth in Nigeria Universities between 1999 – 2009

Academic Session	No. of Applicant	No. Admitted	%Admitted	No. of Unplaced Applicants
1999/2000	418,292	64,368	15:39	353,924
2000/2001	416,381	45,766	10:99	270,615
2001/2002	714,548	90,769	12:70	623,779
2002/2003	994,380	51,845	5.21	942,535
2003/2004	1,046,950	105,157	10,04	941,793
2004/2005	841,878	122,492	14.54	719,386
2005/2006	916,371	65,609	7.16	850,762
2006/2007	803,472	123,626	15	679,846
2007/2008	911,653	119,195	13	792,458
2008/2009	1,054,060	127,082	12	926,978

Source: Joint Admission and Matriculation Board, 2008

The significance of university education in an individual's life, particularly as a pathway for social mobility, personal growth, and self-fulfillment, has become widely recognized, as highlighted in Table 1. Nigeria boasts the largest university system in sub-Saharan Africa (NUC, 2006). However, despite this expansive framework, the federal government, which is responsible for funding public universities, has not substantially increased the proportion of the national budget allocated to education over the past decade, even as student enrollment has surged, as seen in Table 2.

From 2003 to 2013, education spending fluctuated, comprising 8.21 percent of the national budget in 2003, decreasing to 6.42 percent by 2009, and then rising to 8.7 percent in 2013. In 2014, the government made a notable improvement, raising the education allocation to 10.7 percent of the overall budget. However, this upward trend was short-lived, as recent reports indicate that the current allocation has fallen back below 10 percent, largely due to the economic crisis triggered by falling oil prices (World Education News Review, 2017). The sustainability of higher education funding remains a pressing concern.

Table 2: Enrolment growth in Nigeria Universities between 2010 and 2015

Academic Section	Number of Applicant	Number Admitted
2009/2010	1.5m	423,531
2010/2011	1.64m	417,341
2011/2012	1.63m	477,176
2012/2013	1.92m	463,355
2013/2014	1.79m	437,707
2014/2015	1.61m	485,338

Source: Joint Admission and Matriculation Board, 2015

Recent developments in Nigeria's university system suggest that the quality assurance mechanisms in place are not meeting expectations. This is especially concerning when one considers Nigeria's historical role as a hub for university education in West Africa. Unfortunately, the once internationally respected Nigerian university education is rapidly losing its esteem both in the job market and within society. A growing perception is that graduates lack the necessary skills and competencies in their fields of study (Omoregie, 2008).

The Honourable Minister of Education has expressed disappointment that many foreign universities are hesitant to accept Nigerian university degrees,

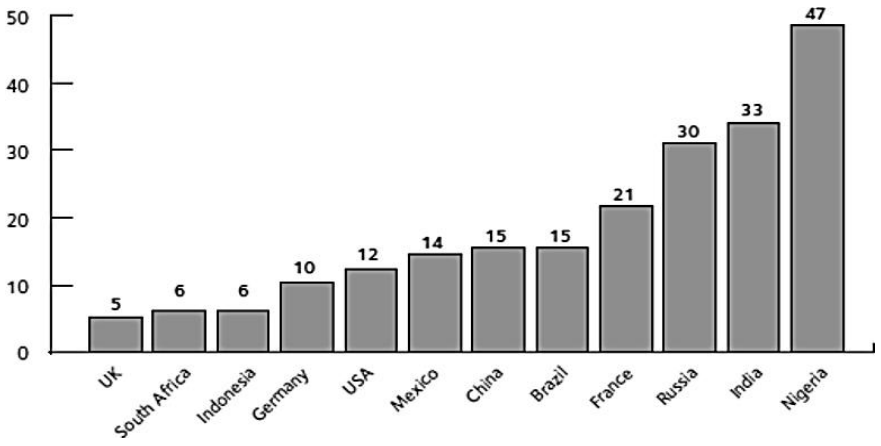
prompting numerous parents to seek quality education abroad for their children (Ijeoma and Osagie, 2005). For the ambitious goals of university education to be realized, it is imperative to maintain high standards across the system.

As with universities worldwide, quality assurance in Nigerian institutions has both external and internal components. According to Okojie (2008), external mechanisms include regulatory frameworks and monitoring systems aimed at maintaining quality. These encompass the establishment of universities and their programs, the accreditation process, and the admission of qualified candidates. Internally, quality assurance focuses on the evaluation, maintenance, and improvement of academic standards within the university itself. All administrative processes within the university should inherently contribute to delivering quality education.

In 2004, the National Universities Commission (NUC) took significant steps toward universalizing quality assurance in higher education. This study evaluated universities based on their productivity and the relative effectiveness of their outcomes. Nigerian universities were included in this ranking, as evidenced by the growing issue of graduate unemployment depicted in Figure 1. In response,

the NUC has intensified its efforts to standardize and improve the quality of university education in Nigeria (Adebayo, Oyenike, and Adesoji, 2009).

Similarly, India has witnessed a massive expansion in higher education enrollment, doubling from 14 million in 2007 to 28 million in 2013. By 2025, India is expected to have the world's largest population of college-aged students, with an estimated 119 million. However, quality control in India's higher education system has lagged behind this rapid growth. According to a British Council report, issues such as an overreliance on rote learning, a lack of qualified faculty, and outdated curricula have left many students unprepared for the workforce (as seen in Figure 1), and have caused Indian universities to struggle in international rankings (Oxford University, 2017).



Source: Oxford University, 2017

Figure 1: Recent University Graduate Unemployment Rates in Selected Countries (Percent)

To create and sustain high-quality standards, universities and the NUC share responsibility for solving the following issues: According to Adedipe (2007): • Minimum academic standards • Accreditation • Capacity and admission quotas. • Visitation • Research and development • Publications and research assessments • Infrastructure and utilities.

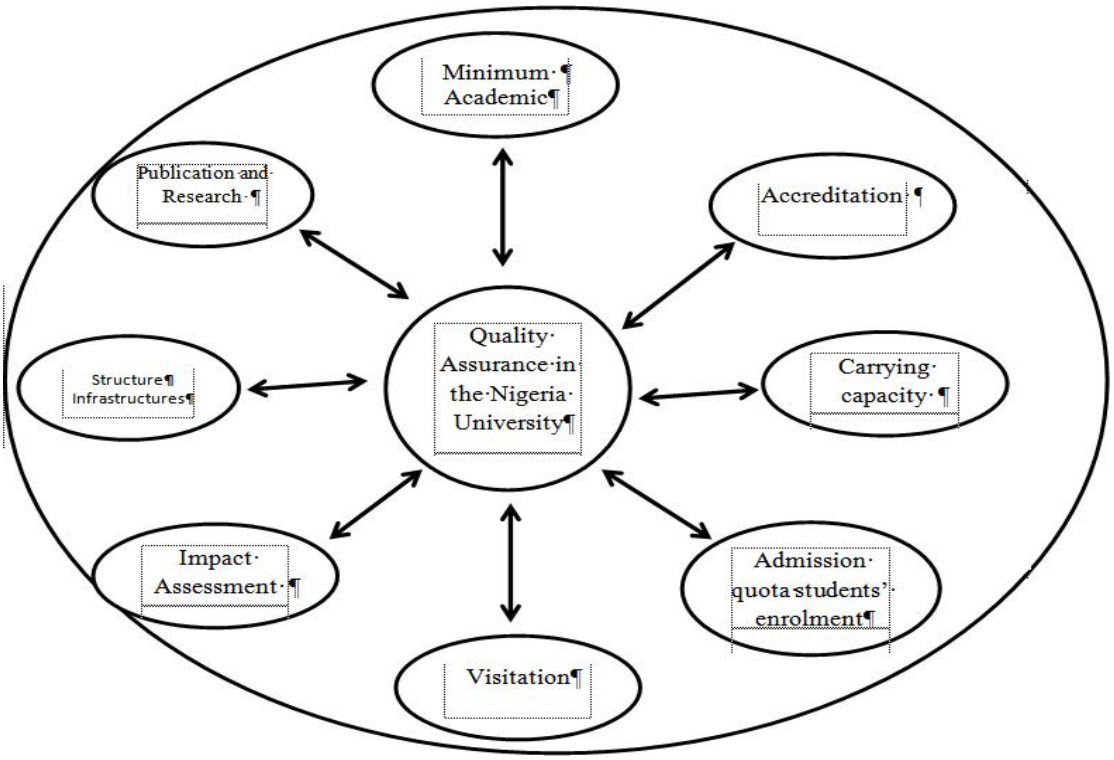


Figure 2: Quality Assurance Drivers in Nigeria Universities System Adopted from Adedipo, 2007

- Minimum academic standards serve as the foundational guidelines for ensuring quality education in universities. They outline the required syllabus structure, human resources, infrastructure, equipment, and related facilities necessary for the establishment, administration, and management of a

university.

- Accreditation is the process through which academic programs are evaluated against these minimum standards. It also involves an institution's overall academic, research, and development activities being measured against set criteria, which often include internal reviews and self-developed strategic plans.
- The carrying capacity of a university refers to the maximum number of students it can effectively educate, based on its available human and material resources, ensuring the quality of education is maintained.
- Visitation to universities is a statutory requirement that enables the overseeing body or proprietor to assess the institution's well-being and compliance with set standards.
- Impact assessment is a specialized evaluation method used to determine whether a university is fulfilling the core objectives for which it was established.
- Research is the cornerstone of human advancement on a global scale, and the value of this research should be demonstrated through publications.

- Structures, infrastructure, and utilities are essential drivers of productivity within any organization, especially within a university system, as they directly contribute to the quality of education and overall institutional efficiency.

No nation can achieve meaningful development without ensuring that the majority of its citizens receive a quality education. For sustained growth, it is crucial that a significant portion of the population completes university education of a high standard. Adedoja (2010) highlights that access, equity, and quality assurance have increasingly become key metrics in determining the relevance and effectiveness of education, especially in developing countries. In these regions, education reforms have become essential for achieving global targets like the Education for All initiative and the Millennium Development Goals. However, despite the recognized importance of access, equity, and quality in university education, these factors continue to pose significant challenges to the sector. Given the vital role of education in national and regional development, it is imperative that it serves everyone, as it is both a human right and a necessity for progress. Below are some of the critical factors that hinder quality assurance in Nigerian universities.

Enrollment Explosion: Nigerian universities have experienced a surge in student enrollment. As of September 2004, the enrollment across 57 universities had reached 823,210 (Okebukola, 2007). Overcrowded classrooms, insufficient laboratories, and a shortage of learning materials—all due to poor funding—are some of the significant challenges universities face. This enrollment explosion has also contributed to negative practices like examination malpractice, sexual harassment, "sorting" (bribing for grades), the sale of handouts, cultism, and delayed release of exam results. There is no doubt that this rapid increase in student numbers, coupled with these issues, negatively impacts the quality of university education in Nigeria.

Underfunding: Poor funding significantly contributes to the decline in educational quality. Between 1990 and 2000, there was a gross inadequacy in government funding, which led university administrators to over-enroll students, often of low academic quality, through satellite campuses and remedial programs to generate income through tuition fees (Banji, 2000). Although funding for higher education

has increased since the start of the 21st century, it still falls far short of what is needed. In 2004, federally funded universities required N216.7 billion, but the Federal Government only allocated N53.5 billion, covering just 24.7% of the requested amount. This funding shortfall makes it difficult to maintain educational standards (Federal Ministry of Education, 2009).

Inadequate Staffing: A significant shortage of academic staff in Nigerian universities has led to a decline in quality assurance. According to the National Universities Commission (NUC, 2006), only 16,856 out of 72,704 university staff in federal institutions are academic staff. Many Nigerian universities have an unbalanced academic staff structure, with a shortage of senior lecturers and an abundance of junior lecturers. Moreover, many lecturers are not pursuing doctoral degrees, and with the growth of private universities, the staffing situation is likely to worsen.

Challenges to Autonomy: The statutory responsibilities of university senates have increasingly been undermined by federal agencies like the NUC and JAMB, particularly in terms of quality assurance for academic programs (Ade-Ajayi,

2003). William (1992) also observed that the external political environment hampers university autonomy, making it difficult for Nigerian universities to fully perform their essential functions, such as teaching, certification, research, knowledge dissemination, public service, and intellectual discourse.

Inadequate Physical Facilities: Adequate facilities are essential for ensuring the efficient operation of universities and for guaranteeing quality education. Ehiametalor (2001) emphasized that students learn better when universities are equipped with quality facilities, such as well-maintained buildings and comfortable seating for both students and teachers. Universities are akin to manufacturing organizations, where plants and equipment must be in optimal condition to achieve results. Unfortunately, the facilities in Nigerian universities are often in poor condition, severely overstretched, and poorly maintained (NUC, 2006). This infrastructural deficit has a direct negative impact on educational quality.

Poor Management: Effective university management relies neither on government nor market forces, but rather on institutional self-governance and autonomy. Clark (2005) argues that Nigerian universities need to adopt an

entrepreneurial mindset to address their reliance on outdated systems of governance. However, the mismanagement of funds is another pressing issue, with instances where university administrators have failed to account for the resources provided to them. Stevenson (2006) asserts that while accountability in governance is essential, the manner in which it is handled often fails to meet ethical expectations. Inadequate resources—whether in terms of funds, manpower, or physical infrastructure—inevitably lead to a decline in the quality of education. Oghuvbu (2017) notes that when an institution lacks sufficient resources, it becomes increasingly difficult to generate the human capital needed for national development, resulting in a corresponding decline in quality assurance in Nigerian universities.

Table 3: Influence of Inadequate Resources on Quality

S/N	Item	Score	Percentage	Mean
1	Inadequate and poor quality teachers	3345	75%	3.0
2	Excess staff workload	3390	76%	3.1
3	Inadequate academic materials, poor curriculum contact.	3343	75%	3.0
4	Overcrowded classroom	3434	77%	3.6
5	Inadequate physical facilities	3300	74%	2.95
6	Poor funding	3346	75%	3.00

7	Poor staff welfare	3389	76%	3.02
8	Unconducive learning environment, noncompliance to quality assurance guidelines	3033	68%	2.7
	Total	**26,580**	**74**	**2.98**

Source: Oghuvbu (2008e), Opara (2017), Okome (2014).

- **Poor Funding:** Insufficient funding can lead to a failure in securing qualified personnel, a decline in physical resources, and the inability to provide modern facilities and equipment.
- **Inadequate Academic Materials:** The shortage of essential academic resources results in poorly equipped libraries, ineffective communication, disorganized examinations, delayed release of results, and the production of graduates who lack the necessary skills and knowledge.
- **Inadequate Human Resources:** A lack of sufficient personnel leads to ineffective management, oversized classes, excessive workloads for staff, and a reduction in the effectiveness of teaching and learning processes.
- **Inadequate Facilities:** Insufficient infrastructure negatively impacts the quality of teaching and learning, causes undue stress for staff, contributes to higher mortality rates, and results in overcrowded classrooms and lecture halls.

- **Poor Curriculum Content:** A weak curriculum hampers the achievement of educational objectives, leads to irrelevant knowledge and skills being imparted, and contributes to students being unable to complete programs on time, high dropout rates, societal dissatisfaction, and poor academic performance. Other factors contributing to the decline in educational quality due to insufficient resources include excessive workloads for staff, inadequate staff welfare, and a lack of adherence to quality assurance standards (Okome, 2014). The cumulative impact of these issues leads to a decline in educational quality, evidenced by the production of graduates who lack sufficient knowledge and practical skills.

Higher Education in Nigeria: A Comprehensive Examination

Higher education in Nigeria has undergone substantial transformation over the years, serving as a critical driver of the nation's socio-economic progress. This in-depth review delves into the historical development, present state, challenges, policies, and future prospects of Nigeria's higher education system, incorporating recent scholarly insights to offer a well-rounded perspective.

Historical Development

The origins of higher education in Nigeria trace back to the colonial era, beginning with the establishment of the University of Ibadan in 1948, the country's first degree-granting institution (Falola, 2018). Following independence, Nigeria rapidly expanded its higher education framework to meet the increasing demand for skilled professionals and the needs of a growing population (Aina, 2020). The creation of additional universities, polytechnics, and specialized institutions marked key milestones in widening access to tertiary education (Okoro & Adeyemi, 2021).

Current Structure and Institutions

By 2023, Nigeria had developed an extensive network of over 200 universities, comprising federal, state, and private institutions (National Universities Commission [NUC], 2023). The higher education system is structured as follows:

1. **Federal Universities:** Funded and overseen by the federal government, these institutions include well-known universities like the University of Lagos and Ahmadu Bello University.
2. **State Universities:** Administered by state governments, these universities cater primarily to regional educational needs.
3. **Private Universities:** Having emerged more prominently in recent decades, private universities offer a wide range of programs and have become essential components of the educational landscape.

4. **Polytechnics and Colleges of Education:** These institutions are integral to the system, focusing on vocational education and teacher training, respectively (Ogunyemi, 2022)

Access and Enrolment

While Nigeria has made notable progress in expanding access to higher education, with rising enrolment figures (Eze, 2021), disparities remain based on geography, socio-economic status, and gender. Efforts to promote inclusivity

include scholarship schemes, affirmative action policies, and programs aimed at reaching underrepresented populations (Bassey & Udoh, 2023).

Quality of Education

Maintaining high educational standards poses an ongoing challenge for Nigeria. Issues such as insufficient funding, inadequate infrastructure, and faculty shortages hinder the quality of education (Chukwuemeka, 2020). To address these concerns, the NUC has put in place several quality assurances measures, including accreditation systems and periodic institutional assessments to ensure compliance with academic standards (National Universities Commission, 2023).

Research and Innovation

Research and innovation in Nigerian universities have been a major focus of national development strategies. Initiatives aimed at strengthening research include increased financial support, collaborations with international academic institutions, and the establishment of research centres (Adeyemi, 2021). However, significant obstacles such as limited research funding and the ongoing issue of brain drain continue to impede substantial progress (Ibrahim & Musa, 2022).

Technological Integration

The integration of technology in Nigerian higher education has gained momentum, particularly in the wake of the COVID-19 pandemic. Digital platforms for learning, online libraries, and virtual courses have become increasingly prevalent, enhancing both accessibility and flexibility for students (Olorunfemi, 2022). However, challenges persist due to disparities in technological infrastructure and limited digital literacy, which continue to hinder widespread adoption (Lawal & Bello, 2023).

Governance and Policy Framework

Effective governance is crucial to the sustainability of higher education institutions. Nigeria has established several regulatory bodies, including the National Universities Commission (NUC), Joint Admissions and Matriculation Board (JAMB), and the Tertiary Education Trust Fund (TETFund), which are responsible for overseeing policies, funding, and quality assurance (Uche & Okeke, 2021). Recent reforms have focused on granting more autonomy to institutions,

improving funding mechanisms, and strengthening accountability measures (Emeka, 2023).

Funding and Financial Sustainability

One of the recurring challenges in Nigerian higher education is inadequate funding, particularly in public universities, which often face significant financial constraints. Heavy reliance on government funding has limited the capacity to invest in infrastructure, research, and staff development (Adebayo, 2022). While private universities address some of these gaps through tuition fees and private investments, affordability remains a significant barrier for many students (Nwosu, 2023).

Challenges Facing Higher Education

Several obstacles continue to undermine the full potential of Nigeria's higher education system:

1. Inadequate Infrastructure: Many institutions face issues such as outdated facilities, overcrowded classrooms, and limited laboratory resources (Okonkwo, 2020).
2. Faculty Shortages: A deficit of qualified academic staff, exacerbated by brain drain and inadequate compensation, affects the quality of education (Eze & Ogbonna, 2021).
3. Academic Misconduct: Challenges like plagiarism, grade inflation, and examination malpractice threaten academic integrity (Ajayi, 2022).
4. Funding Deficits: Limited financial resources stifle expansion and improvement efforts in the higher education sector (Ibrahim, 2023).
5. Political Instability: Insecurity in certain regions disrupts academic activities and poses significant risks to both students and faculty (Abubakar & Musa, 2023).

Policy Responses and Reforms

In response to these issues, the Nigerian government and educational stakeholders have implemented various policy reforms aimed at improving the sector:

- TETFund Initiatives: TETFund has played a significant role in providing grants for infrastructure development, research activities, and staff training (Tertiary Education Trust Fund, 2023).
- Autonomy for Universities: Institutions have been granted greater autonomy to enhance decision-making, improve governance, and increase accountability (Emeka, 2023).
- Quality Assurance Measures: Strengthened accreditation processes and regular assessments have been put in place to maintain high academic standards (National Universities Commission, 2023).
- Digital Transformation Strategies: The promotion of e-learning and digital literacy is a key part of modernizing educational delivery (Olorunfemi, 2022).

Future Prospects

The future of Nigeria's higher education sector depends on overcoming current challenges and harnessing opportunities for growth. Key areas for improvement include:

- Enhancing Funding Models: Diversifying funding sources is essential to reduce reliance on government allocations.
- Investing in Infrastructure: Upgrading facilities and integrating technological resources will be critical to meeting modern education demands.
- Promoting Research and Innovation: Encouraging research initiatives through increased funding and international partnerships is crucial for academic advancement.
- Fostering Inclusive Education: Ensuring equal access for all, particularly marginalized groups, will be essential to creating a more inclusive education system.
- Strengthening Governance: Developing robust governance frameworks will ensure transparency, accountability, and sustainability.

Nigerian higher education is at a crucial juncture, marked by both achievements and ongoing challenges. Addressing issues such as funding, infrastructure, quality assurance, and governance is vital for the system to realize its full potential as a catalyst for national development. Continued reforms, strategic investments, and collaborative efforts will be essential in shaping a resilient and dynamic future for higher education in Nigeria.

Accreditation of Higher Educational Institutions in Nigeria

Accreditation is a fundamental element in the higher education landscape, serving as a key mechanism for ensuring that institutions uphold established standards of quality and effectiveness. In Nigeria, accreditation plays a crucial role in maintaining academic standards, enhancing institutional accountability, and fostering continuous improvement. This detailed review explores the current state of accreditation in Nigeria, drawing on recent scholarly research and official reports.

Overview of Accreditation

In Nigeria, accreditation is overseen by the National Universities Commission (NUC) for universities, with other bodies responsible for different types of institutions. The primary goal is to confirm that institutions and their programs meet rigorous standards essential for academic excellence and professional relevance (NUC, 2023).

Accrediting Bodies and Their Responsibilities

1. National Universities Commission (NUC): The NUC is tasked with accrediting universities across Nigeria. It conducts regular evaluations to ensure institutions adhere to national standards (NUC, 2023).
2. National Board for Technical Education (NBTE): This body is responsible for accrediting polytechnics and monotechnics, with a focus on technical and vocational education (NBTE, 2022).
3. National Commission for Colleges of Education (NCCE): The NCCE oversees the accreditation of colleges of education, which are crucial for training future educators (NCCE, 2023).

Accreditation Process

The accreditation process typically unfolds in several key stages:

1. Self-Assessment: Institutions begin by conducting internal reviews to evaluate their compliance with accreditation standards (Musa, 2023).
2. Site Visits: Accreditation agencies visit institutions to verify adherence to established standards (Ogunyemi & Adebayo, 2022).
3. Evaluation and Reporting: Agencies analyze their findings and produce comprehensive reports on the institution's performance (Adeyemi, 2021).
4. Decision: Based on the evaluation, decisions are made regarding accreditation status, which may range from full accreditation to provisional status or denial (Eze, 2022).

Recent Developments and Challenges

1. Increased Emphasis on Quality Assurance: Recent reforms have highlighted the importance of robust quality assurance mechanisms to ensure consistent adherence to accreditation standards (Bassey & Udoh, 2023).
2. Technological Advancements: The integration of technology into the accreditation process has improved efficiency in assessments and monitoring (Chukwuemeka, 2020).
3. Challenges Faced: Institutions often encounter obstacles such as inadequate infrastructure, insufficient funding, and resistance to change, which can affect the accreditation process (Ibrahim & Musa, 2022).

Impact of Accreditation

1. Enhanced Educational Quality: Accreditation helps institutions improve their educational offerings by identifying areas for development and implementing best practices (Ajayi, 2022).
2. Boosted Institutional Reputation: Accredited institutions typically gain greater recognition and credibility, which can attract both students and faculty (Olorunfemi, 2022).

3. Increased Accountability: Accreditation ensures that institutions remain accountable to their stakeholders, including students, faculty, and the public (Emeka, 2023).

Policy and Regulatory Framework

- National Policy on Education: This policy outlines the regulatory framework for higher education in Nigeria, including the processes for accreditation (Federal Ministry of Education, 2022).
- Accreditation Guidelines and Standards: The NUC and other accrediting bodies provide detailed guidelines and standards that institutions must follow (National Universities Commission, 2023).

Future Directions

1. Enhancing Accreditation Mechanisms: There is a need for ongoing improvements in accreditation processes to address emerging challenges and ensure consistent adherence to standards (Eze, 2022).
2. Promoting Transparency: Increasing transparency in the accreditation process can build trust and credibility among all stakeholders (Bassey & Udoh, 2023).

3. Supporting Institutions: Offering support in areas such as infrastructure and staff training can facilitate successful accreditation outcomes (Ibrahim & Musa, 2022).

Accrediting is a vital aspect of Nigeria's higher education system, playing an essential role in upholding and enhancing educational standards. While there have been notable advancements in the accreditation process, persistent challenges require ongoing attention and reform. By addressing these challenges and focusing on quality assurance, Nigeria can ensure that its higher education institutions meet the highest standards of excellence.

Physical ICT Facilities

Physical Information and Communication Technology (ICT) facilities encompass the tangible infrastructure that supports the digital ecosystem. These facilities include data centres, network infrastructure, computing devices, telecommunications equipment, and other hardware necessary for the storage, transmission, and processing of data. With the rapid expansion of the digital

economy, the significance of robust and scalable physical ICT infrastructure has grown substantially.

Data Centres

Data centres are the cornerstone of contemporary digital infrastructure, serving as centralized hubs for data storage, management, and distribution. They are vital for the operation of cloud services, enterprise applications, and online platforms.

Structure and Components

A data centre typically consists of several critical elements, including servers, storage systems, network infrastructure, and cooling mechanisms. The design and layout of data centres are meticulously planned to ensure high levels of availability, reliability, and security. According to Barroso et al. (2021), modern data centres are increasingly adopting hyperscale architectures, which enable rapid scaling and

efficient resource management. These architectures are designed to manage the enormous data volumes generated by extensive applications such as social media and e-commerce platforms.

Energy Efficiency

Energy efficiency is a significant concern for data centres due to the substantial power requirements for operating and cooling servers. Strategies such as server virtualization, advanced cooling techniques, and the adoption of renewable energy sources are being employed to mitigate the environmental impact of data centres (Shehabi et al., 2016). The Power Usage Effectiveness (PUE) metric, which measures the ratio of total facility energy consumption to the energy used by IT equipment, is commonly used to evaluate data centre efficiency. Innovations in data centre design, including liquid cooling systems and AI-driven energy management, are contributing to improved PUE scores (Van Heddeghem et al., 2020).

Network Infrastructure

Network infrastructure includes the physical hardware necessary to connect computing devices and ensure smooth communication within and across networks. This infrastructure comprises routers, switches, fiber optic cables, and wireless access points.

Fibre Optic Networks

Fibre optic technology has transformed network infrastructure by enabling high-speed data transmission with minimal signal loss over long distances. Agrawal (2018) highlights that fibre optics is crucial for accommodating the increasing demand for bandwidth-intensive applications, such as video streaming and cloud computing. Recent advancements in Dense Wavelength Division Multiplexing (DWDM) technology have further enhanced the capabilities of fibre optic networks by allowing multiple data streams to be transmitted simultaneously over a single fibre. This advancement boosts bandwidth without necessitating additional physical infrastructure (Srinivasan & Carter, 2019).

Wireless Networks

Wireless networks, particularly those utilizing 5G technology, are reshaping ICT infrastructure by providing faster data transmission, reduced latency, and enhanced connectivity. The deployment of 5G networks requires new hardware, including small cells, macro cells, and massive MIMO (Multiple Input Multiple Output) antennas (Zhang et al., 2021). The integration of 5G with edge computing, where data processing occurs closer to the data source, is anticipated to decrease latency and enhance the performance of applications such as autonomous vehicles and the Internet of Things (IoT) (Taleb et al., 2017).

Computing Devices and Hardware

Computing devices and their associated hardware are essential to ICT facilities, offering the processing power and interfaces required for data manipulation and interaction.

Storage Systems

Servers are central to data centres, handling the processing and management of data. The shift towards server virtualization and the adoption of hyper-

converged infrastructure (HCI) has revolutionized server deployment, making it more efficient and scalable. HCI combines computing, storage, and networking into a single system, simplifying data centre management and reducing costs (Buyya et al., 2018).

In terms of storage, ICT facilities have moved from traditional hard disk drives (HDDs) to more advanced solutions like solid-state drives (SSDs) and non-volatile memory express (NVMe) drives. These newer storage technologies offer significantly faster data access speeds and lower latency, enhancing overall performance (Jung et al., 2020).

End-User Devices

End-user devices such as desktops, laptops, tablets, and smartphones act as the bridge between users and digital services. The widespread use of mobile devices and the rise of bring-your-own-device (BYOD) policies have led to the development of sophisticated, secure, and scalable device management solutions (Streim et al., 2020). Additionally, the trend towards edge computing is influencing the design of end-user devices, emphasizing the need for enhanced processing

power and connectivity to support real-time data processing at the network's edge (Shi et al., 2016).

Telecommunication Equipment

Telecommunication equipment, including base stations, satellite dishes, and transceivers, underpins global communication networks, facilitating voice, data, and video transmission over long distances.

Base Stations and Cell Towers

Base stations and cell towers are essential for wireless communication, especially in mobile networks. The rollout of 5G networks has introduced new types of base stations, such as small cells and distributed antenna systems (DAS), which improve coverage and capacity in densely populated areas (Dahlman et al., 2020).

Satellite Communication

Satellite communication is crucial for providing connectivity in remote and underserved regions. Low Earth orbit (LEO) satellite constellations, such as

SpaceX's Starlink, are set to revolutionize global internet access by bridging the digital divide (Gilat & Shamai, 2018). These satellites rely on ground stations equipped with parabolic antennas and radio-frequency transceivers to establish reliable communication links with end-user terminals, ensuring data transmission across vast distances (Diouf et al., 2018).

Power and Cooling Systems

Power and cooling systems are vital for maintaining the continuous operation of ICT hardware and preventing overheating.

Uninterruptible Power Supply (UPS)

Uninterruptible Power Supply (UPS) systems offer backup power during outages, ensuring uninterrupted operations. These systems are crucial for data centers and telecommunication facilities, where even brief power disruptions can lead to data loss and service interruptions (Foster & Yong, 2019). Modern UPS systems are designed to be energy-efficient, incorporating features like eco-mode

operation and modularity, which support scalability and reduce energy consumption (Gandhi & Lemmon, 2017).

Cooling Technologies

Effective cooling is essential for maintaining optimal temperatures in ICT facilities, particularly in data centres where high server density generates substantial heat. Traditional air conditioning systems are increasingly complemented or replaced by more efficient cooling methods, such as liquid cooling, which involves circulating coolant to directly absorb heat from server components (Sharma et al., 2019). Immersion cooling, where servers are submerged in non-conductive fluids, is another emerging technology that offers superior heat dissipation and energy efficiency (Whitehead et al., 2020).

Infrastructure

Security infrastructure in physical ICT facilities encompasses both physical security measures and cybersecurity protections.

Physical Security

Physical security is crucial for safeguarding ICT facilities against unauthorized access, theft, and vandalism. This includes biometric access control systems, surveillance cameras, and security personnel (Schneier, 2018). Data centers often establish secure zones to restrict access to sensitive areas like server rooms and network operations centers (NOCs).

Cybersecurity Hardware

Cybersecurity hardware, including firewalls, intrusion detection systems (IDS), and hardware security modules (HSMs), is vital for defending ICT facilities against cyber threats. These devices monitor network traffic, detect anomalies, and enforce security policies to prevent data breaches and cyberattacks (Kim & Solomon, 2018). The integration of AI and machine learning in cybersecurity hardware has enhanced the ability to detect and respond to threats in real-time, providing a more proactive security approach (Nguyen et al., 2021).

Trends and Future Directions

Several emerging trends are shaping the future of physical ICT facilities, driven by technological advancements and evolving demands.

Edge Computing

Edge computing is becoming increasingly important, as it involves processing data closer to its source, which reduces latency and conserves bandwidth. This trend is fostering the development of micro data centers and edge devices with advanced processing capabilities (Satyanarayanan, 2017).

Green ICT

Sustainability is a growing focus in ICT facility design and operation. Green ICT initiatives aim to minimize the environmental impact of ICT operations through energy-efficient designs, renewable energy sources, and circular economy principles (Murugesan, 2018).

IoT Integration

The integration of IoT devices into ICT infrastructure is leading to smarter, more interconnected facilities. IoT-enabled sensors and actuators are used to monitor and manage environmental conditions, optimize energy usage, and enhance security in real-time (Atzori et al., 2010).

Summary of Reviewed Literature

The reviewed literature extensively covers various topics, including quality management theory, ICT concepts, quality assurance in Nigerian universities, and the role of physical ICT facilities in quality management. Despite the breadth of this literature, gaps remain. Many studies have focused on contexts outside Nigerian higher education institutions, and there is limited research linking ICT's impact on quality management in these institutions. Additionally, few studies address tertiary institutions in Akwa Ibom State specifically. These gaps highlight the need for further research into the impact of ICT on quality management in Nigerian higher education institutions.

CHAPTER THREE

METHODOLOGY

This chapter outlines the procedures and methods employed in the research, organized into the following sections: Study Design, Population of the Study, Sample and Sampling Technique, Research Instrument, Validity of the Instrument, Reliability of the Instrument, Data Collection Method, and Data Analysis Method.

Research Design

The research design acts as a framework guiding the collection, analysis, and interpretation of data, and defines the extent to which the findings can be generalized (Omorogiuwa, 2013). For this study, a survey research design was utilized, specifically the ex-post-facto design, which falls under the umbrella of Causal-Comparative Research Design. This design is retrospective, examining the causes of relationships or differences between variables after the events have occurred. "Ex-post-facto," derived from Latin meaning "after the fact," reflects this approach to analyzing effects and causes. The survey research method is employed to assess a population's characteristics through a representative sample, as it is often impractical to study the entire population directly. Although this design is commonly used by professionals across various disciplines such as psychology, sociology, anthropology, economics, political science, and statistics, this study opted for methods beyond just questionnaire surveys.

Population of the Study

The population of a study encompasses the group to which the research findings will be generalized (Omorogiuwa, 2013). This study considered all

individuals from Nigeria, with the 2006 Census reporting a population of around 140 million. Since then, Nigeria's population has surged, exceeding 200 million in the early 2020s. The focus was on higher education institutions in Nigeria, including:

Universities:

1. Akwa Ibom State University (AKSU) – 500 students
    - Locations: Ikot Akpaden (Main Campus) and Obio Akpa
    - Type: State University
2. University of Uyo (UNIUYO) – 500 students
    - Location: Uyo
    - Subtotal: 1,000 students

Polytechnics

1. Akwa Ibom State Polytechnic – 1,000 students
    - Location: Ikot Osurua
    - Type: State Polytechnic

Colleges of Education:

1. Akwa Ibom State College of Education – 1,000 students

    - Location: Afaha Nsit
    - Type: State College of Education

Total sample size: 3,000 students. These numbers are approximate and may change with the establishment of new institutions or upgrades to existing ones.

Sample and Sampling Technique

The research utilized various discrete sampling techniques, including:

1. Direct Sampling (Inverse Transform Sampling): Generating uniform random numbers and mapping them to discrete values using the inverse of the cumulative distribution function (CDF).
2. Alias Method: Sampling efficiently from discrete distributions with precomputed structures and uniform random numbers.

3. Rejection Sampling: Adapting rejection sampling methods from continuous to discrete distributions by bounding and accepting or rejecting samples.
4. Markov Chain Monte Carlo (MCMC) Methods: Utilizing techniques like the Metropolis-Hastings algorithm for sampling from discrete distributions via a Markov chain.
5. Randomized Algorithms: Methods like reservoir sampling for partially known or dynamic discrete distributions.

A multistage sampling approach was employed for selecting institutions for data collection:

- Stage One: Data was gathered from the National Universities Commission (NUC), National Board for Technical Education (NBTE), and National Council of Colleges of Education. A panel of four members collected this data, with three focusing on universities, polytechnics, and colleges of education. Preliminary oral interview questions were submitted to these bodies before selecting the sampled institutions.

- Stage Two: Institutions in Akwa Ibom State were selected:

Universities:

1. Akwa Ibom State University (AKSU)
2. University of Uyo (UNIUYO)

Polytechnics

1. Akwa Ibom State Polytechnic

Colleges of Education

1. Akwa Ibom State College of Education

- Stage Three: Data was collected from 3,000 respondents, with 1,000 individuals sampled from each type of institution.
- Stage Four: The collected data was compiled for presentation and analysis in Chapter Four.

Research Instrument

The research utilized a combination of surveys, structured oral interviews, brainstorming sessions, and panel discussions to explore the impact of Information and Communication Technology (ICT) on quality management in higher education institutions in Nigeria. Twelve trained research assistants facilitated data collection, which involved 1,500 staff members and 1,500 students from institutions in Akwa Ibom State.

Validity of the Instrument

The research instrument underwent validation by three experts: the researcher's supervisor and two additional specialists in research methods and statistics from the Department of Educational Management (DEM) and Educational Evaluation and Counselling Psychology (EECP) at the University of Benin. Their feedback was incorporated into the final version of the instrument used for data collection.

Reliability of the Instrument

Since the instrument was a standardized set of oral interview questions designed for clarity and ease of response, it was not subjected to a separate reliability test.

Method of Data Collection

Data collection was conducted over two months with the help of research assistants who were thoroughly briefed. The data was collected from respondents at various hotels across Nigeria:

- North-Central: Nicon Luxury, Abuja
- North-East: Yola International Hotel, Yola
- North-West: Kaduna Hotel, Kaduna
- South-East: De Santos Hotel, Enugu
- South-South: Uyi Grand Hotel, Benin City
- South-West: Lagos Marriott Hotel, Ikeja

Method of Data Analysis

The data from surveys, panel discussions, internet sessions, brainstorming activities, and oral interviews were analysed using percentages and tables to interpret the study's findings.

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

This chapter dealt with the data analysis, interpretation and discussion of results. The chapter is divided into two sections (i.e. Sections A and B). Section A provided answers to research questions, Section B dealt with discussion the findings.

Section A - Presentation of Results

Research Question 1: How are these Institutions rated in respect of Quality Management Indices?

Table 4: – Quality Management in the Institutions

S/N	ITEM	AGREED	DISAGREED
1.	Customer Satisfaction Index (CSI)	2,500(83.33%)	500 (16.66%)
2.	Product/Service Quality Index	1,000(33.33%)	2,000(66.66%)
3.	Process Performance Indicators	1,000(33.33%)	2,000(66.66%)
4.	Internal Audit Findings	2,000(66.66%)	1,000(33.33%)
5.	Employee Engagement and Training Index	2,500(83.33%)	500 (16.66%)
6.	Supplier Quality Index	1,500(50%)	1,500(50%)
7.	Cost of Quality (CoQ)	500 (16.66%)	2,500(83.33%)
8.	Continuous Improvement Index	2,000(66.66%)	1,000(33.33%)
9.	Compliance Index	2,800(93.33)	200 (6.66%)
10.	Return on Quality (ROQ)	2,600(86.67%)	400(13.33%)
11.	Customer Complaint Resolution Time	2,700(90%)	300 (10%)
12.	First Pass Yield (FPY)	1,500(50%)	1,500(50%)

Results from Table 1 revealed that 2,500 (83.33%) agreed on Customer Satisfaction Index while 500 (16.66%) disagreed; 1,000(33.33%) agreed on Product/Service Quality Index while 2,000(66.66%) disagreed;1,000(33.33%) agreed on Process Performance Indicators while 2,000(66.66%) disagreed; 2,000(66.66%) agreed on Internal Audit Findings while 1,000 (33.33%) disagreed; 2,500(83.33%) agreed on Employee Engagement and Training while 500 (16.66%) disagreed; 1,500(50%) agreed on Supplier Quality Index while 1500 (50%)

disagreed; 500 (16.66%) agreed on Cost of Quality (CoQ) while 2,500 (83.33%) disagreed; 2,000(66.66%) agreed Continuous Improvement Index while 1,000 (33.33%) disagreed; 2,800(93.33) agreed on Compliance Index while 200 (6.66%) disagreed; 2,600(86.67%) agreed on Return on Quality (ROQ) while 400 (13.33%) disagreed; 2,700 (90%) agreed on Customer Complaint Resolution Time while 300(10%); 1500 (50%) agreed on First Pass Yield (FPY) while 1500 (50%) disagreed.

Research Question 2: How are these Institutions in Akwa-Ibom State rated on Availability of Physical ICT Facilities?

Table 5: – Availability of Physical ICT Facilities in the Institutions

S/N	ITEM	AGREED	DISAGREED
1.	Number of Computers per User	200 (6.66%)	2,800(93.33%)
2.	Internet Connectivity and Bandwidth	100(3.33%)	2,900(96.66%)
3.	Availability of Network Infrastructure	200 (6.66%)	2,800(93.33%)
4.	ICT Facility Accessibility	330 (11%)	2,670(89%)
5.	Availability of Peripheral Devices	100(3.33%)	2,900(96.66%)
6.	Software Availability	100(3.33%)	2,900(96.66%)
7.	ICT Facility Maintenance and Support	100(3.33%)	2,900(96.66%)
8.	Power Supply Reliability	50(1.66%)	2,950(98.33%)

9.	Space and Ergonomics	280(9.33)	2,200 (73.33%)
10.	Security of ICT Facilities	100(3.33%)	2,900(96.66%)
11.	User Satisfaction with ICT Facilities	50(1.66%)	2,950(98.33%)
12.	Budget Allocation for ICT Facilities	150(5%)	2,850(95%)
13.	ICT Facility Utilization Rate	100(3.33%)	2,900(96.66%)

Results obtained from research question 2 on Table 2 revealed that on number of computer per user 200 (6.66%)agreed on Number of Computers per User while 2,800(93.33%)disagreed; 100(3.33%) agreed on Internet Connectivity and Bandwidth while 2,900(96.66%) disagreed; 200 (6.66%) agreed on Availability of Network Infrastructure while 2,800(93.33%) disagreed; 330 (11%) agreed on ICT Facility Accessibility while 2,900(96.66%) disagreed: 100(3.33%) agreed on ICT Facility Maintenance and Support while 2,900(96.66%) disagreed; 50(1.66%) agreed on Power Supply Reliability while 2,900 (98.33%) disagreed; 280(9.33%) agreed on Space and Ergonomics while 2,200 (73.33%) disagreed; 100(3.33%) agreed on agreed Security of ICT Facilities while 2,900(96.66%) disagreed; 50(1.66%) agreed on User Satisfaction with ICT Facilities while 2,950 (98.33%) 150(5%) agreed on ICT Facility Utilization Rate while 2,850 (95%) disagreed; 100 (3.33%) agreed on ICT Facility Utilization Rate while 2,900(96.66%) disagreed.

In a nutshell, the critical issue of Impact of Information and Communication Technology (ICT) on Quality Management in Higher Institution of Nigeria slide in that abysmal level. In the institutions sampled in this study the situation become extremely worrisome with hike in prices of consumer goods, Premium Motor Spirit (PMS), Electricity, Housing, Building Materials, ICT Facilities, Generators, Cellular Phones, Computer Peripherals to mention but a few.

Section B – Discussion of Findings

Study Findings on ICT and Quality Management in Nigerian Higher Education

The study examined the impact of Information and Communication Technology (ICT) on quality management within higher education institutions in Akwa Ibom State, Nigeria. The results of the research questions revealed significant insights. Among the twelve quality management indices assessed, the Compliance Index stood out with 2,800 responses (93.33%) indicating high scores, whereas the Cost of Quality (CoQ) index received lower scores with 500 (16.66%)

and 2,500 (83.33%) indicating less favorable evaluations. These findings suggest notable improvements in quality management within the institutions studied.

This outcome aligns with the observations of Oladipo et al. (2023), who found that the adoption of quality management practices in Nigerian universities has significantly enhanced curriculum development, staff training, and student satisfaction. Nevertheless, they also acknowledge ongoing challenges in fully embedding quality management principles throughout all levels of these institutions. Oladipo et al. highlight that "while progress has been made, many Nigerian institutions still face difficulties with consistent implementation of quality management systems due to limited resources and resistance to change" (p. 128).

The authors advocate for overcoming these hurdles through a dedication to continuous improvement, increased investment in quality management infrastructure, and fostering a culture of quality within institutions. They also suggest that adapting international best practices to the local context—considering cultural and economic factors unique to Nigeria is essential for realizing the full benefits of quality management.

The second research question uncovered several challenges related to ICT indices within the institutions examined. The data reveals a mixed picture of quality management and ICT infrastructure in Nigerian higher education. While there is enthusiastic adoption of certain quality management principles, including a strong emphasis on customer satisfaction and employee engagement, there is less enthusiasm for measures related to product and service quality and process performance. This discrepancy suggests a gap between institutional intentions and actual implementation, indicating difficulties in translating recognition of customer satisfaction into effective, consistent practices.

The most concerning issue is the stark contrast between the positive perceptions of quality management and the state of ICT infrastructure. The overwhelmingly negative feedback on ICT metrics highlights severe underinvestment and neglect. Institutions fall short in fundamental areas such as computer access, internet connectivity, and software availability, as well as in more advanced infrastructure concerns like network capabilities. This technological shortfall significantly hinders the effective implementation of modern quality

management practices and creates barriers to progress, affecting both staff and students.

Moreover, the inadequate budget allocations for ICT facilities exacerbate the issue, perpetuating a cycle of underinvestment. This technological gap not only impacts daily operations but also threatens the long-term competitiveness and relevance of these institutions on the global stage.

In essence, the data reflects a challenging scenario where the ambitions for quality management are undermined by inadequate technological infrastructure. It underscores the need for a comprehensive approach that aligns ambitious goals with the practical resources necessary to achieve them. As Nigerian institutions pursue excellence, addressing this critical disconnect between quality aspirations and technological capabilities will be vital for sustainable growth and progress.

Supporting this perspective, Nwankwo et al. (2023) also highlight the inadequate ICT facilities in Nigerian institutions, noting the wide-reaching consequences. Their research underscores that "the lack of up-to-date ICT

infrastructure in many Nigerian universities has created a digital divide, limiting students' global competitiveness and institutions' ability to adopt modern pedagogical practices" (p. 217).

The authors argue that the ICT deficiency impacts various aspects of institutional functioning:

1. Teaching and Learning: Limited access to computers, poor internet connectivity, and outdated software hinder the adoption of blended learning approaches and restrict students' exposure to essential digital tools.
2. Research Capabilities: Inadequate ICT facilities impede researchers from accessing global databases, collaborating internationally, and utilizing advanced data analysis tools, which can slow innovation and knowledge production.
3. Administrative Efficiency: Inefficient administrative processes result from a lack of robust ICT infrastructure, affecting student registration, financial management, and other critical operations.

4. Global Competitiveness: Institutions with limited ICT resources risk falling behind in global rankings and struggle to attract international collaborations as technology becomes increasingly integrated into higher education.

Nwankwo et al. (2023) suggest that addressing this challenge requires a multi-faceted strategy, including increased government funding, private sector partnerships, and strategic planning by institutional leadership. They point out that "institutions that have improved their ICT infrastructure have experienced notable advancements in student engagement, research output, and overall performance" (p. 219). However, they also caution against viewing ICT improvements as a cure-all, emphasizing the need for comprehensive digital literacy training for staff and students to fully leverage these investments.

The impact of ICT facilities on Nigerian institutions is profound and far-reaching. As these institutions aim to prepare graduates for a digital economy, addressing ICT infrastructure deficiencies is not just about technological advancement but a crucial factor for maintaining relevance and competitiveness in the global education landscape.

CHAPTER FIVE

SUMMARYY, CONCLUSION AND RECOMMENDATIONS

This chapter presented the summary, conclusion, recommendations, contribution to knowledge and suggestion for further studies.

Summary

The study aimed to examine the impact of Information and Communication Technology (ICT) on quality management within higher education institutions in Nigeria, specifically in Akwa Ibom State. The variables of interest included various indices of Quality Management and aspects of ICT, as detailed in Appendices IV and V of the study. The theoretical foundation was based on the Theory of Quality Management (TQM) by Hackman and Wageman (1995), and the conceptual framework for ICT was adapted from Zuppo (2012). Two research questions were addressed, with results presented in Tables 1 and 2.

Employing a survey research design, the study involved 3,000 respondents from higher institutions in Akwa Ibom State, as outlined in Chapter Three. Discrete Sampling Techniques were utilized, with a sample size of 3,000. The research employed a combination of surveys, structured oral interviews, brainstorming sessions, and panel questions to explore the impact of ICT on quality management. The oral interview questions were validated by three experts, and their feedback

was incorporated into the final version of the instrument. Data collection was managed by twelve well-briefed research assistants.

The findings revealed two key points:

1. Significant improvements in quality management were observed in the institutions studied.
2. The institutions faced numerous challenges related to ICT indices.

Conclusion

The study concluded that ICT components significantly influence quality management in Nigerian higher education institutions. It also emphasized that addressing these challenges requires a comprehensive approach, including increased government funding, partnerships with the private sector, and strategic long-term planning by institutional leaders.

Recommendations

Based on the findings, the study recommends:

1. Evaluating the efficiency and effectiveness of organizational processes.
2. Tracking non-conformances and issues identified during internal audits.
3. Increasing the number of computers available per user to accommodate the population of staff and students.
4. Measuring the ratio of computers to users, such as students and staff.
5. Assessing the availability, speed, and reliability of internet connections.
6. Monitoring metrics like connection speed (Mbps), bandwidth per user, and uptime percentage.
7. Evaluating the quality and presence of network infrastructure, including routers, switches, and wireless access points.

Contribution to Knowledge

This study sheds light on the relationship between ICT and quality management in Nigerian higher education institutions, focusing on Akwa Ibom State. It empirically confirms the linkage between ICT and quality management and highlights the need for institutions to enhance their ICT facilities to improve operational quality.

Suggestions for Further Research

Future studies could explore:

1. The impact of physical ICT facilities on science education in Nigerian higher institutions.
2. The correlation between ICT facility availability and effective management in Nigerian universities.
3. The influence of quality control on quality assurance in Nigerian polytechnics.

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APPENDIX I

UNIVERSITY OF BENIN, BENIN CITY, NIGERIA

DEPARTMENT OF EDUCATIONAL MANAGEMENT (DEM)
FACULTY OF EDUCATION

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our Ref: _____

Date: 21st August, 2024

TO WHOM IT MAY CONCERN

Letter of Introduction: Isioma Favour AZU

This is to inform you that the undergraduate student (name above) is from the Department of Educational Management, Faculty of Education, University of Benin, Benin City. She needs data for her Project titled: **Impact of Information and Communication Technology (ICT) on Quality Management in Higher Institution of Learning in Nigeria.**

Kindly render her your assistance.

Thank you.

DEPT. OF EDUCATIONAL MANAGEMENT UNIVERSITY OF BENIN

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APPENDIX II

LETTER OF VALIDATION

Department of Educational Management
Faculty of Education,
University of Benin,
Benin City,
Nigeria

July 17th, 2024

Dear Validator

REQUEST FOR VALIDATION OF THE INSTRUMENTS FOR DATA COLLECTION

I would appreciate your assistance in validating the instruments attached for my research titled "**Impact of Information and Communication Technology (ICT) on Quality Management in Higher Institution of Learning in Nigeria**."

Please be assured that your responses will remain confidential and will be used exclusively for the purposes of this study.

Thank you.

Yours Faithfully,

Isioma Favour Azu
EDU2001611
Researcher

APPENDIX III

LETTER OF REQUEST TO RESPONDENTS

Department of Educational Management,
Faculty of Education,
University of Benin,
Benin City, Nigeria.

July 17th, 2024

Dear Respondents,

These instruments have been developed to gather pertinent data for a study **titled "Impact of Information and Communication Technology (ICT) on Quality Management in Higher Institution of Learning in Nigeria."**

I kindly request your cooperation in providing the necessary information to help ensure the study is conducted with accuracy and objectivity. Please rest assured that your responses will be kept confidential and used solely for the purposes of this research.

Thank you very much for your support.

Best regards,

Isioma Favour Azu
EDU2001611
Researcher

Appendix IV

INDICES OF QUALITY MANAGEMENT

1. Customer Satisfaction Index (CSI)

- Measures how satisfied customers are with a product, service, or overall experience.
- Often gathered through surveys, feedback forms, or Net Promoter Scores (NPS).

2. Product/Service Quality Index

- Assesses the quality of products or services based on predefined standards or specifications.
- Involves metrics like defect rates, error rates, or conformance to requirements.

3. Process Performance Indicators

- Evaluates the efficiency and effectiveness of processes within the organization.
- Includes metrics such as cycle time, process capability (Cpk), and throughput.

4. Internal Audit Findings

- Tracks non-conformances and issues identified during internal audits.
- Helps in understanding gaps in the QMS and areas that need improvement.

5. Employee Engagement and Training Index

- Measures the level of employee involvement in quality initiatives and the effectiveness of training programs.

- Indicators include the number of training hours, participation rates, and employee feedback.

6. Supplier Quality Index

- Assesses the quality of products or services provided by suppliers.
- Metrics include supplier defect rates, on-time delivery rates, and compliance with requirements.

7. Cost of Quality (CoQ)

- Represents the total cost of ensuring quality, including prevention costs, appraisal costs, and failure costs.
- Helps in balancing the investment in quality with the financial benefits.

8. Continuous Improvement Index

- Measures the effectiveness of continuous improvement initiatives, such as Lean or Six Sigma projects.
- Can include metrics like the number of improvement projects, cost savings, and process enhancements.

9. Compliance Index

- Evaluates the organization's adherence to regulatory and industry standards.

- Includes metrics related to compliance with ISO standards, legal requirements, and other regulations.

10. Return on Quality (ROQ)

- Assesses the financial return gained from investments in quality initiatives.
- Calculated by comparing the cost of quality initiatives to the benefits realized (e.g., reduced defects, increased sales).

11. Customer Complaint Resolution Time

- Measures the time taken to resolve customer complaints.
- A shorter resolution time generally indicates a more responsive and effective quality management system.

12. First Pass Yield (FPY)

- The percentage of products or services that pass all quality checks the first time without requiring rework.
- High FPY indicates efficient processes and effective quality control.

These indices collectively provide a comprehensive view of how well an organization's quality management system is performing and where improvements may be necessary.

Appendix V

INDICES OF AVAILABILITY OF PHYSICAL ICT (INFORMATION AND COMMUNICATION TECHNOLOGY) FACILITIES

The indices of availability of physical ICT (Information and Communication Technology) facilities are measurable factors used to assess the presence, adequacy, and accessibility of ICT infrastructure within an organization, school, or community. These indices help evaluate how well-equipped an environment is to support ICT-related activities, such as teaching, learning, business operations, or digital communication. Here are some key indices:

1. Number of Computers per User

- Measures the ratio of computers to users (e.g., students, staff, or employees).
- A higher ratio indicates better availability and access.

2. Internet Connectivity and Bandwidth

- Assesses the availability, speed, and reliability of internet connections.
- Includes metrics like connection speed (Mbps), bandwidth per user, and uptime percentage.

3. Availability of Network Infrastructure

- Evaluates the presence and quality of network infrastructure, such as routers, switches, and wireless access points.
- Indicators include the number of access points, network coverage area, and signal strength.

4. ICT Facility Accessibility

- Measures how easily users can access ICT facilities.
- Includes metrics like the number of ICT labs, opening hours, and accessibility for users with disabilities.

5. Availability of Peripheral Devices

- Assesses the presence of necessary peripheral devices like printers, scanners, projectors, and interactive whiteboards.
- Indicators include the number of devices per user and their operational status.

6. Software Availability

- Evaluates the availability of necessary software tools and applications for various tasks.
- Includes metrics like the number of licenses, the diversity of software available, and the alignment with user needs.

7. ICT Facility Maintenance and Support

- Assesses the frequency and quality of maintenance and technical support for ICT facilities.
- Includes metrics like the response time for technical issues, the frequency of maintenance checks, and the availability of IT support staff.

8. Power Supply Reliability

- Evaluates the reliability of the power supply to ICT facilities.
- Includes metrics like uptime percentage, the availability of backup power sources (e.g., generators, UPS), and power outage frequency.

9. Space and Ergonomics

- Assesses the adequacy and suitability of physical space for ICT facilities, including the layout, seating, and environmental conditions.
- Indicators include the number of workstations, room size, ventilation, and ergonomic design.

10. Security of ICT Facilities

- Measures the presence of security measures to protect ICT facilities from theft, vandalism, or cyber threats.
- Includes indicators like surveillance systems, access control, and cybersecurity protocols.

11. User Satisfaction with ICT Facilities

- Assesses the satisfaction level of users regarding the availability and quality of ICT facilities.
- Often gathered through surveys, feedback forms, or usage statistics.

12. Budget Allocation for ICT Facilities

- Evaluates the financial resources allocated for the acquisition, maintenance, and upgrading of ICT facilities.
- Includes metrics like the percentage of the total budget dedicated to ICT and expenditure per user.

13. ICT Facility Utilization Rate

- Measures how frequently and effectively ICT facilities are used.
- Indicators include the percentage of time facilities are in use versus available and the number of users per day.

These indices provide a comprehensive view of the availability and effectiveness of physical ICT facilities, helping organizations and institutions identify areas for improvement and ensure that their ICT infrastructure meets the needs of their users.

Appendix VI

ORAL INTERVIEW FORMAT

1. How are these Institutions rated in respect of Quality Management Indices?
2. How are these Institutions in Akwa-Ibom State rated on Availability of Physical ICT Facilities?

ABSTRACT

The primary objective of this study was to explore how Information and Communication Technology (ICT) affects quality management in Nigeria's higher education institutions. The research focused on specific indices of Quality Management and ICT, detailed in Appendices IV and V. Two research questions were formulated and addressed directly. Employing a survey research design, the study targeted a population of 3,000 respondents from higher education institutions in Akwa Ibom State, as outlined in Chapter Three. Discrete Sampling Techniques were applied, with a sample size of 3,000. The study utilized a variety of methods, including surveys, structured oral interviews, brainstorming sessions, and panel discussions, to assess the impact of ICT on quality management in these institutions. The oral interview questions were validated by three experts, and their feedback was used to finalize the instrument presented in Appendix IV. Data collection was managed by twelve well-briefed research assistants.

The findings of the study highlighted significant improvements in quality management within the institutions investigated. However, it also identified

numerous challenges related to ICT indices. The study concluded that ICT components play a significant role in predicting quality management outcomes in higher education institutions across Nigeria. Addressing these challenges effectively requires a multi-faceted approach, including enhanced government funding, collaboration with the private sector, and strategic long-term planning by institutional leaders.

Based on these findings, the study recommends that institutions assess the efficiency and effectiveness of their internal processes and monitor non-conformances and issues discovered during internal audits. By focusing on these areas, institutions can better manage their resources and improve overall quality management practices.