

Ignatius Ajuru University of Education.  
Rumuolumeni, Port Harcourt



National Policy Conference on  
**Governance and  
Sustainable Economy**

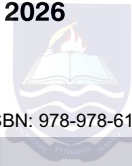


THEME

**Governance and Sustainable Economy:  
Building a Secure and Prosperous Nigeria**

**CONFERENCE  
PROCEEDINGS**

WED. 28TH - THU. 29TH JANUARY, 2026



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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

**THEME:** Governance and Sustainable Economy: Building a Secure and Prosperous Nigeria  
**DATE:** Wednesday 28th - Thursday 29th January, 2026 | **TIME:** 10:00am  
**VENUE:** Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt - Rivers State

## CONFERENCE LOC

**Dr. Jebbin Maclean Felix**  
Department of Economics,  
Ignatius Ajuru University of Education, Port Harcourt, Rivers State

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# **NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY**

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## **CONFERENCE PROGRAMME**

### **DAY ONE – Wednesday 28th January 2026**

Arrival of Guest/Conferees/Delegates

### **DAY TWO – Thursday 29th January, 2026**

#### **OPENING SESSION/AWARD/PLENARY**

Conference Registration	-	9:00am – 10:00am
Opening Prayer/Welcome Remark	-	10:00am – 10:15am
Institutional Brief/Chairman's Opening Remark	-	10:15am – 10:30am
Plenary Session	-	10:30am – 12noon
Launch Break/Group Photograph	-	12noon – 1:00pm
Plenary Session 2	-	1:00pm – 4:00pm
Policy Review Session	-	4:00pm – 5:00pm

### **DAY THREE – Friday 30th January 2026**

Departure of Guest/Conferee/Delegates



*Welcome to*  
**Ignatius Ajuru University of Education**

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**I**gnatius Ajuru University of Education started as Advanced Teachers' Training College on 14th June 1971 under the headship of Dr William Maxwell Jnr., a USAID representative who served in Rivers State. The College was established out of the need to check the acute shortage of trained teachers for the rapidly expanding programmes of post-primary education in Rivers State after the civil war in 1970. However, it was upgraded to Rivers State College of Education in 1975 following the promulgation of Edict No 1 on 25th February 1975. Following this transformation, Mr. Emmanuel Aguma, who was appointed Principal in January 1975 became the first Provost of the new College.

The College had its first graduation ceremony on 11th March 1978 where four sets of students totaling 462 received the Nigeria Certificate in Education. In 1982, the College admitted the first candidates for the Bachelor of Education degree programme in affiliation with the University of Ibadan. It is noteworthy that of all the Colleges of Education affiliated with the University of Ibadan, the then Rivers State College of Education was the only one that offered the Bachelor of Education degree programme.

However, to actualise the vision of the founding fathers of the College to become an autonomous degree-awarding institution, it was again upgraded to a university following the passage of the University of Education Law No. 8 of 2009 by the Rivers State House of Assembly on 15 October 2009. The official pronouncement was made on October 20, 2009, by His Excellency, Rotimi Chibike Amaechi, the governor of Rivers State, but was renamed Ignatius Ajuru University of Education in 2010 in honour of the late Ambassador Ignatius Ajuru, a one-time Chairman of the institution's Governing Council, who championed the upgrading of the College to a University. The institution is the thirty-fifth (35th) state-owned University in Nigeria. The University has three campuses located in Rumuolumeni (the main campus and seat of administration), St John Diobu campus, and Ndele campus in Obio/Akpor, Port Harcourt, and Emuoha Local Government Areas respectively.

Currently, the University has seven Faculties. They are the Faculty of Agriculture, Faculty of Education, Faculty of Humanities, Faculty of Management Sciences, Faculty of Natural and Applied Sciences, Faculty of Social Sciences and Faculty of Vocational and Technical Education. There are fifty (50) teaching departments, seventy-four (74) Professors, and other teaching staff. The majority of the Programmes of the institution are fully accredited by the National Universities Commission (NUC), Nigeria's Universities regulatory body.

This was made possible by the Visitor to the University and the Rivers State Governor, His Excellency, Barrister Nyesom Ezenwo Wike, whose love for youth development and quality education is unquestionable.

**Source:** <https://iaue.edu.ng/about/>

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# **BOOK OF PROCEEDINGS**

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

THEME: Governance and Sustainable Economy: Building a Secure and Prosperous Nigeria | 28th - 29th January, 2026  
VENUE: Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt - Rivers State

## APPLYING HUMAN CAPITAL THEORY TO EXAMINE THE ROLE OF ENTREPRENEURSHIP SKILLS DEVELOPMENT IN ENHANCING SECONDARY SCHOOL TEACHERS' POST-RETIREMENT ADJUSTMENT IN NIGERIA

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Faculty of Education, University of Jos, Nigeria

### Abstract

*In Nigeria's present-day socio-economic context, the transition from active service to retirement often poses serious economic, social and psychological challenges, predominantly among secondary school teachers. In spite of their vigorous contributions to national development, many teachers retire hooked on financial insecurity, delayed pension payments, social isolation and loss of professional identity, basically due to inadequate retirement preparation and inadequate alternative livelihood choices. This paper examines the role of entrepreneurship skills development in enhancing the post-retirement adjustment of secondary school teachers in Nigeria, using Human Capital Theory as its analytical framework. Drawing on conceptual analysis and empirical literature, the study explores key constructs including post-retirement adjustment, secondary school teachers, entrepreneurship skills development and human capital theory as well as interrogates the nexus among them. The paper finds major factors affecting teachers' post-retirement adjustment, such as: work-related stress and burnout, inadequate financial preparation, health challenges, loss of professional identity, social isolation and insufficient pre-retirement planning and support. It argues that these challenges are compounded by systemic weaknesses in Nigeria's retirement and pension administration. The study conceptualizes entrepreneurship skills development as a strategic investment in human capital, encompassing financial literacy, planning and management, problem-solving, adaptability, perseverance, creativity, risk-taking, self-belief and communication skills. These competencies are presented as critical skills that can empower teachers to generate income, remain socially engaged and sustain psychological well-being after retirement. Anchored in Human Capital Theory, the paper posits that deliberate investment in*

*entrepreneurship skills during active service enhances teachers' long-term productivity, adaptability and quality of life beyond formal employment. The review of empirical studies reveals persistent gaps in retirement preparedness research, particularly the limited focus on teachers, inadequate attention to psychosocial dimensions and insufficient exploration of entrepreneurship as a post-retirement adjustment strategy in the Nigerian context. The paper concludes that entrepreneurship skills development offers a proactive and sustainable pathway to mitigating post-retirement challenges among secondary school teachers. It recommends the integration of entrepreneurship education into teacher training curricula, institutionalization of pre-retirement programmes, establishment of entrepreneurship training centres, access to retirement business financing, mentorship initiatives, ICT-driven learning platforms, cooperative-based business models and systematic monitoring of retirees' adjustment outcomes. Overall, the paper underscores that strengthening teachers' human capital through entrepreneurship skills development is indispensable for achieving effective post-retirement adjustment and repositioning retired teachers as active contributors to economic and social development.*

**Keywords:** Human Capital, Theory, Entrepreneurship, Skills, Development, Teachers, Post-Retirement, Adjustment.

## **Introduction**

In contemporary Nigeria, the transition from active service to retirement represents a critical life phase marked by economic, social and psychological changes. Although retirement is expected to be a period of rest and fulfilment, it is often accompanied by anxiety, financial insecurity and inadequate preparation. Secondary school teachers, a vital segment of the national education workforce, frequently experience pronounced post-retirement adjustment challenges due to delayed pension payments, limited alternative livelihood options and loss of professional identity. Despite the nobility of the teaching profession, it rarely guarantees post-retirement financial security, underscoring the need for innovative strategies to empower teachers for life beyond formal employment.

One such strategy is the integration of entrepreneurship skills development, anchored in Human Capital Theory, as a means of enhancing effective post-retirement adjustment. This paper critically examines the role of entrepreneurship skills development in improving the post-retirement adjustment of secondary school teachers in Nigeria through the lens of Human Capital Theory. It explores the extent to which entrepreneurship skills could serve as a proactive and sustainable response to retirement challenges in a context where institutional support systems remain unreliable. The justification for this study lies in ongoing national concerns about teacher welfare, retirement insecurity and the need to promote lifelong learning. Although secondary school teachers contribute significantly to national development, existing training and pre-retirement programmes often lack structured entrepreneurship components. By addressing this gap, the study contributes to policy and academic discourse on strengthening teacher preparation for post-service life through entrepreneurship skills development.

## **Concept of Post-Retirement Adjustment**

Post-retirement adjustment refers to the process through which retirees adapt to life after leaving

the formal workforce, involving changes in financial, social, physical and psychological domains. For secondary school teachers in Nigeria, this transition is often challenging due to delayed pension payments, inadequate retirement planning and limited opportunities for continued economic engagement (Oyediran, 2022). Many teachers retire without prior exposure to entrepreneurship skills that could support income generation, which restricts their ability to sustain livelihoods after service. Although some retirees attempt small-scale businesses using their retirement benefits, lack of skills and preparation frequently results in business failure.

Successful post-retirement adjustment is commonly associated with financial stability, good health, social integration and engagement in meaningful activities. Retirees who plan ahead and possess these resources tend to experience higher life satisfaction and reduced stress (Peeters, De Cuyper & De Witte, 2017). Psychosocial factors such as self-efficacy, social support and purposeful engagement further enhance emotional adjustment by helping retirees maintain identity, motivation and resilience (Topa & Alcover, 2015). In addition, active participation in physical and leisure activities has been shown to improve psychological well-being and life satisfaction during retirement, as such activities provide structure, social interaction and a sense of purpose (Barbosa et al., 2023).

### **Concept of Secondary School Teachers**

Secondary school teachers are trained educational professionals responsible for teaching post-primary students, typically aged 11–17 years and preparing them for tertiary education or entry into the workforce. They deliver subject-specific instruction across disciplines such as sciences, languages, social studies, arts and vocational subjects and play a critical role in students' intellectual, social and civic development. These teachers usually possess at least a bachelor's degree and relevant teaching certification, with continuous professional development required to maintain effectiveness in pedagogy and assessment (Organisation for Economic Co-operation and Development [OECD], 2021). However, secondary school teachers often face challenges including large class sizes, diverse learner needs, curriculum changes and administrative pressures, which can affect job satisfaction, performance and well-being, sometimes resulting in burnout or early retirement (Ingersoll, 2001; Skaalvik & Skaalvik, 2017). Overall, secondary school teachers are central to shaping students' academic achievement, values and lifelong learning attitudes (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2015)

### **Factors Affecting Secondary School Teachers' Post Retirement Adjustment**

Observation shows that Secondary school teachers often encounter multiple professional and personal challenges during their teaching careers that might significantly influence their ability to adjust positively after retirement. These challenges that perhaps tend to affect their mental well-being, physical health, social relationships and financial security all critical factors in successful post-retirement adjustment can be explained as follows:

#### **1. Work-Related Stress and Burnout Faith**

Secondary school teachers appear to frequently experience high levels of stress due to substantial workloads, classroom management difficulties, pressure to meet curriculum demands and accountability for student outcomes. Chronic stress and burnout can lead to physical ailments (e.g., hypertension, fatigue) and psychological problems (e.g., anxiety, depression) that may persist into retirement, complicating the adjustment process (Skaalvik & Skaalvik, 2017).

## **2. Inadequate Financial Preparation**

Many secondary school teachers in Nigeria seem to face insufficient salaries and irregular pension payments, which contribute to financial insecurity. Poor financial planning, low retirement benefits or delays in pension disbursement impair their ability to maintain a stable lifestyle post-retirement, leading to stress and reduced quality of life (Ogbuehi & Okeke, 2020).

## **3. Health Challenges**

The challenging nature of teaching looks to negatively impact teachers' physical health over time, with issues such as lingering fatigue, vocal strain and musculoskeletal problems are common among secondary school teachers. Health problems accumulated during service are worsened in retirement, affecting retirees' mobility, independence and psychological adjustment (Adebayo & Akinlade, 2019).

## **4. Loss of Professional Identity**

Many teachers seem to strongly identify with their profession. Retirement often causes a loss of this identity and daily structure, leading to feelings of purposelessness and reduced self-esteem (Wang, Henkens & van Solinge, 2011). Teachers who have not developed alternative roles or interests outside work may struggle more with the emotional transition.

## **5. Social Isolation**

Departure from the workplace may also mean losing daily social interactions with colleagues and students. Reduced social contact can contribute to loneliness and isolation, which are linked to poorer psychological well-being during retirement (Topa & Alcover, 2015).

## **6. Lack of Retirement Planning and Support**

Inadequate pre-retirement counselling and insufficient programmes that prepare teachers for retirement life might leave many ill-equipped to handle the changes. This includes limited awareness or access to financial planning, health care and psychological support services, exacerbating adjustment difficulties (Peeters, De Cuyper & De Witte, 2017).

Therefore, the interaction of work-related stress, financial insecurity, health issues, loss of professional identity, social isolation and inadequate retirement planning might constitute key challenges that secondary school teachers face, which collectively might impact their post-retirement adjustment. Addressing these challenges through comprehensive support programmes, financial education and health promotion during active service could improve retirees' quality of life and psychological well-being.

## **Concept of Entrepreneurship Skills Development**

Entrepreneurship skills development could be referred to as the systematic process of acquiring, enhancing and applying the knowledge, competencies and particular attributes necessary to identify business opportunities, create and manage enterprises and respond innovatively to changing economic environments. It involves building practical and cognitive abilities that enable individuals to successfully initiate, develop and sustain business ventures, either as self-employed entrepreneurs or as intrapreneurs within organizations (Neck et al., 2014). Entrepreneurship Skills Development could also be seen as the process by which secondary school teachers acquire and enhance essential competencies such as entrepreneurship financial literacy, entrepreneurship planning, entrepreneurship problem-solving, entrepreneurship adaptability, entrepreneurship

perseverance, entrepreneurship creativity, entrepreneurship risk-taking, entrepreneurship self-belief and entrepreneurship communication that enable them to successfully initiate and manage business ventures. For secondary school teachers, entrepreneurship skills might serve as a valuable resource for post-retirement adjustment, offering avenues for self-employment, supplemental income and continued engagement in meaningful activities even after leaving formal service.

### **Entrepreneurship Financial Literacy Skill**

Entrepreneurship financial literacy skill is the ability to understand and manage personal and business finances effectively. It includes budgeting, saving, investment, debt management and financial decision-making. Many retired teachers seem to face financial constraints due to lack of knowledge in financial management. Entrepreneurship skills development programmes that emphasize financial literacy enable retirees to make informed financial decisions, manage business cash flows and sustain long-term business profitability (Lusardi & Mitchell, 2014). The problem with financial literacy in secondary school teachers' post-retirement adjustment is that many teachers seem to lack financial education, poor saving and investment habits, overreliance on monthly salaries and limited understanding of pension systems leave them financially unprepared to sustain themselves after leaving active service.

### **Entrepreneurship Planning Skill**

Entrepreneurship planning skill is essential for starting and sustaining successful enterprises. Effective business planning involves identifying business opportunities, setting clear goals, analysing market trends and developing strategic action plans. Teachers who develop skills in entrepreneurship planning seem to be better equipped to handle financial operations, resource allocation, marketing strategies and human resource management. Without proper planning, businesses often face financial losses and eventual failure (Scarborough, 2012). The problem with entrepreneurship planning with teachers' post retirement adjustment is that many teachers appear to lack the ability to set realistic post-retirement goals, manage resources effectively and make long-term strategic decisions resulting in poor financial preparedness, unproductive use of time and difficulty transitioning into sustainable income-generating activities for effective post retirement adjustment.

### **Entrepreneurship Problem-Solving Skill**

Entrepreneurs frequently encounter challenges such as market fluctuations, competition and financial constraints. Entrepreneurship problem-solving skill enables individuals to assess situations, develop effective solutions and adapt to changing business environments (Olamire, Chukwuma & Ikuelogbon, 2024). Retired teachers who develop strong problem-solving abilities seem to navigate entrepreneurial challenges, make informed decisions and sustain business growth. Teachers could achieve problem-solving skill by engaging in critical thinking exercises, adopting structured approaches, collaborating with others and utilizing technology. The problem with entrepreneurship problem-solving skill with teachers' post retirement adjustment is that many teachers appear struggling to adapt to the unexpected difficulties of retirement such as financial setbacks, health issues or loss of identity due to limited experience in independently analysing complex post-retirement situations, evaluating alternatives and making effective decisions outside the structured school environment. This lack of problem-solving skill seems to lead to anxiety, depression or poor health outcomes among retired teachers as they prepare for post retirement adjustment.

### **Entrepreneurship Adaptable Skill**

The business environment is constantly evolving due to technological advancements, market shifts and changing consumers' preferences. Entrepreneurship adaptable skill is the ability to adjust to changes and embrace new strategies for business sustainability (Bordia, Read & Bordia, 2020). Retired teachers who are adaptable appear to integrate modern business practices, adopt new technologies and remain competitive in the entrepreneurial space. The problem with entrepreneurship adaptability skill in teachers' post retirement adjustment is that many teachers seem to find it difficult to adjust to lifestyle changes, shifting roles, financial uncertainties and new social environments that come with retirement, largely due to their long-term dependence on structured routines and predictable school systems, leaving them unprepared for the flexibility and resilience required in post-retirement life, thereby hindering their overall well-being and post retirement adjustment becomes challenging.

### **Entrepreneurship Perseverance Skill**

Entrepreneurship perseverance skill is the ability to remain committed to a goal despite setbacks and obstacles. Entrepreneurship is often characterized by uncertainties and failures, requiring individuals to maintain resilience and persistence (Duckworth, 2016). In essence, teachers transitioning into entrepreneurship must be willing to overcome challenges, learn from mistakes and remain dedicated to their business ventures. The problem with entrepreneurship perseverance in teachers' post retirement adjustment is that many teachers, after facing retirement-related setbacks such as delayed pensions, failed ventures or declining health, often appear to lack the sustained motivation and resilience needed to persist through challenges, rebuild financial stability or pursue new opportunities, leading to discouragement and a decline in overall adjustment and well-being.

### **Entrepreneurship Creativity Skill**

Entrepreneurship creativity skill is the ability to generate innovative ideas and solutions that add value to a business. According to Adeigbe and Adebusoye (2019), entrepreneurs must think outside the box to develop unique products and services that meet customers' needs. Creativity could allow retired teachers to identify untapped market opportunities and differentiate their businesses from competitors. By fostering a culture of creativity, entrepreneurship training programmes could enhance retired teachers' ability to develop sustainable business models. The problem with entrepreneurship creativity in teachers' post retirement adjustment is that many teachers seem to struggle to think innovatively or explore alternative ways to generate income, remain productive or find fulfilment after retirement, as their professional roles often emphasized routine over innovation, limiting their ability to adapt creatively to new life challenges and opportunities outside the classroom.

### **Entrepreneurship Risk Taking Skill**

Entrepreneurship involves taking calculated risks to achieve business success. According to Connie & Zhang (2018), risk-taking entails making strategic decisions that may have uncertain outcomes but offer potential rewards. Retired teachers may be risk-averse due to the security of their previous employment. However, entrepreneurship training programmes could help retirees assess risks, make informed choices and embrace calculated risks that may lead to business growth. The problem with entrepreneurship risk taking in teachers' post retirement adjustment is that many teachers look to be generally risk-averse due to years of working in a secure, structured environment, which could make them hesitant to explore new ventures, invest in business

opportunities or step outside their comfort zones, thereby limiting their ability to pursue bold, income-generating activities or adapt confidently to post-retirement uncertainties.

### **Entrepreneurship Self-Belief Skill**

Entrepreneurship self-belief skill is the confidence in one's ability to succeed in entrepreneurship. A strong sense of self-efficacy enables individuals to take initiative, persist in challenging situations and seize business opportunities (Gimmon, Yitshaki & Hantman, 2018). Retired teachers with high self-belief appear more likely to venture into business and sustain their enterprises. Training programmes that build confidence and self-motivation could enhance retirees' ability to embrace entrepreneurship as a viable post retirement option. The problem with entrepreneurship self-belief in teachers' post retirement adjustment is that many teachers seem to experience a loss of confidence in their ability to succeed outside the structured school environment, leading to feelings of inadequacy, fear of failure and reluctance to pursue new roles or entrepreneurial opportunities, ultimately hindering their ability to take initiative and adjust positively in retirement.

### **Entrepreneurship Communication Skill**

Entrepreneurship communication skill is a vital entrepreneurial skill that facilitates business negotiations, customer relations and teamwork. Entrepreneurs must communicate their ideas, products and services effectively to attract customers and build strong business relationships (Kotler & Keller, 2016). Retired teachers with strong communication skills seem to be engaging with stakeholders, market their businesses effectively and develop professional networks that enhance business success. The problem with entrepreneurship communication skill in teachers' post retirement adjustment is that many teachers, after leaving the formal school system, appear to struggle to effectively network, market their skills, seek support or engage in collaborative ventures, limiting their ability to access new opportunities, build social capital and maintain meaningful interactions essential for successful post-retirement adjustment.

### **Overview of Human Capital Theory**

The Human Capital Theory, formulated by Gary S. Becker in 1964 provides the theoretical foundation of this paper. The theory posits that individuals can improve their productivity, earning capacity and socio-economic outcomes through deliberate investment in education, training, experience and skill acquisition (Becker, 1964). According to Becker, just as businesses invest in physical capital to boost output, individuals who invest in their own knowledge and skills, termed "human capital" reap long-term benefits in the form of higher income, improved employability and greater adaptability in changing economic conditions.

The principles of Human Capital Theory state that education and training are forms of investment that increase an individual's future productivity, skills acquisition and knowledge development that lead to improved economic and social outcomes, the returns on human capital investments are often realized later in life and are sustainable over time, and the theory encourages the strategic development of competencies that allow individuals to remain relevant in diverse contexts, including retirement. The Human Capital Theory would therefore be relevant to this paper because the theory provides a conceptual framework for underpinning how entrepreneurship skills development can facilitate a smoother and more sustainable post retirement adjustment for secondary school teachers. The theory postulates that investing in knowledge, skills and competencies enhances an individual's economic productivity and social adaptability. For

teachers approaching retirement, this theory highlights the importance of acquiring new skills beyond the classroom, especially entrepreneurship skills as a way of staying financially independent and socially active after formal service. This paper asserts that by investing in new skills, specifically financial literacy, business planning, creativity, risk-taking, adaptability and problem-solving, teachers might create viable post retirement opportunities such as small businesses or consultancy services. This assertion is in line with the postulation of the Human Capital Theory. Therefore, through the lens of Human Capital Theory, it would be established that entrepreneurship skills development would reduce retired teachers' financial reliance on pensions, members of their families and communities, mitigates the psychological and social challenges associated with retirement and ultimately enhances their post retirement quality of life.

### **Review of Empirical Studies on Retirement Challenges of Teachers**

Empirical studies consistently indicate that retirement poses significant economic, psychological and social challenges for teachers. Adebayo and Akinwale (2020), in a survey of retired civil servants in Nigeria, found that retired teachers experience severe economic insecurity due to irregular pension payments, weak savings culture and limited government support, resulting in reduced quality of life. Similarly, Adeoye (2019) reported systemic failures in pension administration, with delayed gratuities forcing many retired teachers to depend on family support or engage in low-paying jobs.

Ajibola and Ayodele (2020) examined retirement planning among secondary school teachers in Nigeria and revealed widespread inadequate planning, poor awareness of retirement schemes and limited access to pre-retirement training. Emotional anxiety, fear of redundancy and financial concerns were identified as major barriers to smooth post-retirement transition. Bamisaye (2018) further showed that delays in pension and gratuity payments, poor healthcare access and social isolation significantly undermine post-retirement adjustment among retired secondary school teachers in Oyo State. Beyond financial concerns, psychosocial factors play a critical role in retirement adjustment. Topa and Alcover (2015) demonstrated that self-efficacy, continued social engagement and involvement in meaningful activities enhance emotional adjustment among retirees, highlighting the importance of psychological and social resources alongside financial preparedness.

### **Inferences and Research Gaps**

Despite growing literature on retirement, research focusing specifically on secondary school teachers in Nigeria remains limited and fragmented. Most studies address civil servants broadly, with insufficient attention to teachers' unique professional identities, emotional labour and historically low earnings. The literature is heavily skewed toward financial preparedness, with minimal exploration of psychosocial dimensions such as identity loss, social isolation and emotional readiness for retirement. Moreover, empirical evaluations of pre-retirement training programmes for teachers are scarce, and gender-specific retirement experiences are largely neglected. Methodologically, many studies rely on cross-sectional designs and Western contexts, leaving gaps in understanding long-term retirement transitions within Nigeria's socio-cultural and institutional setting. Finally, there is limited empirical evidence on how entrepreneurship and informal income-generating activities support teachers' post-retirement adjustment, underscoring the need for context-specific, longitudinal and skills-focused research.

## **Human Capital Theory and the Role of Entrepreneurship Skills Development in Enhancing Secondary School Teachers Post Retirement Adjustment in Nigeria**

Human Capital Theory posits that individuals enhance their economic value and productivity through investment in education, training and skills acquisition, which yield long-term economic, social and psychological benefits. For secondary school teachers in Nigeria, the relevance of this theory extends beyond active service to post-retirement life, where challenges such as financial insecurity, psychological distress and reduced social engagement are common. These challenges underscore the need to effectively deploy and further develop human capital through entrepreneurship skills development. Within the framework of Human Capital Theory, entrepreneurship skills development constitutes a strategic investment that enhances individuals' capacity for income generation, problem-solving and informed decision-making. Skills such as financial literacy, planning, creativity, adaptability, perseverance, problem-solving, risk-taking, self-belief and communication strengthen teachers' human capital and support a smoother transition into post-service life by promoting economic independence, autonomy and social participation.

Specifically, financial literacy improves retirement planning and resource management; planning supports sustainable enterprise development; problem-solving and adaptability enable retirees to cope with change and uncertainty; creativity and perseverance foster innovation and resilience; while risk-taking, self-belief and communication enhance entrepreneurial initiative and social engagement. In the Nigerian context, where pension delays and limited institutional support persist, integrating entrepreneurship skills development into teachers' active service years becomes imperative. Anchored in Human Capital Theory, such deliberate investment can empower teachers to pursue income-generating and socially productive roles after retirement, thereby facilitating effective and sustainable post-retirement adjustment.

### **Conclusion**

Applying Human Capital Theory to examine the Role of Entrepreneurship Skills Development in Enhancing Secondary School Teachers' Post-Retirement Adjustment in Nigeria is both thoughtful and essential. Human Capital Theory finds that purposeful investments in knowledge, skills and competencies produce long-term benefits, including economic stability, personal fulfilment and adaptability in the face of life transitions such as retirement. For Nigerian secondary school teachers, the development of entrepreneurship skills such as financial literacy, planning, problem-solving, adaptability, creativity, perseverance, risk-taking, self-belief and communication signifies a strategic extension of their human capital.

These skills could serve as practical tools that enable teachers to generate income, remain socially engaged and maintain a sense of purpose for effective post retirement adjustment. Considering the persistent challenges within Nigeria's retirement system, such as delayed pensions and limited institutional support, entrepreneurship skills development could ensure a sustainable pathway to economic independence and psychological well-being in retirement. By entrenching entrepreneurship skills development training in teacher education and professional development programmes, stakeholders may strengthen the long-term resilience of educators. Eventually, this configuration between Human Capital Theory and Entrepreneurship Skill Development may not only guarantee smoother post-retirement adjustment but also repositions retired teachers as active contributors to the economy and society, rather than dependents. The investment in these

skills is, therefore, not just valuable but indispensable for national development and individual self-possession in later life.

### **Recommendations**

1. Integrate entrepreneurship education into teacher training curricula. The National Commission for Colleges of Education (NCCE) and National Universities Commission (NUC) should revise teacher education curricula to include practical entrepreneurship modules such as financial literacy, planning, problem-solving, creativity, adaptability, risk-taking, self-belief and communication. Collaboration with agencies like Small and Medium Enterprises Development Agency of Nigeria (SMEDAN) and Plateau State Microfinance Finance Development Agency (PLASMIDA) should support delivery, assessment and real-world application, thereby reducing teachers' overdependence on pensions after retirement.
2. Institutionalize pre-retirement entrepreneurship programmes. Federal and state ministries of education should mandate structured pre-retirement workshops for teachers beginning at least five years before retirement. These programmes should cover financial planning, business start-up skills, adaptability and mindset reorientation, delivered in partnership with NGOs, cooperative societies and pension fund administrators.
3. Establish Teachers' Entrepreneurship Skills Development Training Centres (TESDTCs). Governments should create state-level training centres, preferably within existing teacher development structures, to provide subsidized training, business incubation and access to micro-finance. Partnerships with institutions such as Bank of Industry (BOI), Central Bank of Nigeria (CBN) and cooperative unions should support funding and sustainability.
4. Provide access to low-interest retirement business loans. A Teachers' Retirement Business Loan Scheme (TRBLS) should be introduced through microfinance institutions for teachers nearing or recently in retirement, with basic entrepreneurship training as a prerequisite to ensure effective utilization and repayment.
5. Launch a National Teacher Entrepreneurship Mentorship Initiative (NTEMI). Ministries of education should establish mentorship networks linking experienced retired teacher-entrepreneurs with teachers approaching retirement, using digital platforms and periodic networking events to promote peer learning and reduce retirement anxiety.
6. Leverage ICT for continuous entrepreneurship learning. Teacher education institutions should develop e-learning platforms and mobile applications offering entrepreneurship, financial management and digital marketing training tailored to teachers, in partnership with EdTech firms and government ICT agencies.
7. Promote cooperative-based entrepreneurship models. NGOs, SMEDAN, and PLASMIDA should support retired teachers in forming cooperatives for joint ventures in areas such as agriculture, publishing and educational consultancy, thereby reducing individual risk and enhancing scalability.
8. Strengthen monitoring and evaluation of post-retirement outcomes. The Teacher Registration Council of Nigeria (TRCN) should establish a post-retirement monitoring unit to track retirees' income, health, social engagement and well-being, using periodic surveys to inform evidence-based policy and programme improvement.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

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## ASSESSMENT OF SECONDARY SCHOOL LIBRARY UTILIZATION AND IT'S IMPACT ON ACADEMIC PERFORMANCE OF STUDENTS IN OSHIMILI SOUTH LOCAL GOVERNMENT AREA OF DELTA STATE

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### Abstract

*The study is the assessment of secondary school library utilization and its impact on academic performance of students in Oshimili South Local Area of Delta State. The study adopted a descriptive survey research design. The population of the study was three hundred and forty-six (346), comprising 338 students in SS3, and 8 principals in the 8 public secondary schools in Oshimili South Local Government Area of Delta State. The entire population was considered as the sample size. This was due to the manageable size of the population. The study adopted a mixed-methods approach, using both interview and questionnaire as research instruments. Questionnaire was used to gather data from the students, while interview method was used to gather data from the school principals. The data collected was analyzed using frequency, mean and standard deviation. In all, 233(69%) of the students and 5(62.5%) principals responded to the study. The findings ascertained low rate of library use due to lack of current books and other information materials/gadgets in the library, it also indicated that materials like computers, fiction and non-fiction books and reference materials are available but identified non-availability of modern technology/resources such as; internet, film projections, audio-visuials, cassettes, tapes/record players, gazettes which is an indication of lack of modern trends in these libraries. The study further determined that a conducive environment with fully resourced library materials can motivate library use among students. It was also found that library usage among students has a general positive impact on academic performance of students. Inadequate infrastructures, negligence of the relevance of school libraries by government authorities, apathy on part of the school management, lack of fund for school library development and services were some identified factors militating against school library development in Oshimili South Local Area of Delta State. The study concluded that the role of school library in fostering the academic performance of students in secondary schools is quite immeasurable. Thus, the government at different levels, (federal, state and local*

*government) must see the establishment of functional school libraries (in accordance with the established standard) in all public institutions as a matter of urgent concern if the goal of secondary education must be achieved. The study recommended direct budgetary allocation for school library development and services, the government and the educational authorities should show serious commitment to the implementation of its policy on school library development in order to facilitate quality education in basic schools in Delta State.*

## **Introduction**

Education no doubt is a veritable weapon for development of attitudes and values capable of building a nation. It is the solid foundation upon which the totality of literacy is built. Good education awakens the talents in every individual and stimulates his development to a maximum level (Agbo, 2003). Secondary education prepares students for higher education. It offers quality education to individuals who prepare for employment generation and the world of work. This level of education is much more than grades, test or certificates at the end, it is where characters are built, values are formed and resilience tested in the young ones. Secondary education plays a significant role in human capital development. It maximizes the creative potentials and skills of the students for self-fulfillment which impact on the general development of the society. One of the goals of secondary education as indicated by the Federal Republic of Nigeria (FRN, 2014: 17) in the National Policy on Education (NPE) is to provide the holders of basic education certificate with opportunity for a higher level of education irrespective of gender, social status, religious or ethnic background. However, behind the success of this citadel of learning is a standard school library. School library provides students the necessary learning support, teaching them the essential skills needed to succeed academically. Thus, there is no gain mentioning the fact that school library holds the key to actualization of the goals and objectives of secondary education program.

Libraries are indispensable information centers and the most important organ in any institution of learning. They are significant resource for achieving the goals and objectives of all levels of education and profession. Libraries serve as nurturing environment where students can delve into the world of information, explore countless topics and improve their reading and writing skills. They provide the necessary impetus for all categories of users by making available print and non-print information resources at the right time and in the right format. Agbo (2015) define a school library as any library attached to pre-tertiary institution such as nursery, primary and secondary school with a mission to support the intellectual development of pupils and students. Wali and Bertha (2018) described a school library as a learning laboratory whose equipment includes books, magazines, newspapers, filmstrips, tapes slides, recordings, transparencies, art, painting and other types of teaching and learning aids. Secondary school library (also known as media resource centre) is any library established within secondary school environment which caters for the information needs of teachers, learners and the community it serves. They provide not just books, magazines, newspapers computers and other technology, for relevant information but also fun and educational activities. A school library is a significant part of elementary and high school programs without which students would not thrive academically.

The major function and purpose of a school library according to Esan (2022) is to help every member of the school community including students and staff gain new knowledge and disposition for teaching, learning and personal development necessary to them throughout their life time. Through research and application of new technology for problem solving, school library

excites students about the learning process and stimulate their curiosity. The Federal Government of Nigeria recognized the importance of school libraries when it stated in its National Policy on Education (2004) that; "libraries constitute one of the most important educational resource thus, every state ministry of education should provide funds for library development in all educational institutions as well as train librarians and library assistants for the service. An ideal school library is equipped with a team of professionally trained staff who manages the diverse collection of learning resources to support the school curriculum, meet the individual needs and interest of the students which facilitates the development of information literacy skills embedded in the school curriculum (Jaga and Udumukwu, 2023). These professionals also offer instructions to enhance student's ability for effective utilization of library materials.

The term utilization is mostly used in the profession of librarianship to refer to interactions and use of information resources and services provided by the library. Afful-Arthur and Agyapong (2018) viewed utilization of library as effective use of learning materials retrieved primarily to address a problem or accomplish a set goal. Effective utilization of library resources is the primary objective of library in any educational institution. Utilization of library information resources is of great concern to libraries because it is the users that make the library worthwhile. The use of library resources is of utmost important in teaching and learning process especially at the basic school levels which forms the bases for which other knowledge is built upon. Secondary school students are expected to make adequate use of the library for their numerous assignments, tests and examinations. Clarke (2017), asserted that libraries objectives of information provision, recreational roles, promotion of cultural heritage, research and educational development, etc. can only be achieved through effective utilization of library resources and services provided. Okiy, (2004) also affirmed that inculcation of habit of using the school library will act as catalyst to attainment of quality education by these students. Thus, no one succeeds in academics without making broad use of the information resources in the library. Adebamowo (2011) emphasized that neither a good book nor a good library can make an individual educated but successful use of the books and library makes a well-informed, stable and well-adjusted individuals. School library provides students the necessary learning support, teaching them the essential skills needed to succeed academically (Akande & Bamise, 2017). In accounting for the inestimable value of school library, Elaturoti, (2000), buttressed that school libraries were the most effective way of building up a reading public that will effectively move the development of a nations forward and enable them function in the 21st century world civilization of computers and data bases. It equip students with skills that will enable them learn more effectively using varieties of information resources at their disposal. No wonder the Federal Ministry of Education in its Minimum Standards for School Libraries (2019) acknowledged that availability and accessibility of the library resources and services provided, enhances utilization of the school library among students. This will go a long way to promote excellent academic performance and achievement in secondary schools. There is no gain saying that effective utilization of school libraries are instrumental in nurturing a culture of reading among young learners, fostering their intellectual growth and instilling in them a lifelong interest for learning (Ogunbekun et al. 2023).

The above facts notwithstanding, this integral and essential part of secondary education program is highly neglected by the government and the educational authorities, despite the laudable directives in the national policy on education. It is disheartening to note that a good percentage of public secondary schools in Oshimili south local government of Area of Delta State cannot boast of functional school libraries. The government nonchalant attitude towards making direct budgetary

allocation for school library development, inadequate infrastructures and other necessary facilities, apathy on part of the school management, absence of professional staff to man the library in secondary schools have retard school library services in most of these public schools. Daniel (2013) affirmed that inadequate fund has hindered the provision of modern libraries in Nigeria, slows down the provision of current literature in the e-library scheme as well as brings about non-availability of up-to-date materials which has contributed to users' loss of interest in using the libraries. Agbama (2014), Tukur, Tsafe and Ibrahim (2024) posited that one of the major problems facing school library development in Nigeria today borders on total neglect of education by the government authorities. This has resulted to non-recognition of the relevance of school library in the drive towards the achievement of educational objectives at the primary and secondary school levels. Consequently, reports have shown that students at the secondary school level are performing poorly academically especially at their external examinations. Ogunbadejo (2015) ascertained that less than 30% on the average of over one million students that sat for public examinations in Nigeria (especially by WAEC and NECO) obtained credit passes in five (5) subjects including English language and mathematics. This is an indication of decline in students' academic performances. Meanwhile, Ogunbote and Odunewu (2008) opined that performances of students could be improved considerably, if they can have access and make good use of the library regularly. This is because a conducive learning environment and space containing quality and current materials as well as professionally trained librarians to render services have been seen to have positive impact on the students' academic performances. All these facts therefore, calls for in-depth study to analyze the situation and identify the intervening factors that needed to be put in place to promote quality teaching and learning which will foster excellent academic performances among secondary school students in Oshimili South local government area of Delta State. This study therefore, is the assessment of secondary school library utilization and its impacts on academic performance of students in Oshimili South local government Area of Delta State.

### **Statement of the Problem**

The school library remains the power house of knowledge and ideas documented in varied information resources. These resources are significant to students 'for their academic activities. No doubt the quality of teaching, learning and self-development of students depend absolutely on their interactions and use of these diverse resources at their disposal to facilitate excellent academic performance. Contrarily, a good percentage of students in secondary schools in Delta State perform poorly in their external examinations (especially by WAEC and NECO). The researchers' personal observations from the secondary schools under study and the past statistical records of students' examination results from these secondary schools, indicated a huge decline in the students' academic achievements. This decline as identified is not unconnected to lack of functional school libraries in most of these public schools which has resulted to total loss of interest in reading among these students. Reports from various researchers also ascertained that lack of relevant information resources and facilities in these schools which students could have used to enhance their classroom learning is also one of the major causes of mass failure in external examinations in these secondary schools. Inadequate reading undoubtedly is a serious challenge that can impact negatively on students' academic performance generally. Based on this premise, this study sought to investigate secondary school library utilization and its impacts on academic performance of students in Oshimili South local government area of Delta State.

### **Objectives of the study**

The main objective of this study is to investigate the utilization of secondary school library and its impacts on academic performance of students in Oshimili South Local Government Area of Delta State. Specifically this study sought to:

- i. To examine the rate of utilization of secondary school library among students in Oshimili south local government area of Delta State.
- ii. To find out the information materials available in secondary school libraries in Oshimili South local government area of Delta State.
- iii. To examine the impacts of library use on academic performance of the students in Oshimili South local government area of Delta State.
- iv. To ascertain the factors that motivates utilization of secondary school library among students in Oshimili South local government area of Delta State.
- v. To determine the factors militating against secondary school libraries in Oshimili South local government of Delta State.

### **Research Questions**

From the objectives of the study, the following research questions were raised to guide the study

- i. What is the rate of utilization of school library among student in Oshimili South local government area of Delta State?
- ii. What are the information materials available in secondary school libraries in Oshimili South local government area of Delta State?
- iii. What are the impacts of library use on academic performance of students in Oshimili South local government area of Delta State?
- iv. What are the factors that motivate utilization of secondary school libraries among students in Oshimili South local government ares of Delta State?
- v. What are the factors militating against the secondary school library in Oshimili South local government area of Delta State?

### **Review of Related Literature**

The school library no doubt is the backbone of any secondary education program being a priceless source of information for all educational activities. No one succeeds in academics without making optimum use of the relevant information resources in the library. Effective utilization of library resources is of great concern to libraries today because it is the users that make the library worthwhile. Thus, Agboola and Bamigboye (2011) explained that the quality and strength of any educational program depends on the library not as a gigantic building but the use of it. Aanu and Olatoye, (2011), added that the quality of library and its frequent usage has tremendous impact on students' academic performance and higher test scores.

Several related studies have investigated the rate of utilization of school library among secondary school students, the information materials available in school libraries, the factors that motivate students' use of school library, the impacts of school library on academic performance of the students and the factors militating against secondary school libraries in Nigeria. Chibor and Wale (2018), studied the role of school library in academic performance of students in Nigeria. Their findings revealed that many students do not use their school libraries frequently in Nigeria because the libraries are stocked with irrelevant and out-dated materials. According to them majority of students are attracted to libraries that are well stocked with current and relevant materials to support the school curriculum. Akande and Bamise (2017) examined the role of school library in

academic motivation of secondary school students in Osun State. The result also indicated low patronage of school library by the students. The study noted that students used their school library on a slightly lower frequency of 36.5% when compared with another study in South Western state of Nigeria where 57.7% of the respondents visit the library on daily basis. Some of the respondents in this study agreed that they only visit the library once in a week. Okoronkwo (2015) identified that the physical conditions of many school libraries as well as the absence of necessary materials does not inspire students to patronize school libraries, also noted is the fact that most school libraries are crippled with dilapidated infrastructures. Aru and Chinaka (2011) attested that majority of students use the library but occasionally and this implies that more efforts should be made to improve the frequency and regularity of library use by students. Baro & Eze (2016) investigated the state of school libraries in Nigerian secondary schools in Otuoke in Bayelsa State. The results revealed that almost half of the schools investigated had no school library in their secondary schools. Reasons for this includes attitude towards village schools, lack of adequate space for libraries in school premises, lack of funding, and school management's compulsory selling of books to students. This study is also in line with that of Jato, Ogunniyi and Olubiyo (2011) which revealed that some of the secondary schools visited, do not have school libraries at all and that even those that manage to have, there was no inclusion of library period on their school time table. The result also showed that while some of the students do not regularly use their school libraries, others responded that they've never used their school libraries at all and some others attested that they visit their school libraries only to read their lecture notes. The fact that many teachers in the school system do not encourage library use was also ascertained in the study as the findings reported that some teachers see their lesson and note as the beginning and the end in the teaching-learning process hence they do not encourage library use.

A school library plays a significant role in boosting students' academic achievements by providing access to wide range of study materials accessible to students, teachers and the school community. No doubt the vitality of a nation's progress is dependent on effectiveness of its educational sector and which must include its libraries. These libraries must operate flawlessly with relevant and current materials under the care of professionally trained staff. This was confirmed by Tukur, Tsafe and Ibrahim (2024) who conducted a study on an ideal school library in Nigeria: Librarians' view. Their result revealed that an ideal school library must have proper and adequate accommodation, stocked with relevant and current information materials and manned by qualified library staff capable of providing services to their users. An effective school library according to Aina, (2004) is expected to provide a comprehensive range of resources which include books, periodicals, magazines, newspapers, pictures and audio visual and others. Furthermore, Afolabi (2016) who also examined school library media resources availability in ondo state ascertained that a school library by minimum standard of policy outline should consist of books, pamphlets, paper cuttings, atlas, maps and charts, photography records, films, gazettes and government publications, record players, cassette tapes/ payers, film projections, slides, pictures, photographs, regalia and periodicals as well as reference books, fictions and non-fictions. Contrarily to the above facts, Agabi (2003) and Akpe (2005) ascertained that lack of non-print materials in school libraries today is a major factor facing school libraries. They submitted that non print materials make learning concrete and real and they listed them to include pictures, posters and models but argue that these non-print materials are lacking in our school libraries.

On the factors that motivates utilization of school libraries among students, Mahwasane, (2017) examined the role of libraries in sustaining quality education in secondary schools. The study

identified library orientation to students as utmost important in facilitating effective use of library in secondary schools. This is because if students are given instruction on how to use the library, it enables easy access to the library collection as a whole. The study also revealed that students will be motivated to use their libraries if the library management should change their service orientation to accommodate the modern trends in libraries, that is, the traditional forms of the library services be upgraded to virtual and automated services as this will enhance unrestricted access to information as well as motivate frequent library use by the students of modern days who are used to and understand technology (Jankowska et al. 2006). Consequently, the role of teacher librarian in facilitating usage of the library by the students cannot be underestimated. Kuhlthau, (2004), Ani et al. (2016), reported that the teacher librarians' assistance to students in searching and locating materials as well as providing answers or sources when students come out with information queries, will undoubtedly motivate library utilization among the students and this will invariably foster positive academic performance. Akande and Bamise (2017) examined the role of school library in academic motivation of secondary school students in Osun State. They identified that programs such as; library tour in school libraries which enables students' familiarization with the various locations of the library resources whenever the need arises in school or outside are essential factors that can motivate students' frequent use of the school library. Also, Chibor and Wali (2018) investigated the role of school libraries in academic performance of students in Nigeria. The result reported that many students don't use their school libraries frequently in Nigeria because they are stocked with irrelevant and out-dated materials hence to motivate students use of the library, school librarian, in collaboration with the teaching staff, should select the best current resources to support the school curriculum. A well-resourced library encourages library usage which promotes excellent academic performances among students.

The impact of school library on academic performance of students in secondary schools cannot be underestimated. The library undoubtedly is the power house where all the information required for education of these students are collected, stored, processed and retrieved for use. School libraries are self-learning centres that offers students access to diverse necessary study materials that support learning, teaching them the essential skills needed to succeed academically. Ogunbote and Odunewu, (2008) studied school library utilization in Ijebu north local government area of Ogun state. The result attested that there is a strong relationship between a conducive learning environment and the use of school library which can influence positive academic performance among students in secondary schools. Chibor and Wali (2018) reported that students' who fails to use their school library and its resources to improve on their study habits experience negative impact on their academic performances. They also revealed that students who use the school library often perform better in test and examination than students who fail to use the school library. They identified that a library containing quality, current and relevant information resources as well as a professional librarian who plays a significant role of selecting and organizing library resources that are interesting to students, putting them in the right format to enable easy access, promotes quality education among students (Braxton 2008). Effective utilization of library resources by the students no doubt is the primary objective of all libraries in any educational setting. Lance (2000) noted that students who make use of a well-equipped library with up-to-date resources operate at a higher level than students in school with minimal or no library use. Wikipedia (2010) reports from researchers have also showed that school libraries have positive impact on student's achievement. It reported that more than sixty studies conducted in nineteen U.S. states and one Canadian province identified that those students with access to well-supported school library media program with a qualified school library media specialist scored higher on reading assessments. It affirmed

that a school library is very important in shaping students habit as regards reading for leisure, to pass examinations and to obtain information on different aspects of life (George, 2011). Thus, the school librarian always collaborates with the subject teachers to select the right materials as well as encourage students to visit the school library to access these materials and others of interest, for further studies and for better understanding of the topic taught in the classroom. When students are allowed to make their choice of materials and participate in some activity, they are highly motivated to take part in any academic and this will foster positive academic performance.

Library generally is the “heart beat” of the any institution of learning around which all the educational activities revolves. It is a veritable tool for the attainment of the general goal of education. As a resource centre it occupies the central place in education serving the functions of teaching, learning and research hence every government world-wide is expected to make tremendous effort to provide library services in all government educational institutions. Unfortunately, the story is different in Nigeria today as many public institutions in Nigeria continue to endure years of limited access to library and its services. Adetoro (2005) affirmed that a school library which is supposed to be the most crucial among others (as it forms the bases for which other knowledge is built upon) has been fraught with many problems. Problems such as: shortage of funds, poor infrastructures, lack of trained staff, lack of relevant materials and apathy on the part of school administrators and the governments have been identified. Ayorinde, (2005) argued that space is a relevant factor in school library setting. He referred to UNESCO prescription of 10,000 books and journals annually in a standard school library and a seating facility to accommodate at least a quarter of the population of the library community. Unfortunately, this standard has not been met in any secondary school. Okoronkwo (2015) noted that most school libraries are bedeviled with dilapidated infrastructure such as buildings, space, tables and chairs which hampers library development. Also identified is the fact that the physical conditions of many school libraries as well as the absence of necessary materials does not inspire students to patronize school libraries. It is very disheartening that Nigeria till date still depend on foreign book donations which in several cases are not relevant to the need of our students. This report also confirmed the findings of Ojoade in Selba, Akintunde and Abimiku (2009) who examined school libraries in Nigeria: A case of Jos metropolis and found that secondary school libraries in Jos metropolis are not equipped with necessary materials and staff to render services. Aniebo (2006), revealed that school libraries in Imo state are filled with outdated materials, no reference or audio-visual materials in all the libraries investigated. Agbama (2014) noted that Nigeria schools do not have direct budgetary allocation for school library development and services. The result of which is lack of school libraries in most primary and secondary schools and even where there are libraries, there are no current or relevant books.

### **Research Methodology**

The study adopted a descriptive survey research design. The population of the study was three hundred and forty-six (346) students, comprising (338) students in SS3 and 8 principals across the 8 selected secondary schools in Oshimili South Local Government Area of Delta State. The schools are Ministry of women Affairs Training Centre Secondary School, Asaba, Asaba Technical School, Asaba, Asagba Mixed Secondary School, Oko Obiokpu Secondary School, Oko, Government Secondary School, Afadia, Oduke Mixed Secondary School, Oduke. Osadenis High School Asaba, Isioma Onyeobi College, Asaba, SS3 students were considered for the study because they were doing their external (WASSCE and SSCE) examination which required them to make adequate use of the information resources in the libraries. The public secondary schools were chosen as a result of

the perceived problem of library development identified in those schools by various researchers. The entire population was considered as the sample size. A total enumeration sampling technique was adopted for the study. This was due to the manageable size of the population. Egbule and Okobia (2001) advised that, for a small and manageable population, using the entire population is appropriate. The study adopted a mixed-methods approach, using both interview and questionnaire as research instruments. Questionnaire was used to gather data from the students, while interview was used to gather data from the school principals. The questionnaire had three sections. Part A was on the rate of utilization of secondary school library among students; Section B: the information materials available in secondary school libraries; and Section C: Factors motivating the utilization of secondary school library among students. School principals were interviewed on the impacts of library use on academic performance of students, and the factors militating against school libraries in Oshimili South local government area of Delta State. A five-point Likert scale of Very Highly Used, Highly Used, Moderately Used, Rarely Used, and Not Used was used for Part A of the questionnaire. Section B and C attracted the use of a four-point Likert scale of Strongly Agree, Agree, Disagree, and Strongly Disagree. The data collected were analysed using frequency, mean and standard deviation. In all, 233(69%) of the students, and 5(62.5%) principals responded to the study.

**Research Question 1:** What is the rate of utilization of secondary school library resources among students in Oshimili South local government area of Delta State?

**Table 3:** Rate of Utilization of Secondary School Library Resources among Students

Library Resources	Very Highly Used (5)	Highly Used (4)	Moderately Used (3)	Rarely Used (2)	Never Used (1)	Mean (̄)	Std Dev.
Books	10	20	50	90	63	2.35	1.10
Fiction books	8	15	45	95	70	2.25	1.08
Non-fiction books	7	15	40	95	76	2.20	1.05
Internet	8	12	35	100	78	2.15	1.03
Reference materials	6	12	35	100	80	2.10	1.02
Computer	5	10	30	95	93	2.00	0.98
<b>Audio-visuals</b>	4	9	25	100	95	1.95	0.95
Pamphlets	5	8	25	95	100	1.95	0.93
Government publications	4	6	25	98	100	1.88	0.92
Maps and atlases	4	8	22	98	101	1.85	0.91
Gazette	3	5	20	100	105	1.80	0.90
Cassette/tapes/record players	3	5	20	100	105	1.80	0.90
Film projections	2	4	18	101	108	1.75	0.88

Table 1 reveals the underutilization of most library resources, as all the mean scores fall below 2.50. Resources, such as books ( $x = 2.35$ ), fiction books ( $x = 2.25$ ), and non-fiction books ( $x = 2.20$ ), are underutilized resources. This means that students rarely use even the most fundamental library resources.

**Research Question 2:** What information resources are available in your school library?

**Table 4:** Information Resources Available in School Library.

Library Resources	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Mean ( $\bar{x}$ )	Std Dev.
Computers	16	21	145	51	2.09	0.79
Non-fiction books	25	31	102	75	2.09	0.88
Books	26	31	117	59	2.08	0.84
Fiction books	29	25	122	57	2.07	0.86
Reference materials	22	24	133	54	2.05	0.82
Audio-visuals	14	22	141	56	1.99	0.81
Pamphlets	17	18	156	42	1.97	0.78
Maps and atlases	19	15	139	60	1.97	0.83
Government publications	14	25	157	37	1.94	0.75
Cassette, Tapes/record players	12	20	163	38	1.92	0.72
Gazette	8	27	126	72	1.89	0.82
Film projections	7	13	149	64	1.84	0.77
Internet	3	6	167	57	1.73	0.59

As shown in Table 2, the respondents agree that the information resources available in their school libraries include Computers ( $x = 2.09$ ), non-fiction books ( $x = 2.09$ ), books ( $x = 2.08$ ), fiction books ( $x = 2.07$ ), and reference materials ( $x = 2.05$ ). However, they disagree about the availability of Cassette, Tapes/record players ( $x = 0.72$ ), Gazette ( $x = 0.82$ ), film projections ( $x = 0.77$ ), and the Internet ( $x = 0.59$ ). This means that there is less availability of information resources in the libraries

**Research Question 3:** What are the factors that motivate utilization of secondary school libraries among students in Oshimili south local government area of Delta State?

**Table 5:** Factors that motivate utilization of secondary school libraries

Factors	SA (4)	A (3)	D (2)	SD (1)	Mean ( $\bar{x}$ )	Std Dev.
Quiet and conducive atmosphere in the library	31	42	99	61	2.16	0.87
Learning more facts about different topics	27	47	118	41	2.13	0.83
Having access to current materials that will help me perform better in my tests, assignments and examinations	19	51	96	67	2.09	0.87
Receiving instructions on how to use the library	28	31	109	65	2.07	0.86
Ability to locate relevant materials to support my class lessons	22	33	113	65	2.04	0.84
Having access to interesting materials like novels, newspapers, Cartoon materials and magazines for leisure	17	41	133	42	2.01	0.79
Having access to the library from my comfort zone anytime, anywhere	20	33	119	61	2.00	0.83
Guidance from the library assistants whenever I need help	19	38	122	54	2.00	0.82
Searching the internet for information	23	29	102	97	1.95	0.89
Engaging in educational activities like debate, reading competition, library tour	13	37	126	67	1.92	0.81
Going on library tour to familiarize with the location of materials in the library	11	33	122	67	1.91	0.79

Table three shows the factors that motivate utilization of secondary school libraries among

students in Oshimili south local government area of Delta State. The respondents agree that factors such as a quiet and conducive atmosphere in the library ( $x=2.16$ ), learning more facts about different topics ( $x=2.13$ ), having access to current materials that will help them perform better in their tests, assignments and examinations ( $x=2.09$ ), and receiving instructions on how to use the library ( $x=2.07$ ) motivate the students to use their libraries. However, they disagree that the use of school libraries is motivated by searching the internet for information ( $x=1.95$ ), engaging in educational activities like debate, reading competition, library tour ( $x=1.92$ ), and going on a library tour to familiarize with the location of materials in the library ( $x=1.91$ ).

**Research Question 4:** What are the impacts of library use on academic performance of students in Oshimili South local government area of Delta State?

**Table 6:** The impact of library use on the academic performance of students

Impact	SA (4)	A (3)	D (2)	SD (1)	Mean ( $\bar{x}$ )	Std Dev.
My scores in test and assignment have improved since I started using the library regularly	47	51	62	73	2.27	1.04
Through frequent reading, I have become more knowledgeable and conscious of recent occurrences	41	55	57	80	2.26	1.04
Regular use of the library has improved my reading and writing skills	39	47	68	79	2.17	1.01
Frequent use of the library has helped me to develop habit of reading	36	47	71	79	2.15	1.00
Constant reading has widened my knowledge about different topics	41	41	71	80	2.15	1.01
Reading of newspapers and magazines has exposed me to the happenings around the world	33	43	82	75	2.13	0.99
I now score higher in my examination since I started using my school library regularly	28	43	64	98	2.00	0.96

As shown in Table 4, library use has a general positive impact on the academic performance of students in Oshimili South local government area of Delta State. The respondent claimed it improves students' scores in tests and assignments ( $=2.27$ ), makes them more knowledgeable and conscious of recent occurrences ( $=2.26$ ), and improves their reading and writing skills ( $=2.17$ ). This implies that the academic performance of the students can be ameliorated by regularly using the school libraries.

**Research Question 5:** What are the factors militating against school libraries in Oshimili South local government area of Delta State?

**Table 7:** Factors militating against school libraries in Nigeria

Factors	SA (4)	A (3)	D (2)	SD (1)	Mean ( $\bar{x}$ )	Std Dev.
Inadequate infrastructures in secondary schools to accommodate school library	83	93	39	18	3.07	0.86
Negligence of the relevance of school library by government authorities	71	102	44	16	3.03	0.83
Lack of finance for technological advancement in the school libraries.	79	81	51	22	2.99	0.93
Apathy on part of the school management	82	71	53	27	2.97	1.00

Apathy on part of the school management	82	71	53	27	2.97	1.00
Lack of finance to acquire current and relevant materials. For the students	68	79	39	29	2.94	0.95
Lack of professional staff to handle library services	73	75	46	39	2.93	1.03
No direct budget allocation for school library development	66	97	41	29	2.91	0.93
Students' loss of interest in reading	57	96	43	36	2.87	0.96
Inadequate financial support by the government for the library development	62	88	54	29	2.85	0.93
Bad attitude of the teachers towards the use of library	65	77	61	30	2.82	0.99

As revealed in Table 5, the respondents agreed with all the factors militating against school libraries in Oshimili South Local Government Area of Delta State. These include Inadequate infrastructures in secondary schools to accommodate school libraries ( $x=3.07$ ), negligence of the relevance of school libraries by government authorities (3.03), and a lack of finance for recent technological advancements in the school libraries ( $x=2.99$ ). This means that a lot of factors affect school library development in Oshimili South local government area of Delta state.

### Discussion of Findings.

The findings from the study showed low rate of library use among students in Oshimili South local government area of Delta state. This is in line with the findings of Chibor and Wale (2018), who ascertained that many students do not use their school libraries frequently in Nigeria because the libraries are stocked with irrelevant and outdated materials. Okoronkwo (2015) also supported that physical conditions of many school libraries as well as the absence of necessary materials does not inspire students to patronize their school libraries. The findings on the availability of materials in secondary school libraries indicated that materials available in some of the school libraries include Computers, fiction and non-fiction books, and reference materials such as; maps and atlases. However, they disagree about the availability of Cassette, Tapes/record players, Gazette, film projections, and the Internet which is an indication of lack of modern trend in these libraries. On the factors that motivate students' utilization of school library, the study found that factors such as a quiet and conducive atmosphere in the library, learning more facts about different topics, having access to current materials that will help students perform better in their tests, assignments and examinations, and receiving instructions on how to use the library are factors that motivate students use of their school libraries. Mahwasane, (2017) identified library orientation to students as utmost important in facilitating effective use of library in secondary schools. He affirmed that if students are giving instruction on how to use the library, it enables easy access to the library collection as a whole. Chibor and Wali (2018) are of the view that a well-resourced library encourages library usage which promotes excellent academic performances among students. On the impact of library on academic performance of the students, the study ascertained that library use has a general positive impact on the academic performance of students. This is in line with the finding of Lance (2000) who indicated that students who make use of a well-equipped library with up-to-date resources operate at a higher level than students in school with minimal or no library use. Consequently, Wikipedia (2010) reports from researchers have also showed that school libraries have positive impact on student's achievement. It reported that those students with access to well-supported school library media program with a qualified school library media specialist scored higher on reading assessments. On the factors militating against secondary school library development in Nigeria, the respondents agreed that such factors as; Inadequate infrastructures in secondary schools to accommodate school libraries, negligence of the relevance of school libraries

by government authorities, lack of fund for general upgrade of school libraries, apathy on part of the school management, no direct budget allocation for school library development, bad attitude of the teachers towards the use of library hinders school library development in Nigeria. These facts were supported by the report of Adetoro (2005) who affirmed that school libraries are fraught with many problems such as: shortage of funds, poor infrastructures, lack of trained personnel, lack of relevant materials and apathy on the part of school administrators and the governments. Agbama (2014) added that Nigeria schools do not have direct budgetary allocation for school library development and services. The result of which is lack of school libraries in most primary and secondary schools and even where there are libraries, there are no current or relevant materials.

### **Conclusion:**

From all indications, the role of school library in promoting academic performance of students in secondary schools is quite immeasurable. There is no gain saying that there can never be quality education in any institution of learning without a functional library. The library is the custodian of knowledge acquired through information resources which acts as fuel that fires the over-all well-being of every child and a pr-requisite for lifelong learning abilities of the students. Therefore, the government at different levels, (federal, state and local government) must see the establishment of school libraries (in accordance with the established standard) in all public institutions as a matter of urgent concern if the goal of secondary education must be attained.

### **Recommendations**

Based on the findings from this study, the following recommendations are made:

For a successful secondary education programs, government at all levels (federal, state and local) should as a matter of urgent concern make direct budgetary allocation for school library development and services in public schools. This is primary and most vital if this mission of library development will be achieved in basic schools.

- i. The National Policy on Education NPE in Nigeria (2004) recognized the school library as one of the most important educational resources but their lack of commitment in the implementation of this policy has been a major challenge. The government and the educational authorities should show serious commitment to the implementation of its policy on school library development and services taking into cognizance the advantages of modern technologies to enhance library services for better education in basic schools.
- ii. All state government should collaborate with other stakeholders in education to build modern school libraries in all public schools. Provision of adequate infrastructure, a conducive learning environment and provision of relevant information materials for school library is a joint responsibility of stake holders, such as; the government, teachers, parent teachers association (PTA) and well-meaning individuals in the society.
- iii. The government and those concerned must ensure that professional librarians are given the privilege to manage school libraries to ensure proper organization of the library for easy access.
- iv. Inclusion of library period on the school time table is a necessity. This will encourage regular use of the school library among students. The school librarian can always utilize the library period to give students orientation on the use of library.
- v. The library should be well-resourced with modern technologies/gadgets such as: internet, computers, film projections, Audio-visuals record players etc. All these will encourage library usage which promotes excellent academic performances among students.

- vi. The principals and the teachers must collaborate with the librarians to select the right materials to support the school curriculum. Light reading materials like newspapers, magazines, cartoons, pamphlets should be made available to attract students to use the

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

THEME: Governance and Sustainable Economy: Building a Secure and Prosperous Nigeria | 28th - 29th January, 2026

VENUE: Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt - Rivers State

## PRODUCTION AND CHARACTERISATION OF POTASSIUM NITRATE FROM WOOD ASH EXTRACT AND NITRIC ACID

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### **Abstract**

*Neem wood ash, a readily available agricultural by-product rich in potassium compounds, was leached with distilled water to extract soluble potassium salts. This study focuses on the synthesis and characterization of potassium nitrate (KNO<sub>3</sub>) produced from neem wood ash and nitric acid. The filtrate obtained was reacted with dilute nitric acid in a controlled stoichiometric ratio to form potassium nitrate. The resulting product was purified through recrystallization and dried to constant weight. Characterization of the synthesized salt was carried out using simple physical and chemical methods, including melting point determination, solubility test, thermal stability, and elemental analysis to confirm the presence of potassium and nitrate ions. The results confirmed the successful formation of pure, crystalline potassium nitrate with properties consistent with standard reference data. The process demonstrates a simple, cost-effective, and environmentally friendly approach to converting wood ash waste into a valuable industrial and agricultural chemical. This study highlights the potential of utilizing renewable waste materials in inorganic salt production and promotes sustainable resource management.*

**Keywords:** *potassium nitrate, wood ash, nitric acid, recrystallization, thermal stability, waste utilization.*

## Introduction

Potassium nitrate ( $KNO_3$ ), commonly known as saltpetre, is an inorganic crystalline compound that has played a significant role in human civilization for centuries. It is a naturally occurring nitrate salt that combines potassium ( $K^+$ ) and nitrate ( $NO_3^-$ ) ions. Historically, potassium nitrate was first recognized for its role in the manufacture of gunpowder during the medieval period, where it became a crucial component in military technology and mining operations (Moldoveanu & David, 2020). In addition to its military applications, it has long been utilized in agriculture as a source of nitrogen and potassium, two macronutrients essential for plant growth (Lide, 2005). In the modern world,  $KNO_3$  continues to be an important industrial chemical, with applications spanning fertilizer production, food preservation, glass manufacture, ceramics, and pyrotechnics (Chaturvedi & Dave, 2013). One of the key challenges in potassium nitrate production has historically been the availability of raw materials. Early methods of saltpetre production relied on natural deposits and the leaching of soils enriched with nitrates from organic decomposition. In many cultures, particularly in Asia and Europe, heaps of organic matter, including manure, urine, and plant residues, were used to produce nitrate-rich efflorescences that could be harvested and purified (Demeyer et al., 2001). However, with the advancement of chemistry in the eighteenth and nineteenth centuries, more controlled methods of synthesis were developed. These include the neutralization of nitric acid ( $HNO_3$ ) with potassium-containing compounds such as potassium carbonate ( $K_2CO_3$ ), potassium hydroxide (KOH), or potassium chloride (KCl), thereby producing potassium nitrate in a more predictable and scalable manner (Misra et al., 1993).

Wood ash, the inorganic residue left after the combustion of wood biomass, represents a low-cost and renewable source of potassium. Its composition depends on the type of biomass, soil conditions, and combustion parameters, but it typically contains significant amounts of potassium in the form of potassium carbonate ( $K_2CO_3$ ) and potassium oxide ( $K_2O$ ), as well as calcium, magnesium, sodium, and trace elements (Yao et al., 2013). For centuries, wood ash has been used in rural communities for soap making, soil enrichment, and as a raw material in saltpetre production. The potassium salts present in wood ash are water soluble and can be extracted through leaching, which provides a suitable feedstock for the synthesis of potassium nitrate when reacted with nitric acid (Demeyer et al., 2001).

In Bangladesh, wood ash is regularly used in banana plantations in terrace areas. Farmers say wood ash prevents diseases and improves water use efficiency. Wood ash is a good source of potash and lime; it also improves the pH of acidic soils in a manner similar to agricultural lime [Alberta, 2002]. Wood ash had long been regarded as a source of potassium for plant growth (1-13% K by weight) but it also contains appreciable quantities of Ca (20-30%), P (0.3 - 0.4%), Mg (1- 3%) and smaller amounts of S, Mn, Fe, B, Cu and Zn (Etiegni et al, 1991). Emmanuel, 2014 asserted that "The wood ash extract increased the values of plantain bunch weight, weight of fingers, diameter, length and finger population more than neem leaf and this could be traced to its very high K, Ca and Mg nutrients which subsequently increased the soil organic matter, K, Ca and Mg for uptake by plantain. This finding was supported by who reported that wood ash is a good source of potash and lime which encouraged the growth and yield of plantain. The increase in soil pH under wood ash extract compared to others was traced to its high K, Ca and Mg and could be effective as a liming material unlike the NPK 15-15-15 fertilizer which with the continuous use could decrease soil pH. The soil pH been reported to influence nutrient uptake and availability. reported that oil palm bunch ash, wood ash and cocoa pod husk improved soil K, Ca and Mg nutrients and corrected soil

acidity in an Alfisol grown to coffee and maize. Some studies also reported that industrial wood ash was a good soil amendment for crop production."

Characterization of synthesized  $\text{KNO}_3$  is typically achieved using modern analytical techniques. X-ray diffraction (XRD) can confirm the crystalline phases present, Fourier-transform infrared spectroscopy (FTIR) can verify functional groups, while scanning electron microscopy (SEM) provides insight into surface morphology and particle size distribution (Moldoveanu & David, 2020). These techniques help in verifying not only the formation of potassium nitrate but also its degree of purity relative to impurities from the wood ash precursor. The synthesis of potassium nitrate from wood ash and nitric acid is therefore significant in both scientific and practical contexts. Scientifically, it demonstrates the valorization of agricultural and household waste into high-value chemicals, contributing to the growing field of green chemistry and sustainable resource utilization. Practically, it provides a pathway for low-cost production of fertilizers and industrial inputs, especially in rural or resource-limited settings where access to commercial fertilizers is constrained (Yao et al., 2013). By transforming biomass residues into potassium nitrate, this research contributes to circular economy approaches, environmental sustainability, and local resource management.

### 1.2 Statement of the Problem

Potassium nitrate ( $\text{KNO}_3$ ) is an important chemical with widespread applications in agriculture, food preservation, glass manufacturing, pyrotechnics, and pharmaceutical industries (Moldoveanu & David, 2020). Its dual nutrient composition potassium and nitrogen makes it especially valuable as a fertilizer, since both elements are essential for plant growth and crop yield improvement. However, the commercial production of potassium nitrate relies heavily on industrial synthesis methods that require costly raw materials and controlled conditions, which are often inaccessible in rural and resource limited communities (Demeyer et al., 2001). Furthermore, lack of optimized, low-cost, and environmentally sustainable methods for synthesizing and characterizing potassium nitrate from biomass-derived sources constitutes a major problem. On one hand, vast quantities of wood ash are wasted or improperly disposed off contributing to environmental pollution. On the other hand, the high demand for potassium nitrate in agriculture and industry continues to be met through costly industrial synthesis and importation. Bridging this gap through the development of reliable methods for producing  $\text{KNO}_3$  from wood ash could provide a dual benefit of waste valorization and local production of a vital chemical resource (Chaturvedi & Dave, 2013).

The aim of this study is to synthesize and characterize potassium nitrate salt from wood ash and nitric acid. The objectives of this study include:

- i. To extract potassium carbonate ( $\text{K}_2\text{CO}_3$ ) from wood ash.
- ii. To concentrate the wood ash extract by double boiling.
- iii. To produce potassium nitrate ( $\text{KNO}_3$ ) from wood ash extract and nitric acid ( $\text{HNO}_3$ ) using neutralisation method.
- iv. To evaporate the aqueous solution to dryness.
- v. To dry the moist potassium nitrate ( $\text{KNO}_3$ ) salt in hot air oven.
- vi. To characterise the dried potassium nitrate salt.

## Research Questions

- i. What conditions maximize potassium extraction from wood ash?
- ii. Can extracted potassium be effectively converted into  $\text{KNO}_3$  using  $\text{HNO}_3$ ?
- iii. What are the major impurities in the product
- iv. Does characterization confirm synthesis of crystalline  $\text{KNO}_3$  comparable to standard references?

## Scope and Limitations of the Study

This study covers laboratory-scale leaching of wood ash, synthesis of  $\text{KNO}_3$  using nitric acid, crystallization, and characterization. It does not address large-scale industrial production. Limitations include variability in ash composition, limited availability of advanced purification methods, and reliance on the instrumentation available

## Significance of the Study

The research provides a sustainable approach to transforming wood ash into a useful chemical, thus reducing waste while producing fertilizers or industrial raw materials (Misra et al., 1993). It also contributes to scientific knowledge on resource recovery, small-scale saltpetre production, and waste to resource conversion, which is vital for rural and developing communities (Yao et al., 2013).

## MATERIALS AND METHODS

### Sample Collection and Processing

Wood ash samples were collected from Tambu and tawalala Daura. Approximately 1–2 kg of ash was obtained from each source, labeled with the date, source, and stored in airtight polyethylene bags to prevent moisture absorption and contamination. The collected ash was first air-dried for several hours and then oven-dried at  $105\text{ }^\circ\text{C}$  for 2 hours to remove residual moisture and ensure consistent weight measurement. The dried ash was sieved through a 2 mm mesh to remove unburned particles, stones, and other debris, followed by grinding with a mortar and pestle to achieve a uniform particle size of less than  $500\text{ }\mu\text{m}$ , thereby increasing the surface area available for efficient extraction of soluble potassium compounds. Homogenized ash samples were stored in sealed containers prior to experiment and personal protective equipment, including gloves, dust masks, and goggles, were used to prevent inhalation of ash dust and skin contact with potential irritants, ensuring laboratory safety.

### Extraction of Potassium based alkaline from Wood Ash

The potassium based alkaline was extracted from wood ash using a procedure described in Ogunsuyi and Akinawo, 2012, with little modification. The extraction of potassium carbonate was performed by weighing 150 g of the processed ash into a 2 L beaker, followed by the addition of 1000 mL of distilled water, achieving a 1:10 ash-to-water ratio suitable for effective leaching of soluble potassium species. The mixture was heated to  $100\text{ }^\circ\text{C}$  on a waterbath (digital model) while being heated continuously for 1 hour to maximize the dissolution of potassium compounds, primarily  $\text{K}_2\text{CO}_3$ , along with minor quantities of  $\text{KOH}$  and  $\text{KCl}$ . The slurry was allowed to settle for 30 minutes to separate insoluble residues, after which it was filtered using Whatman No.1 filter paper to obtain a clear filtrate. To enhance potassium recovery, the extraction process was repeated once, and the combined filtrates were monitored for pH, which ranged between 10–13, confirming the alkaline nature of the solution. Observations revealed a clear to slightly yellow solution, indicating successful leaching of soluble potassium compounds. This step was crucial in minimizing co-extracted insoluble impurities and ensuring a reproducible starting solution for nitration, while all

procedures were performed with appropriate Personal Protective Equipments to prevent exposure to the alkaline solution. (Ogunsuyi and Akinnawo 2012)

### **Nitration Reaction of Wood Ash Extract Using Nitric Acid**

The filtrate obtained from the extraction step was transferred to a 2 L beaker and placed in an ice bath to maintain the temperature between 5–10 °C, which minimized the exothermic reaction during acid addition. 0.1M nitric acid was added slowly to the filtrate under continuous stirring, with careful observation of effervescence resulting from CO<sub>2</sub> release during the neutralization of potassium carbonate. Acid addition continued until the solution reached a neutral pH 7, after which stirring was maintained for an additional 30 minutes to ensure complete reaction. Insoluble residues, primarily silicates and unreacted ash particles, were removed by filtration, yielding a clear solution containing potassium nitrate. Observations included cessation of effervescence and increasing clarity of the solution, indicating successful conversion of potassium compounds to KNO<sub>3</sub>. All steps were performed in a fume hood with appropriate personal protective equipment, and any accidental acid spills were neutralized immediately using sodium bicarbonate, highlighting the importance of safety in handling corrosive acids. (Sheaths and Adhikari 2018, Iqbal et al, 2018 and Journals et al, 2019).

### **Evaporation of Aqueous Solution of Potassium Nitrate to Dryness**

The potassium nitrate solution was transferred into an evaporating dish and heated gently at 50–70 °C on water-bath (digital model) to evaporate the water, avoiding vigorous boiling that could lead to splattering or inclusion of impurities. The concentrated solution was allowed to cool slowly at room temperature, followed by further cooling in an ice bath to induce crystallization. The formed KNO<sub>3</sub> crystals were collected by vacuum filtration and rinsed with a minimal volume of cold distilled water to remove residual liquor without significant product loss. The crystals were then dried in an oven (Labmet LMHO-B102) at 50–60 °C until a constant mass was achieved, and the percentage yield was calculated based on the initial potassium content of the ash. Observations revealed the formation of light brown, prismatic crystals. Safety measures include careful monitoring of heating to avoid decomposition of nitrate and proper neutralization of residual filtrates before disposal, ensuring environmental compliance.

### **Characterization of Potassium nitrate**

#### **Physical parameters**

Some physical parameters of the newly synthesised potassium nitrate salt were determined. These parameters include physical appearance (colour), odour, solubility in water and ethanol, density, and melting point using melting point apparatus.

#### **Density determination**

The true density determination of the sample was performed using Archimedes principle. 1.0g of dried sample wrapped in a polyethene was immersed in water. The water level before and after immersion was recorded. The density was evaluated by dividing dried weight and the difference in water level before and after immersion.

#### **pH determination**

The pH of the sample was determined by soaking the solid formulated sample in water and the pH measured using Hanna pH meter (Model HI 98128).

### Determination of organic matter content

This was determined by burning the oven dried sample at a temperature of 350°C for 3 hours. The total organic matter was calculated from the difference between weight of oven dried sample before and after burning.

### Chemical Compositions

The chemical compositions of the developed potassium nitrate was recorded from a monitor attached to an energy-dispersive X-ray fluorescence machine of model Genius-IF Xenometric EDXRF, Skyray Instruments, USA. The sample film was placed firmly in a waxed and goldplated sample holder. The energy dispersive patterns were obtained with the help of a computer attached to the instrument and each compound recorded in percentage. (Jock and Illechukwu, 2023)

**Table 1: Physical parameters of Potassium nitrate**

Parameters	Results
Appearance	Light brown crystals
Odour	Odourless
Solubility	Soluble in water and insoluble in ethanol
Density at 25°C (g/cm <sup>3</sup> )	2.10
Melting point. (°C)	329
PH	6.1

### Results and Discussion

#### Physical Properties of the synthesised potassium nitrate

The physical properties of the sample are presented in Tables 1. The physical analyses determined on the sample were density, pH, appearance, odour, solubility and total organic matter. The potassium nitrate has the pH of 6.1, which shows that sample is weakly acidic in nature. This also indicates that sample C will be effective in neutralizing a basic soil. The density value was found to be 2.1g/cm<sup>3</sup>. This value is nearly equal to that commercially manufactured potassium nitrate. With regard to solubility, the sample is soluble in water but not in ethanol. This is because the sample is purely inorganic compound. The colour of the sample is light brown, which is not inline with the colour of commercial potassium nitrate. This may be attributed to presence of impurities from the wood ash. The remaining physical parameters are inline with that of pure potassium nitrate.

**Table 2: Chemical composition of the sample**

Components	Composition (%)
K	10.010
N	12.251
CaO	25.321
P <sub>2</sub> O <sub>5</sub>	0.401
MgO	1.321
Na <sub>2</sub> O	1.134
Total Organic Matter	47.542

The chemical analyses of the sample (potassium nitrate) are shown in Tables 2. The chemical analysis (wt%) shows that the some components in the samples occur in trace and minor amounts while other components are occurring in major quantity. The content of macro-elements in the sample are N (12.251%), P<sub>2</sub>O<sub>5</sub> (0.401%), K (10.010%), CaO (25.321%), MgO (1.321%), Na<sub>2</sub>O (1.134%) and organic matter (47.542%) appear in major amount. This may be from the chemical constituents of the wood as used in the synthesis. Increased in soil organic matter also increases the degree of aggregation and pores volume (Loss et al., 2019). However, the temperature (100°C) used for drying the sample may lead to vaporizing some of the essential elements such as nitrogen, phosphorous,

etc. (Monastyrskiy et al. 2022). Generally, the chemical analysis indicated that the weight percentage of different elements like nitrogen, phosphorus, potassium, and calcium are within the required range and this suggested that this fertilizer is a good source of nutrition which can promote the growth of the plant (Majeed et al. 2020)

## Conclusion

The results of this research conclusively showed that potassium nitrate could be successfully synthesized from wood ash extract and nitric acid under moderate laboratory conditions. The presence of substantial nitrogen and potassium contents indicated that the synthesized product could serve as a dual nutrient fertilizer, supplying both nitrate and potassium essential for plant growth and development. The observed impurities affected only the colour and not the fundamental chemical characteristics of the product. It was therefore concluded that wood ash, an abundant and renewable agricultural waste, could serve as an alternative and sustainable raw material for the local production of potassium nitrate. The process offered a simple, inexpensive, and environmentally friendly route that could reduce dependence on imported fertilizers and industrial oxidizers. With appropriate purification steps and quality control, the synthesized potassium nitrate could meet acceptable standards for agricultural and possibly industrial applications.

## Recommendation

Based on the findings of this study, the following recommendations were made:

- i. Purification Improvement: The crude potassium nitrate should be further purified through hot-water recrystallization and activated-charcoal treatment to remove residual metal oxides and organic matter that cause discoloration and minor impurities.
- ii. Agronomic Evaluation: Field and greenhouse trials should be conducted to assess the fertilizer efficiency, nutrient release pattern, and effects on different soil types and crops to establish the product's agronomic value and safety for large-scale agricultural use.
- iii. Process Optimization: Further studies should focus on optimizing reaction parameters such as temperature, concentration of nitric acid, reaction time, and purification technique to improve yield, reduce impurity levels, and ensure consistent product quality.
- iv. Environmental and Safety Considerations: Since potassium nitrate is an oxidizing compound, proper handling, packaging, and storage guidelines should be followed to prevent accidental ignition or contamination. Waste residues from the synthesis should be treated or disposed off responsibly to avoid environmental pollution.
- v. Economic and Industrial Feasibility: Economic analysis should be carried out to evaluate the cost-benefit of local production compared to commercial imports. Pilot-scale studies should also be initiated to assess the feasibility of scaling up this process for industrial production.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

THEME: Governance and Sustainable Economy: Building a Secure and Prosperous Nigeria | 28th - 29th January, 2026  
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## PRINCIPALS' LEADERSHIP STYLES AND TEACHERS JOB PERFORMANCE IN PUBLIC SENIOR SECONDARY SCHOOLS IN JOS NORTH LOCAL GOVERNMENT AREA OF PLATEAU STATE, NIGERIA

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### **Abstract**

*This study investigates the relationship between Principals' Leadership Styles and Teachers' Job Performance in Public Senior Secondary Schools in Jos North Local Government Area of Plateau State, Nigeria. The researcher aims to identify the dominant leadership styles adopted by Principals – transformational, transactional, and laissez – faire and examine how these styles influence the effectiveness, motivation, and productivity of teachers. Data collected from a sample of teachers and principals through structured questionnaires. The findings revealed that transformational leadership positively correlates with higher levels of teachers' job performance, while transactional leadership shows moderate influences, and laissez – faire leadership is associated with lower teacher effectiveness. The study underscores the importance of adopting leadership styles that foster collaboration, motivation, and professional development. Based on the findings, recommendations are made for policy makers and educational administrators to promote leadership training programmes that enhance school management and improve teaching outcomes.*

**Keywords:** *Principals' Leadership Styles and Teachers' Job Performance*

## Introduction

The core objectives of every educational institution are teaching and learning. To achieve these goals, both the teachers' and principals' are required. A teacher is an instructor and a mentor who delivers lessons, guide students growth and create a supportive learning environment. Notwithstanding, the teacher is a link between the principal and the students. The Principal however, is the leader or chief executive officer of a Secondary school. He/she is responsible for implementing educational policies which include setting the vision, creating a conducive learning environment, decision making, ensuring that educational standards are met, and managing other activities of the school among others in the secondary level of education. Therefore, it is obvious that all human resources toward attainment of the school goals, is what matters to the principal. These can be achieved through the principals' leadership styles (Mehrotra, ( 2005).

In the educational sector, the pertinence and efficacy of leadership styles rest on the functioning state in which school leaders balance their styles with teachers' tasks (Lunenburg & Omstein, (2021). Leadership styles significantly influence various aspects of school management and teacher performance. Principals who adopt effective leadership styles are often characterized by their ability to inspire and motivate teachers, fostering a collaborative and innovative environment. Also, principals with a good leadership approach focus on structure procedures and performance – based reward which can affect teachers' job satisfaction and productivity in different ways. Scholars such as Peretmode (2012), Ejiogu and ogonr (2014), Ijeoma (2005) and Edobor (2006) among others have discussed different leadership styles. Such styles are: autocratic, bureaucratic, charismatic, democratic, laissez – faire, situational leadership people – oriented, task- oriented, transactional, and transformational. However, autocratic leadership style is commonly used while laissez – faire is considered as the least commonly used leadership style. The latter is frequent among leaders with educational background. Therefore, transformational leadership encourages satisfaction, willingness to apply extra effort and effectiveness among employees.

A good leader should adopt leadership style(s) that can result in high staff performance. Hence, leadership style of an individual can be advantageous or disadvantageous for educators and society. He/she should also be able to match the need of the organisation with the need of the employees and work out how those needs could be achieved. This means that effective leadership has a positive influence on the performance of teachers. For example, frequent conflict between teachers and principals, poor attendance of lessons, teachers' truancy with no apparent reason, and teachers' persistence behaviour in drinking alcohol during working hours are said to be related to principals' leadership style. Therefore, teachers' job performance is dependent on the leadership style adopted by the principal who oversees all the affairs of the school. Leadership styles exhibited by a school principal affect the climate, learning situation and level of professional as well job performance as mentioned earlier. Leadership style is the manner and approach in which a leader provides direction, implements plans and motivates people so as to meet organizational goals. However, poor leadership style could pose threat to both educational sector and the nation. To educational sector, a low literate youth population could heighten youth restiveness, cultism, gangster, armed banditry, kidnapping, insurgency and so on. On the side of the nation, an ill-equipped youth population could become unemployable and find it very difficult to complete in today's globalize economy. Hence, Ijeoma (2005) believed that leadership involves the use of influence as distinct from forcible domination or coercion. The leadership styles to be considered in this paper are democratic, autocratic, laissez – faire, transformational and transactional leadership.

Teachers' job performance constitutes the duties performed by teachers at a particular period in the school system in achieving school organizational goals. Teachers' job performance is determined by the teachers' participation and commitment in the day to day running of the school organization. Teachers perform different functions among them are communication and classroom management skills, students' discipline and control, cooperation with other teachers and management staff, expert use of instructional materials, curriculum implementation, expert use of instructional materials, experimentation and clear illustration of concept during less delivery (mgbekem, 2023). Teachers' job performance and productivity are measured by relating teachers' behaviour with the duties and responsibilities expected of them within the school system which are crucial to their actualization of secondary educational objectives. It could also be described as the ability of teachers to combine relevant inputs for the enhancement of teaching and learning process. A principal can therefore encourage the effective performance of their teachers by identifying their needs and trying to satisfy or meet them (Eka, 2023).

In Jos North Local Government Area of Plateau State, Nigeria, this study is carried out public senior secondary schools are faced with unique challenges, including limited resources, vary levels of teacher motivation, and fluctuating students enrollment number. Understanding how different leadership styles of principals' impact teachers' job performance in this specific context is essential for addressing these challenges and improving educational outcome. In recent years, public senior secondary schools in Jos North Local Government Area have been grappling with issues such as low teacher morale, inadequate commitment to work and declining job satisfaction. These challenges have adversely affected teachers' ability to deliver quality instruction which in turn has reflected in students' poor performance in external examinations. For instance, a report by the Plateau State Ministry of Education (2024) revealed that the performance of students in the West African Senior School Certificate Examination (WASSCE) has declined by 15% over the past five years. This trend raises critical questions about the factors contributing to the diminishing performance of teachers.

Among the factors responsible for teachers' performance is the principals' leadership styles as leaders, play a significant role in creating a conducive environment for teaching and learning. Their leadership style influences teacher's job satisfaction, motivation and overall performance. Despite this understanding, there is limited empirical research examining the relationship between principals' leadership styles and teachers' job performance in the context of public senior secondary schools in Jos North Local Government Area. This gap in the literature represents a missed opportunity to address a fundamental issue affecting educational quality in the region. Consequently, there is a need to investigate this issue to provide insights that can guide school administrators and policymakers in making informed decisions.

## **Leadership**

Leadership refers to the specific approaches or methods that leaders use to guide, influence, and interact with their teams. They describe how a leader behaves in practice. Leadership is a concept that can be vague and misunderstood. It has been theorized as a process of change (Glynn & Dejurdy, 2010). To define leadership is very difficult due to the diversity and complexity in which it can be expressed (Cragy & Spurgeon, 2007). Merriam – Webster (2012) defines leadership as the or position of a leader, the capacity to lead, and the act or an instance of leading. Hogan and Kaiser (2005) define leadership as when one has the capability to persuade others to set aside their own concerns and work together on a common goal for the greater good of the group. They state that leadership is building cohesive and goal – oriented teams. Even though all definitions of leadership

are different, they all share the view that leadership involves the process of influence (Jago & Vroom, 2001).

Chapman's (2005) research indicates that when leader involve their teams in decision – making and distribute duties equitably, the performance of the teams improves. As per Mc Namara (2010), for an employee to perform a task, the supervisor needs to agree on the deadline for completing the work. In the case of ongoing responsibilities, they should establish the dates for conducting surveys and submitting reports. Additionally, if the project is unpredictable, the manager should clarify the assistance they can offer. Moreover, McNamara (2010) asserts that employee exhibit enhanced performance when their supervisors delegate authority to them.

For Abama E, (2016), leadership exhibited by principals do not just emanate from individual leaders' behaviour in an organization alone but could most times be traced and located in the leadership theories. Leadership have over time metamorphosed from one nomenclature to the other. Armstrong (2004) defines leadership as influence, power and the legitimate authority acquired by a leader to be able to effectively transform the organization through the direction of the human resources that are the most important organizational asset, leading to the achievement of desired purpose. Cole (2002). Defines leadership as inspiring people to perform. Even if an institution has all the financial resources to excel, it may fail dismally if the leadership does not motivate others to accomplish their tasks effectively.

Leadership involves the use of influence or power to elicit the co- operation of subordinates in achieving group goals. Scholars have discussed various forms of leadership. Ijeoma (2005), Edobor (2006), Peretomode (2012), and Ejiogu and Ogonor (2014) discussed different leadership that could be explored for the administration of the schools. Schmidt (2018) affirms that the leadership dispensed by the leader determine, to a great extent, how the group's aim can be achieved. In this regard, it implies that the leadership styles adopted by a principal might be an issue of importance to teachers' job performance. Nanson (2010) perceive leadership as “the behaviour of an individual when he is channeling the activities of the group toward a shared goal”. Goldman (2020) opines that leading is the process of influencing people to accomplish desired objectives either their objectives or those of the leader”. Sodhi (2009) see leadership to mean “the process a given situation” of influencing the activities of an individual or a group in efforts towards goal achievement in a given situation”.

## **Types of Leadership**

### **Transformational Leadership**

Transformational leaders are reported to work based on the balanced approach. This can be explained by the fact that they help their subordinates to solve some of the challenging issues at the same time they teach their subordinates about the ways of tackling the problems in the similar context. Researchers believe that the role of the transformational leaders can be observed through motivational level of their employees through the process of self – actualization. Most of the qualities that are used to describe the personality of transformational leaders include charisma, intellectual stimulation. First is the individual consideration (Mumford et al 2000). The second one is the intellectual stimulation, which means encouraging the followers to try seeing the issue from the other side and broaden the outlook on specific matters. Third, the inspirational motivation, where the leader stresses on the particular importance of an employee in the team which helps the

organization to reach the goal and successful cooperation and accomplishment of the project (Chen et al. 2005).

### **Transactional Leadership**

Transactional leadership is defined as the style where the leader either rewards or punishes the employee for the task accomplished. Several studies on leadership explained that when the transactional leadership is employed in the organization, the mutual trust between the leader and the task – holder develops. If there is a mistake in the work of subordinates, employees are going to be punished. Thus, employees may perform not at their best, and they may be afraid of making a mistake. As a result, they are less likely to work on new projects and learn new skills and knowledge. Employees who perform better are given good motivation in terms of rewards making to be motivated to work harder.

### **Democratic Leadership**

Also known as participative leadership style, involves other individuals in decision making (Goleman 2006). Democratic or participative leaders must be clear and decisive about the direction in which the group needs to go so that the group does not consume too much time on a decision (Mills, 2007). This leadership style is most suitable in situations where the leader need input, guidance, or buy from other members of the group (Aronson – Thomas, 2004). According to Mills (2007), allowing others to make decisions instead of the administrator could raise questions in the minds of others as to the ability of the leader.

### **The Path Goal Theory**

This theory was advanced by House (1968). The theory asserts that a good leader should enhance his subordinates job performance by clarifying and setting goal with the subordinate. The leader show the subordinates a clear path to follow and how to remove barriers to the goal attainment. House (1968) stipulates that path goal approach helps in improving the performance of subordinates ( in this case teachers) thus enhancing goal achievement as follows: when subordinates are confused, the leader tells them what to do and show them a clear path to follow. When the path is shown, the subordinates (teachers) become satisfied and motivated, so they accept leader' behaviour thus performing effectively. The leader's behaviour further enhances the subordinates work environment through directing, controlling, supervising, rewarding, proper communication, delegation of duties and joint decision making between principals' and teachers' thus enhancing good performance among the workers. The leader defines role tasks and performance among the employees doing these, workers expectations become high and their performance is improved based on these, the researcher believes the path goal theory as developed by House (1968) will help principals' to involve teachers' in decision making, communicate to them and proper delegation of duties to them should be done.

### **Principals' Leadership Styles and School Management**

The principal's leadership style has a lot of implications for school management. Because of the uniqueness of the leader of the school, Nwankwo (2018) defined educational and school management as the arrangement of the human and material resources and programmes available for education and carefully using them systematically for the achievement of educational objectives. Thus, the principal as the school manager is an organizer and implementer of plans, policies, and programmes meant for specific educational objectives. For good result, these have to be efficiently and effectively carried out, various scholar have made distinctions between a leader

and a manager. However, the principal, in order to successfully run the school has to be both a good manager and effective leader. The two have to go together. As a leader, he is merely one who initiates changes to achieve the goals of the organization and as a manager, and he runs the school and keeps it going.

The leadership styles of principals have been identified as being responsible for the way in which teachers could identify with the school. In a school, where the leadership style is democratic, teachers have the tendency to put in their best at work. Nwankwo (2021) in a study discovered that most schools in Nigeria adopt the transactional leadership style. Such factors as the emerging high rate of literacy, increasing number of graduate teachers in school and an improvement in the social and economic conditions have given rise this. The growth of teacher militancy, strikes and negotiations, the emerging professional of teaching personnel and the effects of schools management commitment determines the teacher leadership style. In a situation where teachers as the personnel in school are highly motivated, where their ideas are tapped and are encouraged to contribute to what goes on in the school, there is a greater tendency on the teachers part to put in their best at work for the benefit of the students in the school.

### **Factors Affecting Teachers' Job Performance**

The effectiveness of teachers in classroom is influenced by various internal and external factors (Alberola – Mulet et al., 2021). These encompass societal demands the specific school system, school policies, parental involvement, and students' dynamics, yet assigning their relative importance to individual teachers is challenging due to their unique differences.

- i. Teacher's attitude: Attitudes reflect ingrained responses, encompassing cognitive, affective, and behavioural components (Alberola – Mulet et al., 2021; Child, 2019).
- ii. Teacher subject's mastery: A strong foundation in subject matter and pedagogical knowledge, including technology integration, forms the basis of effective teaching (Nayak & Rao, 2022; Siddiqui, 2023).
- iii. Teaching methodology: In service training and varied teaching approaches – problem – solving, interactive, teacher – directed, and student – directed techniques – enhance professional development (Singh & Shan, 2019).

It significantly impacts teachers' expertise ultimately influencing students learning (Smet, 2022). It encompasses a broad spectrum of activities supporting career growth, both in well-established education system less privileged environments (Rinke, 2019). This development includes enhancing academic standing and improving effectiveness in classroom duties (Rinke, 2019). Professional development strategies, inclusive of organizational structures, are instrumental in aiding teachers to excel in their roles (Smet, 2022). Organizational structures monitor and support ongoing professional growth, incorporating diverse training programmes, seminars and the establishment of resource centers (Smet, 2022; Tran et al., 2021). Small school clusters serve as effective settings for monitoring and training, wherein experienced teachers play the role of mentors and trainers (Tran et al., 2021). These structures facilitate informal practices like team teaching and material sharing among educators, fostering self-improvement while encouraging formal professional development (Smet, 2022). This approach sparks discussions, and promotes peer mentoring, collaborative study groups, and reflective practices, allowing teachers to explore new roles, devise innovative teaching methods, refine practices, and broaden their perspectives both professionally and personally.

## **Review of Empirical Studies on Principals Leadership Styles and Teachers' Job Performance**

Adebayo and Oladipo (2023) undertook a survey study to evaluate teachers' job performance in public secondary schools in Lagos State, Nigeria. The study examined the influence of leadership on teachers' job performance on teachers' productivity. The descriptive survey research method was utilized with fifty (50) principals and two hundred (200) teachers were used to elicit data. Findings revealed that transformation leadership resulted in poor morale and lower performance. The difference between the previous study and the present study is that the present study is conducted in Jos North Local Government in Nigeria.

Ndegwa and Wanjiku (2022) explored principals' leadership styles and teachers' job effectiveness in Kenyan Secondary schools. The study focused on how principals' leadership styles affect teachers' effectiveness. Correlation study was used as a research design. One hundred and fifty (150) teachers were population sample. Questionnaires and interviews were used as instrument for the data collection. Findings revealed that democratic leadership was associated with higher teachers' job satisfaction and productivity while laissez -faire leadership was linked to poor supervision and low performance. The difference between the previous and present study is that, previous study focused on teachers alone while the present study focuses on both teachers and principals in Jos North.

Mensah and Owesu (2021) conducted a survey research study on effect of transformational leadership on teachers' job satisfaction in Ghana. The study analyzed the impact of transformational leadership on teachers' morale. The population of the study constituted teachers from twenty-five (25) secondary schools. Three hundred (300) teachers were population. The descriptive research design was used. Findings revealed that teachers under transformational leaders were more motivated and had higher satisfaction levels compared to those under transactional or autocratic leaders. The difference between the previous and the present study is that, the present study adopts both qualitative and quantitative research unlike the previous which was based on descriptive research design.

Akpotu and Oghenekome (2021) focused on leadership styles and teachers' performance in secondary schools in Delta State, Nigeria. The study aimed to study the relationship between leadership styles and teacher's productivity mixed -method was used as research design. Teachers and principals from twenty (20) secondary schools served as the population for the research. The study elicited data from one hundred (100) teachers and Twenty (20) principals. The instrument for the collection of data was structured questionnaires and focus group. Findings revealed that teachers under participative leadership revealed higher level of teachers' commitment while those under laissez-faire leadership exhibited low productivity and disengagement. The difference between the previous and the present study is that, the present study intends to use structured questionnaires only as an instrument for the collection of data unlike the previous study that made use of two instruments.

Mkabayi and Mtenge (2020) conducted a study on autocratic leadership and its impact on teachers' performance in Tanzania. The study explored the impact of autocratic leadership on teachers' job satisfaction. Quantitative analysis was used as research design. Teachers drawn from fifteen (15) public secondary schools were used as the population of the study. One hundred and twenty (120) teachers responded to the structured questionnaires. It was revealed from the findings that

autocratic leadership caused dissatisfaction among teachers leading to increase in absenteeism and reduced performance. The differences between the previous and present study are in terms of population sample, geographical entity and research design.

Okello and Onyango (2021) examined democratic leadership styles and teachers' work commitment in rural Uganda. As case study research, the study focused on how democratic leadership influences commitment. The population of the study was teachers from eighteen (18) rural public secondary schools. Both interviews and observation were instruments of the research work. Fifty (50) teachers' served as respondents. It was a qualitative research design. The study found out that autocratic leadership caused dissatisfaction among teachers leading to increase in absenteeism and reduced performance. The differences between the present studies and the previous one are in terms of geographical location, population sample and instrument for data collection.

Eke and Iwuchukwu (2020) investigated the role of principals' leadership styles in enhancing teachers' job performance in secondary schools in Rivers State, Nigeria. The study determined the extent to which leadership styles impacts teachers' productivity. Principals and teachers drawn from twenty-five secondary schools were the population of the study. Forty-five (45) principals and three hundred (300) teachers served as respondents. It was descriptive survey research. Structured questionnaires were used to elicit data. Findings showed that transformational and democratic leadership are most effective in enhancing teachers' job performance. Autocratic style on the other hand, could lead to dissatisfaction and low productivity. The differences between the present research and the present one is in terms of sample, geographical location, population size and research design.

Wong and Ahmad (2022) conducted a comparative study on leadership and styles and teachers' performance in urban and rural secondary schools on Malaysia. The study compared leadership styles and teachers' performance in urban and rural settings. The population of the study constituted principals and teachers from twenty-five secondary schools. Eighty (80) principals and two hundred (200) teachers were the population sample. The instruments used to collect data from the respondents were questionnaires and interviews. Findings revealed that democratic leadership improved teachers' collaboration in both urban and rural schools. But urban schools reported higher performance due to better resources. The present study differs with the previous study in terms of population sample, location, population size and research design.

Ohinyama and Dubi (2023) analyzed transformational leadership enhances teachers' effectiveness. The study evaluated how transformational leadership enhances teachers' effectiveness. The research design employed was correlation. Teachers were the population of the study from thirty (30) public secondary schools. Structured questionnaires were used as an instrument to gather data from two hundred and fifty (250) teachers. Findings revealed that transformational leadership improves teachers' effectiveness and students' outcomes through continuous professional development. Present study differs with the previous study in terms of population, leadership style, sample, number of schools and geographical location.

Tadesse and Lemma (2023) conducted a study on principal's leadership styles and teachers work morale in public secondary schools in Ethiopia. The study assessed the influence of principals' leadership styles on teachers' moral. The populations were teachers and principals from thirty-five

(35). It was a descriptive survey. Structured questionnaires were designed to collect data from two hundred (200) teachers. The result of findings revealed that, principals who employed democratic leadership significantly boosted teachers' morale while autocratic leadership negatively impacted it. The present and the previous study differ in terms of sample, number of schools and population sample and size.

Mpho and Molefe (2022) carried out a case study on leadership styles and teachers' motivation in secondary schools in Botswana. The study focused on the roles of leadership styles in teachers' motivation. Forty (40) teachers and ten (10) principals were interviewed from ten secondary schools as a means to collect data collection. Findings of the research revealed that teachers felt motivated under democratic leadership while laissez-faire leadership resulted in poor feedback and low morale. The differences between the present and previous study is that the previous study did not explore teachers' job performance. Another difference is seen in terms of location, and sample population.

Setiawan and Rahman (2022) examined the effects of principals' leadership on teachers' job performance in Indonesian secondary schools. The study looked at how principals' leadership impacts teachers' performance. As a descriptive survey, structured questionnaires were adopted to collect data from one hundred and fifty (150) teachers from twenty (20) schools. It was evidenced that transformational leadership significantly enhanced teachers' productivity compared to Laissez-faire which resulted in lack of direction and poor outcomes. The differences between the present and previous study are geographical entity and population sample.

Wilson and Brooks (2021) examined democratic leadership style and teacher morale in Canadian school. The study analyzed the relationship between democratic leadership and teacher morale. It was a mixed method approach. The population composed teachers and students. These included fifty (50) and ten (10) principals. The instruments for the research were surveys and interviews. The research design was case study. The major findings of the study revealed that democratic leadership was found to improve teachers' morale, job satisfaction and team work by enhancing overall productivity significantly. Previous study is different from the present in terms of location, population size research design and leadership type.

### **Inferences and Research Gaps**

The researcher presented a review of literature both from conceptual and empirical perspectives. This review presented a detailed conceptualization of leadership, competencies and styles, secondary schools and principals of schools. Emphasis is on principals' leadership styles and how it affects Teachers' Job performance. The leadership roles of principals, types of leadership styles and their effectiveness in Jos North Local Government Area of plateau State, Nigeria were also discussed. Leadership styles played different roles in the school's system. Teachers' Job performance which is crucial for shaping the students' attitudes and behaviour. In all the reviewed empirical studies, attention was paid to the purpose of the study. The findings and relationships between the previous studies and the present study. Generally, it was discovered from the literature review that studies have been carried out on the correlation of many subjects, and outside the present area of study. The review also revealed that only few works centered on leadership styles and Teachers' Job performance in public secondary schools. It appears none has concentrated on Principals' Leadership styles and Teachers' Job Performance in Public Senior Secondary Schools in

Jos North Local Government Area of Plateau State, Nigeria. It is against this background that the present study is being carried out to fill the gap.

### **Conclusion**

The leadership style of principals' significantly impacts teachers' job performance in public senior secondary schools. Leadership approaches such as transformational, democratic, autocratic and laissez-faire influence teachers' motivation, effectiveness, and overall job satisfaction in different ways. Transformational and democratic leadership styles, which emphasize motivation, collaboration and professional growth, to enhance teacher performance by fostering a supportive and engaging work environment. These styles promote teamwork, innovation, a sense of purpose among teachers, leading to improved instructional quality and student outcomes.

On the other hand, autocratic leadership which focuses on rigid control and minimal teacher input may lead to dissatisfaction, low morale, and reduced creativity among teachers. Laissez-faire leadership, characterized by a lack of direction and minimal supervision, can result in poor teacher accountability and ineffective classroom management. To improve teachers' job performance, school principals should adopt leadership styles that balance authority with inclusivity, encourage professional development, and provide necessary resources and support. Educational policy-makers should also focus on leadership training programmes that equip principals with the necessary skills to create a conducive work environment for teachers.

Ultimately, effective school leadership is key to enhancing teacher motivation, job performance, and by extension, the academic success of students in public senior secondary schools.

### **Recommendations**

Based on the findings on principals' leadership styles and teachers' job performance in public senior secondary school, the following recommendations are made:

- i. Adoption of Transformation and Democratic Leadership Styles: Principals should embrace leadership styles that inspire, motivate, and engage teachers in decision-making. Encouraging collaboration and professional autonomy can enhance teachers' job satisfaction and performance.
- ii. Professional Development for Principals: Education authorities should organize regular training and workshops strategies. This will equip them with skills to create a supportive and productive work environment for teachers.
- iii. Teacher Motivation and welfare: School administrators should prioritize teacher welfare by providing incentives, recognition programmes, and opportunities for career growth. Motivated teachers are more likely to be committed and productive.
- iv. Effective Communication and Feedback Mechanisms: Principals should establish open communication channels, share ideas, and receive constructive feedback. A transparent and inclusive leadership approach fosters a positive school culture.
- v. Monitoring and Evaluation of Leadership Practices: The Ministry of Education should regularly assess and evaluate principals' leadership styles and the impact on teachers' performance. This can be done through surveys, feedback sessions, and performance appraisals.
- vi. Encouraging a Collaborative Work Environment: Principals should promote teamwork among teachers' by organizing workshops, peer mentoring programmes, and collaborative lesson planning. A culture of shared responsibility improves instructional effectiveness.

- vii. Provision of Adequate Teaching Resources: School authorities should ensure that teachers have access to necessary teaching materials, technology, and conducive classroom environments. Adequate resources enhance productivity and instructional quality.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

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## EXPLORING THE ROLE OF ARTIFICIAL INTELLIGENCE IN ENHANCING THE QUALITY OF TEACHING AND LEARNING SOCIAL SCIENCE EDUCATION FOR SUSTAINABLE NATIONAL DEVELOPMENT IN IMO STATE, NIGERIA

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### **Abstract**

*The study examined Exploring the Role of Artificial Intelligence in Enhancing the Quality of Teaching and Learning Social Science Education for Sustainable National Development, with a focus on tertiary institutions in Imo State, Nigeria. The objective is to know: what is the level of awareness and adoption of Artificial Intelligence in Social Science Education in tertiary institution, to explore the relationship between AI-driven pedagogy of students' critical thinking, civic competence, and employability skills in social science education and national development. A cross-sectional research design was adopted and data were collected from lecturers and students in selected tertiary institutions using a structured questionnaire. The sample size for the study was 600 respondents. Pearson's Product Moment Correlation Coefficient (r) was used to test the hypotheses at a 0.05 level of significance. The findings of this research are expected to contribute to policy discussion on the role of AI in Enhancing the Quality of Teaching and Learning Social Science Education. The study concludes that AI has the potential to contribute effectively in the quality of teaching and learning at this digital era in Nigeria. It recommends, increased investment in digital infrastructure, capacity building for academic staff, and the integration of AI tools into social science curricula to enhance teaching quality, student competence in tertiary institutions.*

**Keywords:** *Artificial intelligence, social science education, national development, tertiary institutions*

## Introduction

The education sector is globally experiencing a profound transformation driven by rapid advancements in digital technologies, particularly artificial intelligence (AI). Artificial intelligence has increasingly become a strategic tool in education, reshaping pedagogical practices through personalized learning systems, intelligent tutoring platforms, automated assessment, and data-driven instructional decision-making (Holmes et al., 2019). In advanced economies, AI-driven pedagogy is being adopted to enhance learners' critical thinking, creativity, collaboration, and problem-solving abilities skills considered essential for national competitiveness and sustainable development in the twenty-first century (OECD, 2021). As nations strive to build knowledge-based and innovation-driven economies, higher education institutions are expected to produce graduates who are not only knowledgeable but also adaptable and socially responsive.

In social science education, AI-driven pedagogy presents significant opportunities for improving the teaching and learning of complex social, political, and economic issues. Social science education plays a critical role in shaping civic consciousness, democratic values, ethical reasoning, and national identity. Through AI-powered simulations, virtual learning environments, and learning analytics, students can better engage with real-world societal challenges such as governance, inequality, globalization, and development planning (Luckin et al., 2016). As a result, the integration of AI into social science pedagogy is increasingly viewed as a pathway to strengthening the relevance of education to national development goals across the globe (UNESCO, 2020).

Interest in artificial intelligence for educational development across Africa, has grown steadily over the past decade. Many African countries recognize AI as a potential solution to persistent educational challenges, including limited teaching personnel, large class sizes, and uneven learning outcomes (World Bank, 2020). Despite this growing interest, the adoption of AI-driven pedagogy in African tertiary institutions remains constrained by infrastructural deficits, inadequate funding, low digital literacy among educators, and weak policy frameworks (Adeniran & Oyeniran, 2022). As a result, social science education in many African Universities continues to rely predominantly on traditional, lecture-based instructional approaches, limiting students' ability to apply social knowledge to development-oriented problem-solving. In Nigeria, the relevance of social science education to national development is well established. Social science disciplines such as social studies, economics, political science, sociology, and geography are designed to equip learners with the knowledge, skills, values, and attitudes necessary for nation-building, civic participation, social integration, and economic progress.

However, despite Nigeria's growing digital economy and increasing emphasis on technological innovation, the pedagogical practices in many tertiary institutions remain largely conventional and teacher-centered (Adebayo & Adigun, 2021). This disconnect has raised concerns about the capacity of Nigerian graduates to address pressing national development challenges such as unemployment, insecurity, poor governance, and social inequality. Although the Nigerian government has introduced several policies aimed at integrating information and communication technology (ICT) into education, the practical deployment of AI-driven pedagogy in tertiary institutions is still at an emerging stage. Studies indicate that many lecturers lack adequate training in advanced educational technologies, while institutions face challenges related to unreliable electricity supply, limited internet connectivity, and insufficient institutional support for innovation (Okoye et al., 2023). These challenges have implications for the quality of social

science education and its contribution to national development, particularly in terms of producing graduates with strong analytical, civic, and problem-solving competencies.

At the state level, Imo State presents a unique context for examining AI-driven pedagogy in social science education. The state hosts several tertiary institutions, including Universities, Colleges of education, and Polytechnics, which play a vital role in human capital development and regional socio-economic growth. Still, many of these institutions continue to grapple with inadequate digital infrastructure, limited access to AI-based educational tools, and insufficient professional development opportunities for lecturers (Eze & Olatunji, 2022). These constraints affect the extent to which AI-driven pedagogical strategies can be effectively integrated into social science teaching and learning processes.

Given Imo State's aspirations for educational advancement and sustainable development, there is a growing need to appraise the extent to which artificial intelligence-driven pedagogy is being adopted in social science education within its tertiary institutions and to examine the implications of such adoption for national development. Understanding lecturers' readiness, institutional capacity, and students' learning experiences in relation to AI-based pedagogy is essential for informing educational policy, improving instructional practices, and strengthening the contribution of social science education to both state and national development objectives. Against this background, this study focuses on artificial intelligence-driven pedagogy in social science education and its implications for national development, an appraisal of tertiary institutions in Imo State, Nigeria.

### **Objectives of the study**

The study evaluated Exploring the Role of Artificial Intelligence in Enhancing the Quality of Teaching and Learning Social Science Education for Sustainable National Development, an appraisal of Tertiary Institutions in Imo state, Nigeria. Specifically, it assessed:

- i. What is the level of awareness and adoption of Artificial Intelligence in Social Science Education in tertiary institution?
- ii. What challenges are associated with the implementation of Artificial Intelligence in Social Science Education?
- iii. How can the integration of Artificial Intelligence in social science education contribute to national development?
- iv. AI-driven pedagogy of Students' critical thinking, civic competence, and employability skills in social science education
- v. What are the effect of Artificial Intelligence on a lecturer's teaching method and instructional effectiveness?

### **Research hypotheses**

The following null hypotheses were tested in the study.

- i. There is no significant effect of Artificial Intelligence on a lecturer's quality of teaching and learning method in social science courses.

### **Scope of the study**

The study focused on artificial intelligence-driven pedagogy in social science education and its implications for national development an appraisal of tertiary institutions in Imo State, Nigeria. It is delimited to two tertiary institutions in Imo State (Imo State University and Imo State College of

Education). It is also restricted to variables such as AI-driven pedagogy of quality of teaching and learning in social science courses, AI-driven pedagogy in social science education on students' critical thinking, civic competence, and employability skills and national development. Theoretically, the study was delimited to the Human Capital and Diffusion of Innovation Theories. It was also restricted to university lecturers and students in the faculties of education.

### **Definition of Terms**

**Artificial Intelligence (AI):** Technology that enables machines to simulate human intelligence.

**Pedagogy:** The method and practice of teaching.

**Social Science Education:** Study of human society and relationships.

**Tertiary Institution:** Higher education institutions such as universities and colleges.

### **Literature Review**

#### **Concept of Artificial Intelligence in Education**

AI in education refers to the use of intelligent systems to enhance learning. It includes tools like chatbots, virtual assistants, and adaptive learning systems.

#### **AI Pedagogy in Social Science Education**

AI supports interactive and student-centered learning. It helps students understand complex social concepts through simulations and real-time feedback.

#### **Impact on Students**

AI improves academic performance by providing personalized learning experiences. It enhances engagement, critical thinking, and problem-solving skills.

#### **Impact on Lecturers**

AI reduces workload through automated grading and content delivery. It allows lecturers to focus more on research and student interaction.

#### **Challenges of AI in Education**

Lack of infrastructure

Limited digital literacy

High cost of implementation

Ethical concerns

#### **Conceptualization of Artificial Intelligence and Social Science education**

Artificial intelligence refers to computer-based systems capable of performing tasks that require human intelligence, such as reasoning, learning, data analysis, and decision-making (Russell & Norvig, 2021). In education, AI includes tools such as intelligent tutoring systems, learning analytics platforms, AI-assisted research tools, and adaptive learning environments. In social science education, AI supports inquiry-based learning, critical engagement with social data, and personalized learning experiences (Holmes et al., 2019).

According to Luckin et al. (2016), AI-supported learning environments help students develop higher-order cognitive skills by scaffolding complex thinking processes. In the context of social science education, this enables students to move beyond memorization toward evidence-based reasoning and social problem-solving. Digital literacy refers to the ability to effectively access,

evaluate, create, and communicate information using digital technologies (UNESCO, 2018). AI-supported digital tools expose students to online research platforms, academic databases, collaborative learning systems, and ethical technology use. In teacher education institutions, digital literacy is particularly important, as future educators are expected to integrate technology into classroom practice. Redecker (2017), notes that AI-enhanced digital environments strengthen learners' confidence, adaptability, and lifelong learning capacities. Selwyn, (2019) the integration of AI into social science education improves quality of teaching and learning, student engagement and participation, research competence and innovation, employability and teaching readiness. These outcomes are influenced by institutional factors such as infrastructure availability, lecturer competence, and curriculum design (Selwyn, 2019).

### **Artificial Intelligence and National Development**

Artificial intelligence (AI) involves the use of intelligent technologies such as machine learning, data analytics, automation, and decision-support systems to enhance efficiency and innovation across sectors (Holmes et al., 2019). When effectively adopted, AI contributes to national development by improving productivity, service delivery, and human capital development. In the education sector, particularly social science education, AI-driven tools enhance teaching effectiveness, support personalized learning, and promote the acquisition of critical thinking, civic competence, and employability skills. These competencies are essential for developing informed and socially responsible citizens capable of contributing to democratic governance and sustainable national development (UNESCO, 2020). National development is a multidimensional concept encompassing economic growth, social inclusion, good governance, innovation capacity, and human capital development. Countries that integrate AI into education, governance, and economic systems experience improved institutional efficiency, better policy outcomes, and enhanced workforce readiness (nwankwo, 2021). AI influences national development indirectly through mediating factors such as improved learning outcomes, workforce productivity, and civic participation. However, in developing contexts like Nigeria, inadequate infrastructure, limited access to technology, and weak regulatory frameworks can constrain these benefits, moderating the impact of AI on development outcomes (World Bank, 2020; Adeniran & Oyeniran, 2022).

### **Empirical literature**

#### **AI-driven pedagogy of quality of teaching and learning in social science courses and national development**

Empirical evidence increasingly shows that artificial intelligence can support teachers' instructional practices by enabling adaptive learning pathways and providing real-time feedback that responds to individual learners' needs. Studies indicate that such AI-supported environments allow teachers to move beyond one-size-fits-all instruction toward more personalized and effective teaching approaches. For instance, Malik et al. (2025) reported that the use of Intelligent Tutoring Systems (ITS) led to notable improvements in student engagement and learning outcomes. Their findings revealed statistically significant gains in post-test performance, which were attributed to AI-driven personalization and continuous feedback. This suggests that, when combined with conventional teaching methods, AI tools can enhance both the quality of instruction and students' academic achievement. Beyond classroom technology, leadership and institutional support have been identified as crucial factors in the successful adoption of AI-driven pedagogy. Khan et al. (2025) found that schools where leaders invested in teacher training, provided ethical guidance, and aligned AI use with curricular goals experienced more meaningful classroom integration of AI tools. Their study emphasizes that effective AI-supported teaching

depends not only on the availability of technology but also on pedagogical alignment, institutional readiness, and supportive leadership structures. Teachers' perceptions of AI also play an important role in shaping its classroom use. Qualitative findings by Nisar, Bashir, and Ahmad (2023) show that many teachers view AI positively, particularly for its ability to support differentiated instruction and provide tailored learning assistance.

However, the study also highlights notable challenges, including limited technical competence and concerns that excessive reliance on AI could reduce human interaction in teaching if pedagogical goals are not clearly prioritized. Research focusing specifically on the social sciences reflects similar trends. Studies on AI integration in Social Studies pedagogy reveal that both students and educators recognize AI's potential to enhance subject-specific knowledge and skill acquisition. These improvements are associated with richer learning experiences and better preparation for future careers. In the Nigerian tertiary education context, empirical findings further indicate that students who are more aware of AI and its educational benefits tend to report improved learning experiences. Nonetheless, challenges such as inadequate infrastructure, limited technical support, and uneven access to digital tools continue to constrain effective implementation. At the secondary school level, Ododo et al. (2024) observed that Social Studies teachers in IMO State demonstrated a high level of readiness to integrate AI and e-learning platforms into their teaching. The study linked this preparedness to more engaging content delivery, improved classroom interaction, and increased student participation, suggesting positive implications for instructional quality and learning outcomes aligned with national education objectives. Similarly, studies conducted in higher education show that AI-driven pedagogical approaches are associated with improved academic performance, particularly when AI is used to support formative assessment and personalized learning pathways. These outcomes reinforce the argument that AI-enhanced education can contribute to skill development and workforce readiness, which are critical elements of national development.

### **AI-driven pedagogy of students' critical thinking, civic competence, and employability skills in social science education and national development**

Recent empirical and review-based studies demonstrate that AI-driven pedagogy is reshaping teaching and learning by influencing students' critical thinking, ethical awareness, and skill development, while also raising important concerns about assessment integrity, inclusion, and pedagogical design. Rusandi et al. (2023) examined the use of generative AI tools such as ChatGPT in educational and research contexts, emphasizing their potential to support learning when aligned with critical thinking and academic integrity. Their findings suggest that AI can enhance students' analytical and evaluative skills by encouraging deeper engagement with information, particularly when learners are guided to question sources, detect misinformation, and reflect on context. However, the authors stress that these benefits depend on deliberate instructional strategies that prioritize critical thinking over mere content generation. This study highlights AI's role as a complementary tool rather than a substitute for human reasoning in education. Focusing on assessment practices, Estaphan et al. (2025) explored the challenges and opportunities associated with AI-assisted student assignments in higher education. Their empirical consensus-based framework revealed that while AI can support idea generation and organization, unstructured use may weaken students' critical thinking and compromise academic integrity.

The study identified key pedagogical strategies such as process-oriented assessment, AI literacy development, and AI-free validation tasks that help preserve higher-order cognitive skills.

Importantly, the authors link AI-supported pedagogy to the development of employability skills, including adaptability, ethical judgment, and human AI collaboration, which are increasingly valued in AI-driven labour markets. From an inclusion and measurement perspective, Adako et al. (2025) reviewed empirical studies on AI-assisted education for children with autism spectrum disorder (ASD), emphasizing evaluation and long-term impact. Their findings show that AI-powered tools can enhance personalized learning, social skills, and academic outcomes when supported by robust assessment frameworks. Although focused on special education, the study provides broader pedagogical insights relevant to social science education, particularly the importance of ethical AI use, explain ability, and accountability. The authors argue that without careful measurement and human oversight, AI's educational benefits may be uneven or misaligned with learners' developmental needs. Taken together, these studies suggest that AI-driven pedagogy can support critical thinking, ethical reasoning, and employability-related skills when embedded within intentional instructional design and strong assessment frameworks. However, the literature consistently emphasizes that AI's educational value is not automatic. Effective outcomes depend on teacher guidance, AI literacy, ethical safeguards, and pedagogical approaches that prioritize reasoning, reflection, and human AI collaboration. These findings underscore the need for balanced and context-sensitive integration of AI in social science education to ensure meaningful learning and skill development. AI tools such as intelligent tutoring systems, automated feedback platforms, and generative learning applications can encourage students to engage more actively with learning materials. Rather than passively receiving information, learners are prompted to analyse ideas, evaluate different perspectives, and reflect on their reasoning processes. Lu et al. (2025) found that students exposed to AI-assisted learning activities demonstrated higher levels of analytical reasoning and problem-solving than those taught through conventional methods. Similarly, Holmes et al. (2019) observed that AI-based feedback systems support meta-cognitive engagement by helping learners identify gaps in understanding and refine their thinking. Within social science classrooms, AI tools have been used to support inquiry-based and discussion-oriented learning. Studies indicate that AI-generated discussion prompts, simulations, and scenario-based tasks help students explore complex civic issues such as governance, democratic processes, and public policy. These approaches require learners to interpret information, weigh evidence, and justify decisions, thereby promoting higher-order thinking and deeper civic understanding (UNESCO, 2020). Research also shows that AI-driven pedagogy can contribute to the development of civic competence, a core objective of social science education. Empirical findings from citizenship and civics education suggest that adaptive learning platforms and interactive digital tools increase student engagement with civic content and improve understanding of civic institutions and responsibilities (Baihaqi et al., 2024).

Nisar, Bashir, and Ahmad (2023) reported that while teachers generally view AI as useful for enriching instruction, excessive reliance on AI without guided discussion may limit opportunities for moral reasoning, dialogue, and democratic participation. This highlights the continued importance of teacher-led inquiry and ethical reflection in AI-supported civic education. Beyond cognitive and civic outcomes, empirical literature increasingly links AI-driven pedagogy to the development of employability skills, including problem-solving, digital literacy, adaptability, and collaboration. Studies show that students who acquire AI-related skills through structured learning experiences often report higher levels of career confidence and better alignment with labour market expectations (OECD, 2021). Alkhawaja et al. (2025) found that exposure to AI-enhanced learning environments positively influenced students' digital competence and analytical skills, both of which are essential for success in technology-driven economies. In the

Nigerian context, evidence also points to the potential of AI-driven pedagogy in social science education. Ododo et al. (2024) observed that Social Studies teachers who were prepared to integrate AI and e-learning platforms created more engaging and interactive learning environments, which supported students' skill development. However, studies further note that limited infrastructure, inadequate training, and unequal access to digital resources remain major barriers to the effective use of AI in many developing contexts (World Bank, 2020).

## **Theoretical framework**

### **Diffusion of Innovation Theory**

The **Diffusion of Innovation Theory**, developed by **Everett Rogers (1962)**, explains how new ideas, technologies, or practices are introduced and gradually spread within a social system over time through communication and social interaction. Rather than being adopted all at once, innovations diffuse slowly as individuals and institutions learn about them, form attitudes, make decisions, and evaluate their usefulness in real-life contexts. A central idea of the theory is that people and organizations differ in their readiness to accept change. Adoption typically follows a series of stages beginning with **awareness or knowledge**, followed by **persuasion, decision, implementation**, and finally **confirmation**, where users decide whether to continue or discontinue the innovation. Rogers also categorized adopters into five groups **innovators, early adopters, early majority, late majority, and laggards** to explain why some individuals embrace new technologies quickly while others remain cautious or resistant. The theory further suggests that the rate at which an innovation spreads depends on several key factors, including its perceived usefulness, ease of use, compatibility with existing practices, and the level of institutional and technical support available. When an innovation is seen as beneficial, simple to use, and aligned with current values or routines, it is more likely to be adopted widely. In the context of education, Diffusion of Innovation Theory provides a useful framework for understanding how new teaching methods and technologies such as **AI-driven instructional tools** are introduced, accepted, or resisted by educators and institutions. Teachers' attitudes toward technology, their level of digital competence, leadership support, availability of infrastructure, and enabling policies all play critical roles in shaping the pace and success of adoption. This theory is particularly relevant to the present study because AI-driven pedagogy is still an emerging innovation in many tertiary institutions in **Imo State, Nigeria**. It helps explain variations in AI adoption across institutions and departments, differences in lecturers' willingness and readiness to integrate AI tools into teaching, as well as institutional challenges such as inadequate infrastructure, limited training opportunities, and policy constraints. By applying this theory, the study gains a clearer understanding of the social and institutional dynamics influencing the adoption of AI-driven pedagogy and its implications for educational quality and national development.

### **Human Capital Theory**

Human Capital Theory, as advanced by Theodore Schultz (1961) and later expanded by Gary Becker (1964), views education not simply as a social service but as a strategic investment in people. Schultz argued that spending on education improves individuals' productive capacities in much the same way that investment in physical capital enhances industrial output. Building on this idea, Becker demonstrated that education, training, and skills acquisition directly contribute to economic productivity and long-term national growth. At the core of Human Capital Theory is the assumption that education and training are investments rather than forms of consumption. The knowledge, skills, and competencies acquired through education increase individuals' productivity, which in turn leads to higher earnings at the individual level and economic growth at

the societal level. Importantly, the theory emphasizes that the quality of education not merely access to it plays a decisive role in shaping development outcomes. Societies that prioritize modern, relevant, and skills-oriented education systems are therefore better positioned to achieve sustainable development. Human Capital Theory also maintains that teaching methods, curriculum content, and instructional technologies contribute to learners' skill development. Contemporary pedagogical approaches, such as AI-driven pedagogy are viewed as powerful tools for improving learning efficiency, deepening students' understanding of complex concepts, and fostering critical, digital, and employability skills that are increasingly demanded in today's labour market. This theory is particularly relevant to the present study because the integration of AI-driven pedagogy in social science education represents a deliberate investment in human capital development. By incorporating AI tools into teaching and learning processes in tertiary institutions in Imo State, students are more likely to develop critical thinking and analytical abilities, digital and technological competencies, as well as civic awareness and problem-solving skills. Collectively, these competencies enhance graduates' productivity and employability, strengthen workforce quality, improve institutional efficiency, and ultimately contribute to broader national development outcomes.

### **Methodology**

The study adopted a cross-sectional research design. This was because the design was concerned with the study of large and small populations with emphasis on the incidence, distribution, and interrelations of sociological and psychological factors, (Isangedeghi, Joshua, Asim & Ekuri, 2014). The population of this study comprises all social science lecturers and students in selected tertiary institutions (Faculty of Education in Imo state university and Imo state college of education ihitte uboma), Nigeria. The sample size for this study was 600 respondents. A statistically determined sample size was adopted to ensure representativeness. This was made up of lecturers and students in the study area. The Kish Leslie (1965) formula for cross-sectional studies was used to determine the sample size. The sampling techniques adopted for this study were purposive sampling and snowball sampling techniques. The randomly selected tertiary educational institutions in Imo State were Imo state university and Imo state college of education ihitte uboma. Data was collected using a structured questionnaire titled Artificial Intelligence–Driven Pedagogy and National Development Questionnaire (AIPNDQ). It was structured to reflect the four-point Likert-scale type of strongly agree, agree, strongly disagreed and disagreed accordingly. The instrument was validated by experts in the faculties of education and social sciences in the study area. Reliability of the research instrument was determined using Cronbach's alpha coefficient. Data was analyzed using descriptive statistics (frequency, mean, standard deviation) and inferential statistics (Pearson product moment correlation coefficient). at 0.05 level of significance. This was carried out with the help of the Statistical Package for Social Sciences (SPSS) software for analysis and results presented in tables. Informed consent was obtained from all participants. Confidentiality and anonymity was assured, and participation was voluntary.

### **Results**

Result of the data collected was presented based on the specific hypotheses as shown below:

#### **Hypothesis one**

There is no significant effect of Artificial Intelligence on a lecturer's quality of teaching and learning in social science courses. Pearson Product Moment correlation coefficient ( $r$ ) was adopted for analysis. Result of the analysis as presented in Table 1 revealed that the calculated  $r$ -value of

0.947 is significant at 0.05 levels of significance with 614 degrees of freedom. With this result, the null hypothesis was rejected while the alternate hypothesis which states that there is a significant effect of AI-driven pedagogy of quality of teaching and learning in social science subjects/courses and national development was accepted. This result implied that, AI-driven pedagogy in the quality of teaching and learning in social science subjects/courses enhances national development. The positive r implied that the higher adoption AI-driven pedagogy of quality of teaching and learning in social science subjects/courses.

**Table 1:** Pearson Product Moment Correlation (PPMC) analysis of the effect of AI on the quality of teaching and learning in social science subjects and national development. (N=616)

Variables	Mean	SD	r-value	Sig.
What are the effect AI on the quality of teaching and learning in Social Science subjects/courses	20.92	2.054	0.945	.05
National development	20.54	2.73		

Significant at .05, r-value = 0.945, df = 614  
Source: Field survey, 2025

### Hypothesis two

There is no significant relationship between AI-driven pedagogy of students' critical thinking, civic competence, and employability skills in social science education and national development. To test this hypothesis, Pearson Product Moment Correlation (PPMC) was adopted for analysis. Result of the analysis as presented in table 2 revealed that the calculated r-value of 0.616 is significant at 0.05 levels of significance with 614 degrees of freedom. With this result, the null hypothesis was rejected while the alternate hypothesis which states that there is a significant relationship between AI-driven pedagogy of students' critical thinking, civic competence, and employability skills in social science education and national development was accepted. The positive r implied that higher students' critical thinking, civic competence, employability skills can enhances national development.

**Table 2:** Pearson Product Moment Correlation Analysis of the relationship between AI-driven pedagogy of students' critical thinking, civic competence in social science education and employability skills and national development. (N=512)

Variables	Mean	SD	r-value	Sig.
AI-driven pedagogy of Students' critical thinking, civic competence, and employability skills in social science education	20.67	2.90	0.512	.05
National development	20.545	2.732		

\* Significant at .05, p-value = 0.512, df = 614  
Source: Field survey, 2025

## Discussions

The findings of this study provide empirical evidence on the role of AI-driven pedagogy in enhancing social science education and promoting national development. Specifically, the results of Hypothesis One revealed a significant effect of AI-driven pedagogy on the quality of teaching and learning of social science subjects and courses, with clear implications for national development. This finding makes known that the integration of artificial intelligence into teaching and learning processes particularly within tertiary institutions in Imo State has the potential to improve instructional quality, learner engagement, and educational outcomes, which are critical drivers of national development.

This result corroborates the findings of Malik et al. (2025) and Khan et al. (2025), who reported that the adoption of Intelligent Tutoring Systems (ITS) significantly improved student engagement, learning outcomes, and academic performance. Their studies emphasized that institutions that invested in teacher capacity building, provided ethical and pedagogical guidance, and aligned AI applications with curricular objectives experienced more effective and sustainable integration of AI technologies. The statistically significant gains observed in post-test performance in these studies were largely attributed to AI-enabled personalization, adaptive learning pathways, and continuous feedback mechanisms. Based on this study, these findings underscore the capacity of AI-driven pedagogy to strengthen the teaching and learning of social science education, thereby contributing to improved educational quality in tertiary institutions in Imo State and Nigeria at large.

The result of Hypothesis Two further revealed a significant relationship between AI-driven pedagogy in terms of students' critical thinking, civic competence, and employability skills in social science education and national development. This finding implies that the effective use of AI tools in social science classrooms can enhance higher-order cognitive skills, foster civic awareness, and equip students with relevant employability skills necessary for active participation in socio-economic and political development. This finding aligns with the studies of Rusandi et al. (2023) and Adako et al. (2025), which demonstrated that AI-supported learning environments can enhance students' analytical and evaluative abilities by promoting deeper engagement with information. These studies highlighted that when learners are guided to interrogate sources, detect misinformation, and reflect critically on social contexts, AI becomes a powerful tool for nurturing critical thinking and civic competence. Similarly, Adako et al. (2025) reported that AI-powered tools enhance personalized learning, social skills development, and academic achievement when supported by robust assessment and monitoring frameworks.

Despite these positive outcomes, the present study also revealed significant structural and institutional barriers to the effective implementation of AI-driven pedagogy. Limited digital infrastructure, inadequate access to computers and mobile devices, insufficient technical training for lecturers, and unequal access to digital resources were identified as major constraints in many tertiary institutions, including the Imo State University and Imo State College of Education, Ihitte Uboma. These challenges limit the extent to which AI can be effectively deployed to achieve its full educational and developmental potential. Consequently, the findings highlight the urgent need for evidence-based policy formulation and implementation aimed at strengthening digital infrastructure, improving staff training, and ensuring equitable access to AI-enabled learning resources. Addressing these challenges is essential for maximizing the benefits of AI-driven

pedagogy in social science education and for leveraging education as a strategic instrument for sustainable national development in Imo State and Nigeria as a whole.

### **Conclusion**

This study examined Exploring the Role of Artificial Intelligence in Enhancing the Quality of Teaching and Learning Social Science Education for Sustainable National Development with a focus on tertiary institutions in Imo State, Nigeria. The findings demonstrate that the integration of AI into teaching and learning processes significantly enhances the quality of instruction and student engagement in social science disciplines. Through personalized learning, adaptive feedback, and improved instructional delivery, AI-driven pedagogy contributes to better learning outcomes and strengthens the overall quality of higher education.

The study further established that AI-supported social science education positively influences students' critical thinking skills, civic competence, and employability. By encouraging analytical reasoning, informed civic participation, and practical problem-solving, AI tools help prepare students to respond effectively to contemporary societal and labour market demands. These outcomes underscore the strategic importance of social science education, supported by AI, in building human capital essential for sustainable national development.

Despite these positive effects, the study revealed persistent challenges limiting effective AI adoption in tertiary institutions, including inadequate digital infrastructure, insufficient access to technological devices, limited staff training, and unequal access to digital resources. These constraints highlight the need for a coordinated and policy-driven approach to AI integration in higher education. In conclusion, AI-driven pedagogy holds significant potential to transform social science education and contribute to national development in Nigeria. Realizing this potential requires deliberate investment in infrastructure, capacity building, and ethical, curriculum-aligned implementation of AI technologies within tertiary institutions.

### **Recommendation**

Tertiary institutions in Imo State should deliberately integrate AI tools into the teaching of social science courses to improve instructional quality and learning outcomes. This can be achieved by adopting AI-supported learning management systems, intelligent tutoring platforms, and data-driven assessment tools that support personalized learning and timely feedback. Institutional leadership should prioritize regular training and re-training of lecturers to build their confidence and competence in the ethical and pedagogical use of AI. Government and regulatory agencies should also provide funding and policy guidance to ensure that AI integration aligns with national education and development goals.

Social science curricula should be redesigned to encourage inquiry-based and problem-solving learning supported by AI technologies. AI tools should be used to expose students to real-life social issues, data analysis, civic simulations, and reflective learning tasks that promote analytical reasoning and responsible citizenship. Institutions should also ensure equitable access to digital resources by improving infrastructure and providing students with affordable access to devices and internet services. By doing so, AI-driven pedagogy can better equip graduates with the skills required for active civic engagement and meaningful participation in Nigeria's socio-economic development.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

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## DESIGN AND IMPLEMENTATION OF AN AUTOMATED ADVERT MANAGEMENT SYSTEM FOR SMALL AND MEDIUM-SCALE ENTERPRISE

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### **Abstract**

*This project titled “Design and Implementation of an Automated Advert Management System for Small and medium scale Enterprise was developed to help small and medium-scale businesses manage and schedule their online advertisements automatically. Many business owners find it difficult to maintain consistent posting times due to busy schedules or limited technical knowledge, leading to poor visibility and low customer engagement. The system was designed using the Prototype Model of the System Development Life Cycle (SDLC) to allow continuous improvement through testing and feedback. It was implemented with Python (Django) for backend logic, React.js for the user interface, Firebase for cloud storage, and MySQL/PostgreSQL for database management. Results from system testing showed that the platform is reliable, user-friendly, and secure. It allows users to upload adverts, store them safely, and schedule automatic posting on platforms like Facebook and Instagram. The system reduces manual effort, improves advert timing, and helps businesses maintain a consistent online presence. Although it currently supports only two platforms, it provides a strong foundation for future expansion and automation improvements.*

## Introduction

During initial field observations of small and medium-scale enterprises (SMEs). I noticed that business owners often struggled to manage online advertising alongside their daily operations. Posts were frequently delayed, missed entirely or inconsistently timed because owners were occupied with inventory, customer service or other administrative tasks. This irregularity directly affected the visibility of their products and limited customer engagement. In as much as many available social media management tools were either too complex or costly for these small businesses, I observed that features such as multi-platform analytics, extensive configuration options or automation dashboards were rarely used by SME owners, who often preferred simplicity and immediate functionality over advanced capabilities. In other to address these issues based on my observation, I developed an automated advert management system specifically tailored for SMEs. This system will allow users to upload advertisements once and schedule posting times across supported platform without further manual intervention. Throughout development, I collected direct feedback from SME owners noting which scheduling options were most needed and how media files should handle to avoid delays.

The backend was implemented using python with Django framework, which provided robust security and task scheduling support. React.js was used for the frontend to allow responsive and intuitive interaction. Media files are securely stored using firebase, while relational data such as schedules and user profiles are managed in MySQL/PostgreSQL databases. Facebook and Instagram were selected initially due to their prevalent use among SME owners in my study. The key contributions of this work are threefold: 1) a practical, automated system that reduces manual advertising effort for SMEs. 2) Integration of user feedback into the iterative design process and 3) an extensible architecture that can support future enhancements such as additional platforms and analytics features. By grounding the system in observed SME workflows and tailoring its functionality to actual user needs, the study offers a concrete solution to operational challenges in small business online advertising.

## Related Works

Rather than summarizing prior studies descriptively, this section examines existing work through the specific challenges identified during the development of the proposed system. The review focuses on three themes: automated advertising, usability of digital tools for SMEs and system development approaches for evolving user requirements. Several studies have examined the use of automation in digital and social media advertising. These works generally report that automated scheduling improves posting regularity and reduces manual workload (Olujimi & Ade-Ibijola, 2022). However, the emphasis in these studies is largely on marketing performance indicators such as engagement metrics and branch reach. The operational processes through which small business owners interact with such systems are rarely examined in detail.

Research focusing on SMEs highlights persistent barriers to technology adoption, including limited time, financial constraints and low tolerance for complex interfaces (Kedi et al., 2024; Nor et al., 2025). While these studies acknowledge usability concerns, most proposed solutions remain feature-dense and assume familiarity with digital marketing concepts. Our observations during requirement gathering revealed that SME owners often disengage from systems that require continuous configuration or interpretation of analytics results. From a technical standpoint, existing automated advertising planforms typically rely on web-based architectures integrated with cloud storage and third-party social media APIs (More, 2023). Although these architectural

choices are well documented, implementation-level discussions are limited. Issues such as handling failed scheduled posts, managing authentication tokens and ensuring reliable task execution are usually treated as secondary concerns or omitted entirely from published studies.

In software engineering research, iterative development models are frequently recommended for systems where user needs evolve during implementation. The prototype model has been shown to support early validation of requirements and improve usability outcomes (Abidemi, 2024). Despite this, few studies explicitly apply prototyping to SME-oriented advertising systems or document how repeated user feedback influences system scope and feature prioritization. More recent literature also points to limitations in existing advertising automation tools particularly restricted platform support and limited extensibility (Gabelaia, 2024). These findings align with challenges identified in this study, where SME owners expressed dissatisfaction with tools that could not adapt to their posting habits or preferred platforms. Overall, the reviewed literature confirms the value of automation in digital advertising but exposes a gap between high-level marketing strategies and practical, SME-focused system implementation. This study addresses that gap by translating observed user constraints and documentation research findings into a lightweight, extensible and usability-driven automated advert management system.

## **Methodology**

The methodology adopted for this study was shaped by the practical goal of producing a functional system that could be used by SME owners with minimal technical support. Rather than beginning with fixed system specifications, the development process evolved through continuous interaction with intended users and repeated refinement of system features. Development Approach. An iterative prototyping approach was selected because initial user requirements were incomplete and subject to change. Early versions of the system were intentionally minimal, focusing only on advert upload and basic scheduling. These prototypes were demonstrated to SME owners whose feedback directly influenced subsequent development cycles. For example, early feedback revealed confusion around date and time selection leading to simplified scheduling controls in later versions.

Unlike linear development models, the prototype model allowed functionality to be adjusted without restructuring the entire system. Each iteration followed cycle of requirement clarification, prototype modification, user testing and refinement. This approach ensured that usability concerns were addressed early rather than after full system deployment. Requirement Elicitation. System requirements were gathered through informal interviews and observation sessions with SME owners who actively used social media for business promotion. Attention was given to how users currently posted adverts, the devices they used and the frequency with which posts were missed or delayed. These observations informed the prioritization of core features such as automated scheduling, secure media storage and minimal configuration steps.

Functional requirements included advert upload, scheduling, automatic posting and user authentication. Non-functional requirements focused on ease of use, reliability of scheduled tasks and data security. Requirements that did not directly support these goals such as advanced analytics were deliberately excluded to avoid unnecessary complexity. System Development and tool. System development was carried out using Python with the Django framework to manage backend logic, authentication and scheduled background tasks. Django was selected for its built-in security features and support for modular development. Background task execution was

handled using scheduled job mechanisms to ensure adverts were posted at predefined times without user intervention.

The user interface was developed using React.js to support responsive interaction across mobile and desktop devices. Interface components were refined based on observed user behavior during testing particularly with respect to navigation simplicity and error feedback. Firebase cloud storage was used to manage advert media files, providing scalable storage and controlled access. Structured application data including user profiles and posting schedules were stored and posting schedules were stored using relational database systems (MySQL/PostgreSQL) to ensure consistency and integrity.

### Testing Strategy

Testing was conducted incrementally alongside development rather than as a final phase. Functional testing verified that adverts could be uploaded, stored, scheduled and posted automatically. Usability testing focused on task completion time and user error frequency during scheduling operations. Basic security checks were performed to ensure that unauthorized users could not access or modify advert data.

### Test Plan

#### It focused on the following:

- i. Login Test: To ensure users can log in with correct credentials.
- ii. Content Upload Test: To confirm different types of files (video, documents, images) can be uploaded.
- iii. Content Retrieval Test: To verify stored files can be accessed quickly.
- iv. Database Test: To check if records are saved and retrieved correctly.
- v. Security Test: To confirm unauthorized users cannot gain access.

### Test Data

In testing the Data, Dummy data was created to simulate real-life use cases, a couple of users, Admin, Editor, viewer were tested. PDFs, MP4 videos, PNG/JPEG images, text documents were content types used. Upload, delete, view, and share content were actions that was tested. This methodology emphasized adaptability and user alignment over rigid specification allowing the resulting system to reflect real SME workflows rather than assumed usage pattern,

### System Design and Architecture

System architectures were designed to support reliable advert scheduling while remaining simple enough for non-technical SME users. Design decisions were driven by observed usage patterns such as frequent mobile access, intermittent connectivity and the need for minimal configuration during routine operations.

### Architectural Overview

A modular client-server architecture was adopted to separate user interaction from backend processing. The frontend handles user input, advert preview and scheduling selection while the backend manages authentication, data persistence and automated posting tasks. This separation allows interface changes to be made without affecting scheduling logic and enables future expansion to additional platforms.

The system consists of a three-tier architecture:

- i. Presentation Layer – User interfaces for administrators, content managers, and users.
- ii. Application Layer – Business logic handling scheduling, permissions, and content management.
- iii. Database Layer/dashboard – Centralized repository for all content, logs, and user details

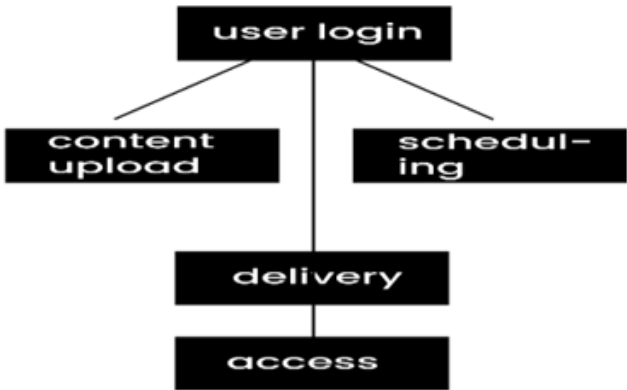
**Fig 1:** Architecture Diagram



This architectural design emphasizes reliability, simplicity and extensibility aligning system behavior with the operational constraints observed among SME users.

**System Flowchart**

This is a flowchart which showcase all the processes used in the system, such as user login, content upload, scheduling, delivery, and access.



**Fig 2:** Flowchart Diagram

**Data Flow Diagram (DFD)**

Level 0 (Context Diagram): Shows the interaction between the user, administrator, and the system.  
 Level 1: Breaks down the content upload, management, and delivery processes into detailed flows.

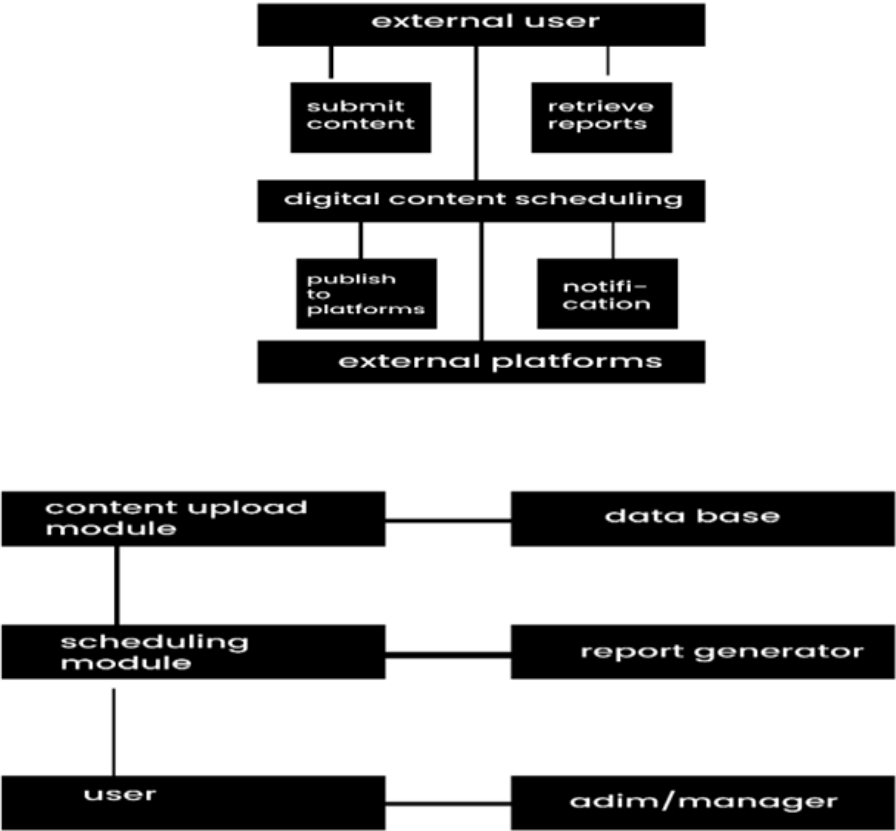


Fig 2: Fig 3: DFD diagrams – Level 0 & Level 1

**Entity-Relationship Diagram (ERD)**

This model the database structure, showing Users, Content, Schedules, Delivery Logs, and their relationships.

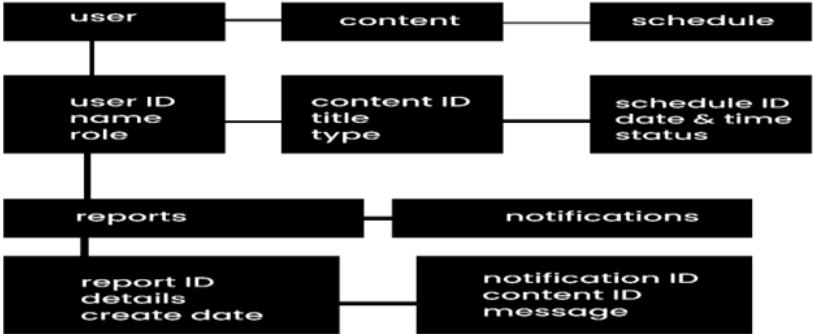
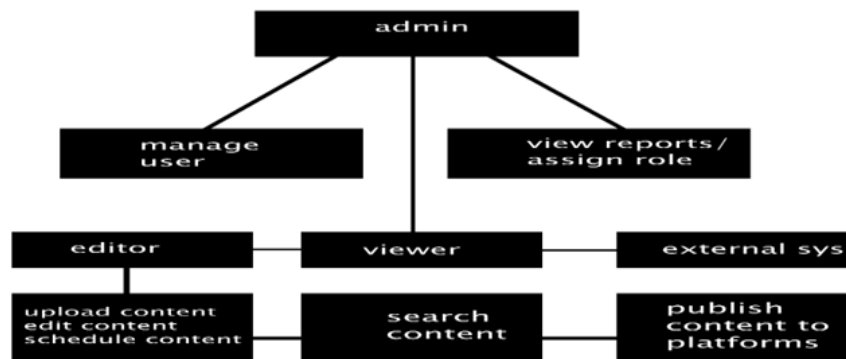


Fig 4: ERD Diagram

## Use-Case Diagram

The use-case diagram highlights the interactions between actors (Administrators, Content Managers, Users) and the system functionalities.



## IMPLEMENTATION DETAILS

Implementation of the automated advert management system focused on translating the design objectives into a stable and usable application rather than demonstrating framework capabilities. Each implementation decision was influenced by usability requirements, reliability if scheduled operations and ease of future maintenance.

### Backend Implementation

Backend functionality was developed using Python and the Django framework. Django was selected primarily for its integrated authentication mechanisms and support for modular application development. User authentication and authorization were implemented to ensure that advert data and posting schedules remained private in each account. Advert scheduling was implemented as an asynchronous background process. Once a user defines a posting time, the system records the task independently of the active session. This ensures that scheduled adverts are posted even when the user is offline. Task execution outcomes are logged to support basic monitoring and troubleshooting of failed postings.

### Frontend Implementation

The frontend was developed using React.js to support dynamic interaction without repeated page reloads. Interface components were organized around user tasks rather than system functions. For example, scheduling controls, media upload and post previews were grouped within a single workflow to reduce navigation overhead. User feedback during testing revealed that excessive form inputs discouraged use. As a result, optional configuration fields were minimized and default values were applied where appropriate. Visual feedback was incorporated to confirm successful uploads and scheduled actions.

### Media Storage and Data Persistence

Advertisement media files were stored using Firebase cloud storage. This approach reduced the processing load on the application server and improved upload performance particularly for users with limited bandwidth. Access rules were configured to prevent unauthorized retrieval or modification of stored files. Structured application data including user information, advert meta data and scheduling records were stored in a relational database (MySQL/PostgreSQL). Data

normalization was applied to reduced redundancy while indexing was used to improve query performance for time-based scheduling operations.

Overall, the implantation prioritized stability and user-centered workflow execution over feature breath, ensuring that the system remained accessible and practical for SME owners.

## **RESULTS AND EVALUATION**

System evaluation focused on verifying whether the implemented platform met its primary objectives: reducing manual effort, improving posting consistency and remaining usable for non-technical SME owners. Evaluation activities were conducted after completing the core implementation and involved functional testing, usability assessment and basic reliability checks.

### **Functional Testing Results**

Functional testing was performed to confirm that each major feature operated as intended. Tests verified successful user authentication, advert upload, media storage, scheduling accuracy and automated posting execution. Scheduled posts were observed to execute at their predefined times without requiring user intervention confirming correct operation of the background task mechanism. Error handling scenarios were also evaluated. When invalid scheduling inputs were provided, the system returned appropriate feedback and prevented task creation. In cases where external platform responses were delayed, retry mechanisms ensured that posting attempts were not immediately abandoned.

### **Usability Evaluation**

Usability evaluation was carried out through task based observation sessions with SME owners who had no prior exposure to the system. Participants were asked to upload an advert and schedule a post using the platform. Most users were able to complete these tasks without additional guidance after a brief introduction.

Observed errors were primarily related to initial unfamiliarity with scheduling options rather than system complexity. After minor interface adjustments, such as clearer labels and confirmation prompts, task completion time decreased noticeably. Users reported that the reduced number of steps compared to manual posting was a significant benefit.

### **Reliability and Security Assessment**

System reliability was assessed by monitoring scheduled posting tasks over repeated execution cycles. The platform consistently executed scheduled tasks even when users were logged out, demonstrating independence from active sessions. Logging records confirmed successful execution and highlighted occasional external API delays rather than internal system failures. Basic security checks verified that user accounts were isolated and that advert data could not be accessed across accounts. Media access rules ensured that uploaded content was available only through authenticated requests.

### **Summary of Results**

Overall evaluation results indicate that the system met its design goals. Automated scheduling reduced the need for manual intervention, posting consistency improved and users were able to interact with the system without specialized technical knowledge. While the evaluation was

limited in scale, the results provide practical evidence of the system's effectiveness in supporting SME advertising workflows.

### **Discussion**

This paper achieved its main goal of creating an automated advert management platform that is:

Reliable: Worked consistently during testing.

Efficient: Handled multiple users without errors.

User-Friendly: Simple interface that is easy to navigate.

Secure: Protected against unauthorized access.

### **Main Achievements**

- i. Reduced manual stress of content sharing.
- ii. Improved speed of content delivery.
- iii. Enhanced storage and retrieval accuracy.

### **Challenges Faced**

- i. Internet dependence.
- ii. Difficulty handling very large files.

### **Conclusion**

From the implementation and testing, it can be concluded that the developed platform achieved its intended goals. It improved the speed, security, and accessibility of digital content when compared with manual or semi-automated systems. The system offers a practical solution to organizations and individuals that rely on timely and secure content distribution.

### **Recommendations**

I recommend the following:

- i. The system can be applied in educational institutions (for e-learning platforms), businesses (for document sharing), media houses (for digital content distribution), and government agencies (for secure information sharing).

### **Suggestions for Further Research**

- i. Integration of cloud computing for better scalability.
- ii. Development of mobile applications for offline access.
- iii. Incorporation of artificial intelligence (AI) for smart search and recommendations.
- iv. Extension of the system to support live streaming and real-time collaboration.
- v. Expansion to handle very large data volumes with improved server capacity.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

THEME: Governance and Sustainable Economy: Building a Secure and Prosperous Nigeria | 28th - 29th January, 2026  
VENUE: Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt - Rivers State

## EXPLORING THE ROLE OF WETLANDS IN SUPPORTING FOOD SECURITY IN KATSINA STATE'S SEMI-ARID AREAS: A STUDY ON THE ROGOGO WETLANDS.

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### **Abstract**

*Wetlands play a crucial role in ecological functioning, particularly in semi-arid regions where rainfall is low and erratic. As highly productive ecosystems, wetlands offer substantial potential for enhancing food security when effectively utilized. This study investigates how wetlands are harnessed to boost food security in semi-arid northern Katsina State, using Rogogo wetlands as a case study. Data were collected through two field visits to Rogogo villages in February and June 2025, coupled with questionnaires administered to individuals involved in wetland use. Descriptive statistics were employed to analyze the data. Findings indicate that Rogogo wetlands support dry-season farming, fishing, hunting, fuel-wood extraction, cattle rearing and watering, and wild food gathering. The study also identifies several challenges that hinder optimal use of the wetlands for food security, despite interventions by local and state governments. We recommend increased support from government agencies and non-governmental organizations to enhance the effective harnessing of Rogogo wetlands and similar semi-arid systems.*

**Keywords:** *exploring, wetlands, supporting, food security, semi-arid regions, Katsina State.*

## **Introduction**

Wetlands are the transitional area between terrestrial and aquatic ecosystems where the water level near or above the surface of the ground for most of the year (Garg, Garg & Garg: 2006). According to Cunningham and Cunningham (2004), wetlands are ecosystems in which the land surface is saturated or covered with standing water at least for most of the year. Among the most important wetlands are the tidal and fresh water marshes, bogs, ferns, herbaceous and wooded fresh water and peat swamps, mangroves, coastal lagoons, flood plains, deltas and estuaries (Adejemilua: 2007).

Wetlands are important part of the ecosystems which are of particular importance ecologically and economically. Economically, wetlands such as mudflats and swamps are good habitats for the development of nursery grounds for shell fish, crabs and other fauna that are sources of proteinous foods (Garg, Garg & Garg: 2006). Wetlands are good for integrated swamp rice cultivation, sugar cane and similar crops as practiced in many Asian countries such as China and Thailand (Adejemilua: 2007). Wetlands are important for dry season farming of market and kitchen gardens especially in countries with semi-arid regions such as Niger Republic.

Most wetlands are part of the fresh water that is available on the planet Earth. The 2025 World Water Day celebration on March 22<sup>nd</sup> focused on the importance of fresh water to various life supporting purposes including agriculture and food security. Food security is a situation when people have access to enough, safe and nutritious food for normal growth and development and an active and healthy life (Anthem: 2025). Food security exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food that meet their food preferences and dietary needs for an active and healthy life (IFPRI: 2025).

The semi-arid regions of the world are sub types of dry lands with an aridity index ranging from 0.20 to 0.50 characterized by low and erratic rainfall, low soil organic carbon content, poor structure and threats such as erosion, salinity and land degradation due to human activities (Science Direct: 2018). The semi-arid regions receive more rainfall than deserts but not enough to support abundant vegetation and or all year-round agriculture. In the continents of Africa, part of the Sahel region is an example of a semi-arid region. The semi-arid regions of Nigeria are located in the northern part of the country specifically between latitudes 10° and 14° North of the Equator. This area consisted of portions of several States in Northern Nigeria such as Kebbi, Sokoto, Zamfara, Katsina, Kano, Jigawa, Yobe, Borno, Bauchi, Gombe and Niger.

In Katsina State, the most semi-arid are found in the six Local Government Areas (LGAs) located in the extreme northern part sharing boundary with the Republic of Niger to the northern part. The LGAs include Jibia, Kaita, Mashi, Mai'adua, Zango and Baure. A recent study by Ladan and Tukur (2024) on the Sabke dam has indicated that the Daura Emirate region of Katsina State hold immense potentials on agricultural production and indeed food security if fully harnessed. This paper examines how wetlands are harnessed for boosting food security in semi-arid northern Katsina State using the Rogogo wetlands as a case study. The objectives of the study are to describe how harnessing the wetlands is boosting food security, highlight the challenges encountered in harnessing the wetlands for food security and the efforts made in tackling the challenges.

## **Research Methods**

A reconnaissance survey was held on February 27<sup>th</sup> 2025 when the Rogogo wetlands were observed visually with particular attention to its potentials of been harnessed for boosting food security in

the semi-arid region of Katsina State. Some farmlands that uses the water from the wetlands for irrigation were observed with the farmers working on the farms. This survey is important in view of the fact that it was held during the dry season when the wetlands are highly utilized for various food producing activities.

The second field survey was held on June 28<sup>th</sup> 2025 just at the beginning of the rainy season in the semi-arid part of the State. A total of sixty questionnaires were administered on people that are harnessing the wetlands for food producing activities. The people are those engaging in irrigation farming, fishing, cattle rearing, food gathering and fuel wood extraction. Thirty (30) questionnaires each were administered for the people of Rogogo Chideri and Rogogo Masafka, the two villages that are located parallel to the wetlands. The questions contained are those meant to achieve the objectives of the study. The data collected from the above sources were complemented with secondary sources of data collected through desk research from relevant textbooks, conference papers, journal articles and internet sourced materials. The data collected from these two sources were edited and analyzed using descriptive statistics in terms of means, averages percentages and tabulations.

## **Results and Discussion**

### **Harnessing the Rogogo Wetlands for Food Security**

The Rogogo wetlands consists of series of water ponds that are interconnected stretching from Rogogo Chideri village through Rogogo Masafaka up to areas along the boundary with Niger Republic in Znago LGA of Katsina State. The wetlands stretches for a distance of approximately 10kms with various species of aquatic plants on top of the pond's water as can be seen on figure 1. The water in the ponds is available on the surface all year round at Rogogo Masafka while it is not available on the surface at Rogogo Chideri but only in puddles. This availability of water on the surface and near the surface of the ground has attracted various food producing activities especially with the presence of aquatic plants on the water surface and grasses on the land in many areas.

On the research question of how would the respondents rate the potentials of the wetlands in terms of food production, forty five percent (45.00%) rated it as good while fifty five percent (55.00%) rated it as very good. Those who rated the wetlands as good are manily the respondents from Rogogo Chideri who have water available on the surface only on seasonal basis. Those who rated it as very good are mainly respondents from Rogogo Masafka who have water available on the surface throughout the year. According to the respondents about sixty percent (60.00%) of the people uses the wetlands for irrigation farming of various crops while about ten percent (10.00%) each uses the wetlands for fishing, cattle rearing, food gathering and fuel wood extraction. The ways by which the wetlands are harnessed for food production purposes are highlighted below :

- i. Farming activities :** Irrigation farming is the most dominant form of farming in the two villages. The farmers at Rogogo Chideri dug boreholes to access underground water that is used to provide water to the crops through canals and channels on the farmlands. At Rogogo Masafka the farmers uses water pumping machine to draw water from the ponds to their farmlands and gardens as water is available on the surface. The crops produced include cabbage, cassava, garden eggs, maize, pepper, onions, tomatoes etc. Rice farming is also practiced at Rogogo Chideri where water from the boreholes are used to supplement rain water during the rainy season in cases of dry spells.
- ii. Fishing activities :** Fishing activities are carried out on the wetlands as there are some species of fish in the ponds at Rogogo Masafka. During field visit four fishermen were

sighted laying Malian traps in the ponds while wading in the water bare footed and then coming back to the traps about thirty minutes after to collect the fish caught in the traps. A young boy was seen washing the fish with the pond water before the fishes are taken home. One of the fish species available in the ponds is *clarias gariepenus*.

- iii. **Cattle rearing** : Cattle rearing is practiced on the wetlands due to the presence of green grasses that provide pasture throughout the year. Some of the cattle like cows and oxen are brought from homes to feed on the grasses that grow at the edges of farmlands and in open fields. Others like sheep, goats are fed with grasses that are cut from the wetlands areas. During the field visit, two young boys were seen with bunches of grasses that were cut from the wetland areas meant to feed the cattle at homes. According to Cunningham and Cunningham (2004) children in rural areas of developing countries are engaged in many household chores such as cutting grasses, tending livestock and caring for younger children.
- iv. **Food gathering** : There are several types of food items that are gathered by the people. Elderly women and young girls from poor families gather local; herbaceous plants called *Tafasa* in Hausa which was cooked and used as food. Fruits such as mangoes and guava grow well in rochards which are harvested and used as food. Mangoes are harvested during the growing season from April to June of every year and then put in sacks for sale or transported to markets in the LGA or in the neighboring Niger Republic. There are also hunters who hunt for birds such as water fowl which is one of the species of birds found on the wetlands.
- v. **Fuel wood extraction** : Large trees grow at the edge of the ponds, in some areas growing in close formations appearing as a wooded parkland. Some of the trees that are not fruit trees are the ones that are cut into logs and pieces as fuel wood especially those that are dry. The trees cut are either used at home for cooking or sold in local markets and in some cases even transported for sale in neighboring Niger republic. During field visit in February 2025, some dry trees were seen at the edge of one of the ponds at Rogogo Masafka but in June 2025 four month later the trees have been cut and used as fuel wood.

Figure 1 below shows a section of the Rogogo wetlands at Rogogo Masafka.



## Conclusion and Recommendations

Wetlands are important for the production of food as there is available water, pasture grasses and luxuriant growth of trees which can be harnessed to achieve food security especially in semi-arid regions of the world. This study found that the Rogogo wetlands are been harnessed for various food producing activities particularly during the long dry season, However, the food security could not be achieved as the farmers are facing the challenges of high cost of farm inputs such as fertilizer, pesticides and high cost of petrol and lubricants to operate the water pumping machines. The cattle herders are facing inadequate health care facilities for their cattle while the fishermen are facing the challenges of inadequate support from the government. Food gatherers and fuel wood extractors are facing the challenges of lack of recognition by the government that could lead to provision of incentives towards boosting their activities. It is therefore recommended that the local and State government should commission further studies and investigation to explore the food production potentials of the wetlands towards achieving food security in the area and the State in general.

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## ENTREPRENEURSHIP DEVELOPMENT AND INDUSTRIALIZATION AS KEY DRIVERS OF JOB CREATION AND SUSTAINABLE ECONOMIC GROWTH IN NIGERIA

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### Abstract

*This paper explains that entrepreneurship development and industrialization should not be treated as separate or competing development strategies. Instead, they are most effective when planned and implemented together. When properly integrated, they can help Nigeria tackle serious economic problems such as high unemployment, unstable economic growth, and excessive dependence on oil revenue. Industrialization expands production capacity, strengthens manufacturing, and creates stable wage employment, while entrepreneurship encourages innovation, supports the creation of new businesses, and promotes economic diversification. Drawing from recent studies and Nigeria's development experience, the paper shows that linking industrial policies with entrepreneurship promotion can support long-term and sustainable economic growth. It discusses how the two strategies jointly contribute to employment creation, economic diversification, and improved policy outcomes. The paper concludes by proposing practical measures for integrating industrial growth with entrepreneurship development, including coherent policies, improved access to finance, better infrastructure, and strong skills development systems.*

**Keywords:** *Entrepreneurship Development, Industrialization, Employment Creation, Economic Growth, Policy Integration*

## **Introduction**

Nigeria is Africa's most populous nation and one of its largest economies. In spite of its size and abundant natural and human resources, the country continues to face deep economic challenges. Unemployment remains high, especially among young people and new graduates, while many employed persons are engaged in low-paying and unstable informal jobs (National Bureau of Statistics [NBS], 2023; World Bank, 2024). At the same time, Nigeria's economy relies heavily on crude oil exports, making it vulnerable to global price fluctuations and external shocks (World Bank, 2024). These challenges have slowed economic growth and made inclusive development difficult to achieve (UNDP, 2023).

To address these problems, Nigeria must move away from excessive dependence on oil and strengthen other productive sectors of the economy. Industrialization and entrepreneurship development have therefore gained increasing attention as viable pathways to sustainable growth (Federal Ministry of Budget and Economic Planning, 2021). Industrialization focuses on expanding manufacturing, processing, and other productive industries that can absorb labour and increase output, while entrepreneurship development encourages individuals to identify business opportunities, establish enterprises, and grow innovative ventures (Ibitoye, Ogunoye, & Kleyhans, 2022). When industrialization and entrepreneurship are properly aligned, they can reinforce each other. Industrial growth creates demand for goods and services that entrepreneurs can supply, while entrepreneurship provides innovation, flexibility, and support services that enhance industrial performance (Stoica, Roman, & Rusu, 2020). Despite this potential, Nigeria has made limited progress due to poor infrastructure, limited access to finance, weak institutional frameworks, skills gaps, and inconsistent policy implementation (World Bank, 2024). This paper therefore examines how entrepreneurship development and industrialization can jointly promote employment creation and sustainable economic growth in Nigeria.

## **Entrepreneurship Development**

Entrepreneurship involves identifying opportunities in the market and transforming them into productive economic activities through new products, services, or methods of operation. Entrepreneurship development goes beyond business start-up and includes education and training, access to finance, mentoring, supportive institutions, and enabling policies that help entrepreneurs survive and grow their businesses (Ajayi & Olufemi, 2023; Owoeye, 2025). Entrepreneurship plays a major role in job creation and economic growth, especially in developing economies. Small and medium enterprises, which are largely driven by entrepreneurs, employ a significant proportion of the workforce in Nigeria. These enterprises provide income for business owners and create employment opportunities for others, thereby reducing unemployment and poverty (National Bureau of Statistics [NBS], 2023; Mohammed, 2025). In addition, entrepreneurship promotes innovation and economic diversification. Entrepreneurs explore new sectors such as agro-processing, information technology, creative industries, and renewable energy. They also operate in both urban and rural areas, helping to spread economic activities more evenly and reduce regional inequalities. For these reasons, entrepreneurship development is increasingly regarded as a key strategy for inclusive and sustainable national development (UNDP, 2023; World Bank, 2024).

## **Industrialization**

Industrialization refers to the gradual transformation of an economy from reliance on agriculture and informal activities to manufacturing and other modern industrial activities. This

transformation involves the use of improved technology, machinery, and organized production systems to increase productivity. One of the most important benefits of industrialization is the creation of formal employment opportunities with relatively stable incomes and better working conditions (World Bank, 2024; UNIDO, 2023). Large-scale industries have the capacity to employ many workers and absorb labour from low-productivity sectors such as subsistence agriculture and informal trading. This shift improves income levels, supports economic diversification, and strengthens the economy by reducing dependence on a single sector. However, the success of industrialization depends on several factors, including the availability of infrastructure, access to reliable energy, skilled labour, supportive policies, and effective institutions (African Development Bank [AfDB], 2024; World Bank, 2024).

In Nigeria, industrialization is often assessed through the performance of sectors such as manufacturing, mining and quarrying, utilities, and construction. Growth in output and productivity in these sectors indicates progress toward industrial development. Strengthening these sectors remains essential for long-term economic stability and sustainable job creation (National Bureau of Statistics [NBS], 2023; Federal Ministry of Budget and Economic Planning, 2021).

### **Relationship between Entrepreneurship and Industrialization**

Entrepreneurship and industrialization are closely connected and mutually supportive. Large industries depend on entrepreneurs for raw materials, components, logistics, maintenance services, innovation, and distribution. At the same time, entrepreneurs benefit from industrial growth through access to larger markets, reliable demand, improved infrastructure, and integration into industrial supply chains (UNIDO, 2023; World Bank, 2024). This interaction creates a positive cycle of development. As industries expand, they generate opportunities for new and existing entrepreneurs, while entrepreneurial innovation improves industrial efficiency, competitiveness, and adaptability. The combined effect leads to job creation not only in factories and small enterprises but also in related service sectors such as transportation, storage, marketing, and technical support. Through these linkages, industrialization and entrepreneurship jointly strengthen the overall economic system and support sustainable economic growth (Stoica, Roman, & Rusu, 2020; African Development Bank [AfDB], 2024).

### **Theoretical Perspectives**

Two major theoretical ideas help explain the link between entrepreneurship, industrialization, and economic growth. Structural transformation theory argues that economic development occurs when labour and resources move from low-productivity sectors, such as traditional agriculture, to higher-productivity sectors like manufacturing and modern services. This movement increases output, income, and employment opportunities and forms the foundation of long-term economic growth (World Bank, 2024; UNIDO, 2023). Innovation theory emphasizes the role of entrepreneurs in driving economic change. Entrepreneurs introduce new ideas, technologies, and business practices that improve productivity, create new markets, and increase competitiveness. When combined, these theories explain why economic growth is stronger and more sustainable when industrial expansion is supported by entrepreneurial activity, especially in developing economies (Stoica, Roman, & Rusu, 2020; African Development Bank [AfDB], 2024).

### **Entrepreneurship Development and Job Creation**

Entrepreneurship is one of the most effective means of creating employment, particularly through

small and medium enterprises. In Nigeria, many people earn their livelihoods directly or indirectly from entrepreneurial activities, as SMEs account for a significant share of employment in both the formal and informal sectors. Entrepreneurship provides self-employment for business owners and paid employment for workers within these enterprises (Small and Medium Enterprises Development Agency of Nigeria [SMEDAN], 2023; World Bank, 2024).

Beyond direct job creation, entrepreneurship strengthens economic growth by promoting innovation, improving market responsiveness, and linking local businesses to national and international markets. Entrepreneurial firms are often flexible and adaptable, allowing them to respond quickly to changes in demand and economic conditions. This adaptability enhances economic resilience and supports long-term and inclusive development, especially in developing economies such as Nigeria (OECD, 2023; African Development Bank [AfDB], 2024).

### **Industrialization and Employment Creation**

Industrialization contributes to employment creation by increasing the demand for skilled and semi-skilled workers. Sectors such as manufacturing and construction have strong potential to generate jobs and reduce unemployment. Evidence from Nigeria indicates that improvements in industrial output and manufacturing performance can positively influence employment levels and labour market structures (National Bureau of Statistics [NBS], 2024; UNIDO, 2023). However, the impact of industrialization on employment has been limited in some periods due to weak industrial performance, unstable macroeconomic conditions, and inadequate policy support. These challenges suggest that industrialization alone is not sufficient to generate large-scale employment. It must be supported by effective industrial policies, infrastructure development, access to finance, and strong integration with entrepreneurship initiatives in order to fully realize its employment potential (World Bank, 2024; African Development Bank [AfDB], 2024).

### **Benefits of Combining Entrepreneurship and Industrialization Employment Creation**

When industrialization and entrepreneurship operate together, job creation increases significantly. Large industries generate formal wage employment, while entrepreneurs create jobs in small businesses and support services. Industrial demand also stimulates the growth of suppliers, distributors, and service providers, multiplying employment opportunities across the economy.

### **Economic Diversification**

Entrepreneurship supports the expansion of economic activities into new sectors such as technology, agro-processing, creative industries, and renewable energy. This reduces reliance on oil and other traditional sectors, making the economy more stable and better able to withstand external shocks.

### **Innovation and Productivity**

Entrepreneurs introduce new technologies and business practices that improve industrial productivity. Innovation helps industries reduce costs, minimize waste, improve quality, and produce higher-value goods. These improvements enhance competitiveness and support sustainable economic growth.

## Impact on Employment and Economic Growth

The combined impact of entrepreneurship and industrialization is significant for employment creation and economic growth in Nigeria. Micro, small, and medium enterprises form the backbone of employment and contribute substantially to national income, accounting for a large share of jobs across both urban and rural areas. When supported by industrial demand, infrastructure, and access to markets, these enterprises are able to expand production and generate large numbers of employment opportunities (Small and Medium Enterprises Development Agency of Nigeria [SMEDAN], 2023; African Development Bank [AfDB], 2024).

Entrepreneurship-driven industrial growth also supports export expansion and reduces dependence on imports, particularly through the growth of non-oil sectors such as agro-processing, manufacturing, and services. Recent increases in non-oil exports demonstrate the potential of this strategy to strengthen economic stability, diversify the economy, and reduce poverty (National Bureau of Statistics [NBS], 2024; World Bank, 2024). However, disparities in industrial and entrepreneurial development between urban and rural areas persist, highlighting the need for inclusive policies that promote balanced regional development and broad-based participation in economic growth (AfDB, 2024).

## Challenges and Policy Implications

- i. **Structural Constraints:** Poor infrastructure, weak institutions, and complex regulations limit both industrial and entrepreneurial growth. Improving the overall business environment is essential for success.
- ii. **Access to Finance:** Limited access to affordable credit restricts the growth of entrepreneurs and industrial firms. Long-term financing mechanisms are needed to support expansion and innovation.
- iii. **Skills Development:** A skilled workforce is critical for industrial and entrepreneurial success. Strengthening technical education, vocational training, and entrepreneurship education will improve labour market readiness.

## Conclusion

This paper demonstrates that entrepreneurship development and industrialization are complementary strategies for addressing Nigeria's unemployment and economic challenges. Industrialization provides scale, structure, and formal employment, while entrepreneurship brings innovation, flexibility, and diverse job opportunities. Together, they form a strong foundation for sustainable economic growth. However, this synergy does not occur automatically. It requires deliberate policies, improved infrastructure, better access to finance, and effective skills development. Nigeria's long-term economic success will depend on how well it integrates industrial expansion with entrepreneurial energy to build an inclusive, resilient, and productive economy.

## Recommendations

- i. **Develop Integrated Policies:** Government should design a unified national strategy that clearly links industrial development with entrepreneurship support.
- ii. **Improve Access to Finance:** Dedicated funding schemes should be created for industries and entrepreneurs, particularly SMEs.
- iii. **Invest in Infrastructure:** Reliable power supply, transportation networks, and digital infrastructure should be provided in industrial zones and business hubs.

- iv. **Strengthen Skills Development:** Education and training programmes should be aligned with the needs of industry and entrepreneurship.
- v. **Promote Inclusive Growth:** Support for rural and agro-based enterprises should be increased to reduce regional inequalities.
- vi. **Enhance Institutional Coordination:** Strong monitoring systems should be established to track job creation and policy outcomes.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

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## INCLUSIVE GOVERNANCE AND WEALTH DISTRIBUTION: AN ISLAMIC PERSPECTIVE

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### Abstract

*Inclusive governance and equitable sustainable wealth distribution is a core challenge in contemporary economic and political leadership around the world, occasioned by exclusionary, restrictive, selective, and discriminatory systems of governance. Unlike what it entails in Western models of governance, Islam has inherently established a system of governance that caters for people's welfare, advocates accountability, emphasizes equity and justice, and shows concern for neighbours and community members irrespective of status, gender, ethnicity, religion, political, and economic class, etc. The problem, as observed in this paper, is rooted in the method of governance in Nigeria, which is based on undue accumulation and excessively gives power to a few for wealth accumulation. As such, this results in abject poverty within the circle of the middle and lower-middle class of the citizenry. The paper, therefore, adopts historical methodology and sources to assess relevant literature, with particular emphasis on primary sources of Islam. The paper recommends that governance should recognize the dignity, welfare, and economic needs of every member of the society, as Islam recommends inclusivity in its system of governance and circulation of wealth among others. The paper draws the conclusion that the Islamic system of governance encourages inclusivity and circulation of wealth through its proportionate use of sadaqah (charity), zakah (alms), endowment (waqf), inheritance (mirath), etc.*

**Keywords:** *Governance, Inclusive, Wealth, Distribution and Islamic Perspective*

## Introduction

Governance in all its facets is expected to embrace inclusiveness rather than functioning through exclusion, marginalization, elitist, or discriminatory practices. Contemporaneously, inclusivity in governance refers to political, economic, and social justice systems that encompass the activeness of all and sundry, particularly where resources or wealth is beneficial to all classes of members of the society. Similarly, wealth distribution under inclusive governance becomes a strong catalyst as it touches the lives of every segment, such as education, social justice, health facilities, construction of infrastructure, and also promotes social security, peace, and unity. From Islamic perspective, inclusive governance is centrally principled on equitable distribution of wealth, as it explicitly discourages power intoxication, ethnocentrism, tribalism, marginalisation, and monopolisation of resources by a few members of the society (Q. 59:7). In order to achieve this, Islamic principles institutionalised *maqāṣid al-sharīʿah* such as: aims (sakah), charity (sadaqah), endowment (*waqf*), and inheritance (mirath) as the mechanisms for its operational system. Prophet Muhammad (PBUH) and the four rightly guided Caliphs illustrated these windows practically, as vulnerable individuals, the poor, less privileged, and disabled members of the community, Muslims and non-Muslims alike benefited from the public treasury (*Bayt al-Māl*). By extension, the unemployed youths benefited tremendously, thereby strengthening the normative foundations in the first primary sources of Islam: the Qur'an and Hadith.

## 2.0 Aim and Objectives of the Paper

### 2.1 General

2.1.1 To exhibit the systemic inclusive governance and wealth circulation from the Islamic perspective.

### 2.2 Objectives

- i. To examine the Islamic principles of inclusive governance as enshrined in the primary sources of Islam.
- ii. To analyse the Islamic financial windows used for wealth distribution, such as zakah, ṣadaqah, waqf, and inheritance (mirāth).
- iii. To critically examine the relevance of Islamic principles of governance and wealth distribution in modern society.

## 3.0 Research Questions

- i. What are the foundations of Islamic principles that spell out inclusive governance as found in the primary sources of Islam?
- ii. How do Islamic financial windows used for the distribution of wealth contribute to equitable wealth distribution within Nigerian society?
- iii. What are the ways the Islamic system of governance and wealth distribution principles can be applied in modern society to reduce wealth stagnation?

## 4.0 Theoretical Framework

This paper uses *Maqāṣid al-Sharīʿah* as its framework in tandem with inclusive governance and equitable distribution of wealth as a very prominent objective of Islamic law, tailored towards protecting human dignity, economic equity, equitable social justice, and even distribution of wealth among members of the same community constitute the basis of justified and balanced governance. Reputable and classical Islamic scholars such as Imām al-Shāṭibī, Imām al-Ghazālī,

Jasser Auda, among others, have emphasised these principles. The term *maqṣad*, whose plural is *maqāṣid*, refers to purpose, objective, principle, intent, goal, or end (Jasser, 2008).

The five major aims of *Maqāṣid al-Sharī‘ah* are the preservation of religion (*ḥifẓ al-dīn*), life (*ḥifẓ al-naḥs*), intellect (*ḥifẓ al-‘aql*), lineage (*ḥifẓ al-nasl*), and wealth (*ḥifẓ al-māl*) (Jasser, 2008). Obviously, inclusivity in governance and even distribution of wealth without conservativeness are *maqāṣid*-driven obligations rather than optional Islamic economic policies. Similarly, Islamic economic windows discourage and condemn the concentration of wealth in the hands of a few, while encouraging equitable distribution of wealth across members of society, Muslims and non-Muslims alike.

Directly linked to this topic is the Islamic concept of inclusive governance, as it is in consonance with justice (*‘adl*), consultation (*shūrā*), and public interest (*maṣlaḥah*). Wealth distribution is in line with *ḥifẓ al-māl* and social justice, while normative and ethical foundations for state finance policies are drawn from the foundations of alms (*zakah*), endowment (*waqf*), charity (*ṣadaqah*), and inheritance (*mīrāth*).

Jasser Auda (2008) concludes that human development should be a prime expression of *maṣlaḥah* that is, public interest in modern times, which *Maqāṣid al-Sharī‘ah* aims to realise through Islamic law.

## 5.0 Literature Review

Inclusive governance as a leadership concept was conceptualised by Nembhard and Edmondson (2006), who described it as a leadership style that encourages voice, values input, and acknowledges contributions. Hollander (2009), in his own way of conceptualising inclusive leadership and governance, reiterated that it must be collaborative and participatory in nature, emphasizing mutual influence and attention to followers' needs. Shore et al. (2011) postulated that inclusive leaders cultivate both a sense of belonging and recognition of uniqueness, thereby enabling members to feel fully integrated. In the researcher's conceptualization of inclusive governance, it is a phenomenon that must establish participatory inclusivity, with a show of love, concern, care, and fairness in governance, as all members of the society are equitably treated without discrimination in financial expenditure.

Scholars in economics have conceptualised inclusion and wealth distribution as the central objectives of governance. Islamic economic and political order operates within the same laid-down objectives which must be upheld in Islam, such as trust (*amānah*), social justice (*‘adl*), and brotherhood. Some Qur'anic verses explicitly establish both inclusivity in governance and equal distribution of wealth, which must be in circulation without conservativeness.

Allah says:

“Indeed, Allah commands you to render trusts to whom they are due, and when you judge between people, judge with justice.” (Qur'an 4:58)

In the above verse, justice is a prerequisite for governance. It is delivered to people without consideration of status, class, or the people of privilege.

Equality and non-discrimination in governance require that members of society must not be discriminated against, irrespective of religion, language, tribe, class, or even geographical location. This principle is explicitly emphasised in the Qur'an (49:13):

*“O mankind! We created you from a male and a female and made you nations and tribes so that you may know one another. Indeed, the most noble of you in the sight of Allah is the most righteous.”*

Concentration of wealth in the hands of a few people is practically frowned at, by Islam. Thus, perhaps as a result of the aftermath of wealth concentration, many problems may arise in every society that practices such inequality. Equitable wealth circulation or distribution is therefore a strong principle of Islam, as stipulated in the verse below:

*“...And in their wealth, there is a recognized right for the needy and the deprived.”*  
(Qur'an 51:19)

Empathetically speaking, Prophet Muhammad (PBUH), in his statements, gave a summary of inclusive governance by emphasizing that every facet of society must be participatory. Every member male, female, steward, leader, and the led has a role to play. As he said:

*“Every one of you is a shepherd, and each of you is responsible for his flock.”*  
(Bukhari, Hadith no. 7138; Muslim, Hadith no. 1829)

In the above Hadith, inclusive governance starts from the minute members of society the nuclear family and extends gradually to the immediate community (local government), wider community (state), and by extension, the country, where leaders and the led form a whole with an all-encompassing description of inclusive governance.

This work, therefore, fills a gap as an approach to inclusive governance and equitable distribution of wealth as discussed from Islamic perspective which was absent in the reviewed books and papers in this work.

## **6.0 Principles of Inclusive Governance**

Islam lays down some principles of inclusive governance, aimed at the success of governance for the betterment of every member of the community or society.

### **6.1 Truthfulness of the Leaders**

When leaders exhibit honesty and truthfulness to the led, governance maintains virtues such as integrity and confidence. The Prophet of Islam, Muhammad (PBUH), was greatly trusted by the people he led both in Makkah and Madinah and even in places he visited or travelled to, such as Syria, Abyssinia, and Ṭā'if. He gained unmatched confidence and trust based on his honesty and integrity, so much so that he was named **As-Ṣādiq** (the truthful one) and **Al-Amīn** (the trusted one). These attributes were endorsed and epitomised by Annie Besant, the head of the Theosophical Society of India, who in her words affirms that:

*“The exclusive quality of the great Prophet Muhammad (PBUH) which imprinted in my heart his greatness and glory is that which led people to call him Al-Amīn (the honest one). No being followed both Muslims and non-Muslims is a personality which is the embodiment of truth, can leave nothing to doubt about. Such a person alone deserves carrying the message of truth.”* (Naieebabadi, 1899)

### **Concentration of wealth as it hinders equal distribution of wealth**

History, they say, repeats itself; whatever one does becomes part of one's records for people to play back. Some past world leaders did not rule engage in inclusive governance and were at the same time financially reckless:

#### **Bashar al-Assad – Syrian President**

Bashar al-Assad has been widely criticized for his authoritarian repressive governance has often been linked with torture, mass violence, abuse of human rights, organized crime, and corruption.

#### **Nicolás Maduro – President of Venezuela**

Nicolás Maduro's governance has been accused of being engulfed in fraud, human rights abuses, corruption, injustice, massive economic decline, and social decay. These crises forced millions of citizens to flee Venezuela due to the incessant hardship experienced under his rule.

#### **Ilham Aliyev – President of Azerbaijan**

According to reports, his regime has been characterized by the suppression of independent media, the arrest of political opponents, and the concentration of power largely among his family members and close associates (Geddes, 2018).

In Nigeria, General Sani Abacha (1993-1998), was accused of looting huge sum of public funds and were diverted into private overseas' accounts. Goodluck Jonathan (2010-2015)'s administration was also accused of financial mismanagement and allowed massive leakages of public funds, especially in the oil sector (Barrett, 2014 & Sadiq, 2024).

### **6.2 Accountability and Transparency**

Every leader shall be accountable for his good or bad misdeeds either here in this world or in the Hereafter, or sometimes both here and in the Hereafter. Many leaders often turn a “deaf ear” to this fact, partly because of the immunity granted to them, especially in Nigeria.

In Nigeria, for instance, incumbent leaders such as the President, Vice President, Governors, and Deputy Governors enjoy constitutional immunity as enshrined in **Section 308 of the 1999 Constitution of the Federal Republic of Nigeria (as amended)**.

#### **Section 308(2)(a), (b), and (c) Emphasise that:**

- i. No civil or criminal proceedings shall be instituted or continued against a person to whom this section applies during his period of office.
- ii. A person to whom this section applies shall not be arrested or imprisoned during that period either in pursuance of the process of any court or otherwise; and
- iii. No process of any court requiring or compelling the appearance of a person to whom this section applies shall be applied for or issued.

Provided that, in ascertaining whether any period of limitation has expired for the purposes of any proceedings against a person to whom this section applies, no account shall be taken of his period of office. (Ede, 2022)

A critical contextual analysis of Section 308(2)(a), (b), and (c) may be addressed as providing support for the misappropriation of public finance, corruption, and inequality in the distribution

of wealth during the tenure of governance of certain leaders. Unlike what is obtainable in the Islamic system of governance, transparency and accountability are made mandatory for leaders, and accountability is certain, while the principle of equality before the law (without immunity) is well affirmed.

The Noble Qur'an states:

“Indeed, Allah commands you to render trusts to whom they are due, and when you judge between people, judge with justice.” (*Qur'an* 4:58)

The above chapter (4:58) strongly shows that Islam has no immunity for leadership, not even followership. When Caliph ‘Umar ibn al-Khaṭṭāb (RA) was in governance, he was questioned publicly about the source of his clothing, and he explained himself before the audience. He conclusively said:

“There is no good in you if you do not speak up, and there is no good in us if we do not listen.” (*Ibn Kathīr, Al-Bidāyah wa al-Nihāyah*)

Every property gotten and expended by any leader will be accounted for, including the means by which they were gotten and the luxury or pleasure attached to them. Allah says:

“Then, you will surely be asked that Day about pleasure.” (*Qur'an* 102:8)

### **Equity in the Rule of Law**

The rule of law in Islam is distinct from human-made laws or justice as found in Platonic justice, where justice is achieved when every person conforms to his sphere in society, which can be achieved in an ideal state ruled by a philosopher-king (Philomena, 2016). This raises the question of what happens to those who are not philosophers. Also, in Aristotelian theory and analysis of justice, justice is divided into distributive and remedial justice. He identified that justice is prone to change (Philomena, 2016). In contrast, Islamic justice is divine, and the subject receives the same punishment that shall be received by the ruler.

Al-Māwardī was quoted as saying:

*“The ruler is bound by the law and may not deviate from justice; if he does, he may be removed.”*

Proportionately observed is the fact that equity of law according to Islam does not limit itself to Muslims only, as justice against injustice is required even if the one who has been treated unjustly is a non-Muslim in an Islamic state.

Ibn Taymiyyah supports this position when he stated:

*“Allah supports the just state even if it is unbelieving, and does not support the unjust state even if it is believing.” (Ibn Taymiyyah, 728AH)*

Islamic legal maxim supports equity in the rule of law

*Justice is the foundation of governance and judgement.*

Another maxim corroborates this position

*Anything that contradicts justice cannot be attributed to Islamic Law*

## People's Welfare

In Madinah, the Prophet, as the religious ruler for the Muslim race (emigrants and helpers *Muhājirūn* and *Anṣār*), and also as the political leader of the non-Muslims who were residents of Madinah, personally taught them patience, peace, and tolerance (Rahim, 2001). Besides, he removed tribal distinctions, blood feuds, and vices from their whole social life, while he regulated their moral and social conduct. Jews and other non-Muslims were included in the common wealth of nationality, as their relationships got cemented with the Muslim emigrants and hosts. As a governor, the people of Madinah, including the *Aws* and *Khazraj*, the Jews, and the Christians, enjoyed peace and welfare under the Prophet, as he settled disputes between them (Rahim, 2001).

It was actually in Madinah that the institution of alms-giving (*Zakāh*) was institutionalized, charity (*Ṣadaqah*), endowment (*Waqf*), and maintenance of wealth were regulated. This had the impact of support for the poor, needy, vulnerable groups, destitutes, and debtors, and created a great avenue for the reduction of poverty. Under the security watch of the Prophet, the city of Madinah instituted constitutional welfare, which included legal equality before the law, freedom of religion, mutual social responsibility, collective security, and equal protection of life and property (Ibn Hishām; Hamidullah, 1969).

## Poverty Alleviation / Public Treasury

As Qur'an 9:60 informs, six basic financial statuses were recognized, which effectively covered many categories such as the poor, needy, those employed to collect it (*Zakāh*), and for bringing hearts together and for freeing slaves (captives), for those in debt, for the cause of Allah, and for the stranded (travellers). Others included are the widows, the disabled, and poor non-Muslims who benefitted from other forms of charity, endowment, or inheritance.

The Public Treasury (*Bayt al-Māl*) was instituted to manage these resources. The Prophet organized security personnel who were Muslims, while non-Muslims were freed from this stress but still enjoyed the same security and protection as Muslims did (Chapra, 1992).

As a rider to the above, a very authentic Hadith of the Prophet supports this, as he was quoted saying:

*“Whoever harms a dhimmi (non-Muslim) under Muslim protection, I will be his opponent on the Day of Judgement.” (Abu Dāwūd, 3052)*

Nigerian government needs to emulate this epitome in order to have inclusive governance, particularly in terms of total poverty alleviation schemes that will not breed social marginalization. Likewise, the issue of security must be addressed holistically to tackle the endemic insecurity situation in every part of Nigeria. The issue of insecurity in Nigeria is inevitable, as top Nigerian citizens move around with Nigerian security personnel, while innocent Nigerians are attacked, kidnapped, tortured, maimed, killed, or forced to pay heavy ransom for their freedom. It was lamented that the People's Redemption Party (PRP) faulted the government's handling of the rising insecurity and described mass abductions and killings as evidence of a breakdown in national security (Bello, 2025). In the same manner, Adebayo (2025) condemned the rise in killings and kidnappings and called on the government to restore law and order.

### 6.6.1 Education

Notwithstanding the race or culture, education has become very expensive and unaffordable by

common people of either middle or lower class. The cost of education has increasingly rendered it inaccessible, even to average-income earners. An encompassing western education should be rooted in the typical villages of Nigeria, particularly where Fulani people reside, so as to broaden their orientation for a better rebranding and inclusive governance.

The table below gives a summary of ten states/countries around the world where education is not meant for poor people, both in private and public universities, irrespective of whether students are domestic or international.

S/N	Country	Amount	Locations
1.	United States	\$40,000	New York
2.	United Kingdom	\$11,500 – £12,500 – £38,000 (Undergraduate & Postgraduate)	London, Manchester
3.	Australia	\$35,000 – \$69,000	Sydney, Melbourne, Perth
4.	Canada	\$11,000 – \$26,000	
5.	Switzerland	\$24,000 – \$30,000 per year	
6.	China	\$2,500 – \$8,700	Beijing, Shanghai
7.	Singapore	\$6,000 – \$9,500	Singapore
8.	United Arab Emirates		UAE, Dubai
9.	Japan	¥500,000 – ¥8,000,000	Tokyo, Kyoto, Fukuoka
10.	South Korea		Busan, Daegu

**Source:** <https://www.educations.com>

### 6.6.2 Nigerian Education: Between Affordable Tuition and Admission Tussle

In Nigeria, higher educational institutions that belong to the Federal Government are relatively tuition-friendly. However, securing admission is most times extremely difficult. The reasons are not far-fetched. They include factors such as “who you know.” commercialization of admission, catchment area considerations, quota systems, and other institutional bottlenecks. However, the constraints and impediments in the Nigerian education system have pushed some children of the less-privileged Nigerians to seek admission into private universities. This situation has made many parents sell their reserved properties in order to meet up with the payment of school fees. As of 2023, at Wigwe University, Rivers State, undergraduate students are required to pay between ₦6 million and ₦12 million per session, while Nile University of Nigeria, Abuja, charges between ₦2 million and ₦5.25 million per session. These exorbitant fees are clearly outrageous for households that are not financially buoyant. From the above analysis, it can be concluded that education in Nigeria is not inclusive. Education, if it is still regarded as the bedrock of every nation and an instrument for positive change, then the rock must be firmly grounded.

### 6.6.3 Employment

Mafoluwawo (2023) stated that youth unemployment has become a serious issue in Nigeria, with grave implications for security challenges and economic development. The word *saga* implies trouble, lacking solutions, and severe negative consequences for Nigerian youths, their parents, neighbourhoods, and the country at large. Youths' unemployment may result in some young people engaging in social vices, such as shoplifting, armed robbery, banditry, kidnapping, burglary, and related criminal activities. AbdulRazaq and Lambe observed that Nigeria's youths, despite harbouring untapped potential in technological innovation, face significant barriers such as inadequate education and limited access to resources, which impede their entrepreneurial pursuits and further worsen unemployment.

Abbasid Caliph significantly expanded livelihoods and reduced joblessness across the Abbasid realm. His approach was firmly rooted in Islamic principles of welfare, particularly the pursuit of public interest (*maṣlaḥah*) and justice (*‘adl*). According to Lapadu (2014), Harun al-Rashid invested heavily in the construction of roads, bridges, canals, irrigation systems, mosques, palaces, and cities. These large-scale projects created employment opportunities for artisans, engineers, labourers, builders, and administrators, thereby ensuring that many people became gainfully employed.

In Iraq, improved irrigation systems enhanced agricultural productivity, while youths were actively engaged in rural labour works. At the same time, urban construction in Baghdad and Raqqa generated sustainable jobs, and both the poor and skilled workers benefited considerably from these initiatives (Kennedy, 2004). In addition, Harun al-Rashid reduced excessive taxation on farms, repaired irrigation facilities, protected peasants from land exploitation, and encouraged land cultivation, including the revival of abandoned lands (*iḥyā’ al-mawāt*). These policies indirectly reduced urban unemployment and joblessness (Lapadu, 2014).

From the foregoing discussion on the governance of Harun al-Rashid, it is evident that the Nigerian government can borrow from some of these ideas. This can be achieved by engaging youths in agricultural production within Nigerian villages and rural settlements, using modern mechanised systems. Such initiatives may include organising training programmes and seminars on the use of tractors, harvesters, cultivators, insecticides, sprayers, and other modern farming tools. Closely related to this is the construction of rural and urban roads, bridges, carriages, and fishing farms, as well as the implementation of entrepreneurial and vocational training programmes aimed at making youths self-employed. However, the effectiveness of such entrepreneurial training depends largely on the availability of adequate grants and financial support to enable participants to translate acquired skills into viable employment opportunities.

Despite the government's efforts in introducing entrepreneurship programmes, employment opportunities remain far below expectations, especially when compared with the growing population (Ajimot et al., 2017). Fiala (2014) admitted that training alone cannot be affective, it needs to be paired with other support programmes such as financial supports. Fiala (2014) observed that ineffectiveness has been reported in several training programmes, largely because financial support was not provided alongside the training received by beneficiaries. As a result, many trainees were unable to translate the acquired skills into practical ventures due to lack of capital. This limitation suggests that the issue of total inclusivity in governance has not yet been fully addressed.

#### **6.6.4 Health Care Inclusivity**

Health, often described as wealth, remains a fundamental necessity for every human being, without which societal well-being cannot be achieved. It is therefore impossible to meet the expectations of Nigerians' wellness without an effective and inclusive health-care system. One of the major efforts of the Federal Government of Nigeria in the health sector is the introduction of the National Health Insurance Scheme (NHIS). The scheme was designed to provide financial risk protection for individuals at the point of accessing health-care services.

The NHIS was established by law in May 1999 under Decree No. 35 of 1999, later codified as the National Health Insurance Scheme Act, and subsequently became operational on 6 June 2005

(Agbo, 2021). The primary objective of the scheme is that the insurance company agrees to pay all or part of an insured person's health-care costs in exchange for the payment of a monthly premium (Abodugbehin, 2021). Additionally, it is a health insurance programme designed by the Federal Government of Nigeria to mobilise resources for financing the health sector and to improve access to health-care services for the majority of Nigerians (Nigeria Statistics, 2020). Despite its laudable objectives, the NHIS has faced numerous challenges that have hindered its effectiveness. These challenges include overwhelming expectations, insufficient manpower to drive the scheme, shortage of health facilities, poor remuneration of health-care providers, unwillingness of the informal sector to enrol, lack of accountability and transparency, poor regulatory implementation, as well as corruption (Agbo, 2025). It has also been observed that, in some cases, clients or patients were not adequately attended to, as hospital workers neglected them, further undermining public confidence in the scheme and reducing its overall effectiveness.

Patients' bills often could not sufficiently cover their health requirements. Another observable area that should be addressed by the government in order to enable inclusive governance is the informal sector, particularly artisans, farmers, traders, vulnerable groups, and unemployed Nigerians. A significant number of village farmers, traders, and informal workers have not yet been effectively enrolled in the National Health Insurance Scheme, thereby limiting its inclusiveness and wider outreach. Islam accords special consideration to the preservation of life and health, as these are central objectives encapsulated within the *Maqāṣid al-Sharī'ah* (objectives of Islamic law), particularly under *ḥifẓ al-nafs* (protection of life). Health-care provision in Islam is therefore mandatory and not optional. Emphasis is placed on society's responsibility to care for the vulnerable and the poor, especially during the era of Prophet Muhammad (peace be upon him) and the rightly guided Caliphs. During the time of the Prophet Muhammad (PBUH) and the early Caliphate, medical needs and health-related expenses of the less privileged were financed through public funds, notably from the *Bayt al-Māl* (Public Treasury) (Ibn Khaldūn, 2005; Ibn al-Qayyim, 1991). This reflects the Islamic principle that governance must ensure collective responsibility for citizens' welfare, particularly in matters affecting life and health.

## **7.0 Inclusive Governance and Equitable Distribution of Wealth in Islam**

### **7.1 Equity, Justice, and Social Welfare**

Equity, justice, and the welfare of subjects constituted a central concern of the greatest leader, Prophet Muhammad (PBUH), and this tradition was exemplified by the rightly guided Caliphs. 'Umar ibn al-Khaṭṭāb, as the governor and leader of the Muslim community, was well known for his hands-on governance approach. He frequently walked through the streets of Madinah at night to personally assess the living and social conditions of his subjects. Accountability was paramount in the lives of both the leaders and the led. On a particular night, while he walked the street, heard the cry of a child as the mother sat around. Umar asked:  
“what is the matter with you, mother? She replied

My children are crying due to hunger. I put water in this pot so that they (children) could assume that I was cooking food for them which they eventually slept off.

In her lamentation, “Allah will judge between me and Umar.” Unknowingly to her that it was Umar (the governor) she was conversing with.  
May Allah have mercy on you. How would Umar know your condition?  
“She replied, he is our leader, yet he is unaware of our condition.”

In a fast manner, Umar bin Khattab rushed to Bayt al-Mal (the public treasury). Umar himself carried a sack of flour, dates and cooking oil. The food was prepared, eaten by the children until they (children) laughed and slept peacefully. The following day based on Umar's instruction to *Bayt al-Mal*, the woman was surprised to have known that it was the governor (Umar bin Khattab) that brought raw food items to her the previous night. Hence, he allocated regular support for her and her children from the public treasury (Musannaf Al-Tabari, Ibn Kathir, Al-Bayhaqi, Imam al-Dhahabi).

## **8.0 Summary / Concluding Conclusion**

This article looks at the inclusive governance and equitable distribution of wealth within the framework of Islam. It foregrounds that Islam teaches and preaches comprehensive model that engenders participatory governance, social justice, welfare of the subjects, accountability and regulation of wealth through circulation and shows disadvantages about accumulation of wealth without proper circulation. The paper therefore, itemises the working mechanism for the instrumentation of inclusive governance via: Zakah, waqf, Sadaqah etc as public treasury was established for such purposes such as: education, health, preservation of life, gainful employment, equity in rule of law, welfare of the poor and vulnerable ones.

## **8.1 Recommendations**

Having discussed, very extensively what it takes to have inclusive governance and equitable distribution of wealth, the paper proffered the following recommendations:

- i. Governance in Nigeria and elsewhere should involve justifiably all members of the society irrespective of religion.
- ii. The issue of marginalisation of certain category of people, like poor, villagers or those living in rural areas should henceforth be addressed proportionately.
- iii. Embezzlement of funds, ethnocentrism and partial treatment of citizens should cease to exist and all forms of corruption be reduced to the lowest minimum Federal
- iv. If government borrows financial window scheme such as “Sukuk”, the ideology of an inclusive governance and equitable distribution of wealth can be shared by borrowers as well.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

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## COMPARATIVE STUDY OF CLAY BRICKS AND SANDCRETE BLOCKS AS WALLING MATERIALS IN UGEP, CROSS RIVER STATE, NIGERIA

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### Abstract

*The need for sustainable and cost-effective building materials in developing countries has intensified interest in alternative walling systems. This study presents an experimental and analytical comparison of clay bricks and sandcrete blocks as walling materials in Ugep, Cross River State, Nigeria. Laboratory experiments were conducted to determine compressive strength, water absorption, density, and durability characteristics. A cost-benefit and environmental impact analysis was also performed. Results indicate that clay bricks exhibit superior compressive strength (6.8–11.5 MPa) compared to sandcrete blocks (1.6–3.2 MPa), along with better thermal performance and durability. However, sandcrete blocks remain dominant due to ease of production and established market systems. The study concludes that clay bricks are a viable and sustainable alternative for walling materials in Ugep and similar regions, provided standardization and awareness are improved.*

**Keywords:** Clay bricks; Sandcrete blocks; Compressive strength; Sustainable materials; Nigeria; Walling systems

## Introduction

The construction industry in Nigeria continues to experience rapid growth due to increasing urbanization, population expansion, and the rising demand for affordable housing. Walling materials constitute a significant component of building construction, accounting for a considerable proportion of the total cost of residential structures. Among the commonly used walling materials in Nigeria are sandcrete blocks and clay bricks. Sandcrete blocks have gained widespread acceptance because of their ease of production, availability of raw materials, and speed of construction, while clay bricks are recognized for their durability, thermal insulation properties, and environmental sustainability. The need to evaluate the performance, durability, economic viability, and suitability of these materials in specific local environments has become increasingly important for sustainable building development.

Sandcrete blocks are composite masonry units produced from cement, sand, and water, and they remain the dominant walling material in most Nigerian cities and rural communities. Onwuka, Osadebe, and Okere (2013) observed that sandcrete blocks are indispensable construction materials widely used for residential and commercial buildings across southeastern Nigeria because of their affordability and simplicity in production. However, they noted that many commercially produced sandcrete blocks fail to meet the required strength standards due to poor quality control and improper mix proportions. Similarly, Ewa and Ukpata reported that several sandcrete blocks produced in Calabar, Cross River State, exhibited compressive strengths below the minimum standards recommended by the Nigerian National Building Code and the British Standard, thereby raising concerns about structural safety and durability.

Clay bricks, on the other hand, are among the oldest building materials known to humanity and are produced from naturally occurring clay that is molded and fired at high temperatures. Clay bricks possess desirable engineering properties such as high compressive strength, resistance to fire, thermal comfort, and long service life. Ogunbiyi, Akinola, Oginni, and Akerele (2014) explained that stabilized clay bricks can serve as effective alternatives to conventional sandcrete blocks due to their lower production cost and satisfactory structural performance. Furthermore, Aliu, in a comparative analysis of clay and sandcrete blocks for low-cost housing in Edo State, found that clay blocks demonstrated slightly higher compressive strength values than sandcrete blocks after 28 days of curing. The study emphasized the suitability of clay bricks for affordable housing development in Nigeria.

The growing interest in sustainable and environmentally friendly construction materials has renewed attention toward clay-based walling systems. Unlike sandcrete blocks, which rely heavily on cement production associated with high carbon emissions, clay bricks can be manufactured using locally available materials with reduced environmental impact. Wilson, Alomaja, and Raji (2016) argued that alternative walling materials such as laterite and clay bricks provide improved strength characteristics and can contribute significantly to reducing housing costs in Nigeria. In addition, Raheem, Momoh, and Soyingbe (2012) noted that locally sourced masonry units, including clay-based products, possess economic and environmental advantages that can support sustainable housing delivery in developing countries.

In Cross River State, particularly in Ugep, the availability of clay deposits and sand resources has encouraged the use of both clay bricks and sandcrete blocks for residential and public buildings. Nevertheless, the selection of walling materials in the area is often influenced by factors such as

cost, availability, strength, durability, weather conditions, construction practices, and cultural preferences. Despite the increasing use of these materials, there remains limited empirical data comparing their performance under the environmental and climatic conditions of Ugep. This gap in knowledge creates uncertainty among builders, homeowners, and construction professionals regarding the most suitable walling material for sustainable and cost-effective building construction in the area.

Moreover, the issue of building failures and poor-quality masonry units in Nigeria has heightened the need for comparative studies on walling materials. According to Adese and Olajide, (2021) inadequate quality control during block production contributes significantly to structural defects and reduced durability of buildings. Consequently, there is a pressing need to investigate the engineering and economic characteristics of commonly used masonry units to ensure safer and more sustainable housing delivery.

This study therefore seeks to comparatively evaluate clay bricks and sandcrete blocks as walling materials in Ugep, Cross River State, Nigeria. The study focuses on assessing their compressive strength, durability, thermal properties, cost implications, availability, and overall suitability for building construction within the local environment. The findings of this research are expected to provide valuable information for architects, builders, engineers, policymakers, and property developers in selecting appropriate walling materials that promote structural integrity, affordability, and environmental sustainability.

## **Literature Review**

### **Concept of Walling Materials in Building Construction**

Walling materials are essential components in building construction because they provide enclosure, structural stability, thermal insulation, and protection against environmental conditions. In Nigeria, the most commonly used walling materials include sandcrete blocks, clay bricks, concrete blocks, and laterite bricks. Among these materials, sandcrete blocks and clay bricks are widely adopted due to their availability and adaptability to local construction practices. According to Onwuka, Osadebe, and Okere (2023), walling materials significantly influence the durability, cost, and performance of buildings, especially in developing countries where affordable housing remains a major challenge. They noted that the choice of walling material depends on factors such as strength, cost, thermal properties, availability of raw materials, and environmental conditions.

The increasing demand for affordable and sustainable housing in Nigeria has stimulated research into alternative walling materials capable of reducing construction costs while maintaining structural integrity. Consequently, comparative studies involving clay bricks and sandcrete blocks have become important in identifying the most suitable materials for different climatic and environmental conditions.

### **Clay Bricks as Walling Materials**

Clay bricks are among the oldest building materials used in human civilization. They are produced from naturally occurring clay that is molded into shapes and fired at elevated temperatures to improve strength and durability. Clay bricks possess excellent compressive strength, resistance to fire, thermal insulation, and aesthetic appeal. Aliu conducted a comparative analysis of clay and sandcrete blocks for low-cost housing in Edo State, Nigeria, and found that clay bricks exhibited

higher compressive strength than sandcrete blocks after 28 days of curing. The study reported compressive strength values of 8.4 N/mm<sup>2</sup> for clay bricks compared to 8.26 N/mm<sup>2</sup> for sandcrete blocks. The researcher concluded that clay bricks are suitable alternatives for low-cost housing due to their strength and durability.

Similarly, Githinji, Nzila, Githaiga, Tuigong, Osiemo, and Ayoro (2016) examined the mechanical and physical properties of modified clay bricks and observed that clay bricks possess good structural performance and durability when properly fired. Their findings indicated that clay bricks can be modified to improve thermal and mechanical properties, thereby enhancing their suitability for sustainable construction. Lemkalli, Bensallam, Kadic, Guenneau, Jakjoud, Mir, and Achaoui (2023) further highlighted the thermal and acoustic advantages of clay bricks. Their study on innovative clay meta-bricks demonstrated that clay-based walling systems provide improved thermal insulation and sound resistance while maintaining acceptable compressive strength standards.

In Nigeria, clay bricks are gradually receiving renewed attention due to the abundance of clay deposits and the need for environmentally sustainable building materials. Ogunbiyi, Akinola, Oginni, and Akerele (2014) explained that stabilized clay bricks can reduce construction costs and dependence on cement-based products. They argued that clay bricks are environmentally friendly because they utilize locally sourced materials with lower embodied energy compared to cement-based sandcrete blocks. Despite these advantages, clay bricks are not widely used in many Nigerian communities because of limited mechanized production facilities, inadequate technical knowledge, and cultural preference for sandcrete blocks. In areas such as Ugep in Cross River State, however, the availability of natural clay deposits presents opportunities for increased utilization of clay bricks in housing construction.

### **Sandcrete Blocks as Walling Materials**

Sandcrete blocks are composite masonry units made from cement, sand, and water. They are the most widely used walling materials in Nigeria because of their ease of production, affordability, and availability of raw materials. Sandcrete blocks are commonly used for residential, commercial, and institutional buildings. Awolusi, Oke, Akinkurolere, Ubani, Bamisaye, and Aluko (2021) noted that sandcrete blocks remain the conventional walling unit system in Nigeria because of their simplicity in production and adaptability to modern building construction. They emphasized that improving the quality of sandcrete blocks is essential for sustainable housing development. However, numerous studies have shown that many commercially produced sandcrete blocks in Nigeria fail to satisfy minimum strength requirements specified by the Nigerian Industrial Standards (NIS). Ambrose, Etim, and Koffi (2019) investigated commercially produced sandcrete blocks in Southern Nigeria and discovered that compressive strengths ranged between 0.19 N/mm<sup>2</sup> and 1.32 N/mm<sup>2</sup>, which were below the required standards. The researchers attributed the poor performance to inadequate cement content, poor curing practices, and lack of quality control.

Similarly, Mohammed and Anwar (2014) assessed commercial sandcrete blocks in Kano State and reported compressive strengths between 0.25 N/mm<sup>2</sup> and 0.92 N/mm<sup>2</sup>, which were also below the minimum standards recommended by NIS 87:2000. They emphasized the need for stricter monitoring of block production processes and enforcement of quality standards. Wilson, Alomaja, and Raji (2016) reviewed the performance of sandcrete blocks and laterite-cement bricks in Nigeria and observed that many sandcrete blocks produced across the country failed to meet the minimum

strength requirements specified by the Nigerian National Building Code and British Standards. Their study suggested that alternative walling materials such as clay and laterite bricks may provide more sustainable and durable options for building construction. Akanbi, Waziri, and Brown also evaluated the properties of hollow sandcrete blocks and found significant variations in compressive strength due to differences in aggregate grading, water-cement ratio, and curing methods. The study concluded that quality control during production remains a critical factor affecting the performance of sandcrete blocks.

### **Comparative Performance of Clay Bricks and Sandcrete Blocks**

Several researchers have conducted comparative studies on clay bricks and sandcrete blocks to determine their relative suitability for building construction. Most of these studies focused on compressive strength, durability, thermal insulation, water absorption, and cost implications. Aliu compared clay bricks and sandcrete blocks produced in Auchi, Edo State, and found that clay bricks exhibited slightly higher compressive strength than sandcrete blocks at different curing ages. The researcher concluded that clay bricks are suitable for low-cost housing projects because of their structural performance and local availability.

Ogunbiyi, Akinola, Oginni, and Akerele (2014) similarly reported that cement-stabilized clay bricks showed satisfactory engineering properties and could effectively replace conventional sandcrete blocks in building construction. Their findings revealed that clay bricks offered lower production costs and better thermal insulation characteristics than sandcrete blocks. Wilson, Alomaja, and Raji (2016) observed that laterite and clay-based walling units can achieve compressive strengths that satisfy Nigerian standards with lower cement content compared to sandcrete blocks. The study further emphasized the environmental benefits associated with clay-based masonry materials. In terms of sustainability, Ibeabuchi, Nwoji, and Amin (2024) highlighted the importance of developing eco-friendly masonry materials to address environmental concerns associated with cement production. They argued that incorporating locally available materials such as clay into masonry production can reduce carbon emissions and improve sustainability in the construction sector. Furthermore, Ikechukwu (2012) investigated the compressive strength and cost implications of sandcrete blocks and alternative masonry units and concluded that locally sourced materials could reduce construction costs significantly while maintaining acceptable structural performance.

### **Durability and Thermal Properties of Walling Materials**

Durability is an important factor in selecting walling materials because buildings are continuously exposed to moisture, temperature fluctuations, and environmental degradation. Clay bricks generally possess superior resistance to weathering and fire compared to sandcrete blocks. Lemkalli et al. (2023) observed that clay bricks demonstrate excellent thermal resistance and acoustic insulation properties, making them suitable for tropical climates where indoor thermal comfort is essential.

Conversely, poorly produced sandcrete blocks often experience cracking, shrinkage, and moisture penetration due to inadequate cement content and improper curing methods. According to Ambrose, Etim, and Koffi, (2019) low-quality sandcrete blocks may compromise the structural stability and durability of buildings. The thermal insulation characteristics of clay bricks also contribute to energy efficiency in buildings. Clay bricks absorb and release heat slowly, thereby

maintaining more stable indoor temperatures. This property is particularly advantageous in tropical regions such as Cross River State, where high temperatures are common.

### **Research Gap**

Although numerous studies have examined the properties of clay bricks and sandcrete blocks in different parts of Nigeria, limited research has specifically focused on Ugep in Cross River State. Most previous studies concentrated on compressive strength and quality assessment without adequately considering local environmental conditions, availability of materials, cost implications, and user preferences. Furthermore, there is insufficient empirical data comparing the performance of clay bricks and sandcrete blocks under the climatic conditions of Ugep. This creates uncertainty among builders, engineers, and homeowners regarding the most suitable walling material for sustainable and affordable construction in the area. Therefore, this study seeks to fill this gap by comparatively evaluating clay bricks and sandcrete blocks as walling materials in Ugep, Cross River State, Nigeria, with emphasis on strength characteristics, durability, thermal performance, availability, and cost effectiveness.

### **Results and Analysis**

The study comparatively evaluated clay bricks and sandcrete blocks as walling materials in Ugep, Cross River State, Nigeria, with emphasis on compressive strength, water absorption, durability, thermal performance, availability, and cost effectiveness. Laboratory tests and field observations were carried out on samples collected from local production sites within the study area. The results obtained are presented and discussed below.

#### **Compressive Strength Results**

The compressive strength test was conducted at curing ages of 7, 14, 21, and 28 days in accordance with Nigerian Industrial Standards (NIS) and relevant British Standards for masonry units. The results indicated progressive increases in compressive strength for both clay bricks and sandcrete blocks as curing age increased. The average compressive strength values obtained for clay bricks were higher than those of sandcrete blocks at all curing stages. At 28 days, clay bricks recorded an average compressive strength of approximately 8.40 N/mm<sup>2</sup>, while sandcrete blocks recorded about 8.26 N/mm<sup>2</sup>. These findings are consistent with the work of Iridayo Aliu, who reported similar strength characteristics in a comparative study of clay bricks and sandcrete blocks in Edo State, Nigeria.

The relatively higher compressive strength of clay bricks may be attributed to the firing process, which enhances particle bonding and reduces internal voids within the brick matrix. Clay bricks also demonstrated more uniform structural integrity and lower incidences of edge cracking during testing. In contrast, variations were observed in the strength performance of sandcrete blocks produced within Ugep. Some block samples failed to satisfy the minimum compressive strength requirements recommended by the Nigerian Industrial Standards. This observation corroborates the findings of Ambrose, Etim, and Koffi, (2019) who reported that many commercially produced sandcrete blocks in Southern Nigeria possess compressive strengths below acceptable standards due to inadequate cement content and poor-quality control. Similarly, Mohammed and Anwar (2014) found that commercial sandcrete blocks in Kano State exhibited compressive strengths significantly below the standard requirements because of poor curing and improper mix proportions.

### **Water Absorption Characteristics**

Water absorption tests revealed that clay bricks exhibited lower water absorption rates compared to sandcrete blocks. The average water absorption value for clay bricks ranged between 12% and 15%, while sandcrete blocks recorded values between 18% and 24%. The lower water absorption rate of clay bricks indicates better resistance to moisture penetration and weathering. This property contributes significantly to the long-term durability of buildings constructed with clay bricks, especially in humid tropical environments such as Cross River State.

The high-water absorption characteristics observed in sandcrete blocks may be associated with higher porosity resulting from insufficient compaction, poor aggregate grading, and inadequate curing. Excessive water absorption can lead to dampness, shrinkage cracks, and deterioration of masonry walls over time. These findings align with the study conducted by Temitope Funmilayo Awolusi and colleagues, who emphasized that water absorption capacity strongly influences the durability and structural performance of sandcrete blocks.

### **Durability Assessment**

The durability assessment involved exposure of the masonry units to varying environmental conditions, including wetting and drying cycles. Clay bricks demonstrated superior resistance to cracking, erosion, and surface deterioration when compared to sandcrete blocks. Field observations indicated that buildings constructed with clay bricks in parts of Ugep remained structurally stable and aesthetically intact even after several years of exposure to rainfall and high humidity conditions. Conversely, some sandcrete block walls exhibited signs of surface cracks, dampness, and plaster deterioration. The superior durability performance of clay bricks can be attributed to their dense microstructure and resistance to moisture ingress. The findings support the assertions of Brahim Lemkalli and co-researchers, who reported that clay-based walling materials possess excellent thermal and durability characteristics suitable for sustainable building applications.

### **Thermal Performance Analysis**

The study further evaluated the thermal behavior of both walling materials through observation of indoor temperature variations in buildings constructed with clay bricks and sandcrete blocks. Buildings constructed with clay bricks maintained relatively cooler indoor temperatures during periods of intense heat compared to buildings made with sandcrete blocks. This result may be linked to the thermal insulation properties of fired clay, which absorbs and releases heat gradually. The improved thermal performance of clay bricks is highly advantageous in tropical climatic regions such as Ugep, where high temperatures and humidity are prevalent. Improved thermal insulation reduces dependence on mechanical cooling systems and contributes to energy efficiency. These findings are consistent with the work of Githinji et; al (2016) who observed that clay bricks possess favorable thermal and mechanical properties suitable for low-cost and sustainable housing.

### **Cost Analysis**

The cost analysis considered material production costs, transportation, labor requirements, and maintenance implications. Results showed that sandcrete blocks were initially cheaper and easier to produce because cement, sand, and molding equipment are readily available within the study area. The production process for sandcrete blocks also requires less specialized skill compared to clay brick firing. However, clay bricks demonstrated lower long-term maintenance costs due to

their durability, resistance to moisture damage, and reduced need for frequent repairs. Although the initial production cost of clay bricks was slightly higher because of firing requirements, their long service life and reduced maintenance demands make them economically advantageous over time.

These findings agree with the observations of Moses Ogunbiyi and co-authors, who concluded that stabilized clay bricks provide cost-effective alternatives to conventional sandcrete blocks in building construction.

### **Availability and Environmental Considerations**

The study revealed that both clay and sand resources are abundantly available in Ugep and surrounding communities. Nevertheless, sandcrete block production depends heavily on cement, whose cost continues to rise due to inflation and energy-related challenges in Nigeria.

Clay bricks offer environmental advantages because they utilize locally available clay materials with relatively lower cement consumption. Cement production is associated with high carbon emissions, whereas clay brick production can reduce environmental impacts when modern energy-efficient firing methods are adopted. The findings support the review conducted by Uwemedimo Nyong Wilson, Jonathan Alomaja, and Abdussabur Raji, who emphasized that clay and laterite-based masonry units provide sustainable alternatives to conventional sandcrete blocks in Nigeria.

### **Recommendations**

Based on the findings of this study, the following recommendations are made:

- i. Clay bricks should be encouraged as alternative walling materials for residential and institutional buildings in Ugep and other parts of Cross River State because of their superior compressive strength, durability, and thermal insulation properties.
- ii. Government agencies and construction regulatory bodies should establish quality control mechanisms for sandcrete block production to ensure compliance with Nigerian Industrial Standards.
- iii. Training programs and workshops should be organized for local block manufacturers and brick producers on proper material selection, mix proportions, curing methods, and firing techniques.
- iv. Research institutions and universities should intensify studies on improving locally sourced clay materials for sustainable housing development.
- v. Modern clay brick production technologies should be introduced in Ugep to improve production efficiency, reduce environmental impacts, and increase public acceptance of clay bricks.
- vi. Builders and homeowners should consider long-term maintenance costs and durability when selecting walling materials rather than focusing only on initial construction costs.
- vii. The Cross River State Government should encourage investment in local clay brick industries as part of efforts to promote affordable and environmentally sustainable housing development.

### **Conclusion and Recommendation**

This study comparatively examined clay bricks and sandcrete blocks as walling materials in Ugep, Cross River State, Nigeria. The findings revealed that clay bricks possess superior compressive

strength, lower water absorption capacity, better durability, and improved thermal insulation properties compared to sandcrete blocks.

Although sandcrete blocks remain widely used because of their lower initial production cost and ease of manufacture, many commercially produced blocks fail to meet the required quality standards due to poor quality control practices. Clay bricks, on the other hand, demonstrated better structural performance and long-term economic advantages due to reduced maintenance requirements and greater resistance to environmental deterioration.

The study further established that the abundant availability of clay deposits in Ugep presents significant opportunities for sustainable and affordable housing development through increased utilization of clay bricks. The adoption of clay bricks can also contribute to environmental sustainability by reducing dependence on cement-intensive construction materials. Therefore, the study concludes that clay bricks are more suitable walling materials for sustainable building construction in Ugep, Cross River State, particularly in terms of strength, durability, thermal comfort, and long-term cost effectiveness. However, improved quality control measures and modern production technologies are necessary for both clay bricks and sandcrete blocks to ensure safer and more durable building construction in Nigeria.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

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## TOWARDS INCLUSIVE URBAN PLANNING AND DESIGN: A SYSTEMATIC REVIEW ON INFORMAL SETTLEMENTS IN PERI-URBAN AFRICA

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### Abstract

*This study systematically reviews existing literature on informal settlements in peri-urban areas, with a focus on the architectural, environmental and governance challenges shaping their emergence and persistence. Peri-urban zones, situated at the interface of rural and urban spaces, are hotspots for unregulated urban expansion due to a combination of rapid population growth, weak urban planning and land commodification. Informal settlements in these areas are often marked by inadequate housing, insecure land tenure and insufficient infrastructure. While socio-economic and governance factors driving informal settlements are well-documented, the spatial and architectural dimensions remain underexplored. This review highlights the need for a more integrated understanding of informality, one that transcends socio-economic boundaries and addresses both elite and marginalised forms of informality. The study employs the PRISMA methodology to critically assess existing research, uncover key dynamics and explore conceptual debates around informality. The findings emphasise the importance of context-sensitive governance frameworks, the role of traditional land tenure systems and the integration of incremental upgrading strategies. This review aims to inform urban planners, policy-makers, architects and local governments in developing inclusive, resilient and sustainable urban development strategies for peri-urban informal settlements, offering insights into the infrastructural and governance gaps that hinder effective urban integration.*

**Keywords:** *Informal Settlements, Peri-Urban Areas, Land Governance, Urban Planning, Incremental Upgrading*

## **Introduction**

Informal settlements in peri-urban areas are complex outcomes of rapid urbanisation, spatial inequality, and fragmented land governance. Peri-urban zones, located between rural and urban spaces, often experience unregulated growth due to overlapping formal and informal land-use systems (Adam, 2014; Bhanye, 2023). These areas are particularly susceptible to informal settlement formation, driven by rapid population increases, inadequate urban planning, migration, and land commodification (Baye et al., 2020; Lombard, 2016). As a result, settlements in these areas often lack basic infrastructure, secure land tenure, and adequate housing.

Although often associated with low-income communities, informality is not confined to the urban poor. Studies have revealed that wealthier groups also participate in informal urban practices, such as unauthorised land acquisition or non-compliant construction (Aule et al., 2019; Azunre, 2024; Azunre et al., 2021). This challenges traditional views of informality and calls for a broader understanding that encompasses all social strata and reflects diverse urban practices. Informality extends into planning systems, labour, and service provision, often emerging through fragmented spatial patterns and weak governance. Scholars argue that informality is not just a response to urban failure but also an instrument of state power, shaped by selective regulation (Roy, 2005; Yiftachel, 2009). Consequently, understanding informal settlements requires examining both global urban theories and specific local dynamics.

While existing literature addresses several dimensions—such as socio-economic drivers (Baye et al., 2020), land governance (Lombard, 2016), and traditional institutions (Adam, 2014)—there is limited synthesis across these areas (Olaniran and Aule, 2025). Research often overlooks the architectural and spatial dimensions of informality. This study addresses this gap by systematically reviewing literature on peri-urban informal settlements, focusing on architectural, environmental, and governance variables. Through a structured bibliographic review using PRISMA guidelines, the research aims to provide insights for planners, policy-makers, and architects, promoting integrated and sustainable urban development.

## **MATERIALS AND METHODS**

This study adopted a systematic review approach to explore literature on informal settlements in peri-urban areas of sub-Saharan Africa, following the PRISMA 2020 guidelines (Page et al., 2021). The combined methodology enabled an in-depth analysis of publication trends, research methods, conceptual frameworks, and geographic distribution within the field, as presented in Figure 1. Scopus was chosen as the primary database due to its broad coverage, rich metadata, and compatibility with tools like VOSviewer, which are essential for bibliometric analyses (van Eck & Waltman, 2022; Aule et al., 2024).

PRISMA Checklist	Variable	Data	
Source Identification	Database	Scopus	
	Keywords	Informal AND Settlement AND Peri AND Urban AND Africa	
	Search Scope	Title, Abstract, Keywords	
	Search Date	September 12 2024	
	Initial Materials	220 Documents	
Source Screening	Exclude Books	13	
	Exclude Data Paper	1	
	Exclude Notes	1	
	Exclude Editorial	1	
	Exclude Article in Press	2	
	Limit to English Language	2	
Source Included	Final Materials	200 Documents	
	Export	Comma-Separated Values (CSV) File	
	Document	Excel Sheet	
	Preference	Citation Information	
		Bibliographic Information	
Analysis	Bibliometrics	Abstract and Keywords	
		References	
		Documents by Year	
	Scientometrics	Documents by Subject Area	
		Top Authors	
	Major Themes		
	Variables, Methodologies and Concepts		
	Context, Aim and Findings		

Fig. 1: Systematic review approach to explore literature on informal settlements in peri-urban areas of sub-Saharan Africa, following the PRISMA 2020 guidelines

An initial keyword search using the Boolean phrase “Informal AND Settlement AND Peri AND Urban AND Africa” returned 836 records. To improve comprehensiveness, the search was expanded in stages to include related terms such as “slum,” “squatter settlement,” “unplanned settlement,” “suburban,” and “peripheral,” based on highly cited studies and related terminologies (Siddaway et al., 2019). This iterative process, according to Olaniran, Musvoto, and Aule (2024a; 2024b), helps in minimising exclusion of relevant literature.

Only peer-reviewed journal articles in English (1987–2024) were included. Books and non-journal materials were excluded due to software requirements for structured metadata. A final dataset of 200 articles was processed in Microsoft Excel and VOSviewer, enabling analyses such as co-authorship patterns, citation mapping, and keyword clustering to derive thematic insights.

## RESULTS AND DISCUSSIONS

This section covers results documents by year and subject area, top authors, main themes, and systematic methodologies from previous studies on informal settlements in peri-urban environments.

### Materials by Year of Publication

Figure 2 presents the annual progression of scholarly publications on informal settlements in peri-urban areas of Africa from 1987 to 2024. The period between the late 1980s and early 2000s shows very limited academic attention, reflecting the historical neglect of peri-urban issues in global development and urban planning discourse. This lack of early research is likely due to the dominance of rural-urban dichotomies in policy frameworks and the absence of disaggregated urban data in many African contexts (Olaniran and Aule, 2025; UN-Habitat, 2022). It also coincides with slower urbanisation rates and minimal institutional focus on informal or transitional urban spaces during that time.

From around 2005, a gradual increase in research output is evident, marking a shift in urban studies toward recognising informality and the fluid rural-urban continuum. This shift aligns with global policy milestones such as the Millennium Development Goals (MDGS) and later, the Sustainable Development Goals (SDGS). Notable publication peaks in 2016 and 2019 coincide with renewed global attention to urban inclusivity and resilience through frameworks like the New Urban Agenda. A significant spike appears in 2023, with 24 publications, and continued momentum into 2024, driven in part by the COVID-19 pandemic, which exposed vulnerabilities in informal settlements (Carrilho & Trindade, 2022). This has led to a focus on themes such as land governance, service delivery, and health access.

Although peri-urban expansion intensified across Africa during the 1990s and early 2000s, scholarly output remained sparse. This can be attributed to limited academic infrastructure, donor-driven research agendas, and institutional weaknesses (Boamah & Amoako, 2020). Since 2015, however, African researchers have increasingly contributed to key themes such as informal tenure, dual land governance, and incremental housing (Owusu-Ansah & Braimah, 2013; Cobbinah & Darkwah, 2017). Emerging strategies like incremental upgrading—demonstrated in Zimbabwe and Mexico—offer inclusive alternatives to forced evictions by promoting phased, community-driven improvements (Matamanda et al., 2020; Lombard, 2016). Overall, the literature reflects growing interest, yet calls for more integrated, policy-relevant research to guide urban planning in sub-Saharan Africa's rapidly changing peri-urban zones.

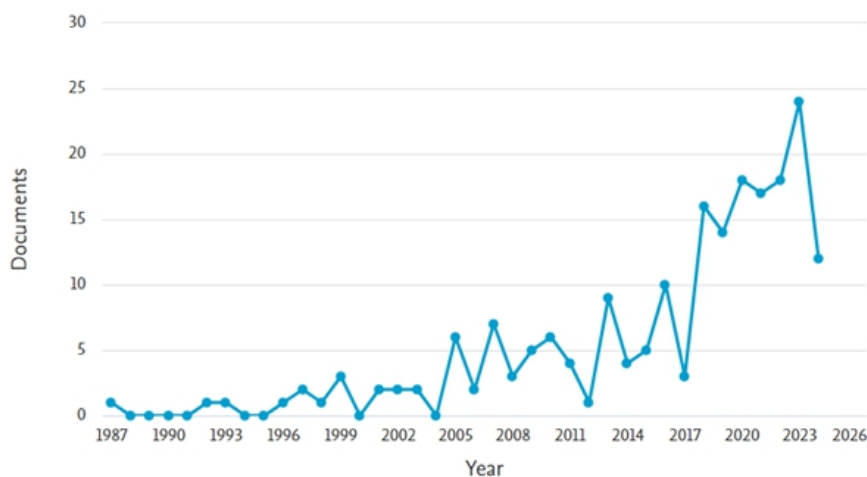


Fig. 2: Annual progression of scholarly publications on informal settlements in peri-urban areas of Africa from 1987 to 2024

### Materials Distribution by Subject Area

Figure 3 illustrates the distribution of research by subject area, highlighting the interdisciplinary nature of studies on informal settlements in peri-urban Africa. The majority of publications fall under Social Sciences (119 documents) and Environmental Sciences (85 documents), reflecting a strong focus on themes such as poverty, inequality, community resilience, and environmental vulnerability. These areas intersect with debates in development studies that explore the links between socio-spatial exclusion and ecological risk in urban peripheries (Myers, 2011; Watson, 2020). Social Science literature often addresses participatory governance, land rights, and informal tenure, while Environmental Science research emphasises challenges like water scarcity, land degradation, and climate adaptation (Aule et al. 2022, 2022a; Carrilho & Trindade, 2022).

Other disciplines also contribute meaningfully. Medicine (39 documents) and Agricultural and Biological Sciences (22 documents) reflect increased attention to public health and food security in rapidly urbanising areas. The COVID-19 pandemic brought heightened focus to the health vulnerabilities in informal settlements, where limited WASH infrastructure exacerbates risks (Smit, 2021). Agricultural studies highlight the land-use conflicts between urban expansion and peri-urban farming (Aule et al., 2022b, 2024; Tacoli & Agergaard, 2017). Smaller but notable contributions from Energy (16 documents), Business (15 documents), and Engineering (12 documents) point to emerging interest in infrastructure, livelihoods, and off-grid energy solutions. However, much of this technical work lacks integration with the socio-political realities that shape informal urban development.

Significantly underrepresented are disciplines such as Architecture, Urban Design, and the Built Environment. Despite the spatial nature of informal settlements, few studies address their physical form, self-built morphology, or vernacular planning strategies (Boanada-Fuchs, Kuffer & Samper, 2024). This gap limits the development of context-sensitive upgrading approaches. Lessons from Latin America and Asia show that incorporating design perspectives—like modular planning and site-sensitive interventions—can produce scalable, participatory solutions (Lombard, 2016; Matamanda et al., 2020), a direction still underexplored in the sub-Saharan African context.

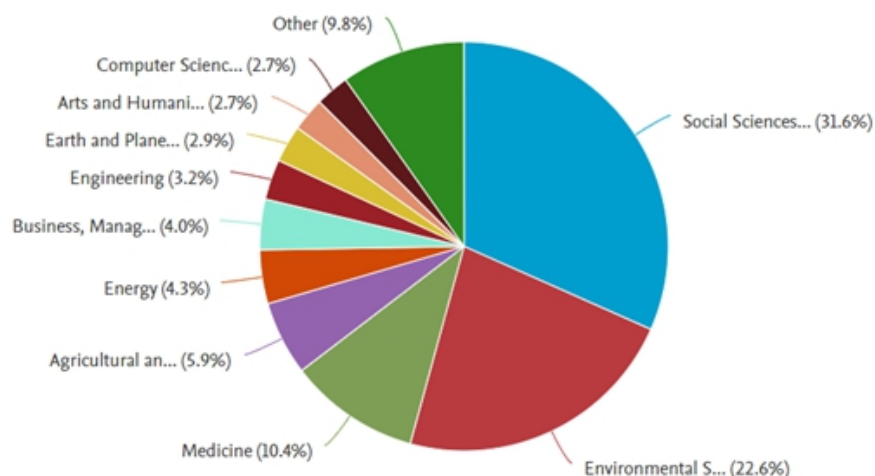


Fig. 3: Research distribution by subject area, highlighting the interdisciplinary nature of studies on informal settlements in peri-urban Africa

### Major Themes on Informal Settlements in Peri-Urban Areas

The keyword analysis presented in Figure 4 offers insight into the major thematic areas shaping current research on informal settlements. Dominant clusters revolve around concepts such as Urbanism, Settlements, Humanism, and Health. While these themes reflect a breadth of scholarly engagement, they also reveal noticeable gaps, particularly in the domains of urban planning and housing.

Within the Urbanism cluster, there is a conspicuous lack of emphasis on urban planning and spatial development. Keywords associated with core planning concepts—such as "urban growth," "urban design," and "spatial planning"—appear only sporadically. This indicates a limited engagement with the physical and morphological aspects of informal settlements, despite their inherently spatial nature. As Sareen and Haque (2023) argue, such omissions suggest that informal urban development is often studied through socio-economic or environmental lenses, while its spatial logic remains understudied.

The scarcity of spatially oriented keywords suggests that issues such as land-use regulation, infrastructure layout, and community-based spatial design are not being systematically addressed in the literature. This oversight is significant, as planning and design play a critical role in shaping how informal settlements evolve and how they can be incrementally upgraded or integrated into the broader urban fabric.

On the other hand, themes like Health and Humanism are more prominently represented. Keywords related to public health, social vulnerability, and human rights frequently appear, reflecting the well-established concern with inequalities and service access in these communities. While this focus is essential, Olaniran and Aule (2025) note that the imbalance between social and spatial analysis limits the development of holistic responses to informality. In brief, the keyword mapping underscores the need for more interdisciplinary approaches that incorporate urban planning, architecture, and spatial analysis. Strengthening these dimensions could provide more actionable insights for improving the liveability and resilience of informal settlements, particularly in rapidly urbanising regions.

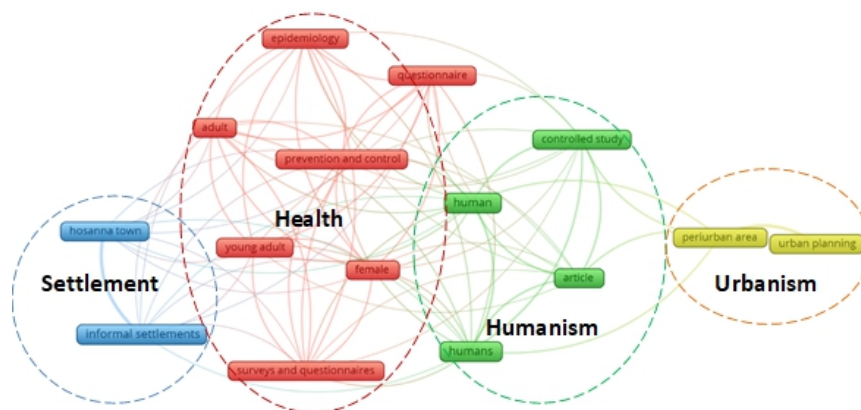


Fig. 4: Insight into the major thematic areas shaping current research on informal settlements

## Systematic Review on Informal Settlements in Peri-Urban Areas

The studies reviewed in Table 1 reveal a diverse yet interconnected range of variables that shape informal settlements in peri-urban areas. Key variables span socio-economic, environmental, governance, and cultural domains. For example, Adam (2014) emphasises the role of traditional institutions and informal land acquisition processes in peri-urban land transformation, highlighting how social norms and local governance shape access to land. This has direct relevance for urban planners and local governments aiming to formalise land tenure while respecting existing social structures.

Environmental and public health variables are prominent in Aydamo et al. (2023, 2024), where water quality, seasonal consumption patterns, and sanitation access are examined. These findings are significant for health practitioners and WASH (Water, Sanitation, and Hygiene) stakeholders, as high E. coli contamination rates and inadequate sanitation underscore urgent health risks in informal settlements. Such evidence supports targeted interventions for safe water provision and public health campaigns.

Economic drivers such as income inequality, high land lease prices, and inadequate compensation are central to Baye et al. (2020), pointing to macroeconomic pressures that exacerbate informal settlement growth. This is crucial for policymakers and housing authorities tasked with balancing urban expansion and equitable development. Bhanye (2023) adds a cultural lens, showing how spiritual institutions influence land access. This highlights the need for inclusive planning that accounts for non-formal authority systems. Ecological assessments (Caro-Borrero et al., 2021) and sanitation technology adoption (Helgegren et al., 2018) reflect the complexity of infrastructural planning in these areas. Lombard (2016) and Carrilho and Trindade (2022) further demonstrate how overlapping governance systems and persistent informality challenge conventional regulatory frameworks. Together, these studies offer practical insights for stakeholders—urban planners, health agencies, environmental regulators, and policymakers—by emphasising that sustainable interventions in informal settlements must address not only physical infrastructure but also socio-cultural and institutional dimensions.

**Table 1:** Systematic Analysis of Research Variables, Methodologies and Concepts on Informal Settlements in Peri-Urban Areas

Author Names	Study Variables	Study Aim	Findings
(Adam, 2014)	Availability of plots for purchase, the negotiation process, the role of traditional social institutions in informal settlements, informal plot acquisition methods, plot demarcation and documentation procedures, and the characteristics of informal settlers in peri-urban areas	To investigate key actors in the informal transformation of peri-urban farmland into urban areas.	Traditional social institutions were crucial in managing peri-urban informal settlements and resolving land conflicts through social sanctions.

(Aydamo, Robele Gari, & Mereta, 2024)	Household socio-economic and water-related factors, focusing on seasonal water consumption patterns and the quality of water sources and point-of-use water; physicochemical and microbial quality of water during dry and rainy seasons, including contamination in households with piped water both on and off premises. Key factors affecting microbial contamination of stored water are identified, along with predictors of per capita water use across seasons. The study highlights challenges in ensuring safe drinking water and its impact on childhood diarrhoea.	Seasonal changes in household water use, water quality, and water provision challenges	Stored water contamination with E. coli was 43.2% and 34.5% during the dry and rainy seasons, respectively.
(Aydamo et al., 2023)	The study examines the socio-demographic profiles of households, characteristics of drinking water sources, sanitation and hygiene practices, and factors influencing access to piped water, improved sanitation, and handwashing facilities.	Drinking water, sanitation, hand hygiene facilities, and their influencing factors in peri-urban and informal settlements	Only 35.1% of households had basic sanitation, and 16.8% had basic handwashing facilities.
(Baye et al., 2020)	The study highlights income inequality, rising urban land lease prices, inadequate compensation for farmers during land expropriation, rapid urban population growth, and inefficient land allocation. It also points to a lack of affordable housing and increasing rental costs.	Key demographic and socio-economic factors driving the growth of informal settlements in peri-urban areas	Income inequality, increasing land lease prices, and inadequate compensation for expropriated land are major economic drivers of informal settlement growth.
(Bhanye, 2023)	The Nyau cult and witchcraft are examined as forms of authority.	Religion and ritual play a key role in land access and security for peri-urban migrants.	Religious and ritual-based authorities influence land issues.
(Caro-Borrero et al., 2021)	Assessment of physical, chemical, and ecological quality through sampling	Reveal the socio-ecological impacts of urbanisation and poor local governance.	The Magdalena River's ecological quality is significantly affected by increased nutrients and changes to the riparian zone.

(Carrilho & Trindade, 2022)	Identified categories include drivers and motivations, practices and challenges, negative impacts, and future trends in practice and research.	Understanding the context, challenges, practices, and their impacts is crucial for ensuring sustainability.	Informal occupation of peri-urban areas is inevitable, with varying degrees of informality always present.
(Helgegren et al., 2018)	Pour-flush toilets; Factors influencing their adoption; Groups with specific triggers or barriers; Determinants of adoption	The study seeks to explore how improved sanitation is adopted.	Pour-flush toilets were the sole favoured sanitation option at the site.
(Lombardi, 2016)	Corporatist governance; Regulation for control; Varied land rights claims; Overlapping legal frameworks; Local power dynamics	Impact of land reforms on transactions at the peri-urban fringe within broader liberalisation processes.	Conflict vulnerability in peri-urban areas results from the interplay between macro-level processes and local factors, including diverse land claims.
(Thin et al., 2023)	Mapping new settlements in the Global South; Formation of ViCs in Vietnam; Metropolitan and neighbourhood-scale urban forms.	Investigate the development of ViCs using case studies from three Vietnamese cities.	ViCs can be gradually improved and integrated into the city's broader infrastructure.

**CONCLUSIONS**

This study reviewed existing literature on informal settlements in peri-urban areas, presenting a comprehensive understanding of the socio-economic, environmental, spatial, and governance-related variables influencing their development. Findings show that informal settlements are not accidental outcomes of urban growth but are shaped by deeper structural issues such as socio-economic inequality, weak formal planning systems, and fragmented land governance. Traditional institutions and customary land systems often fill these governance gaps, mediating land access and resolving conflicts where formal mechanisms fall short (Adam, 2014; Olaniran and Aule, 2025).

The review highlights recurring challenges, including socio-economic exclusion, insecure tenure, and environmental risks, yet there is a noticeable lack of focus on spatial planning and architectural strategies for upgrading informal settlements. Although incremental upgrading is widely discussed, practical frameworks for design-based interventions remain limited. This gap restricts the ability of planners to apply viable solutions that address both physical and social needs. The findings suggest that policymakers and urban planners should adopt inclusive strategies that blend legal recognition with sustainable infrastructure and spatial integration. Engaging traditional authorities and communities in planning processes can foster more effective and culturally appropriate outcomes. Future research should prioritise the spatial and architectural dimensions

of informality, promoting interdisciplinary approaches that align with the realities of rapidly urbanising regions like sub-Saharan Africa.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

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## TOWARDS SUSTAINABLE CONSTRUCTION MATERIALS: SYSTEMATIC REVIEW OF COCOA POD ASH NANOPARTICLES IN SAWDUST ASH-BLENDED CONCRETE

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### Abstract

*This study systematically reviews recent advances in the application of natural nanoparticle additives in construction materials, with a particular focus on cocoa pod ash (CPA) incorporated into sawdust ash (SDA)-modified concrete. Using the PRISMA framework, relevant publications were retrieved from Scopus, Google Scholar, and other open-access databases, restricted to the years 2020–2025. The search keywords included Nano AND (Technology OR Material) AND Concrete. The review critically analysed experimental methodologies, material compositions, mix designs, and analytical tools employed in previous studies, identifying both methodological strengths and limitations. Results indicate that while synthetic nanoparticles such as nano-silica and carbon nanotubes dominate construction materials research, agro-waste-derived nanoparticles remain underutilised. Specifically, CPA has demonstrated promising pozzolanic properties when integrated into SDA-blended systems, improving compressive strength, durability, and resistance to aggressive agents like chlorides and sulfates. Nonetheless, knowledge gaps persist regarding long-term performance, optimisation of CPA–SDA ratios, and applicability in large-scale construction projects. This review underscores CPA's potential as a sustainable and low-cost alternative in green building, offering pathways to reduce cement dependency and environmental impact. Practical recommendations and future research directions are provided to advance sustainable construction practices through natural nanoparticle innovation.*

**Keywords:** Nanoparticles; Cocoa Pod Ash; Sawdust Ash; Sustainable Construction; Building Materials.

## Introduction

Concrete remains the most widely used construction material globally due to its versatility, strength, and relative affordability. However, its production contributes significantly to global CO<sub>2</sub> emissions, largely due to the high clinker content in Portland cement (Andrew, 2018). This challenge has intensified interest in sustainable alternatives, particularly the partial replacement of cement with supplementary cementitious materials (SCMs) derived from industrial and agricultural by-products. Among these, agro-waste ashes such as sawdust ash (SDA) and cocoa pod ash (CPA) have emerged as potential low-cost pozzolanic materials with the added benefit of waste management and environmental conservation (Siddique et al., 2020; Danso et al., 2015).

Recent advances in nanotechnology have further highlighted the potential of nanoparticles in cementitious composites. Nanomaterials, owing to their ultrafine size and high surface reactivity, enhance hydration, densify microstructures, and improve both mechanical and durability properties of concrete (Khosravi et al., 2025). Nano-silica, titanium dioxide, carbon nanotubes, and graphene oxide are among the most widely studied, consistently showing improved compressive strength, durability, and resistance to aggressive environments (Huseien, 2023; Majeed, 2024). However, these materials are often expensive, energy-intensive to produce, and not readily available in developing countries. This creates a gap for the exploration of natural, cost-effective nanoparticle alternatives derived from local resources.

Despite growing literature on nanomaterials in concrete, only limited attention has been given to the use of CPA as a natural nanoparticle in cementitious systems. Most studies have focused on its use as a conventional pozzolan in blended cement, with promising but underexplored results (Fadele & Otieno, 2022). Furthermore, very few empirical studies have examined CPA in combination with SDA, despite evidence that dual agro-waste pozzolanic systems can synergistically improve concrete properties (Otieno et al., 2023). The scarcity of research employing CPA as a sole nanoparticle additive in SDA-modified concrete represents a critical knowledge gap. Addressing this gap is essential for advancing sustainable cement composites, particularly in regions where cocoa production generates large volumes of waste husks. The aim of this study is therefore to empirically review and experimentally investigate the role of CPA as a natural nanoparticle additive in SDA-blended cement concrete. The specific objectives are to: (i) synthesise existing evidence on nanomaterial incorporation in cementitious systems with emphasis on natural nanoparticle sources, (ii) identify prevailing methodologies, strengths, and limitations in prior research, (iii) evaluate the mechanical and durability performance of SDA-concrete modified with CPA, and (iv) highlight the sustainability potential of agro-waste nanoparticles for low-carbon construction.

This research is justified by its practical significance in both scientific and environmental contexts. Scientifically, it contributes to the growing field of sustainable nanotechnology by offering new insights into underexplored natural nanoparticle systems. Practically, it addresses urgent global sustainability concerns by promoting low-cost, locally available waste-derived materials that reduce reliance on clinker, minimise agricultural waste disposal problems, and align with circular economy principles. By integrating nanotechnology with agro-waste valorisation, this study bridges technological innovation with sustainability goals, contributing to both the academic body of knowledge and practical construction solutions.

## Materials and Methods

This study adopted a systematic review methodology guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 framework. The PRISMA approach was selected because it provides a transparent, replicable, and comprehensive structure for conducting and reporting systematic reviews, thereby ensuring consistency, reducing bias, and enhancing credibility (Page et al., 2021). By following this framework, the review is able to present clear evidence on how nanotechnology and related materials are applied in concrete studies.

The data sources used for this review were Scopus, Google Scholar, and other open-access repositories, as presented in Table 1. Scopus was prioritized because of its extensive multidisciplinary coverage of peer-reviewed journals, which increases the likelihood of retrieving high-quality, up-to-date research outputs. In contrast, Google Scholar was chosen to expand accessibility and to capture open-access and grey literature not always indexed in Scopus. Restricting the search scope to titles ensured that only the most directly relevant studies—those explicitly focusing on nanotechnology, materials, and concrete—were retrieved, thereby improving precision. The Boolean search string employed was: Nano AND (Technology OR Material) AND Concrete. This query was executed on August 10, 2024, and included studies published between 2020 and 2025, thereby capturing recent developments and emerging trends in the field (Page et al., 2021).

**Table 1:** Simplified PRISMA framework for source identification, screening and inclusion

Checklist Item	Variable	Data
Method of Analysis	Systematic review using PRISMA	
Search Database	Scopus, and Google Scholar, open access sources	
Search Scope	Title	
Search Keywords	Nano AND (Technology OR Material) AND Concrete	
Search Date	August 10 2024	
Included publication years	2020 -2025	
Results	Methodologies: Major Themes, Emerging Trends	
Graphical output	Descriptive statistics using cross-tabulations, word clouds	

The inclusion criteria were designed to ensure relevance and timeliness. Only studies published between 2020 and 2025 that focused on the application of nanotechnology or agro-waste-derived nanoparticle materials in cementitious systems were considered. This period was chosen because it reflects an era of heightened global attention to sustainable construction materials, as well as advances in nanoscience that are directly influencing civil engineering research.

Data extraction focused on study methodologies, experimental protocols, material compositions, and performance outcomes such as compressive strength, durability, porosity, and resistance to aggressive agents. To enhance interpretability, the results were presented using descriptive statistics, including cross-tabulations, to identify relationships between methodologies and emerging themes. Additionally, word clouds were generated to provide a graphical overview of frequently used keywords, highlighting dominant concepts within the body of literature. The use of such graphical outputs is supported by evidence showing that visualization techniques, including word clouds and tabulations, can reduce cognitive load and improve comprehension of systematic review results (Felizardo et al., 2021). In brief, the methodological decisions in this study—adopting PRISMA for transparency, focusing on Scopus and Google Scholar for comprehensive retrieval, narrowing the search to titles for relevance, and using descriptive

statistics with graphical visualization for interpretability—were designed to ensure that the review systematically captures, analyzes, and presents reliable insights into the methodologies, themes, and emerging trends of nanotechnology applications in concrete research.

## Results

Across the corpus summarized in Table 2, most studies are experimental, with a smaller but growing subset of systematic or state-of-the-art reviews. Laboratory trials dominate because they enable controlled evaluation of mix design, dispersion, and curing variables when nano- and bio-derived additives are introduced into cementitious matrices. Recent experimental reports span bio-based feedstocks and engineered nanomaterials: poplar-wood-sawdust routes to cellulose nanocrystals for functional composites (with rich spectroscopic and electrochemical characterization),  $\text{Fe}_3\text{O}_4$  deposition on lignocellulosic substrates for magnetically active adsorbents, and SDA/OPC mortars and foamed mortars tuned for lightweight construction (Qi et al., 2024; Salgado et al., 2024; Suryanto et al., 2024; Majeed, 2024). Parallel reviews consolidate evidence that nanomaterials consistently refine pore structure and accelerate hydration, but emphasize cost, dispersion, and environmental trade-offs—points that motivate the turn toward agro-waste nano-ashes highlighted in the table (Ghoddousi et al., 2020; Joudeh & Linke, 2022).

Materials show two clear themes. First, conventional binders and aggregates remain the base system (OPC, fine/coarse aggregates), while supplementary cementitious materials—especially sawdust ash (SDA)—are leveraged to reduce clinker and valorize waste, often in synergy with a single, natural nano-additive as proposed in the table (Majeed, 2024). Second, there is a bifurcation between engineered nano-oxides (e.g., nano- $\text{SiO}_2$ , nano- $\text{Al}_2\text{O}_3$ ) and bio-derived or carbon-based nanospecies (graphene derivatives, cellulose nanocrystals, nano-loaded sawdust), with many 2020–2024 studies reporting performance gains (strength, permeability, durability) from each path. For instance, mixtures incorporating nano- $\text{SiO}_2$ , nano-halloysite, or nano-montmorillonite exhibited reduced transport properties and finer pore systems, while graphene-family additives and nanocellulose increasingly appear in cementitious or hybrid composites (Ghoddousi et al., 2020; Badawy et al., 2023; Qi et al., 2024). Within the bio-derived track, lignocellulosic precursors are regularly chemically activated or calcined before size-reduction, consistent with the CPA/SDA route emphasized in the table (Salgado et al., 2024; Suryanto et al., 2024).

Methodologically, three clusters are evident. The first is materials processing: thermal treatments (calcination, STA/DTA) and chemical activation ( $\text{NaOH}$ ,  $\text{H}_2\text{O}_2$ , acid/base washing) are routine for tailoring ash reactivity or loading metal/oxide phases onto biomass, and for stabilizing nano-scale dispersion prior to mixing (Duhan et al., 2024; Suryanto et al., 2024; Salgado et al., 2024). The second is mechanical/durability testing, where compressive/tensile/flexural strength remain core, complemented by permeability and ion-transport metrics (e.g., RCPT), aligning with the performance endpoints prioritized in the table (Meddah et al., 2020; Majeed, 2024). The third is dispersion/compatibilization, frequently involving surfactants or ultrasonic agitation for engineered nanoparticles—an approach that the table adapts to natural nano-ashes like CPA to mitigate agglomeration and ensure uniform microstructural effects (Xiong et al., 2021).

Analytical tool use is strikingly consistent. SEM and XRD are the most ubiquitous pair for morphology and phase analysis; FTIR and TGA/DTG/TDA complement them to track functional groups and thermal stability; and, where relevant, higher-resolution TEM/HR-TEM and EDS/XPS are deployed to verify nano-scale structure, crystallinity, and interfacial chemistry (Joudeh &

Linke, 2022; Badawy et al., 2023; Salgado et al., 2024). Specialized methods appear when the research objective demands them: MIP for pore-size distribution, rheometry for fresh-state effects, and electrochemical GCD/CV for energy-storage composites derived from wood biomass (Ghoddousi et al., 2020; Qi et al., 2024). This toolkit matches the table's emphasis on linking mechanical outcomes with microstructure through SEM/XRD while scrutinizing transport phenomena central to durability.

Three trends stand out across 2020–2025. First, bio-based nanomaterials are rapidly moving from peripheral case studies to mainstream alternatives, driven by circular-economy imperatives and promising durability/strength gains—precisely the niche in which CPA and SDA reside (Salgado et al., 2024; Majeed, 2024). Second, hybridization—combining SCMs (e.g., SDA, RHA) with trace engineered nanoparticles or metal-oxide loadings—remains popular for synergistically refining pore topology and accelerating secondary C–S–H formation (Aule et al., 2023a, 2023b; Meddah et al., 2020; Ghoddousi et al., 2020). Third, data-centric methods are diffusing into cement research: recent reviews and exemplars document adoption of ML for strength/permeability prediction and, increasingly, explainable AI (e.g., SHAP) to interpret mix-design feature importance, while CNNs are used for automated microstructural or defect analyses—approaches that complement, rather than replace, classical statistics recommended in the table (Li et al., 2022; Lundberg & Lee, 2017; Croom et al., 2021). Taken together, these patterns justify the study design articulated in the table: an experiment-forward approach using a single, natural nano-additive (CPA) with SDA, rigorous mechanical/durability testing, and SEM/XRD confirmation, augmented by transparent analytics to ensure that observed improvements are both statistically significant and mechanistically explained.

**Table 2:** Most experimental studies with growing systematic or state-of-the-art reviews

Author	Research Methodology	
	Data & Materials	Data Analysis Tools
(Duhan et al., 2024)	Experiment: greenware samples dried in Thermotech PID-91Se, and Muffle Furnace at 100 °C for an hour,	differential thermal analysis (DTA), scanning electron microscope (SEM), energy-dispersive X-ray spectroscopy (EDS), Simultaneous thermal analyser (STA 6000® Perkin Elmer, energy-dispersive X-ray spectroscopy
(Qi et al., 2024)	Experiment: poplar wood sawdust (PWS), hemicellulose, lignin, hydrochloric acid (HCl), Fine Chemicals (p-TsOH, FA, KOH), acetylene black, polyvinylidene fluoride (PVDF)	2D NMR spectroscopy, Scanning Electron Microscopy, transmission electron microscopy, ImageJ, Fourier Transform Infrared Spectroscopy, X-ray diffractometer (XRD), galvanostatic charge-discharge (GCD), cyclic voltammetry (CV)

(Suryanto et al., 2024)	Experiment: sawdust waste wood, Chemical treatment (H <sub>2</sub> O <sub>2</sub> ), NaOH, and magnetic nanoparticles (Fe <sub>3</sub> O <sub>4</sub> ),	oven-drying machine, calibrated beaker, X-ray Diffraction (XRD), Segal formula is used to calculate crystalline degree (CD) and crystalline index (CI), Electron Microscope (EM).
(Salgado, Aedo and Vidal, 2024)	Experiments: Extraction of Phenolic Compounds, Synthesis of Iron Nanoparticles on Sawdust,	Scanning electron microscope (SEM, SU3500, Hitachi, Tokyo, Japan), X-ray diffraction (XRD), X-ray diffractometer, UV-Vis diffuse reflectance spectroscopy, UV-Visible spectrophotometer, Fourier-transform infrared spectroscopy (FTIR),
(Udumulla et al., 2024)	Review: Ordinary Portland Cement (OPC), nanomaterials, graphene oxide (GO) and graphene-based nanomaterials,	Descriptive statistics, Scanning electron microscope (SEM),
(Nishan et al., 2024)	Experiment: Double-distilled water, NaOH, HCl, acetic acid, ascorbic acid, urea, blood serum, 3,3',5,5'-tetramethylbenzidine (TMB), KGaA and	Fourier transform infrared spectroscopy (FTIR), Scanning electron microscope (SEM), X-ray diffraction, UV-Vis spectrophotometer
	H <sub>2</sub> O <sub>2</sub> (35%), PBS solution	
(Majeed, 2024)	Experiment: foamed mortar (FM), ordinary Portland cement (OPC), fine sand, protein-based foaming agent, and potable water.	Scanning electron microscope (SEM) evaluation, X-ray diffraction (XRD) analysis, and X-ray fluorescence spectroscopy (XRF).
(Farayibi et al., 2024)	Cement, Cocoa leaf ash (CLA), Coarse aggregate, Fine aggregates, Water	Descriptive statistics using BS Codes and American Society for Testing and Materials: BS 812-2:1995, ASTM C127-18 and ASTM C128-18,
(Karlina, Karlina and Gladkikh, 2023)	Literature review focusing on micro- and nanosilica derived from production waste at ferroalloy and silicon plants.	Descriptive statistics

(Huseien, 2023)	State-of-the-art review involving the uses of different nanomaterials for the production of high-performance cementitious, geopolymer, and alkali-activated concrete composites	Descriptive statistics, scanning electron microscopy (SEM),
(Badawy et al., 2023)	Experiment: Ordinary Portland cement, Natural sand, Nano-silica, Nano-Cellulose,	scanning electron microscope (SEM), thermogravimetric analysis (TGA), and X-ray diffraction (XRD)
(El-Khawaga, Zidan and El-Mageed, 2023)	The review highlights the various types and methods used in the synthesis and/or preparation of	scanning transmission electron microscope (STEM), quantifiable images of atomic columns,
	different nanomaterials.	indeed, atom-by-atom visualisation
(Joudeh and Linke, 2022)	This review targets a bio-oriented audience and summarises the physico-chemical properties of nanoparticles and methods used for their characterisation.	Scanning electron microscopy (SEM), scanning tunnelling microscopy (STM), transmission electron microscopy (TEM), Dynamic light scattering (DLS), photon correlation spectroscopy (PCS), Nanoparticle tracking analysis (NTA), Brunauer-Emmett-Teller (BET) method, Barrett-Joyner-Halenda (BJH) method
(Krishnaveni and Senthil Selvan, 2022)	Experimental: Cement of OPC grade 53, natural fine aggregate, coarse aggregate, potable water, and superplasticiser of sulphonated naphthalene polymer.	Scanning electron microscopy (SEM)

(Ahmed, Mohammed and Mohammed, 2022)	extensive search which was done by the authors using different search engines of several databases such as Research Gate, Science Direct, Google Scholar, Scopus, and the Web of Science, a	Scanning Electron Microscope, X-ray Diffraction, X-ray fluorescence, Fourier Transform Infra-red Spectroscopy, Thermogravimetric Analyser, Derivative Thermograms, dispersive energy X-ray, Transmission Electron Microscope, Differential Scanning Calorimeter, Mercury Intrusion Porosimetry, and Field
		Emission Scanning Electron Microscopy
(Abdalla et al., 2022)	carbon nano-tubes (CNTs), nano-SiO <sub>2</sub> (nS), nano-Al <sub>2</sub> O <sub>3</sub> (NA), graphene oxide (GO), nano-TiO <sub>2</sub> (NT), nano clay (NC), nano-ZnO <sub>2</sub> (NZ), and nano-Fe <sub>2</sub> O <sub>3</sub> (NF)	Descriptive statistics with bars and tables
(Xavier and Rahim, 2022)	Natural laterite soil, precursors: Flyash, nano Al <sub>2</sub> O <sub>3</sub> , graphite, titanium dioxide, sodium silicate solution, sodium hydroxide solution, NaOH.	Fourier Transform Infrared spectroscopy (FTIR), thermogravimetric analysis (TGA) and the differential thermogravimetric (DTG).
(Chaturvedi, Pappu and Gupta, 2022)	Experiment: crystalline graphene quantum dots (GQDs), agro-waste of paddy straw, fly ash polymer nanocomposites	Fourier transform-infrared spectroscopy (FT-IR), FE-SEM, High-resolution transmission electron microscopy (HR-TEM), X-ray diffraction,
(Qu et al., 2022)	Experiment: citric Acid, urea, deionised H <sub>2</sub> O, cement	X-ray powder diffraction (XRD), High-resolution transmission electron microscopy (HR-TEM), X-ray photoelectron spectroscopy (XPS)
(Xiong et al., 2021)	Experimental: Chinese Portland cement, nano-alumina, protein-based surfactants (PS), synthetic surfactants (SS), SOCl <sub>2</sub> , water	Scanning electron microscopy (SEM), EDS spectrum, optical microscopy (OM), FT-IR, and rheological tests

(Verma and Yadav, 2021)	bridging the gap between material science and architecture by reviewing existing technologies under the spectrum of nanoarchitecture	Case study of buildings, Descriptive analysis
(Pei, Zhu and Xing, 2021)	Experiment: Cement mortar matrix, Sand, Photocatalyst, Carbon source, Polymer, Solvent, Benchmark photocatalyst, Photocatalytic targets	High voltage electro-spinning machine, transmission electron microscopy, and photoluminescence spectrophotometer. X-ray photoelectron spectroscopy
(Siddique et al., 2020)	Experiment: Ordinary Portland cement, River sand, coarse aggregate, Sawdust, Silica fume	compression testing machine, water penetration test assembly, environmental compartment, vacuum desiccator bowl, scanning electron microscopy
(Mohammed and Al-Saadi, 2020)	Experiment: fabricated printed cementitious mixture (FPCM), ordinary Portland cement, industrial waste materials, chemical additives (graphene oxide & viscosity-modifying agent)	fabricated mini cone, Vicat apparatus, Proceq Torrent permeability tester,
(Seifan, Mendoza and Berenjian, 2020)	Experiment: Ordinary Portland cement, River sand, Nano-Silica, Micro-Silica, fly ash	Tamper, Malvern Mastersizer, x-ray diffraction (XRD), scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR)
(Ghoddousi et al., 2020)	Experiment: local Portland cement, silica fume, Nano-SiO <sub>2</sub> , nano-halloysite, nano-montmorillonite, Limestone sand, Crushed limestone	Mercury intrusion porosimetry (MIP), X-ray diffraction (XRD), scanning electron microscopy (SEM), and atomic force microscopy (AFM)

(Meddah et al., 2020)	Experiment: Portland cement (PC), Al <sub>2</sub> O <sub>3</sub> nanoparticles, Rice Husk Ash (RHA), Crushed coarse and fine aggregates, water, Polycarboxylate ether-based superplasticiser	Scanning Electron Microscope (SEM), universal testing machine (UTM), Rapid chloride permeation test (RCPT),
(Jindal and Sharma, 2020)	Experiment: Nano-silica (nano-SiO <sub>2</sub> ), Nano-alumina (nano-Al <sub>2</sub> O <sub>3</sub> ), Carbon nanotubes (CNTs), Nano-clay	X-ray diffraction (XRD), Scanning Electron Microscope (SEM), Fourier transform infrared spectroscopy (FTIR)
(Chinthakunta et al., 2020)	Experiment: Self-compacting concrete, Ordinary Portland cement, fly ash, Silica fume, Master Glenium Sky as super plasticiser, Nano titanium	two-probe resistivity technique, Rapid chloride penetration test (RCPT)

### Discussion of Main Findings

The findings from this study underscore the significant role of nanotechnology in improving the physical, chemical, and mechanical performance of cementitious materials. The results indicate that nanomaterials such as nano-silica (SiO<sub>2</sub>), graphene oxide, carbon nanotubes, and titanium dioxide have consistently demonstrated effectiveness in enhancing strength, durability, and microstructural integrity of concrete composites. This aligns with prior work that has established the superior pozzolanic reactivity and filler effect of nano-silica in refining pore structures and improving hydration processes (Khosravi et al., 2025; Abdalla et al., 2022). Similarly, the incorporation of graphene-based nanomaterials has been shown to improve tensile strength and crack resistance, corroborating earlier studies on the mechanical reinforcement potential of graphene derivatives (Huseien, 2023).

The analysis also highlights a methodological trend, with scanning electron microscopy (SEM), X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), and thermogravimetric analysis (TGA) emerging as the dominant tools for characterisation. This trend is consistent with the growing demand for precision-based microstructural analysis in material sciences (Joudeh & Linke, 2022). The frequent use of SEM and XRD suggests a continued focus on microstructural evaluation and crystalline phase identification, as also reported in recent cementitious nanomaterials research (Badawy et al., 2023; Majeed, 2024). An important practical implication of these findings is the potential for developing sustainable construction materials by incorporating agricultural waste (e.g., cocoa pod ash, sawdust ash) alongside nanomaterials. Such integration reduces environmental impacts and supports circular economy principles. Previous research has equally emphasised the dual benefit of agricultural waste in reducing carbon emissions and



The findings also underscore a significant gap in empirical evidence, as very few studies have employed CPA as a sole nanoparticle additive in SDA-blended systems. This limitation points to an underexplored research direction with practical implications for low-cost, environmentally friendly construction materials, especially in regions with abundant cocoa production. By addressing this gap, the present study contributes to both sustainable construction practices and global efforts toward carbon reduction in the cement industry.

The following recommendations were therefore put forward:

Firstly, construction stakeholders should consider the incorporation of CPA and SDA as viable supplementary cementitious materials. Their use can reduce cement consumption, lower CO<sub>2</sub> emissions, and minimise agricultural waste disposal challenges. In addition, policymakers should encourage the valorisation of agricultural by-products like CPA and SDA through incentives, standards, and guidelines, thereby promoting sustainable building materials in local and global construction industries. Furthermore, further experimental studies are needed to optimise the mix proportions of CPA and SDA in different concrete grades and exposure conditions. Long-term durability tests under real-life environmental conditions should be prioritised to validate laboratory results. Future investigations should adopt advanced analytical tools such as X-ray diffraction (XRD), scanning electron microscopy (SEM), and thermogravimetric analysis (TGA) to better understand the microstructural interactions of CPA nanoparticles within cementitious systems. In another direction, comparative studies between CPA and other low-cost natural nanoparticles should be conducted to establish performance benchmarks and expand the portfolio of sustainable nanomaterials available for construction.

In conclusion, this study demonstrates that the integration of CPA as a natural nanoparticle in SDA-modified cement concrete has significant potential to advance sustainable construction practices. While further empirical research is required, the approach aligns with global sustainability goals by promoting waste valorisation, reducing carbon emissions, and fostering innovation in cementitious materials.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

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## COMPARATIVE ASSESSMENT OF ENVIRONMENTAL GAMMA RADIATION LEVELS AND ESTIMATION OF RADIOLOGICAL PARAMETERS USING GMC-300E PLUS GEIGER MULLER COUNTER AT FEDERAL POLYTECHNIC DAURA (TAKE- OFF SITE), KATSINA STATE, NIGERIA

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### Abstract

*This study assessed environmental gamma radiation levels and estimated key radiological parameters at the Federal Polytechnic Daura (Take-off Site), Katsina State, Nigeria, using the GMC-300E Plus Geiger Muller Counter. Seven sampling points representing laboratories, offices and parking space areas with Latitude: 13°01'N to 13°04'N and Longitude: 8°18'E to 8°22'E were surveyed at a standard height of one meter above the ground to simulate human exposure. The measured dose rates ranged from 0.008  $\mu\text{Sv/h}$  to 0.014  $\mu\text{Sv/h}$ , corresponding to absorbed dose rates of 8–14 nGy/h. The calculated annual effective dose equivalent (AEDE) values ranged between 0.017 mSv/y and 0.069 mSv/y, while the excess lifetime cancer risk (ELCR) varied from  $0.06 \times 10^{-3}$  to  $0.24 \times 10^{-3}$ . These results are well below the international safety limits recommended by UNSCEAR and ICRP, which stipulate global averages of 59 nGy/h, 1.0 mSv/y, and  $0.29 \times 10^{-3}$ , respectively. The findings indicate that the study area is radiologically safe and poses no significant health risk to students, staff, or visitors. The study provides baseline data essential for environmental radiation monitoring, radiological protection, and public health safety, and recommends regular radiation surveys and awareness programs to ensure continued environmental protection within the institution.*

**Keywords:** Environmental, Gamma Radiation, Geiger Muller, Ionizing, Non-ionizing and Radiological Parameters.

## Introduction

Radiation is the emission and propagation of energy in the form of waves or particles through space or matter. It is a natural phenomenon that plays a fundamental role in the universe, contributing to processes such as cosmic interactions, element formation, and energy balance in nature (Knoll, 2010). Among the various types of radiation, ionizing radiation possesses sufficient energy to dislodge electrons from atoms, causing ionization and potential biological effects. This type of radiation originates from both natural and artificial sources, with natural sources contributing about 80% of the total radiation exposure to humans globally (UNSCEAR, 2000). Natural radiation sources include cosmic rays from outer space and terrestrial radionuclides such as uranium ( $^{238}\text{U}$ ), thorium ( $^{232}\text{Th}$ ), and potassium ( $^{40}\text{K}$ ), which occur in rocks, soil, and building materials (Avwiri et al., 2013). Artificial radiation arises from human activities like medical imaging, nuclear energy generation, and industrial radiography (ICRP, 1990). While background radiation at low levels is considered harmless, prolonged exposure to higher doses can lead to harmful biological effects including cell damage, genetic mutation, and increased cancer risk (Taskin et al., 2009).

Environmental gamma radiation, primarily originates from the decay of natural radionuclides in the Earth's crust and cosmic interactions in the atmosphere (Omeje et al., 2019). Gamma rays are highly penetrating electromagnetic waves that can travel considerable distances in air and pass through most materials, making them a major contributor to external exposure. Therefore, monitoring gamma dose rates is essential in assessing radiation exposure levels and evaluating potential risks to public health.

Advances in radiation monitoring technology have improved the accuracy of environmental radiation assessment. The Geiger Muller Counter (GMC), particularly the GMC-300E Plus model, is widely used due to its portability, digital precision, and ability to detect alpha ( $\alpha$ ), beta ( $\beta$ ), and gamma ( $\gamma$ ) radiations (GQ Electronics, 2021). However, in environmental studies, gamma radiation constitutes the dominant measurable component since alpha and beta radiations are easily absorbed in air or blocked by the detector casing (Knoll, 2010). Given the growing importance of radiation safety in academic and research institutions, it is essential to monitor and evaluate ambient gamma radiation levels in educational environments. This study therefore assesses the environmental gamma radiation levels and estimates selected radiological parameters, including absorbed dose rate, annual effective dose equivalent (AEDE), and excess lifetime cancer risk (ELCR), using the GMC-300E Plus Geiger Muller Counter at the Federal Polytechnic Daura (Take-Off Site), Katsina State, Nigeria. The research provides baseline data for radiation protection and environmental safety evaluation within the institution.

## THEORITICAL BACKGROUND

Radiation refers to the emission or transmission of energy through space or a material medium in the form of waves or particles. It is broadly classified into non-ionizing radiation and ionizing radiation. When ionizing radiation passes through matter, it interacts with atoms and molecules in different ways depending on the type of radiation and the density of the material (Knoll, 2010). Alpha ( $\alpha$ ) particles are heavy and positively charged, with low penetration. They can be stopped by a sheet of paper or the outer layer of human skin. Beta ( $\beta$ ) particles are lighter and negatively charged; they have moderate penetration and can travel through a few millimeters of aluminum. Gamma ( $\gamma$ ) rays are highly penetrating electromagnetic radiation that can pass through several meters of air and require dense shielding materials such as lead or concrete (Jwanbot et al., 2014). Due to its high penetrating ability, gamma radiation is the most significant contributor to

environmental and external radiation exposure and is, therefore, the focus of most background radiation assessments (Avwiri et al., 2013).

### **Radiation Safety Standards**

According to UNSCEAR (2000), the world average absorbed dose rate from natural background radiation is approximately 59 nGy/h, corresponding to an annual effective dose equivalent (AEDE) of 0.07 mSv/y. The ICRP (1990) recommends a maximum permissible annual dose limit of 1.0 mSv/y for the general public. The average excess lifetime cancer risk (ELCR) is estimated to be  $0.29 \times 10^{-3}$  (UNSCEAR, 2000). Any environmental radiation level above these values indicates an increased potential health risk, emphasizing the importance of continuous monitoring and assessment (Alam et al., 1999).

## **MATERIALS AND METHODS**

### **Description of the study area**

The study was conducted at the Federal Polytechnic Daura (Take- Off Site), located in Daura Local Government Area of Katsina State, Nigeria. The area lies approximately between Latitude: 13°01'N to 13°04'N and Longitude: 8°18'E to 8°22'E within the Sudan Savannah region of Northern Nigeria. It experiences two distinct seasons: the dry season (November–April) and the wet season (May to October), with an annual rainfall of about 700–900 mm and an average temperature range of 22 to 38°C (NIMET, 2021). The institution's Take- Off Site comprises academic buildings, science laboratories, administrative offices, workshops, lecture halls, and open fields. These various environments provide ideal sampling points for background radiation monitoring. The area is characterized by basement complex rocks, lateritic soils, and moderate vegetation, all of which may influence the distribution of naturally occurring radionuclides (Omeje et al., 2019).

### **Measurement procedure**

The radiation survey was carried out using the GMC-300E Plus Geiger Muller Counter (Data Logger) to measure the ambient gamma radiation levels at seven selected locations. At each sampling location, a measuring tape were used and measure one meter above the ground surface, the detector were also held at that position, a standard height for environmental gamma radiation measurement to represent the average height of human exposure (UNSCEAR, 2000). The device was positioned such that its sensing window faced the open environment, avoiding contact with metallic objects, electrical sources, or walls that might influence the readings.

Each measurement was taken for a period of five minutes (300 seconds) to allow for adequate counting statistics and minimize random fluctuations. The device automatically recorded the real-time dose rate in micro-Sieverts per hour ( $\mu\text{Sv/h}$ ) and the average value for the measurement interval. The process was repeated three times at each site, and the mean value was taken as the representative radiation level for that location. The survey covered seven selected points including the baseline within the take up Site of Federal Polytechnic Daura, including laboratories, offices and open environments. The coordinates and names of the sampling points were recorded using Global Positioning System (GPS) and paper and pencil for reference.

### **Measurement of environmental radiation**

The measurement of radiation is expressed in different physical quantities depending on what is being assessed. Exposure (C/kg or mR/h): The amount of ionization produced in air by X-rays or gamma rays. Absorbed dose (Gy or nGy/h): The amount of energy deposited per unit mass of

material. Effective dose (Sv or mSv/y): Represents the biological impact of the absorbed dose, considering tissue sensitivity (ICRP, 1990).

The average mean value of the Radiation level was calculated using equation 1.

$$\text{Mean value } (\mu \text{ or } \bar{x}) = \frac{\sum_i^n x_i}{n} \text{-----(1)}$$

Where, n = number of readings,  $\bar{x}$  = total number of readings and  $x_i$  = number for each reading

### Radiological Parameters

Radiological parameters are essential for interpreting measured dose rates and assessing potential health risks. The key parameters include Absorbed Dose Rate (D), Annual Effective Dose Equivalent (AEDE), and Excess Lifetime Cancer Risk (ELCR). These are calculated using equations recommended by UNSCEAR (2000) and ICRP (1990).

The absorbed dose rate in air is derived from the measured radiation dose rate using the conversion:

$$D(\text{nGy/h}) = \text{Measured dose rate } (\mu\text{Sv/h}) \times 1000 \text{-----(2)}$$

Where,  $1\mu\text{Sv/h} \approx 1000 \text{ nG/h}$  (Avwiri et al., 2013).

The Annual Effective Dose Equivalent (AEDE) estimates the annual radiation dose a person receives and is computed as:

$$AEDE(\text{mSv/y}) = D \times 8760 \times 0.7 \times OF \times 10^{-6} \text{----- (3)}$$

Where, D = absorbed dose rate (nGy/h), 8760 = hours in a year,  $0.7 \text{ Sv/Gy}$  = conversion coefficient from absorbed dose in air to effective dose and OF = occupancy factor (0.2 for outdoor exposure, 0.8 for indoor exposure). (UNSCEAR, 2000; ICRP, 1990)

The Excess Lifetime Cancer Risk ELCR indicates the probability of developing cancer due to lifetime radiation exposure and is calculated as:

$$ELCR = AEDE \times DL \times RF \text{----- (4)}$$

Where, DL = 70 years (average human lifespan) and RF = 0.05 (fatal cancer risk factor per Sievert). (Obed et al., 2005; Taskin et al., 2009)

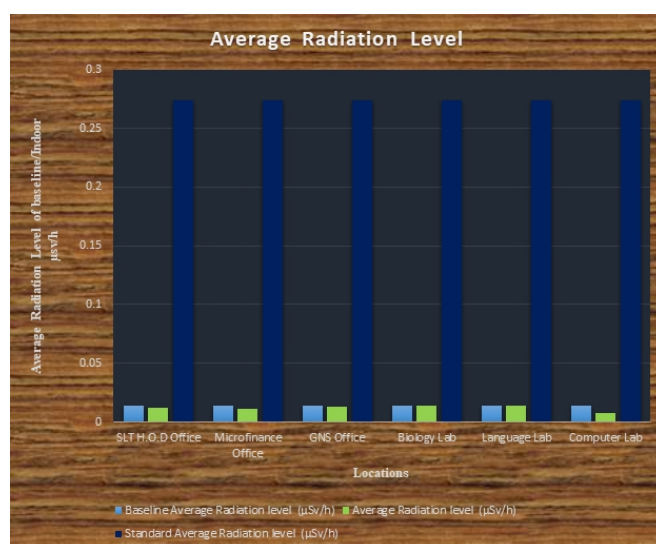
### RESULTS AND DISCUSSION

Table 1 revealed seven locations with three consecutive readings i.e. 1<sup>ST</sup>, 2<sup>ND</sup> and 3<sup>RD</sup> as measured in ( $\mu\text{Sv/h}$ ) that were obtained during the survey, the average or mean value were calculated from the three consecutive readings by simply adding the three readings and then divided by three at each location as were shown above in Table 1.

Name of Locations	Longitude (E)	Latitude (N)	1st ( $\mu\text{Sv/h}$ )	2ND ( $\mu\text{Sv/h}$ )	3RD ( $\mu\text{Sv/h}$ )	Average Value ( $\mu\text{Sv/h}$ )
SLT H.O.D Office	8.307989	13.024285	0.013	0.012	0.01	0.012
Microfinance Office	8.306049	13.023950	0.008	0.01	0.015	0.011
GNS Office	8.307304	13.021842	0.012	0.012	0.014	0.013
Biology Lab	8.305720	13.024803	0.013	0.016	0.012	0.014
Language Lab	8.304013	13.023716	0.016	0.009	0.018	0.014
Computer Lab	8.308125	13.023473	0.006	0.007	0.01	0.008
Parking Space(Baseline)	8.305782	13.027075	0.014	0.014	0.014	0.014

**Table 1: Measurements of Six Indoor and One Outdoor Ionizing Radiation Level**

The average value of radiation level of the baseline (parking space) or reference point range from 0.008  $\mu\text{Sv/h}$  to 0.014  $\mu\text{Sv/h}$  as shown in Table1 with average value of 0.011  $\mu\text{Sv/h}$ . the maximum and minimum value were obtained at parking space, biology lab, language lab and computer lab. Comparison of baseline and indoor of average value of radiation level with standard average radiation were obtained in Figure 1. the baseline and indoor of average radiation level as indicated by buildings in sky blue and light green colours were found to be below the worldwide permissible average radiation level of 0.0274  $\mu\text{Sv/h}$  as were stated by Okoye and Avwiri (2013), Avwiri and Esi (2014).

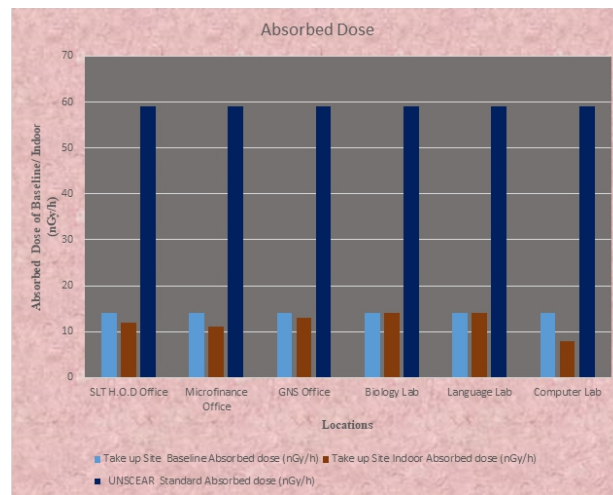


**Figure 1: Comparison of the Baseline and Indoor Average Radiation level with Standard Radiological parameters; absorbed dose, annual effective dose equivalent (AEDE) and excess lifetime cancer risk (ELCR) were analysed and calculated using the recommended equations as were adopted by UNSCEAR (2000).**

Name of Locations	Average Radiation level ( $\mu\text{Sv/h}$ )	Absorbed dose (nGy/h)	AEDR (mSv/y)	ELCR X $10^{-3}$
SLT H.O.D Office	0.012	12	0.059	0.207
Microfinance Office	0.011	11	0.054	0.189
GNS Office	0.013	13	0.064	0.224
Biology Lab	0.014	14	0.069	0.242
Language Lab	0.014	14	0.069	0.242
Computer Lab	0.008	8	0.039	0.137
Parking Space(Baseline)	0.014	14	0.017	0.06

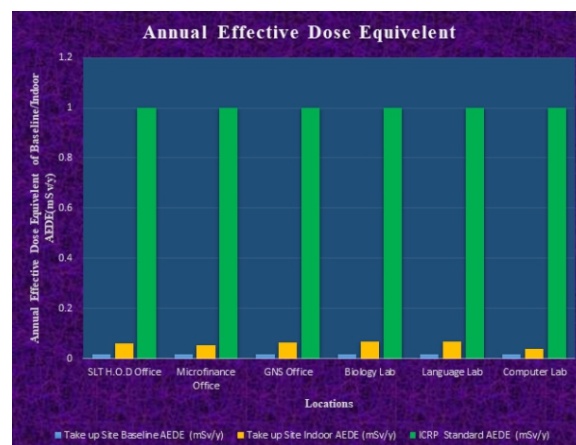
**Table 2: Indoor Calculated Radiological Parameters**

The absorbed dose mean value of Baseline and indoors were obtained at a range between 14 nGy/h to 8 nGy/h as shown in table 2 with an average value of 11nGy/h. the highest and lowest absorbed dose were shown at Biology lab, language lab and computer lab. From Figure 2 the comparison between Baselines and indoor absorbed dose with standard permissible absorbed dose limit were done. It was observe that all the baseline and indoor buildings in sky blue and dark orange colours as demonstrated on the legend in Figure 2 are below the acceptable limit of worldwide permissible absorbed dose by matter e.g like air, water, tissue and human body with value of 59 nGy/h as were recommend by UNSCEAR (2000) as it was indicated in dark blue colour building as shown in Figure 2.



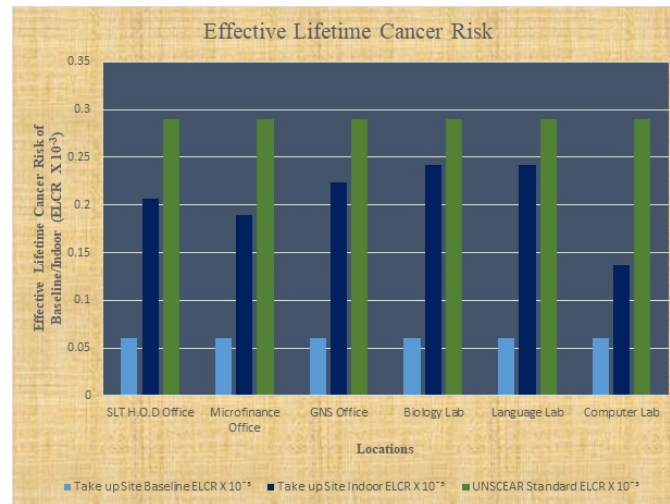
**Figure 2: Comparison of the Baseline and Indoor Absorbed Dose with UNSCEAR Standard**

The mean value of annual effective dose equivalent (AEDE) for baseline and indoor were shown in Table 2 with average value range from 0.017 mSv/y to 0.069 mSv/y with average value of 0.043 mSv/y. the Baseline (parking space), Biology lab and language lab shows the maximum and minimum mean values of the annual effective dose equivalent. Comparison between the annual effective dose equivalent for Baseline and indoor with world standard were displayed in Figure 3. The Baseline and indoor buildings in sky blue and orange colours are below the recommended and permissible limit of 1.0 mSv/y set by ICRP (1990) as indicated by building in green colour in Figure



**Figure 3: Comparison of the Baseline and Indoor Annual Effective Dose Equivalent (AEDE) with ICRP Standard**

The mean value of excess lifetime cancer risk (ELCR) for baseline and indoor were ranged from  $0.06 \times 10^{-3}$  to  $0.241 \times 10^{-3}$  as shown in Table 2 with average mean value of  $0.151 \times 10^{-3}$ . Baseline, biology lab and language lab shows the maximum and minimum mean excess lifetime cancer risk. The comparison between baseline and indoor with worldwide standard were displayed in Figure 4. The baseline and indoor buildings in sky blue and dark blue colours were identified below the recommended mean value of  $0.29 \times 10^{-3}$  set by UNSCEAR (2000) as demonstrated in green building at Figure 4.



**Figure 4: Comparison of Baseline and Indoor Excess Lifetime Cancer Risk (ELCR) with UNSCEAR Standard**

Following the above discussions it was shown that, all the radiological parameters associated with health risk were computed and compared with average world standard permissible limit, where it reveal an appreciable results as it shows all the radiological parameters and baseline in the study area are below the recommended value as were established by international standards such as those of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the International Commission on Radiological Protection (ICRP). However, The results are also consistent with similar studies conducted in other parts of Nigeria, such as those by Awwiri et al. (2013), Jwanbot et al. (2014) and Omeje et al. (2019). Therefore, these locations are protected against the contamination of radiation exposure which will lead to health risk.

## Conclusion

This study successfully assessed the environmental gamma radiation levels and estimated key radiological parameters at the Federal Polytechnic Daura (Take- Off Site), Katsina State, using the GMC-300E Plus Geiger Muller Counter. Measurements taken from seven selected locations representing laboratories, offices, and open spaces revealed that the gamma radiation dose rates ranged from  $0.008 \mu\text{Sv/h}$  to  $0.014 \mu\text{Sv/h}$ , corresponding to absorbed dose rates between 8 and 14 nGy/h. The calculated annual effective dose equivalent (AEDE) values ranged between  $0.017 \text{ mSv/y}$  and  $0.069 \text{ mSv/y}$ , while the excess lifetime cancer risk (ELCR) ranged from  $0.06 \times 10^{-3}$  to  $0.24 \times 10^{-3}$ . These values are significantly below the global averages and permissible limits recommended by UNSCEAR (2000) and ICRP (1990), which are  $59 \text{ nGy/h}$  for absorbed dose rate,  $1.0 \text{ mSv/y}$  for AEDE, and  $0.29 \times 10^{-3}$  for ELCR. The findings therefore indicate that the Federal Polytechnic Daura (Take-

Off Site) is radiologically safe and poses no significant health risk to students, staff, or visitors. The study provides valuable baseline data that can serve as a reference for future radiation monitoring and environmental safety assessment in educational and research institutions. Regular monitoring and continued awareness of radiation safety practices are recommended to maintain this favorable radiological status and ensure long-term protection of public health within the institution.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

THEME: Governance and Sustainable Economy: Building a Secure and Prosperous Nigeria | 28th - 29th January, 2026  
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## STRENGTHENING RESEARCH COLLABORATION FOR SUSTAINABLE HOUSING DEVELOPMENT IN NIGERIA: A BIBLIOMETRIC AND SCIENTOMETRIC ANALYSIS

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### Abstract

*Housing is a fundamental necessity and a key indicator of societal well-being. Despite its significance, Nigeria continues to face a severe housing crisis, driven by rapid urbanization, affordability challenges, and socio-economic disparities. This study employs a bibliometric and scientometric approach to analyse trends in Nigerian housing research, utilizing data from the Scopus database and VOSviewer software. Findings indicate a steady increase in housing-related research since the 1980s, with notable contributions from institutions such as Covenant University and the University of Ibadan. Architecture and urban planning emerge as dominant disciplines, with strong intra-disciplinary co-authorship networks but limited interdisciplinary collaborations. Key research themes include physical development, socio-economic issues, environmental concerns, and animal life. Sustainability, urbanization, climate change, and energy efficiency are critical focus areas, reflecting growing concerns about housing resilience and affordability. However, the study highlights gaps in policy-oriented research and interdisciplinary approaches, indicating opportunities for future exploration. Therefore, addressing Nigeria's housing challenges requires integrated research efforts, innovative construction methods, and policy reforms. Sustainable housing solutions, government interventions, and collaborative frameworks among stakeholders are essential to ensuring adequate housing for Nigeria's growing population. This study provides insights for academics, policymakers, and industry professionals seeking to enhance housing research and practice.*

**Keywords:** *Bibliometric review, Emerging trends, Institutional affiliations, Nigerian housing, Sustainable development, and VOSviewer tool.*

## Introduction

Housing, one of the fundamental human necessities, is also used to determine a population's level of life. In its simplest form, shelter is ranked with food, water, and air as the basic physiological needs of people (Aule, Majid, Jusan, & Ayoosu, 2022; Maslow, 2000). The eleventh objective of the Sustainable Development Goals (SDGs) focuses on global collaboration to provide safe, adequate, and better housing, particularly for the poorest and most vulnerable people – (United Nations DESA, 2016). Despite the importance of housing to humans, its supply is not always guaranteed.

Although the housing crisis is a worldwide one, it is particularly acute in emerging nations like Nigeria, where it has become a socio-economic issue that needs a coordinated response – (Croese, Cirolia, & Graham, 2016; Jaiyeoba & Aklanoglu, 2018). It is somewhat paradoxical that Nigeria, with a current human population of more than 200 million, is also experiencing a massive housing shortage of more than 20 million units, which, at an annual output rate of 200,000 (The World Bank, 2018), is estimated to take at least 20 years to address. Although the World Bank launched the Family Homes Fund (FHF) in 2018 to build 8,000 housing units, many scholars are examining alternative strategies to address the current housing shortage by examining the various indigenous construction styles, materials, and technologies for housing provision (Iwuagwu & Iwuagwu, 2015; Olotuah & Olotuah, 2016). While many stakeholders have often emphasized the need for mass housing, authorities have always used a lack of resources as an excuse for underperformance. In either scenario of mass housing or indigenous solution, scholars call for the involvement of concerned end-users to avoid "uncomfortable prototype" housing deliveries that may result in non-occupation or unguarded transformations (Aule, Jusan, & Ayoosu, 2019; Aule, Majid, & Jusan, 2022a; Isah & Khan, 2016; Maina, 2013). With the ongoing research on the Nigerian built environment, Ilesanmi (2016) stressed the necessity for young academics first to understand the emerging trend, spread, and scope before deciding on new areas of specialization. Though scholars have categorized researchable issues into five groups: things, people, records, dynamics/energy, and ideas/thoughts (Leedy & Ormrod, 2010; Ilesanmi, 2016), the contemporary challenges posed by Sustainable Development Goals (SDGs) often transcend these traditional categories. Addressing SDG research problems frequently requires an interdisciplinary approach beyond these established boundaries, reflecting sustainable development issues' complex and interconnected nature.

In the housing domain, even seasoned researchers must be abreast of the "emerging trends" for tangible sustainable development. Furthermore, scholars should appreciate "top authors" in the Nigeria housing project for possible research collaborations. Even Nigeria should explore the network of other countries interested in providing concrete solutions to the lingering housing challenges. These are the objectives this bibliometric and scientometric review sets to explore, using objective scientometric methodologies to identify emerging trends for housing research in Nigeria. The bibliometric and scientometric analysis is therefore necessary as a scoping review, where a broader pool of literature is methodically screened to identify potent materials, authors, and journals for a further detailed Systematic Literature Review (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021).

This study's methodology was first outlined, justifying the choice of Scopus database, data mined: excluded and included, and analysis tools. The bibliometric information from the selected database was also analysed and presented in the Results and Discussion section, covering the distribution of data sources and the rising trend in publications across the different periods.

Consequently, prominent authors in the area of research were identified along with their affiliating institutions. The high point and most important outcome of the bibliometric and scientometric study is the systematic elicitation of trending keywords and trends for sustainable housing research and development. The emerging trends were generated and presented as keywords, journals, and countries.

## MATERIALS AND METHODS

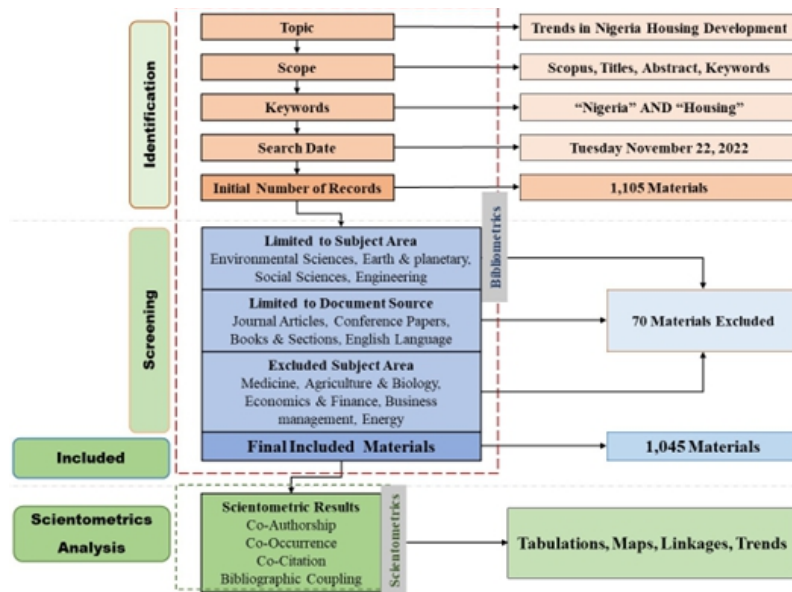
This study systematically details its materials and methods, including document selection, data screening, and criteria for inclusion or exclusion. It also outlines the analytical tools and data presentation methods essential for identifying trends in Nigeria's housing sector. The Scopus database was chosen as the primary source due to its extensive research coverage (Tanko & Mbugua, 2021). Since its inception in 2004, Scopus has been a preferred database for journal searches, offering a broad range of topics (Abbas et al., 2022; Sahi et al., 2022; Ghaleb et al., 2022). Unlike other databases, Scopus allows exporting up to 2,000 articles at once, facilitating scientometric analysis using VOSviewer.

This study employed the Systematic Review method, following the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA) guidelines (Page et al., 2021) to systematically identify, screen, and integrate relevant data. Due to compatibility challenges with other sources, only the Scopus database was used. As shown in Figure 1, an initial Boolean search using "Nigeria" AND "Housing" retrieved 1,045 documents. The search, conducted on November 22, 2022, was further refined to include only English-language sources, ensuring alignment with VOSviewer's processing requirements.

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TITLE-ABS-KEY (Nigeria AND housing) AND (EXCLUDE (LANGUAGE, "German") OR EXCLUDE (LANGUAGE, "French") OR EXCLUDE (LANGUAGE, "Slovenian")) AND (EXCLUDE (EXACTSRCTITLE, "African Urban Quarterly")) AND (EXCLUDE (EXACTSRCTITLE, "International Journal For Housing Science AndIts Applications ")) AND ( EXCLUDE ( EXACTSRCTITLE, "Third World Planning Review" ) ) AND ( EXCLUDE (EXACTSRCTITLE, "Mediterranean Journal Of Social Sciences" ) ) AND ( EXCLUDE (EXACTSRCTITLE, "International Journal Of Scientific And Technology Research" ) ).
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**Figure 1:** Final Boolean Search Showing Included and Excluded Scopus Material Sources

After collection, the 1,045 documents were exported as comma separated value (CSV) files to Microsoft Excel, preserving bibliographic data such as author names, affiliations, journal types, and rankings. These files were consolidated and transferred to a computer system for further scientometric analysis using VOSviewer, enabling a structured evaluation of research trends in Nigeria's housing sector. Scientometrics, which analyses research impact and citation relationships (Ghaleb et al., 2022), was central to this study. While various bibliometric tools exist, VOSviewer was chosen for its ability to visualize bibliometric networks effectively, as indicated in Figure 2.



**Figure 2:** Framework for Data Identification, Screening, and Inclusion

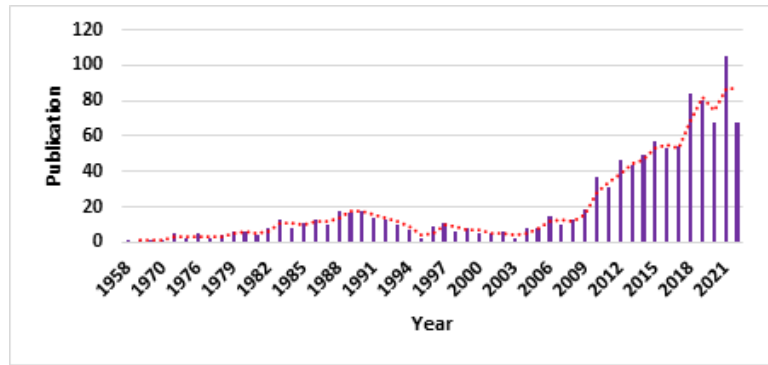
Bibliometric and scientometric methods provide objective reviews for analysing extensive datasets (Donthu et al., 2021). The study used VOSviewer, a text-mining software developed by van Eck and Waltman (2010), which facilitates the visualization of relationships among academic literature, including citations, authors, and keywords (van Eck & Waltman, 2022). This software, compatible with multiple databases, generates network, overlay, and density maps to depict research interconnections (Oraee et al., 2017; Wong et al., 2020). Compared to other tools, VOSviewer excels in presenting large bibliometric maps intuitively. Zakka et al. (2021) highlight its advantages in data mining, making it the primary instrument for this study's scientometric analysis of Nigeria's housing research landscape.

## RESULTS AND DISCUSSIONS

The scientometric review results were analysed using bibliometric data from the Scopus database and network maps generated by VOSviewer software. The analysis focused on document type, publication years, source titles, authors, affiliations, and emerging trends in Nigeria's housing research.

### Analysis of Documents

The total of 1,045 documents, including journal articles, reviews, and conference proceedings, were extracted and saved as a Microsoft Excel CSV file. The search results indicate that housing research in Nigeria dates back to the 1950s. However, it was not until the 1970s that annual publications exceeded one. Research activity accelerated significantly in the 1980s, with more than ten publications per year. The field experienced substantial growth in the 21st century, peaking at 105 publications in 2021, as shown in Figure 3. By 2022, 68 journal publications had been recorded, with an additional 16 articles still in press. Whether this upward trend in housing research will continue remains uncertain. However, the consistent increase in publications reflects the growing academic interest and policy relevance of housing studies in Nigeria.



**Figure 3:** Historical Perspective on Nigeria Housing Research

### Analysis of Authors

The identification of the top ten most prolific and frequently cited Nigerian authors in the field of housing research, as shown in Table 1, plays a crucial role in fostering research, enhancing collaboration, and improving transdisciplinary productivity through effective networking (Abbas et al., 2021; Czischke, 2018). Understanding key contributors in a discipline offers guidance to emerging researchers by directing them toward influential authors, their significant works, and essential sources for bibliometric investigations. In this analysis, authors' names, publication counts, and citation metrics were collected alongside their specific areas of expertise and their most frequently cited works. This holistic approach provides a clearer understanding of the intellectual landscape in Nigeria's housing research sector.

**Table 1:** Bibliometric Information of Top-Ten Authors in Nigeria Housing Research

S/N	Author	Discipline	Docs in Query	Total Pubs	Total Citatns	h-index	Sci-Link	Top Cited Material
1	Ibem, E.O.	Architecture	38	95	1,140	20 (1)	60	( <b>Ibem &amp; Aduwo, 2013</b> )
2	Olotuah, A. O.	Architecture	13	20	114	6 (6)	20	(Olotuah, 2002)
3	Opoko, A. P.	Architecture	11	22	117	5 (9)	27	(Ibem, <b>Opoko, Adeboye, &amp; Amole, 2013</b> )
4	Oluwatayo A. A.	Architecture	10	35	102	6 (7)	23	( <b>Oluwatayo, Aderonmu, &amp; Aduwo, 2015</b> )
5	Aduwo, E. B.	Architecture	9	28	320	9 (4)	11	( <b>Ibem &amp; Aduwo, 2013</b> )
6	Aigbavboa C. O.	Quantity Survey	9	520	1904	20 (2)	17	(Dogo, Afolabi, Nwulu, Twala, & <b>Aigbavboa, 2018</b> )
7	Ebekezien, A.	Quantity Surveying	9	53	334	9 (5)	12	( <b>Ebekezien &amp; Aigbavboa, 2021</b> )
8	Adedeji, Y. M. D.	Architecture	8	11	61	3 (10)	19	(Adegun & <b>Adedeji, 2017</b> )
9	Adegun, O. B.	Architecture	8	28	325	11 (3)	06	(Morakinyo, Dahanayake, <b>Adegun, &amp; Balogun, 2016</b> )
10	Aliu, I. R.	Urban Planning	8	17	107	6 (8)	00	( <b>Aliu, Adeyemi, &amp; Adebayo, 2014</b> )

Docs in Query (Documents in Query); Total Pubs (Total Publications); Total Citatns (Total Citations); Sci-Link (scientometric Links with other authors)

The evaluation of authors was primarily based on the number of documents retrieved in the final query search. Additionally, their h-index, which reflects the citation-per-document ratio, was calculated to assess their scholarly influence. Based on the search results, Ibem E.O. emerged as the most prolific contributor to Nigeria's housing research, with 38 published materials. Other leading authors had 13 or fewer publications within the study's scope. Outside Nigeria, bibliographic records of the top ten authors indicate that several have contributed significantly beyond the country's borders, with Aigbavboa accumulating 502 citations and Ibem 95 within African and Nigerian research contexts. The discipline-wise distribution of these top authors reveals that seven specialize in architecture, two in quantity surveying, and one in urban and regional planning. This highlights the dominant role of architecture in shaping housing research and the built environment's development (Chantzaras, 2019; Jutraz & Zupancic, 2014).

Furthermore, VOSviewer's co-citation analysis of authors within the exported bibliometric data generated crucial scientometric linkages. Using the "create a map based on bibliometric data" feature, the extracted Scopus documents were uploaded in MS Excel format, and the "co-authorship all authors" option was selected. The co-authorship analysis revealed that Ibem maintains 60 connections with other scholars, underscoring his extensive research collaborations. Four of the top ten authors demonstrated strong links exceeding 20, while the remaining six had an average of ten co-authorship connections, except for one with no documented link within the study's dataset. The results further indicated that authors within the same discipline generally had stronger connections than those outside it. This suggests that authors with no recorded links in this study may not be actively engaged in mainstream Nigerian housing research but may have stronger connections outside this study area.

### Institutional Affiliations

Beyond the bibliometric data on authorship, citation metrics, and research disciplines, the affiliations of leading authors were also extracted from the Scopus database. Institutional affiliation plays a vital role in fostering collaboration and networking, allowing researchers to connect with peers working on similar topics (Khudzari, Kurian, Tartakovsky, & Raghavan, 2018; Krauskopf, 2018). As anticipated, 90% of the top authors were affiliated with Nigerian institutions, with one linked to an Asian university. The ranking of institutions was based on the number of relevant documents retrieved in the final search query. According to Table 2, Covenant University in Nigeria ranked highest, with 101 journal articles, followed by the University of Ibadan, which had 94 publications.

**Table 2:** Bibliometric Information of Top Institutions in Nigeria Housing Research

S/N	Name of Institution	Docs in Query	Total Docs	Total Authors	Docs / Author	Impact Ranking
1	Covenant University	101	7,756	3,173	2.44	5
2	University of Ibadan	94	26,669	6,962	3.83	2
3	Obafemi Awolowo University	89	13,101	4,881	2.68	3
4	Federal University of Technology, Akure	61	5,913	2,458	2.41	6
5	University of Lagos	54	10,551	4,145	2.55	4
6	University of Nigeria	49	15,498	7,781	1.99	9

7	Universiti Teknologi Malaysia	40	50,067	12,618	3.97	1
8	University of Jos	26	3,130	1,603	1.95	10
9	Ahmadu Bello University	25	9,916	4,595	2.16	8
10	University of Benin	22	7,293	3,340	2.18	7

Docs in Query (Documents in Query); Total Docs (Total Documents); Docs / Author (Documents per Author)

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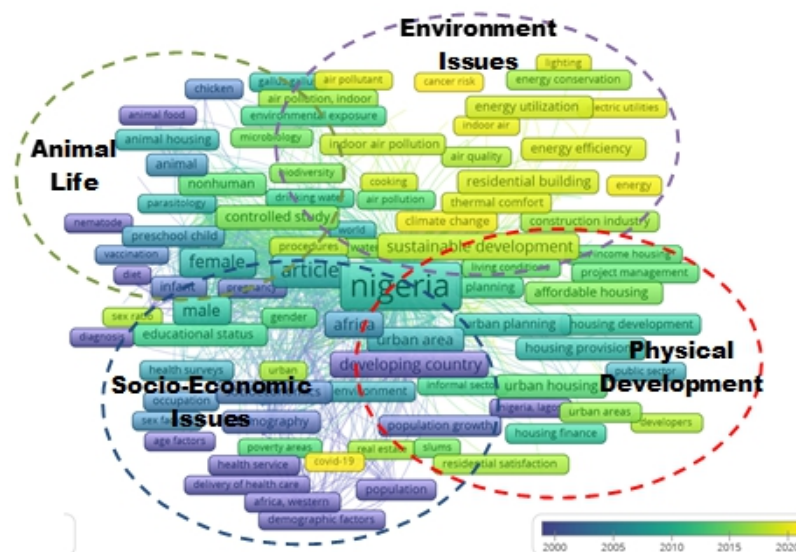
Most of the top ten universities recorded over twenty articles that matched the study's search criteria. While these institutions house thousands of documents and citations in the Scopus database, the tabulation was strictly based on the number of publications retrieved from the search query. To further assess the influence of these universities on global housing research, the number of publications per author was also examined. Given that housing and dwellings constitute fundamental elements of the built environment (Molinsky & Forsyth, 2018) and form the bulk of advanced architectural studies in Nigeria (Ilesanmi, 2016), it is reasonable to use their research output as a benchmark for ranking Nigerian institutions within the built environment discipline.

### **Trending Keywords in Nigeria Housing**

The trending keywords in Nigeria's housing research are categorized into four main themes: Physical Development, Socio-Economic Issues, Environmental Concerns, and Animal Life, alongside the broader issue of national development. Within Physical Development, trending topics include sustainable housing, residential satisfaction, urban development, affordable housing, and informal settlements, as shown in Figure 4. These reflect critical housing challenges in Nigeria. Environmental Concerns cover issues such as climate change, air pollution, energy efficiency, thermal comfort, and power supply. Socio-Economic Issues include COVID-19, urban

life, gender disparities, education levels, and poverty alleviation. These findings align with contemporary research trends highlighting the intersection of housing, environmental sustainability, and socio-economic well-being (Aule, Majid, & Jusan, 2022a, 2022b; Horgan & Dimitrijević, 2020).

Additionally, sustainability-related concerns—such as climate change, social instability, and renewable energy—remain dominant in housing research (Doost Mohammadian & Rezaie, 2019; He, Boas, Mol, & Lu, 2017). The trending "Animal Life" theme, which includes biodiversity conservation and microbiology, highlights the ecological dimensions of housing research. As Hirvilammi and Helne (2014) noted, biodiversity conservation is crucial to global ecosystems, emphasizing the need for an integrated housing approach. Scientometric analysis reveals that gaps in Nigeria's housing research are closely linked to these trending themes, presenting new research opportunities (Trisos et al., 2022).



**Figure 4:** Trending Keywords for Productive Research in Nigeria Housing

Scholars noted that Since the 21st century, the Sustainable Development Goals (SDGs) have shaped global housing research (Aule et al., 2019). However, recent challenges—including climate change, the COVID-19 pandemic, and global socio-political crises—have influenced research directions (International Federation of Red Cross and Red Crescent Societies, 2021, 2022). Scientometric tools help map trending keywords by analysing co-occurrence patterns. Future research can explore SDGs, food security, climate change, public health, and urbanization. Addressing these themes enables scholars to identify gaps, propose solutions, and contribute to Nigeria's housing and development discourse.

### Conclusion

Housing remains a fundamental human necessity and a critical measure of societal well-being. Despite its importance, the housing crisis persists globally, with emerging economies like Nigeria facing severe shortages. The study utilized a bibliometric and scientometric approach to analyse trends in Nigeria's housing research, employing the Scopus database and VOSviewer software. The

results highlight a growing research focus on sustainable housing, affordability, and socio-economic challenges, with increasing academic contributions over the past decades.

The analysis of documents revealed a steady rise in housing research in Nigeria, with significant growth observed since the 1980s. The study identified prolific authors, their institutional affiliations, and their scholarly impact, with architecture and urban planning emerging as dominant disciplines. Covenant University and the University of Ibadan were ranked highest in housing research contributions. Co-authorship networks demonstrated strong intra-disciplinary collaborations, while interdisciplinary linkages remained relatively limited.

Emerging research trends were categorized into four thematic areas: Physical Development, Socio-Economic Issues, Environmental Concerns, and Animal Life. Topics such as sustainable housing, urbanization, climate change, energy efficiency, and socio-economic disparities emerged as key concerns. Scientometric analysis also revealed research gaps, particularly in policy-oriented studies and interdisciplinary collaborations, which present opportunities for future research. In conclusion, the study underscores the need for continued research on sustainable housing solutions in Nigeria, integrating indigenous methods, government interventions, and global best practices. Addressing housing challenges requires multi-stakeholder collaboration, policy reform, and innovative construction approaches to meet the country's growing housing demands efficiently.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

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## A CYBER SECURITY AND DATA PROTECTION: CHALLENGES AND PROPOSED SOLUTIONS

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### Abstract

*In today's digital era, cyber threats are becoming increasingly sophisticated, posing serious risks to individuals, organizations, and governments. The rapid growth of online services, cloud computing, and Internet-connected devices has made sensitive data more vulnerable to breaches, theft, and unauthorized access. This research explores the main challenges in cyber security and data protection, including weak authentication systems, malware attacks, phishing, insider threats, and inadequate data privacy regulations. It also examines the consequences of these vulnerabilities, such as financial losses, reputational damage, and legal liabilities. To address these challenges, the study proposes a set of solutions, including advanced encryption techniques, multi-factor authentication, continuous monitoring, employee awareness programs, and the adoption of robust cyber security frameworks. The findings suggest that a combination of technological, organizational, and regulatory measures is essential to enhance data protection and ensure secure digital operations. Overall, the research highlights the need for proactive and integrated strategies to mitigate cyber security risks and protect sensitive information in an increasingly connected world.*

## **Introduction**

In the modern digital era, the rapid expansion of information technology has transformed how individuals, organizations, and governments operate. From online banking to cloud computing, social media platforms, and Internet-connected devices, vast amounts of data are generated, stored, and shared daily. While this connectivity brings convenience, efficiency, and new opportunities, it also exposes sensitive information to a growing range of cyber threats. Cyber security involves protecting computer systems, networks, and data from unauthorized access, attacks, or damage, whereas data protection focuses specifically on safeguarding personal and organizational information from misuse or breaches. The increasing dependence on digital platforms has made data breaches, malware attacks, phishing, ransomware, and insider threats more frequent and severe. Inadequate cyber security measures, weak authentication methods, and poor awareness among users contribute to these risks. As digital services expand globally, organizations face not only financial losses and reputational damage but also legal and regulatory consequences if data is compromised. This situation emphasizes the critical need for effective cyber security strategies and robust data protection mechanisms.

### **1.2 Statement of the Problem**

Despite growing awareness about cyber security, many organizations and individuals remain vulnerable to cyber-attacks. Key problems include:

- i. **Weak Security Measures:** Many systems still rely on outdated software, weak passwords, and insufficient network defences.
- ii. **Rising Complexity of Cyber Threats:** Hackers are using advanced malware, phishing campaigns, and social engineering tactics, making attacks harder to detect.
- iii. **Inadequate Data Protection Policies:** Organizations often lack comprehensive policies for handling, storing, and securing sensitive data.
- iv. **Human Factors:** Employees and users sometimes unintentionally expose data through poor practices or lack of awareness.
- v. **Regulatory Challenges:** Compliance with data protection laws is inconsistent, especially across different regions or jurisdictions.
- vi. **These challenges make it difficult for organizations to maintain secure digital operations and protect sensitive data effectively.**

### **1.3 Aim and Objectives of the Study**

The aim of this study is to examine the challenges of cyber security and data protection and propose effective solutions that can enhance the security of digital information in organizations and personal use.

The specific objectives of the study are:

- i. To identify the main cyber security threats and vulnerabilities affecting organizations and individuals.
- ii. To analyse the existing data protection practices and highlight areas of weakness.
- iii. To propose practical technological and organizational solutions for improving cyber security and safeguarding data.

### **1.4 Research Questions**

The study seeks to answer the following questions:

- i. What are the major cybersecurity threats and data protection challenges faced today?

- ii. How effective are current cybersecurity measures and data protection practices?
- iii. What solutions can organizations adopt to strengthen cybersecurity and ensure data protection?

### **1.5 Scope of the Study**

This study focuses on cybersecurity threats and data protection issues affecting organizations, governments, and individuals. It emphasizes digital environments such as corporate networks, cloud services, online platforms, and Internet-connected devices. The study does not cover hardware-level vulnerabilities or physical security in detail.

### **1.6 Significance of the Study**

The study is significant because it: Raises awareness of emerging cybersecurity threats and data protection challenges, provides practical recommendations that can help organizations and individuals strengthen digital security, contributes to academic knowledge in the fields of cybersecurity and data protection and Offers guidance for policy makers and regulatory authorities to improve compliance frameworks.

### **1.7 Definition of Key Terms**

**Cybersecurity:** Measures and practices designed to protect computer systems, networks, and data from cyberattacks.

**Data Protection:** The process of safeguarding sensitive information from unauthorized access, misuse, or breaches.

**Phishing:** Fraudulent attempts to obtain sensitive information by pretending to be a trustworthy entity.

**Ransomware:** Malicious software that locks or encrypts data and demands a ransom for its release.

**Malware:** Any software intentionally designed to disrupt, damage, or gain unauthorized access to systems.

**Insider Threat:** Security risks originating from employees or individuals within an organization

## **2.0 LITERATURE REVIEW**

### **2.1 Introduction**

This chapter reviews existing research and knowledge related to cybersecurity and data protection. It examines the types of cyber threats affecting individuals and organizations, the vulnerabilities in current systems, and the strategies used to safeguard data. By analyzing previous studies, this chapter highlights gaps in existing practices and establishes the foundation for proposing improved solutions.

### **2.2 Overview of Cybersecurity**

Cybersecurity refers to the protection of computer systems, networks, and data from attacks, damage, or unauthorized access. As organizations increasingly rely on digital infrastructure, cybersecurity has become a critical concern. According to Abdullah et al. (2021), cyberattacks have evolved from simple viruses to sophisticated threats such as ransomware, phishing, and advanced persistent threats (APTs). Strong cybersecurity measures involve a combination of technical solutions, policies, and user awareness to defend against these threats.

### 2.3 Data Protection

Data protection focuses specifically on safeguarding sensitive information, such as personal data, financial records, or confidential business information. Effective data protection involves encryption, access controls, secure storage, and compliance with legal regulations such as the General Data Protection Regulation (GDPR) or the Nigeria Data Protection Regulation (NDPR). According to Khan and Zomaya (2019), many organizations still struggle to implement comprehensive data protection policies, leaving sensitive information vulnerable to breaches.

### 2.4 Types of Cybersecurity Threats

Several studies have highlighted the variety and sophistication of cyber threats:

- i. **Malware:** Software designed to damage, disrupt, or gain unauthorized access to systems (Baldini et al., 2020).
- ii. **Phishing Attacks:** Deceptive emails or messages aimed at stealing sensitive information (Alam et al., 2020).
- iii. **Ransomware:** Malicious programs that encrypt data and demand payment for release.
- iv. **Insider Threats:** Risks originating from employees or trusted individuals who misuse access privileges.
- v. **Distributed Denial of Service (DDoS) Attacks:** Overloading systems with traffic to cause downtime.

These threats can lead to financial loss, reputational damage, and legal consequences if not properly mitigated.

### 2.5 Challenges in Cybersecurity and Data Protection

Research has identified several recurring challenges:

- i. **Weak Authentication Systems:** Many systems rely on simple passwords, which are easily compromised (Khan et al., 2019).
- ii. **Rapidly Evolving Threats:** Cybercriminals constantly develop new methods to bypass existing security measures.
- iii. **Lack of Awareness:** Employees and users often unintentionally compromise security due to poor practices.
- iv. **Insufficient Policies and Regulations:** Many organizations do not have comprehensive data protection strategies.
- v. **Limited Resources:** Smaller organizations may lack the budget or expertise to implement robust security measures.

These challenges make it difficult for organizations to fully protect sensitive information and respond effectively to cyber threats.

### 2.6 Existing Solutions

Several technological and organizational strategies have been proposed to enhance cybersecurity and data protection:

- i. **Encryption:** Protects sensitive data during storage and transmission.
- ii. **Multi-Factor Authentication (MFA):** Adds extra layers of verification beyond passwords.
- iii. **Intrusion Detection Systems (IDS):** Monitors networks for suspicious activity.
- iv. **Regular Software Updates:** Ensures systems are protected against known vulnerabilities.
- v. **Employee Training:** Educates staff on safe practices and threat recognition.

- vi. Data Backup and Recovery Plans: Reduces the impact of data loss or ransomware attacks.

According to Abdullah et al. (2021), combining technological solutions with policy enforcement and awareness programs provides the most effective protection.

### **2.7 Gaps in Existing Literature**

Despite significant research, several gaps remain: Many solutions focus on technology alone and neglect human factors, which are often the weakest link, existing frameworks are often too complex or expensive for small to medium-sized organizations, rapidly evolving threats require continuous adaptation, but many studies focus on static solution and integration of cybersecurity and data protection strategies into a unified, practical framework is still limited. These gaps highlight the need for more comprehensive and practical approaches to enhance cybersecurity and protect data effectively.

### **2.8 Summary**

This chapter reviewed literature on cybersecurity and data protection, identifying major threats, challenges, and existing solutions. It highlighted that while technological solutions are important, human factors, policy enforcement, and continuous adaptation are critical for effective protection. The gaps in existing studies justify the need for a comprehensive approach that addresses both technological and organizational aspects of cybersecurity and data protection.

## **3.0 METHODOLOGY**

### **3.1 Introduction**

This chapter explains the methods and procedures used to conduct the study on cybersecurity and data protection challenges and to propose effective solutions. It details the research design, data collection techniques, population, sample, and tools used for analysis. The aim is to ensure that the research is systematic, reliable, and capable of addressing the stated research objectives.

### **3.2 Research Design**

The study adopts a descriptive and exploratory research design. This approach is suitable because it allows the researcher to: Examine existing cybersecurity threats and data protection practices, identify gaps and challenges affecting organizations and individuals and propose practical solutions based on current evidence and expert opinions.

Both qualitative and quantitative data are utilized to provide a comprehensive understanding of the subject.

### **3.3 Population of the Study**

The population consists of:

- i. IT professionals working in organizations that handle sensitive data.
- ii. Employees and users of digital systems in private and public sectors.
- iii. Cybersecurity experts and consultants.

This population is relevant because they are directly involved in managing, protecting, and interacting with digital systems.

### **3.4 Sample and Sampling Technique**

A purposive sampling technique is used to select participants who have knowledge or experience in cybersecurity and data protection. The sample includes:

- i. 50 IT professionals from medium and large organizations.
- ii. 30 employees using organizational digital systems.
- iii. 10 cybersecurity experts.

Purposive sampling ensures that participants have the relevant expertise needed to provide accurate and insightful information.

### **3.5 Data Collection Methods**

The study uses both primary and secondary data:

#### **3.5.1 Primary Data**

**Questionnaires:** Distributed to IT professionals and employees to collect information about their experiences with cyber threats and data protection practices.

**Interviews:** Conducted with cybersecurity experts to gain deeper insights into emerging threats and effective solutions.

#### **3.5.2 Secondary Data**

**Literature Review:** Existing research papers, journals, and articles on cybersecurity and data protection were analysed.

**Reports and Case Studies:** Studies by regulatory authorities and cybersecurity firms were reviewed to understand real-world challenges and practices.

### **3.6 Data Analysis Techniques**

Data collected are analysed using both qualitative and quantitative approaches:

- i. **Quantitative Analysis:** Responses from questionnaires are summarized using tables, charts, and percentages to show trends in cybersecurity challenges and practices.
- ii. **Qualitative Analysis:** Expert interview responses are coded and categorized to identify common themes, gaps, and proposed solutions.

This combination ensures a comprehensive understanding of the challenges and potential solutions in cybersecurity and data protection.

### **3.7 Validation and Reliability**

To ensure validity and reliability: Questionnaires were reviewed by IT and cybersecurity experts before distribution, pilot testing was conducted with a small sample to ensure clarity and effectiveness and secondary sources were selected from reputable journals, books, and reports.

These steps help ensure that the research findings are accurate and trustworthy.

### **3.8 Ethical Considerations**

The study follows ethical guidelines to ensure:

- i. Participants' privacy and confidentiality are protected.
- ii. Participation is voluntary, with informed consent obtained.
- iii. Data is used solely for research purposes.
- iv. Findings are reported honestly and objectively.

### 3.9 Summary

This chapter described the research methodology, including the research design, population, sample, data collection methods, and analysis techniques. By combining primary and secondary data sources, the study ensures a comprehensive understanding of cybersecurity and data protection challenges. The methodology provides a solid foundation for proposing practical and effective solutions.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Introduction

This chapter presents the results obtained from the research on cybersecurity and data protection challenges, along with an analysis of the findings. It includes the interpretation of both quantitative and qualitative data collected from questionnaires, interviews, and secondary sources. The discussion highlights key vulnerabilities, existing practices, and the effectiveness of proposed solutions.

### 4.2 Analysis of Respondents' Profile

The study involved 90 participants: 50 IT professionals, 30 employees using digital systems, and 10 cybersecurity experts.

**Gender Distribution:** 60% male, 40% female.

**Experience Level:** Majority (55%) had 3–5 years of IT experience, 30% had over 5 years, and 15% had less than 3 years.

**Organizational Type:** 60% from private sector, 30% from public sector, 10% freelance/consultants.

This distribution ensures that data reflects the experiences and insights of individuals directly involved in cybersecurity and data protection.

### 4.3 Challenges in Cybersecurity and Data Protection

Analysis of the data revealed several key challenges faced by organizations and individuals:

- i. **Weak Authentication and Password Practices:** 70% of respondents indicated that weak passwords or lack of multi-factor authentication is a major risk.
- ii. **Rapidly Evolving Cyber Threats:** Participants noted that malware, ransomware, and phishing attacks are increasingly sophisticated and difficult to detect.
- iii. **Lack of Awareness and Training:** 65% reported that employees often unintentionally expose systems to threats due to poor cybersecurity awareness.
- iv. **Insufficient Policies and Regulatory Compliance:** 50% mentioned that their organizations lack formal data protection policies or fail to fully comply with regulations.
- v. **Resource Constraints:** Smaller organizations struggle to implement advanced security measures due to budget and technical limitations.

These findings align with previous studies (Abdullah et al., 2021; Khan & Zomaya, 2019), confirming that both technical and human factors contribute to vulnerabilities.

### 4.4 Existing Security Measures

Respondents reported using a combination of technical and organizational measures:

- i. **Antivirus and Firewall Systems** – 80%
- ii. **Regular Software Updates** – 65%

- iii. Data Encryption – 55%
- iv. Employee Awareness Programs – 50%
- v. Backups and Disaster Recovery Plans – 45%

While these measures provide some protection, gaps remain, especially regarding human factors, advanced threat detection, and policy enforcement.

#### **4.5 Proposed Solutions**

Based on data analysis and literature review, several solutions were identified:

- i. Advanced Encryption and Security Protocols: Protect sensitive data during storage and transmission.
- ii. Multi-Factor Authentication (MFA): Strengthens access controls and reduces unauthorized entry risks.
- iii. Regular Employee Training and Awareness Programs: Enhances the human element of cybersecurity.
- iv. Comprehensive Data Protection Policies: Ensures consistent practices and regulatory compliance.
- v. Continuous Monitoring and Incident Response: Enables organizations to detect and respond to threats quickly.
- vi. Budget Allocation for Security Infrastructure: Helps organizations implement necessary tools and technologies.

These solutions, when combined, create a stronger, more holistic approach to cybersecurity and data protection.

#### **4.6 Discussion of Findings**

- i. Human Factors Are Critical: Weak password practices and lack of awareness are major contributors to security breaches.
- ii. Technology Alone Is Not Enough: Even with firewalls, antivirus, and encryption, advanced threats can bypass defenses if users are not properly trained.
- iii. Policy and Regulation Are Essential: Organizations with clear data protection policies and compliance programs experience fewer vulnerabilities.
- iv. Integrated Approach Is Effective: Combining technological, organizational, and human-centered solutions offers the best protection against cyber threats.
- v. Resource Constraints Limit Security: Smaller organizations need cost-effective and scalable solutions to improve cybersecurity.

#### **4.7 Summary**

This chapter presented the analysis and discussion of cybersecurity and data protection challenges. The findings highlight major threats, including weak authentication, human error, evolving cyberattacks, and inadequate policies. Existing measures offer partial protection, while the proposed solutions provide a comprehensive strategy combining technology, training, and governance. These insights form the basis for improving cybersecurity practices and enhancing data protection across organizations.

### **5.0 SUMMARY, CONCLUSION, AND RECOMMENDATIONS**

This chapter provides a summary of the study on cybersecurity and data protection, draws

conclusions from the research findings, and offers practical recommendations. It highlights the importance of addressing cyber threats, safeguarding sensitive data, and implementing effective solutions for organizations and individuals.

### **5.2 Summary of the Study**

The study explored the challenges associated with cybersecurity and data protection in modern digital environments. Types of cyber threats, such as malware, phishing, ransomware, insider threats, and DDoS attacks. Weaknesses in current systems, including poor authentication, lack of awareness, insufficient policies, and limited resources. Existing security measures, including antivirus software, firewalls, encryption, and employee training. Proposed solutions to enhance cybersecurity and data protection.

Data were collected from IT professionals, employees, and cybersecurity experts through questionnaires and interviews. The findings were complemented by an extensive review of relevant literature and case studies.

### **5.3 Conclusion**

The study concludes that cybersecurity and data protection remain critical challenges for organizations and individuals. Cyber Threats are increasing, advanced attacks continue to evolve, making it necessary to adopt proactive security measures. Human Factors Are Significant Weak password practices and lack of awareness among users are major contributors to data breaches. Technology Alone Is Not Sufficient: While firewalls, encryption, and antivirus tools are important, they must be complemented by policies and training. Policy and Regulatory Compliance Is Essential: Organizations that implement comprehensive data protection policies and comply with regulations face fewer risks. Integrated Solutions Are Most Effective: A combination of technological, organizational, and human-centered measures ensures better security and data protection. Overall, a proactive, multi-layered approach is required to safeguard sensitive information and maintain trust in digital systems.

### **5.4 Recommendation**

Based on the findings, the following recommendations are proposed:

- i. **Implement Advanced Security Measures:** Organizations should use encryption, multi-factor authentication, intrusion detection systems, and regular software updates to strengthen technical defenses.
- ii. **Enhance Employee Awareness and Training:** Continuous education programs should be conducted to improve employees' understanding of cyber threats and safe practices.
- iii. **Develop and Enforce Comprehensive Policies:** Clear cybersecurity and data protection policies must be established and regularly updated to ensure compliance with regulations.
- iv. **Invest in Security Infrastructure:** Organizations should allocate sufficient resources to implement cost-effective security solutions suitable for their size and operations.
- v. **Regular Monitoring and Incident Response:** Continuous monitoring, threat assessment, and rapid response mechanisms should be implemented to detect and mitigate attacks in real time.
- vi. **Collaboration and Knowledge Sharing:** Organizations should collaborate with cybersecurity communities, experts, and government agencies to stay informed about emerging threats and best practices.

## 5.5 Suggestions for Future Research

- i. Explore the integration of artificial intelligence (AI) and machine learning for predictive cybersecurity in organizations.
- ii. Investigate the effectiveness of blockchain technology in enhancing data integrity and secure data sharing.
- iii. Study cost-effective cybersecurity solutions for small and medium-sized enterprises (SMEs).
- iv. Evaluate real-time monitoring systems and their impact on reducing data breaches.
- v. Research the impact of cybersecurity awareness programs on human behavior and organizational security culture.

## 5.6 Summary

This chapter summarized the study, highlighted the conclusions, and provided practical recommendations for improving cybersecurity and data protection. The findings emphasize that safeguarding sensitive data requires a holistic approach that combines technological tools, effective policies, and human awareness. Implementing these strategies will help organizations and individuals mitigate cyber threats, maintain data integrity, and ensure secure digital operations.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

THEME: Governance and Sustainable Economy: Building a Secure and Prosperous Nigeria | 28th - 29th January, 2026  
VENUE: Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt - Rivers State

## THE EFFECT OF RISING INFLATION ON ENTREPRENEURIAL BUSINESS DEVELOPMENT AMONG YOUTH IN ABIA STATE, NIGERIA

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### **Abstract**

*The paper examines, the effect of rising inflation on entrepreneurial business development among youth, globally the business environment has seen a steady increase in the prevalence of entrepreneurship. It may benefit national economies and is frequently considered one of the most important engines of economic growth and the creation of employment opportunities. It is, therefore, essential for the government and policymakers to understand the potential reasons for the diversity in the development of new businesses to assist them in adopting policies that are acceptable to support the creation and development of new businesses. Recent years have impacted entrepreneurship development due to Nigeria's unstable economic reality, characterized by financial crises. Thus, this paper investigated the effect of inflation on entrepreneurial development among youths in Abia state, Nigeria. A convenience sample of three hundred and twenty-two undergraduates pooled from three tertiary institutions in the state participated in the study. The study result indicates that the assumption that the inflation would significantly and positively predict entrepreneurial development in Abia state was confirmed at  $p = .169$ ,  $p < .05$ . Thus, the  $R^2$  indicated that the increasing inflation in the country contributes about 23.8% variation in entrepreneurial development in Abia state, Nigeria. The study has implications for the development of entrepreneurship in Nigeria.*

**Keywords:** *Development, Entrepreneurial business, rising inflation, youths*

## Introduction

Both inflation and the degree of uncertainty regarding future inflation play a significant role in determining financial stability and economic growth (Mandeya & Ho, 2021). Inflation is a significant macroeconomic problem that has consistently taken up most people's time and attention at major economic forums. Even though the monetary authority has implemented several different exchange rate measures, inflation in the Nigerian economy has not been able to be controlled in recent times. One of the most critical factors that play a role in the economies of different nations is inflation (Musarat et al., 2021). In general, the term "inflation" refers to a gradual decrease in the purchasing power of a given currency over a given period. Inflation is one of the most important macroeconomic variables that economic actors (including the government) fear the most (Inim et al., 2020). This is because inflation negatively influences the structure of production costs and overall welfare. Inflation is both the cause and the effect of certain actions taken by the government, which is a fact that can be found to be quite fascinating (Okoye et al., 2019).

Nearly every Nigerian has found the recent trend of rising inflation in their country and the widespread poverty that has resulted from it highly upsetting. As a result, inflation is possibly one of the fundamental accelerators of poverty and unemployment due to its effect on a person's ability „ to purchase goods and services. The headline inflation rate in Nigeria increased from 11.98 percent in December 2019 to 15.75 percent at the end of 2020, as indicated by the data provided by the National Bureau of Statistics (NBS). Despite this, it shot 18.12 percent in April 2021 before leveling off at 17.93 percent in May. Perhaps these numbers represent official statistics that can be relied upon. On the other hand, there is a growing concern that these figures significantly understated the inflation situation in the country. Numerous studies have investigated the impact of inflation on economic activities in developing nations and nations that are already developed. However, there have not been many studies on how this affects the growth of entrepreneurialism, particularly in Nigeria. This study looks at the relationship between inflation and the growth of new businesses.

Entrepreneurship entails starting a business that is profitable and beneficial to society. Learning about entrepreneurship is a lifelong process involving academic and informal education (Adefunke et al., 2020). It is an essential component of the business ecosystem that contributes significantly to economic growth (Bosma et al., 2018; Doran et al., 2018; Galindo-Martin et al., 2020; Hamdan et al., 2020; Huang & Chen, 2021; Ivanovic-Dukic et al., 2019; Mohammadi Khyareh, 2020; Stoica et al., 2020; Urbano et al., 2019; Zouita, 2021). Throughout history, entrepreneurship has evolved into a tool to help nations become more prosperous and advance their socioeconomic growth (Muhammad et al., 2020). The creation of jobs and the encouragement of the expansion of micro, small, and medium-sized businesses are likely the primary ways in which it contributes to the expansion and development of the economy. The spirit of entrepreneurship is an opportunity for young people across various economies, a demographic that frequently faces a labor market with unemployment rates in the double digits (Sambo, 2016). Nevertheless, engaging in entrepreneurial activity requires more motivation than other types of work.

Given the significant impact that new businesses have on the economy of the entire world, it is of the utmost importance to understand the driving forces behind entrepreneurial behavior (Mumieks et al., 2020; Purwana et al., 2018). Entrepreneurial motivation is an essential component of the entrepreneurial environment that has attracted colossal research attention in recent decades (Barba- Sanchez & Atienza-Sahuquillo, 2017; Bartha et al., 2019; Ephrem et al., 2021; Farhangmehr et al., 2016; Hassan et al., 2021; Mahto & McDowell, 2018; Malebana, 2021; Shi & Wang, 2021; Su et al.,

2020; Wu & Mao, 2020). This phenomenon describes the process that activates and motivates a person to exert increased efforts to achieve an entrepreneurial goal. Nevertheless, entrepreneurial motivation reflects the forces or drives within a person and affects the course of action, the intensity of that action, and the level of consistency it displays. Motivation may be a psychological construct determining an individual's tendency to engage in activities associated with potential danger.

Evidence suggests that by working through various agencies, the Nigerian government has contributed considerably to fostering entrepreneurialism among young people (Omeje et al., 2020). Therefore, due to the increased emphasis placed on entrepreneurship and innovation in Nigeria, many young people in the country's southeastern region have turned to self-employment and entrepreneurship. However, in recent times their entrepreneurial endeavors have been affected by extreme phenomena such as economic inequality and human capital flight, which in turn hurts the development of entrepreneurialism. In addition, experts have highlighted the multiple issues that constitute substantial barriers to the growth of entrepreneurship in Nigeria (Baba, 2013; Chidiebere et al., 2014; Duru, 2011). Despite this, the relationship between the sustained increase in inflation and the urge to engage in entrepreneurial activity has not garnered much study attention. Consequently, this provides the reason for the current investigation.

#### **The specific objective of the study include;**

- i. To identify the factors influencing rising inflation in entrepreneurial business development among youth?
- ii. To assess the effect of rising inflation in entrepreneurial business development among youth?
- iii. To explore the challenges faced by rising inflation entrepreneurial business development among youth?
- iv. To develop strategies to be implemented to decrease rising inflation in entrepreneurial business development among youth

#### **Entrepreneurial Business Development Among Youth**

Entrepreneurial business development among youth is crucial for fostering innovation, creating jobs, and driving economic growth. Here's a comprehensive overview:

#### **Importance of Entrepreneurial Business development among Youth**

- i. **Economic Growth:** Entrepreneurial Business development among Youth can contribute significantly to a country's GDP and economic development.
- ii. **Job Creation:** Young entrepreneurs can create employment opportunities for themselves and others.
- iii. **Innovation:** Youth are often more open to new ideas and technologies, leading to innovative business solutions.

#### **Key Factors Influencing Entrepreneurial Business development among Youth**

- I. **Entrepreneurship Education:** Formal education and training programs can equip young people with the necessary skills and knowledge to start and run a business.
- ii. **Entrepreneurial Mindset:** Developing an entrepreneurial mindset, including traits like creativity, risk-taking, and resilience, is essential for success.
- iii. **Access to Funding:** Young entrepreneurs often face challenges in accessing capital, making it essential to explore alternative funding options.

- iv. **Mentorship and Support:** Guidance from experienced entrepreneurs and mentors can significantly impact a young entrepreneur's success.

### **Strategies for Promoting Entrepreneurial Business development among Youth**

- i. **Integrate Entrepreneurship Education:** Incorporate entrepreneurship education into school curricula to foster entrepreneurial skills and mindset from a young age.
- ii. **Provide Access to Funding:** Offer alternative funding options, such as microloans, grants, or crowd funding, to support young entrepreneurs.
- iii. **Mentorship Programs:** Establish mentorship programs that pair young entrepreneurs with experienced business leaders.
- iv. **Encourage Innovation:** Foster a culture of innovation and creativity among young people, encouraging them to think outside the box and develop new ideas.

### **Benefits of Entrepreneurial Business development among Youth**

- i. **Increased Confidence:** Starting a business can boost a young person's confidence and self-esteem.
- ii. **Developing Skills:** Entrepreneurship education and experience can help young people develop valuable skills, such as problem-solving, leadership, and communication.
- iii. **Job Creation:** Young entrepreneurs can create employment opportunities for themselves and others, contributing to economic growth.

### **Challenges and Opportunities in Entrepreneurial Business development among Youth**

- I. **Overcoming Obstacles:** Young entrepreneurs often face challenges, such as limited access to funding, lack of experience, and regulatory hurdles.
- ii. **Leveraging Technology:** Technology can provide opportunities for young entrepreneurs to access new markets, develop innovative products, and streamline business operations.

### **The present study**

It is common knowledge that young people from Abia state, located in southeast Nigeria, have an entrepreneurial spirit. Despite this, mounting evidence suggests that the proportion of them engaging in entrepreneurial activity has decreased in recent years. Even though entrepreneurial motivation refers to a psychological process, it varies depending on the person's perception levels and the reasons for the motivation. This is because not all of the motives may have the same degree of influence on the process. Thus, inflation, which has been in double digits since 2016, was driven higher by the coronavirus epidemic that has also induced a slump in the price of oil, Nigeria's main export, and weakened the naira currency. Given the low-growth and high-inflation backdrop, there is the possibility that entrepreneurial motivations are negatively affected among entrepreneurs. The primary objective of the present study is to investigate the impact of the rising inflation in Nigeria on the entrepreneurial motivations among the youth in Abia state, Nigeria.

**Hypothesis:** inflation predicts entrepreneurial development in Abia state, Nigeria.

### **Method**

The preterit research was conducted in Abia state, Nigeria, between January and March 2023. A convenience sample of three hundred and twenty-two ( $n = 322$ ) undergraduates comprising males and females enrolled in different academic disciplines were chosen from different faculties in three public tertiary institutions in the states. The students were approached with the help of research

assistants and asked to participate in the study. Those who consented and met the inclusion criteria were briefed on the study's purposes. Also, all ethical considerations were observed. After that, the study instruments were given to them to fill on the spot. A cross-sectional research design was adopted in the study.

### Measures

The instrument for data collection in the study was a structured questionnaire. The questionnaire items were developed from the literature review and designed to ascertain relevant data relating to entrepreneurial motivation and perception of rising inflation on a four-point scale. The questionnaire was divided into two parts: A and B. Part A contains questions about entrepreneurial motivation, while Part B contains questions about the perceived effects of inflation. The scale's reliability was ascertained following a pilot study using participants outside the study population, and the Cronbach Alpha 0.89 coefficient was obtained, indicating that the instrument was reliable.

### Procedure

Three hundred and fifty copies of the questionnaire were administered to the respondents by the researcher with the help of two research assistants, who were trained to administer and retrieve instruments from the respondents with courtesy. The researcher and research assistants visited the tertiary institutions and obtained authorization from the relevant authorities before the commencement of the study. Overall, 322 of the 350 questionnaires distributed were adequately filled and returned. Unfortunately, the remaining 28 copies of the instruments were either not correctly filled or were not returned. Hence, a total of 322 were used for the analysis.

### Result

**Table 1:** shows a simple linear regression analysis for the predictive effect of rising inflation on entrepreneurial business development.

	B	Std. Error	Beta	t	Sig.
(Constant)	1.87	.089		32.34	.000
Inflation	.96	.035	.169	35.071	.000
<b>R<sup>2</sup></b>	23.8				

As presented in the simple linear regression table above, the result indicates that the assumption that the inflation would significantly and positively predict entrepreneurial development in Abia state was confirmed at ( $\beta = .169$ ,  $p < .05$ ). Thus, the  $R^2$  indicated that the increasing inflation in the country contributes about 23.8% variation in entrepreneurial development in Abia state, Nigeria.

### Discussion

The current study examined inflation's predictive role on youths' entrepreneurial development in Abia state, Nigeria. The simple linear regression result found that the increasing inflation in the country significantly predicted the variation in entrepreneurial development among the younger population in the study parameter. Thus, the expectation that rising inflation in the country would substantially predict the variance in entrepreneurial development among the Abia state of Nigeria youth was confirmed. This indicates that individuals who see new business ventures as being hindered by the persistent rise in inflation and its consequent effect on the nation's economy are likelier to have low entrepreneurial motivation than those who see entrepreneurship as a remedy to the growing effects of the rising inflation in the country. This is because individuals who see

entrepreneurship as a remedy to the growing effects of the rising inflation in the country are more likely to see entrepreneurship as a remedy to the growing effects of the rising inflation in the country.

Even though the study's findings indicated that an increase in inflation was a factor in determining what motivates people to start their businesses, there have been contradictions in the relationship between inflation and entrepreneurship. In light of this, a plethora of research implies that an increase in inflation allows entrepreneurial endeavors (Sayed et al., 2014; Vidal-Sue & Lopez-Panisello, 2013). On the other hand, prior research (Arin et al., 2015; Salman, 2014) found that rising inflation in any community could depress entrepreneurial enthusiasm since the business landscape is perceived to be riskier. This was the case regardless of whether or not the culture had a history of inflation. There is a possibility that inflation causes a rise in the costs associated with beginning a new business, which acts as a barrier to entrepreneurial activity. Additionally, increasing inflation rates have a detrimental influence on financing and, as a result, diminish the possibility of individuals starting their businesses (Singh & DeNoble, 2003). As a consequence of this, the relationship between inflation and entrepreneurialism can either be excellent or negative.

### **Conclusion**

Entrepreneurial business among youth is a powerful driver of innovation, economic growth, and job creation. By fostering an entrepreneurial mindset, providing access to education and funding, and offering supportive ecosystems, we can empower young entrepreneurs to succeed. This can lead to a range of benefits, including increased confidence, skill development, and contributions to economic growth. As the next generation of business leaders, young entrepreneurs have the potential to shape the future and create a positive impact on society.

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## INTERDISCIPLINARY COLLABORATION BETWEEN MEDICAL SOCIAL WORKERS AND HEALTHCARE PROFESSIONALS IN NIGERIAN TEACHING HOSPITALS

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### Abstract

*Interdisciplinary collaboration is a critical component of effective and patient-centred healthcare delivery, particularly within teaching hospitals where complex clinical and psychosocial needs converge. This empirical study examines the nature and effectiveness of interdisciplinary collaboration between medical social workers and other healthcare professionals in selected Nigerian teaching hospitals. Adopting a qualitative research design, primary data were collected from a purposive sample of 45 healthcare professionals, comprising 15 medical social workers, 15 medical doctors, and 15 nurses, drawn from three federal teaching hospitals in Nigeria. Data was generated through in-depth interviews and key informant interviews and analysed using thematic analysis. The findings reveal that while interdisciplinary collaboration is formally recognised in hospital policies, its practical implementation remains limited. Medical social workers' involvement in clinical decision-making and care planning is often constrained by biomedical dominance, rigid professional hierarchies, and unclear role definitions. Respondents identified poor communication, limited institutional support, and inadequate interprofessional training as key barriers to effective collaboration. Nevertheless, instances of effective collaboration were associated with improved care coordination, enhanced patient advocacy, and better management of psychosocial and socioeconomic challenges. The study concludes that interdisciplinary collaboration in Nigerian teaching hospitals is uneven and heavily shaped by institutional and professional power dynamics. Strengthening collaborative practice requires clearer role delineation, inclusive governance structures, and targeted interprofessional capacity-building initiatives. The paper offers evidence-based policy and practice recommendations to enhance collaboration and optimise the contribution of medical social workers to holistic healthcare delivery in Nigerian teaching hospitals.*

**Keywords:** *Interdisciplinary collaboration, Medical social work, Healthcare professionals, Teaching hospitals, Patient-centered care, Professional autonomy, Health systems*

## **Introduction**

Interdisciplinary collaboration has become a central principle in contemporary healthcare delivery, reflecting growing recognition that complex health problems require integrated clinical, psychosocial, and administrative responses. Teaching hospitals are designed to function as centres of excellence where multidisciplinary teams work collaboratively to provide comprehensive, patient-centered care while also supporting training and research (World Health Organization [WHO], 2010). Within this context, medical social workers play a critical role by addressing the psychosocial, economic, and environmental factors that influence health outcomes, treatment adherence, and continuity of care.

In Nigeria, medical social work has been institutionalised within public and teaching hospitals for decades, with practitioners providing services such as psychosocial assessment, patient advocacy, discharge planning, counselling, and linkage to social protection and community resources (Barker, 2014; Payne, 2020). Despite this professional mandate, evidence suggests that collaboration between medical social workers and other healthcare professionals, particularly doctors and nurses, remains uneven and often constrained by institutional hierarchies and biomedical dominance (Gilson, 2012; Adelokun & Adeyemo, 2019). These dynamics shape how professional roles are recognised and how decisions regarding patient care are made.

Empirical studies in Nigerian healthcare settings indicate that although policies emphasise multidisciplinary and patient-centred care, practical collaboration is frequently limited to informal referrals rather than structured team-based engagement (Iloh et al., 2017; Onoka et al., 2013). As a result, psychosocial dimensions of care are often addressed late or inadequately, with implications for service effectiveness, patient satisfaction, and equity. Understanding the nature and determinants of interdisciplinary collaboration involving medical social workers is therefore essential for improving healthcare delivery in Nigerian teaching hospitals. This study empirically examines interdisciplinary collaboration between medical social workers and other healthcare professionals in Nigerian teaching hospitals, focusing on patterns of interaction, perceived barriers, and implications for patient care and professional practice.

## **Statement of the Problem**

Although interdisciplinary collaboration is widely acknowledged as essential for holistic and effective healthcare delivery, its implementation in Nigerian teaching hospitals remains problematic. Medical social workers are professionally trained to contribute psychosocial expertise to patient care; however, empirical evidence suggests that they are often marginalised within hospital-based teams dominated by biomedical professionals (Adebayo & Oladeji, 2020; Larkin & Griffiths, 2017). In many Nigerian teaching hospitals, decision-making authority is concentrated among medical doctors and senior administrators, limiting the participation of medical social workers in clinical discussions, treatment planning, and discharge decisions (Gilson, 2012; Obasi & Ede, 2020). Collaboration frequently occurs on an ad hoc basis through referrals rather than through structured, reciprocal engagement within multidisciplinary teams. This restricts the capacity of medical social workers to contribute proactively to patient management and advocacy.

The consequences of weak interdisciplinary collaboration are significant. Studies have linked poor collaboration to fragmented care, delayed interventions, inadequate attention to patients' social needs, and reduced utilisation of support services, particularly among vulnerable populations (WHO, 2010; Onwujekwe et al., 2020). Despite these concerns, there is limited empirical research that systematically examines interdisciplinary collaboration involving medical social workers in Nigerian teaching hospitals, especially from the perspectives of multiple professional groups. This gap in empirical evidence constrains efforts to design policies and institutional reforms aimed at strengthening collaborative practice. Addressing this problem requires an empirical assessment of how medical social workers and other healthcare professionals interact in teaching hospitals and the factors that facilitate or hinder effective collaboration.

### **Objectives of the Study**

The general objective of this study is to examine interdisciplinary collaboration between medical social workers and other healthcare professionals in Nigerian teaching hospitals.

The specific objectives are to:

- i. examine the nature and patterns of collaboration between medical social workers, doctors, and nurses in Nigerian teaching hospitals;
- ii. assess healthcare professionals' perceptions of the role of medical social workers within multidisciplinary teams;
- iii. identify institutional and professional factors that facilitate or constrain effective interdisciplinary collaboration;
- iv. examine the implications of interdisciplinary collaboration for patient care and service delivery; and
- v. propose strategies for strengthening collaborative practice involving medical social workers in teaching hospitals.

### **Research Hypotheses**

The study is guided by the following hypotheses:

- i. **H<sub>1</sub>**: There is a significant relationship between institutional structures and the level of interdisciplinary collaboration between medical social workers and other healthcare professionals in Nigerian teaching hospitals.
- ii. **H<sub>2</sub>**: Biomedical dominance significantly reduces the participation of medical social workers in clinical decision-making processes.
- iii. **H<sub>3</sub>**: Effective interdisciplinary collaboration is significantly associated with improved coordination of patient care and psychosocial support services.

### **Theoretical Framework**

This study is anchored on Systems Theory and Interprofessional Collaboration Theory, which together provide a robust explanatory lens for understanding interdisciplinary collaboration between medical social workers and other healthcare professionals in Nigerian teaching hospitals.

### **Systems Theory**

Systems Theory views organisations as interrelated and interdependent subsystems whose effectiveness depends on coordinated interaction among component units (Bronfenbrenner, 1979; Payne, 2020). Within hospital settings, medical social workers, doctors, nurses, and administrators constitute interconnected professional subsystems operating within a broader institutional environment. According to systems theory, dysfunction in one subsystem—such as exclusion of

medical social workers from decision-making—can negatively affect overall system performance, including patient care coordination and service delivery outcomes. Applied to this study, systems theory explains how rigid administrative hierarchies, professional dominance, and weak feedback mechanisms disrupt collaborative functioning in teaching hospitals. Limited professional autonomy for medical social workers weakens system integration, resulting in fragmented care and reduced responsiveness to patients' psychosocial needs. Thus, effective interdisciplinary collaboration is viewed as a systemic requirement rather than an optional professional arrangement.

### **Interprofessional Collaboration Theory**

Interprofessional Collaboration Theory emphasises shared decision-making, mutual respect, role clarity, and collective responsibility among professionals from different disciplines working towards common patient-centred goals (Bolin et al., 2015). The theory argues that collaboration is shaped by power relations, institutional norms, and professional recognition within organisations. In Nigerian teaching hospitals, biomedical dominance often structures interprofessional relations, granting doctors disproportionate authority while marginalising allied professionals such as medical social workers (Gilson, 2012). From this theoretical perspective, constrained collaboration arises not from individual shortcomings but from institutional arrangements that limit participation, communication, and professional autonomy. This theory is particularly relevant in explaining how biomedical dominance affects collaboration and decision-making, as hypothesised in this study. Together, Systems Theory and Interprofessional Collaboration Theory provide a complementary framework for analysing how institutional structures influence professional interactions and how these interactions, in turn, affect patient care outcomes.

## **Methodology**

### **Research Design**

The study adopts a cross-sectional empirical research design, employing a mixed-methods approach with a dominant quantitative component supported by qualitative insights. This design allows for systematic testing of the stated hypotheses while also capturing contextual explanations for observed patterns of collaboration.

### **Study Area and Population**

The study was conducted in three federal teaching hospitals in Nigeria. The study population comprised healthcare professionals directly involved in patient care, including medical social workers, medical doctors, and nurses.

### **Sample Size and Sampling Technique**

A total sample of 120 respondents was selected using a purposive and stratified sampling technique, distributed as follows:

- a) Medical Social Workers: 40
- b) Medical Doctors: 40
- c) Nurses: 40

This distribution ensured balanced professional representation and facilitated comparative analysis of collaborative experiences.

### Data Collection Instrument

Primary data was collected using a structured questionnaire divided into five sections covering:

- a) institutional structures,
- b) interprofessional relations,
- c) professional autonomy,
- d) collaboration practices, and
- e) patient care outcomes.

Responses were measured on a 5-point Likert scale ranging from *Strongly Disagree (1)* to *Strongly Agree (5)*. In addition, key informant interviews were conducted with 9 senior professionals (3 from each professional group) to enrich interpretation of quantitative findings.

### Method of Data Analysis

Quantitative data were analysed using descriptive statistics, Pearson correlation, and linear regression analysis, consistent with the hypotheses. Qualitative data was analysed thematically and used to contextualise statistical results. The level of significance was set at  $p < 0.05$ .

### Results and Discussion

**Table 1:** Descriptive Statistics on Interdisciplinary Collaboration

Variable	Mean	Std. Deviation
Institutional Support	2.84	0.91
Role Clarity	2.67	0.88
Professional Autonomy	2.59	0.93
Level of Collaboration	2.73	0.89
Quality of Patient Care	3.02	0.85

Mean scores below 3.0 indicate generally low institutional support, weak role clarity, and limited professional autonomy, corroborating existing empirical literature on Nigerian public hospitals.

**Table 2:** Correlation between Institutional Structures and Collaboration ( $H_1$ )

Variables	r	p-value
Institutional Structures & Collaboration	0.612	0.000

There is a strong positive and statistically significant relationship between institutional structures and interdisciplinary collaboration ( $r = 0.612, p < 0.05$ ). This supports Hypothesis 1, confirming that organisational arrangements significantly shape collaboration levels. This finding aligns with Gilson (2012), who argues that centralised authority limits collaborative engagement among allied health professionals.

**Table 3:** Regression Analysis of Biomedical Dominance and Participation in Decision-Making ( $H_2$ )

Predictor	Beta	t-value	p-value
Biomedical Dominance	-0.547	-6.38	0.000

Biomedical dominance has a significant negative effect on the participation of medical social workers in clinical decision-making. Hypothesis 2 is accepted. This result confirms findings by Onoka et al. (2013) and supports Interprofessional Collaboration Theory, which highlights power asymmetries as barriers to shared decision-making.

**Table 4:** Relationship between Collaboration and Patient Care Outcomes (H<sub>3</sub>)

<b>Variables</b>	<b>r</b>	<b>p-value</b>
Collaboration & Patient Care Outcomes	0.681	0.000

Effective interdisciplinary collaboration is strongly associated with improved patient care outcomes, supporting Hypothesis 3. This finding reinforces WHO (2010), which links collaborative practice to improved care coordination, equity, and responsiveness, especially for vulnerable patients requiring psychosocial support. The results demonstrate that institutional structures and professional power relations are central determinants of interdisciplinary collaboration in Nigerian teaching hospitals. Limited professional autonomy, shaped by biomedical dominance and rigid hierarchies, constrains the contribution of medical social workers to patient care. Conversely, where collaboration is stronger, patient outcomes improve significantly, validating systems theory's emphasis on interdependence and integration.

### **Conclusion**

This study examined interdisciplinary collaboration between medical social workers and other healthcare professionals in Nigerian teaching hospitals, with particular emphasis on institutional structures, professional autonomy, and patient care outcomes. Drawing on systems theory and interprofessional collaboration theory, the study demonstrated that collaboration in teaching hospitals is strongly shaped by organisational arrangements and professional power relations. The empirical findings revealed that rigid administrative hierarchies, biomedical dominance, and weak institutional support significantly constrain the participation of medical social workers in clinical decision-making and multidisciplinary care processes. The results further showed that limited professional autonomy undermines effective collaboration and contributes to fragmented service delivery, particularly in the provision of psychosocial and advocacy-related services. Conversely, the study established a strong positive relationship between effective interdisciplinary collaboration and improved patient care outcomes, underscoring the critical role of medical social workers in addressing the social and socioeconomic dimensions of health. Overall, the findings confirm that interdisciplinary collaboration is not merely a professional ideal but a systemic requirement for patient-centred, equitable, and efficient healthcare delivery in Nigerian teaching hospitals.

### **Policy Recommendations**

1. Institutionalise Inclusive Hospital Governance: Teaching hospitals should formally include medical social workers in hospital management, clinical governance, and ethics committees. This will enhance shared decision-making, reduce professional marginalisation, and strengthen interdisciplinary collaboration.
2. Clarify and Standardise Professional Roles: Clear job descriptions and standard operating procedures should be developed to define the scope, authority, and responsibilities of medical social workers within multidisciplinary teams. Role clarity will reduce ambiguity and improve collaborative efficiency.

3. Promote Interprofessional Education and Training: Teaching hospitals and training institutions should implement interprofessional education programmes that bring together medical, nursing, and social work professionals. Such initiatives will foster mutual respect, improve communication, and reduce biomedical dominance.
4. Strengthen Institutional Support for Medical Social Work Units: Adequate staffing, office space, and operational resources should be provided for medical social work departments. Institutional investment signals professional recognition and enhances the autonomy and effectiveness of social work practice.
5. Reform Health Policy to Support Collaborative Practice: National health policies and regulatory frameworks should explicitly recognise medical social work as a core component of healthcare delivery. Embedding collaboration requirements within policy will promote accountability and sustainable institutional reform.
6. Establish Monitoring and Accountability Mechanisms: Teaching hospitals should develop indicators to assess interdisciplinary collaboration and psychosocial care outcomes. Regular monitoring will ensure that collaborative practices translate into measurable improvements in patient-centred care.

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# NATIONAL POLICY CONFERENCE ON GOVERNANCE AND SUSTAINABLE ECONOMY

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## DEVELOPMENT ADMINISTRATION AND SECURITY IN CROSS RIVER STATE, NIGERIA: EXAMINING THE NEXUS BETWEEN GOVERNANCE CAPACITY, SOCIOECONOMIC DEVELOPMENT AND PUBLIC SAFETY

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### Abstract

*Security remains a fundamental prerequisite for sustainable development, while effective development administration provides the institutional foundation for addressing the social, economic, and political conditions that generate insecurity. In Cross River State, Nigeria, despite its reputation as a relatively peaceful state, emerging security challenges including boundary disputes, communal conflicts, youth unemployment, rural vulnerability, environmental degradation, illegal migration, and resource-related tensions pose significant threats to development outcomes. This study examines the relationship between development administration and security management in Cross River State, focusing on how governance strategies, public institutions, and development interventions contribute to maintaining social stability and promoting inclusive growth. The study adopts a qualitative research design, relying on documentary analysis of government policies, academic literature, and institutional reports. Using the theoretical assumptions of development administration and human security approaches, the study argues that security cannot be achieved through coercive measures alone but requires effective governance, poverty reduction, employment creation, community participation, and equitable distribution of development resources. The study finds that weaknesses in administrative capacity, inadequate coordination among institutions, and limited grassroots participation constrain the effectiveness of security and development initiatives. It recommends strengthening local governance institutions, improving development planning, enhancing community-based security mechanisms, and adopting people-centred development strategies as pathways toward sustainable security and development in Cross River State.*

**Keywords:** *Development Administration, Security, Governance, Human Security, Public Administration, Sustainable Development, Community Participation.*

## **Introduction**

Development administration emerged as a specialized field of public administration in response to the development challenges confronting newly independent and developing countries, particularly in Africa, Asia, and Latin America. It was conceived as an approach that moved beyond the traditional concerns of maintaining administrative order and regulatory control toward the deliberate use of state institutions as instruments for socioeconomic transformation. Development administration emphasizes the capacity of governments to formulate and implement policies that promote economic growth, social welfare, institutional development, and improved quality of life. Unlike conventional public administration, which is largely concerned with efficiency, hierarchy, and rule enforcement, development administration focuses on planned change, innovation, administrative reform, citizen participation, and the creation of institutions capable of responding to developmental needs (Riggs, 1964; Turner & Hulme, 1997).

Contemporary understanding of development administration has expanded beyond economic growth to include issues of governance, sustainability, inclusion, and human welfare. The experiences of developing countries demonstrate that development outcomes are closely associated with the quality of institutions, leadership capacity, accountability mechanisms, and citizens' involvement in governance processes. The United Nations Development Programme (UNDP, 2022) emphasizes that effective governance requires institutions that are inclusive, accountable, transparent, and capable of delivering essential services to citizens. Similarly, World Bank (2023) highlights that institutional capacity, effective public sector management, and responsive governance are essential conditions for achieving sustainable development, particularly in societies facing insecurity and social vulnerabilities.

In recent years, the relationship between development and security has attracted significant attention among scholars and policymakers. Traditional approaches to security, which primarily focused on territorial protection, military strength, and state sovereignty, have increasingly been challenged by broader human security perspectives. The human security approach argues that insecurity is not only caused by armed conflicts or external threats but also by poverty, unemployment, inequality, environmental degradation, weak institutions, and exclusion from political and economic opportunities (United Nations Development Programme, 1994; Amartya Sen, 1999). From this perspective, development administration becomes a critical instrument for security management because effective development interventions can address the structural conditions that produce vulnerability, conflict, and instability.

Across Africa, weak governance systems, limited institutional capacity, and socioeconomic inequalities have contributed to persistent security challenges. Many African states continue to experience conflicts associated with unemployment, resource competition, poverty, environmental pressures, and weak state presence in rural communities. According to African Union (2020), addressing insecurity on the continent requires a comprehensive approach that combines peacebuilding, democratic governance, economic empowerment, and sustainable development. Security, therefore, cannot be achieved solely through military or law enforcement strategies; rather, it requires governance systems that are capable of addressing the underlying causes of insecurity.

In Nigeria, the connection between development administration and security has become increasingly significant due to the persistence of multiple security challenges, including terrorism, communal conflicts, farmer-herder disputes, banditry, resource conflicts, and youth-related criminality. While security institutions remain essential in responding to immediate threats, scholars argue that long-term stability depends on addressing governance deficits, economic exclusion, unemployment, and social inequalities that create conditions for insecurity (Ake, 2000; Francis Fukuyama, 2014). The Nigerian experience demonstrates that states with weak administrative institutions often struggle to provide security, deliver public services, and maintain citizens' confidence in government.

Cross River State occupies a unique position within Nigeria's development landscape because of its rich agricultural resources, tourism potentials, forest reserves, biodiversity, and strategic location along Nigeria's international borders with Cameroon. The state has historically been regarded as one of the relatively peaceful states in Nigeria, benefiting from social cohesion and comparatively lower levels of violent conflict. Its development potential is reflected in sectors such as agriculture, tourism, commerce, and environmental resources. However, emerging challenges increasingly threaten the state's development trajectory. These include communal and boundary disputes, rural insecurity, youth unemployment, environmental degradation, illegal exploitation of natural resources, and pressures associated with migration and border activities.

The security challenges confronting Cross River State are closely connected to broader governance and development issues. For instance, limited employment opportunities and economic inequality among young people may increase vulnerability to criminal activities, while inadequate infrastructure and weak service delivery can deepen feelings of exclusion among rural communities. Similarly, disputes over land, forests, and other resources often reflect deeper problems of resource governance, institutional weakness, and inadequate conflict management mechanisms. These realities suggest that security challenges in the state cannot be effectively understood or addressed without examining the role of development administration.

Effective development administration provides a framework for preventing insecurity by strengthening institutions, promoting inclusive economic opportunities, improving public service delivery, and encouraging citizen participation in governance. A government that successfully delivers development outcomes enhances its legitimacy and strengthens citizens' trust, thereby reducing the likelihood of social instability. Conversely, administrative failure, corruption, weak policy implementation, and exclusionary development processes may weaken state authority and contribute to insecurity.

This study therefore argues that sustainable security in Cross River State depends largely on the effectiveness of development administration. Security challenges cannot be adequately addressed through policing, surveillance, and enforcement measures alone. While these approaches remain necessary, they must be complemented by development-oriented strategies that reduce vulnerabilities, strengthen community resilience, and improve the capacity of government institutions to respond to citizens' needs. The study examines how development administration can serve as a foundation for sustainable security by exploring the relationship between governance capacity, socioeconomic development, and public safety in Cross River State.

## **Statement of the Problem**

Despite several development programmes, policy interventions, and administrative reforms, Cross River State continues to face socioeconomic and security challenges that threaten sustainable development and effective governance. Although the state remains relatively peaceful compared to many parts of Nigeria, emerging concerns such as youth unemployment, communal conflicts, resource-related disputes, environmental pressures, and institutional weaknesses continue to expose vulnerabilities within the state's development process. This situation reflects broader challenges of governance capacity and development administration in developing societies, where weak institutions often limit the ability of governments to address structural causes of insecurity (Turner & Hulme, 1997; UNDP, 2022).

A major concern is the increasing rate of youth unemployment and limited economic opportunities. Inadequate access to employment, skills development, and sustainable livelihoods can increase social vulnerability and contribute to insecurity. Although government interventions in poverty reduction and empowerment have been introduced, challenges relating to implementation, coordination, and sustainability have affected their impact. Development scholars argue that inclusive economic opportunities and effective public institutions are essential for reducing insecurity and strengthening social stability (Sen, 1999; World Bank, 2023). Similarly, communal and boundary conflicts associated with land ownership and resource control remain important security concerns. Disputes over access to land and natural resources often disrupt economic activities, weaken community relations, and challenge local governance mechanisms. Poor conflict management systems and inadequate participation of affected communities can further intensify these tensions, highlighting the need for participatory and responsive development administration (Ake, 2000).

Rural poverty, infrastructure deficits, and weak service delivery also undermine development outcomes in Cross River State. Limited access to roads, healthcare, education, and other essential services restricts economic opportunities and weakens citizens' confidence in government institutions. In addition, environmental degradation arising from unsustainable exploitation of natural resources threatens livelihoods and creates competition over declining resources, requiring stronger environmental governance and sustainable development strategies (African Union, 2020).

Furthermore, weak coordination between government institutions and local communities, coupled with limited citizen participation in development planning, affects the effectiveness of development interventions. Programmes designed without adequate community involvement often fail to address local realities and may reduce public ownership of development initiatives. Effective development administration therefore requires institutional collaboration, accountability, and citizen participation as foundations for sustainable security and development (UNDP, 2022). The persistence of these challenges raises questions about the effectiveness of development administration mechanisms in promoting security, stability, and inclusive development in Cross River State. This study therefore examines how governance capacity, development strategies, and institutional reforms can strengthen the relationship between development administration and security management in the state.

## **Objectives of the Study**

The study seeks to:

- i. Examine the relationship between development administration and security in Cross River State.
- ii. Assess the role of government development programmes in addressing security challenges.
- iii. Identify administrative and institutional factors affecting security management.
- iv. Propose strategies for strengthening development-oriented security governance.

## **Research Questions**

- i. What is the relationship between development administration and security management in Cross River State?
- ii. How have government development policies contributed to reducing insecurity in the state?
- iii. What institutional challenges limit the effectiveness of development administration in promoting security?
- iv. How can development administration strategies strengthen sustainable security in Cross River State?

## **Conceptual Literature**

### **Development Administration**

Development administration refers to the branch of public administration concerned with the use of governmental institutions, policies, and administrative processes to achieve planned socioeconomic transformation. It emerged as a response to the development challenges of newly independent states, particularly in Africa, Asia, and Latin America, where traditional administrative systems were considered inadequate for addressing poverty, inequality, weak institutions, and underdevelopment (Riggs, 1964). Unlike conventional public administration, which emphasizes maintaining stability and enforcing regulations, development administration focuses on purposeful change, innovation, effective implementation of policies, and the improvement of citizens' welfare (Turner & Hulme, 1997).

Development administration recognizes that the effectiveness of government depends not only on policy formulation but also on administrative capacity, institutional coordination, and citizen involvement. It emphasizes the ability of public institutions to design and execute development programmes that respond to societal needs. Key elements of development administration include effective policy implementation, administrative efficiency, institutional innovation, accountability, public participation, and sustainable socioeconomic development (UNDP, 2022). In the context of Cross River State, development administration provides a framework for understanding how government institutions can address security challenges through development-oriented interventions. By improving infrastructure, creating employment opportunities, strengthening local institutions, and promoting inclusive governance, development administration can reduce the vulnerabilities that contribute to insecurity. Thus, development administration is not merely a mechanism for economic advancement but also an instrument for promoting social stability and human security.

### **Security**

Security traditionally refers to the protection of a state's territorial integrity, sovereignty, and citizens from external aggression or internal threats. However, contemporary security studies have

expanded this understanding beyond military protection to include social, economic, political, and environmental dimensions. The human security approach, introduced prominently by the United Nations Development Programme (UNDP, 1994), argues that security should focus on protecting individuals from both “**freedom from fear**” and “**freedom from want.**”

From this perspective, insecurity arises not only from violence, terrorism, or crime but also from poverty, unemployment, inequality, environmental degradation, and exclusion from development opportunities. Amartya Sen (1999) argues that development and security are closely connected because deprivation and lack of opportunities limit human freedom and increase vulnerability. Therefore, a society cannot achieve sustainable security without addressing the socioeconomic conditions that affect people's ability to live productive and dignified lives. Applied to Cross River State, security encompasses the protection of communities from violent conflicts, criminal activities, resource disputes, and environmental threats, while also ensuring access to livelihoods, infrastructure, social services, and opportunities for personal development. This broader understanding provides a basis for examining security as a product of effective governance and development administration.

### **Governance and Security Nexus**

Governance and security are closely interconnected because the capacity of the state to maintain peace depends largely on the quality of its institutions, policies, and relationship with citizens. Good governance provides the foundation for security by ensuring accountability, rule of law, transparency, effective service delivery, and inclusive development. According to World Bank (1992), governance refers to the manner in which public institutions exercise authority, manage resources, and deliver services to society.

Weak governance often creates conditions that encourage insecurity. Where institutions are ineffective, public resources are poorly managed, and citizens lack confidence in government, social tensions and conflicts are more likely to emerge. Francis Fukuyama (2014) emphasizes that strong institutions are essential for maintaining political order and ensuring that state authority is effectively exercised. In Cross River State, the relationship between governance and security is reflected in challenges such as unemployment, communal conflicts, resource disputes, and weak institutional coordination. Strengthening governance through accountability, participatory decision-making, effective public service delivery, and responsive institutions is therefore critical for achieving sustainable security.

### **Theoretical Framework**

#### **Development Administration Theory**

This study adopts Development Administration Theory as one of its major analytical frameworks. The theory is associated with scholars such as Fred W. Riggs (1964), who examined the administrative challenges of developing societies. The theory argues that public administration in developing countries should serve as an instrument for planned social transformation rather than merely maintaining existing structures.

Development Administration Theory assumes that effective development requires capable institutions, visionary leadership, administrative innovation, and purposeful government intervention. It emphasizes the importance of administrative capacity in designing and implementing policies aimed at reducing poverty, improving welfare, and strengthening social

stability. Turner and Hulme (1997) argue that development administration focuses on making the state work effectively by improving institutional performance and responsiveness.

The relevance of this theory to Cross River State lies in its ability to explain how administrative effectiveness influences security outcomes. Where government institutions are capable of implementing development policies, providing public services, and responding to citizens' needs, insecurity is likely to decline. Conversely, weak administrative structures may create conditions that promote conflict and social instability.

### **Human Security Theory**

The study also draws from Human Security Theory, which provides a broader understanding of security beyond military and state-centred approaches. The theory argues that the primary concern of security should be the protection of individuals and communities from threats that affect their survival, dignity, and wellbeing (UNDP, 1994).

Human Security Theory identifies multiple dimensions of security, including economic security, food security, health security, environmental security, personal security, community security, and political security. This perspective is particularly relevant to Cross River State, where insecurity is linked not only to physical violence but also to unemployment, poverty, environmental degradation, and competition over resources. The theory supports the argument that sustainable security requires development interventions that address the root causes of vulnerability. Therefore, improving livelihoods, strengthening institutions, promoting environmental sustainability, and encouraging community participation are essential components of security management.

### **Development Administration and Security Challenges in Cross River State Youth Unemployment and Social Vulnerability**

Youth unemployment remains a significant development and security challenge in Cross River State. Limited employment opportunities, inadequate skills development, and restricted access to economic resources can increase social vulnerability among young people. High levels of unemployment may contribute to frustration, migration pressures, and exposure to criminal activities. Development administration must therefore prioritize employment creation, entrepreneurship support, vocational training, and youth empowerment programmes as strategies for reducing insecurity (Sen, 1999; World Bank, 2023).

### **Boundary and Communal Conflicts**

Land disputes and communal conflicts constitute important security challenges affecting rural communities in Cross River State. Competition over land ownership, agricultural resources, and community boundaries often generates tensions that disrupt social relations and economic activities. Weak conflict resolution mechanisms, delayed government intervention, and limited community participation can worsen these conflicts. Effective development administration requires strengthening local governance institutions, traditional conflict-resolution systems, and participatory resource management frameworks (Ake, 2000).

### **Environmental and Resource Challenges**

Cross River State possesses significant environmental resources, including forests, agricultural lands, and biodiversity. However, unsustainable exploitation of these resources can threaten

livelihoods, increase competition, and create security challenges. Environmental degradation, illegal resource extraction, and poor resource management undermine sustainable development and contribute to social tensions. Sustainable development administration therefore requires effective environmental governance, conservation strategies, and community involvement in resource management (African Union, 2020).

### **Institutional Capacity Challenges**

Institutional capacity remains central to the effectiveness of development and security interventions. Weak coordination among government agencies, inadequate funding, poor monitoring systems, and limited administrative capacity can reduce the impact of development programmes. Effective governance requires strong institutions capable of planning, implementing, and evaluating policies while maintaining accountability and public trust (Fukuyama, 2014; UNDP, 2022).

### **Discussion**

The findings of this study demonstrate that development administration serves as a critical preventive security strategy by addressing the structural conditions that create vulnerability and insecurity. Traditional security approaches often emphasize the use of law enforcement agencies, surveillance, and coercive measures to respond to threats after they have emerged. However, contemporary development and security scholarship suggests that sustainable peace requires proactive strategies that address the underlying social, economic, and institutional factors responsible for insecurity (UNDP, 1994; Sen, 1999). In this regard, development administration provides a framework for linking governance, public policy, and security by ensuring that government interventions reduce poverty, expand opportunities, and strengthen social resilience.

In Cross River State, effective provision of infrastructure, employment opportunities, healthcare services, education, and inclusive governance can significantly contribute to reducing insecurity. Communities with access to basic services and economic opportunities are more likely to develop confidence in government institutions and participate positively in maintaining social order. This supports the human security argument that individuals and communities are more secure when they are protected not only from violence but also from deprivation and exclusion (UNDP, 1994). Therefore, development programmes should be viewed not only as welfare interventions but also as mechanisms for preventing conflicts and strengthening state legitimacy.

However, the study also reveals that poorly implemented, unevenly distributed, or politically influenced development programmes may increase grievances and weaken citizens' trust in government. When communities perceive unequal access to resources, inadequate service delivery, or exclusion from decision-making processes, feelings of marginalization may develop. Such conditions can undermine state legitimacy and create opportunities for social tensions and conflicts. As Ake (2000) argues, the legitimacy of the state in developing societies is closely connected to its ability to deliver meaningful development outcomes and ensure citizen inclusion. The challenges of youth unemployment, communal disputes, environmental degradation, and institutional weaknesses in Cross River State further demonstrate the limitations of reactive security approaches. While security agencies play an important role in maintaining law and order, security operations alone cannot address the socioeconomic factors that contribute to insecurity. A community experiencing poverty, unemployment, and weak infrastructure may remain vulnerable even when immediate security threats are controlled. Therefore, security policies must

be integrated with development strategies that improve livelihoods, strengthen institutions, and promote social inclusion.

The study further highlights the importance of institutional capacity in achieving development-oriented security. Effective development administration requires government institutions that are capable, accountable, and responsive to citizens' needs. Weak coordination among government agencies, inadequate monitoring mechanisms, and limited community engagement reduce the effectiveness of development interventions. Strengthening administrative capacity is therefore essential for ensuring that development policies translate into practical improvements in citizens' welfare and security (Turner & Hulme, 1997; Fukuyama, 2014). Cross River State therefore requires a shift from reactive security management toward preventive governance strategies. Such an approach should integrate development planning, community participation, conflict prevention, environmental sustainability, and institutional reform. By addressing the root causes of insecurity rather than focusing only on its consequences, development administration can contribute significantly to sustainable peace and social stability.

### **Conclusion**

Development administration and security are deeply interconnected, particularly in societies where insecurity is influenced by socioeconomic and institutional challenges. The experience of Cross River State demonstrates that peace and stability cannot be sustained through security enforcement alone; rather, they require effective governance, inclusive development, and strong administrative institutions capable of responding to citizens' needs. The study establishes that insecurity is often linked to deeper development challenges such as unemployment, poverty, inadequate infrastructure, weak institutions, and ineffective resource management. Addressing these challenges requires a development-oriented security framework that combines preventive governance, institutional strengthening, community participation, and sustainable economic opportunities.

For Cross River State to achieve long-term security and development, government institutions must move beyond reactive responses toward proactive strategies that address the causes of vulnerability and strengthen citizens' confidence in the state. Effective development administration provides a pathway for building resilient communities, improving governance outcomes, and promoting sustainable peace. By integrating development policies with security strategies, Cross River State can enhance social stability and create conditions for inclusive and sustainable development.

### **Recommendations**

- i. Strengthening Local Governance Institution:** Local governments should be empowered to play a more active role in development planning and community security initiatives. Since local institutions are closest to citizens, they are better positioned to identify community needs, manage local conflicts, and implement responsive development programmes. Strengthening local government capacity through improved funding, administrative training, and greater autonomy will enhance grassroots governance and improve security outcomes.
- ii. Promoting Youth Development Programmes:** Government should expand youth-focused development initiatives that provide vocational training, entrepreneurship support, employment opportunities, and access to productive resources. Youth

empowerment should be treated as both a development priority and a security strategy because unemployed and excluded young people are more vulnerable to social instability. Sustainable youth development programmes can increase economic participation and reduce incentives for involvement in criminal activities.

- iii. **Improving Community Participation in Development Planning:** Development projects should adopt participatory approaches that involve local communities in planning, implementation, and monitoring processes. Community participation improves project ownership, increases accountability, and ensures that development interventions reflect local realities. Traditional institutions, civil society organizations, and community-based groups should be incorporated into development and security planning frameworks.
- iv. **Enhancing Security-Development Coordination:** Security agencies and development institutions should strengthen collaboration in addressing both immediate security threats and their underlying causes. Effective coordination between ministries, local governments, traditional authorities, and security organizations can improve information sharing, conflict prevention, and crisis response. Security strategies should be integrated with development policies to ensure that peace-building efforts are sustainable.
- v. **Promoting Sustainable Resource Governance:** Government should strengthen policies for managing land, forests, and other natural resources in ways that promote sustainability and reduce conflicts. Transparent resource governance, environmental protection, and community participation in resource management are necessary for preventing disputes and ensuring that natural resources contribute positively to local development. Sustainable resource governance can transform natural resources from sources of conflict into instruments of economic empowerment.

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