Land Administration Domain Model and Sustainable Land Administration System in Southeast, Nigeria

Ekwunife Chidubem Azie[1], Charles Chukwunwike Egolum[2],
Fidelis Ifeanyi Emoh[2]

[1]*Ministry of Lands, Survey and Town Planning, Anambra, Nigeria*
[2]*Department of Estate Management, Nnamdi Azikiwe University, Awka, Anambra Nigeria*

ABSTRACT:- Effective land administration systems are crucial for sustainable development, yet many countries, including Nigeria, struggle with inefficient and unsustainable land administration practices. This study evaluates the sustainability of the current land administration system in Southeast Nigeria and explores the potential of the Land Administration Domain Model (LADM) in addressing the challenges. Using a mixed-methods approach, the study assesses the current system's performance and identifies the key challenges hindering its sustainability. The findings reveal that the current system is unsustainable, characterized by inadequate land information, inefficient land use planning, and weak institutional frameworks. The study also demonstrates that the implementation of LADM can significantly improve the sustainability of land administration in the region by standardizing land information, enhancing land use planning, and promoting good governance. The study's results have important implications for land administration policy and practice in Nigeria, highlighting the need for a paradigm shift towards more modern, integrated, and sustainable land administration systems. The adoption of LADM is recommended as a viable solution to the land administration challenges in Southeast Nigeria, with potential applications in other regions and countries facing similar challenges.

Keywords:- Disruptive technologies in land management, LADM, Land administration in developing countries, Sustainable land governance

I. INTRODUCTION

The management of land plays a pivotal role in driving socioeconomic growth, development, and transformation within societies, given its fundamental importance across various human activities and survival needs. In Nigeria, land administrators encounter a multitude of challenges in effectively carrying out their responsibilities due to the prevalence of analog documentation methods (Obi-Aso et al., 2019; Ugonabo and Emoh, 2013; Ugonabo et al., 2019; Ugonabo et al., 2020). These challenges manifest in the form of procedural delays, customer grievances, document misplacement and falsification, corruption, and the potential for duplicate transactions (Nissi et al., 2021). These issues not only have adverse environmental implications but also contribute to a decline in investor confidence and a sluggish land market.

An illustrative example can be seen in Anambra State, where reports of land grabbing and speculation have resulted in conflicts between communities and individuals regarding land ownership and usage. Efforts have been made by the state government to address this issue, such as the revocation and demolition of illegally acquired properties. Additionally, the enactment of the Anambra State Prohibition of Fraudulent Practices on Land and Property Law in 2012 aimed to curb fraudulent land practices and extortion perpetrated by individuals claiming to represent the government. However, a study conducted by Ugonabo, Egolum, and Ogbuefi (2019) reveals that these measures have not yielded significant results in reducing fraudulent land practices.

In Enugu State, the escalating demand for land for development purposes and the practice of reselling already sold land have resulted in a significant challenge of land fragmentation. Agbaogun and Akintunde-Alo (2020) and Ihemezie and Dallimer (2021) have highlighted this concern. Although the state government has implemented measures to address the issue, such as checking trespasses on land ownership as advocated by Uzodinma (2018), Odalonu (2020) argues that these measures have proven ineffective, allowing sharp practices to persist.

Imo State faces obstacles in terms of inadequate land use planning and poor urban development control. This has led to haphazard and unplanned urban growth, resulting in congestion, inefficient land utilization, and insufficient provision of essential infrastructure and services. Okeahialam and Osuji (2019) point out these challenges. To combat the issue, the state government has embraced a digitized approach, including the digital recording of all land documents and facilitating mobile payments. Despite these efforts, Nnaji, Njoku,

and Chibuike (2016) contend that land use planning and urban development control continue to pose significant challenges in Imo State.

In Abia State, the problem of land grabbing and encroachment arises from the absence of proper land demarcation, weak enforcement of land rights, and inadequate protection of customary land tenure systems. These challenges undermine the security of land tenure and impede sustainable development, as highlighted by Egere (2017). The state government has taken several steps to tackle the issues, including improving access to land for agricultural and infrastructural development purposes and undertaking efforts to recover public lands and assets, as outlined by Uchegbu and Maduka (2021). However, Onuoha and Enyiazu (2023) argue that proper land demarcation, enforcement of land rights, and protection of customary land tenure systems remain significant challenges in Abia State.

Ebonyi State grapples with challenges related to land tenure and security of tenure, with farmers and communities facing threats of eviction and displacement due to conflicts over land ownership and use. Nwankwo and Okafor (2021) shed light on these issues. The state government has implemented measures to address land tenure and security, including granting increased protection of land titles to smallholder farmers, improving access to arable land, and strengthening customary land tenure systems. However, according to Abada and Omeh (2022), the anomalies persist, signaling that land tenure and security of tenure remain significant challenges in Ebonyi State.

The operational challenges associated with traditional methods of land administration have prompted states in Southeast Nigeria to initiate the transition towards digitized approaches. Scholars have shown increasing interest in leveraging information and communications technology (ICT) as a catalyst for efficient and sustainable land administration systems (Lemmen et al., 2012; Nissi et al., 2021; Unger et al., 2021). Proponents of this emerging technology argue that it has the potential to achieve a responsive, secure, accessible, accurate, effective, cost-effective, and resourceful land administration system that satisfies all stakeholders and optimizes the investment climate of land markets for socioeconomic development (Nissi et al., 2021; Unger et al., 2021). In support of this argument, they identify the roles of ICT applications such as the Land Administration Domain Model (LADM), geographic information systems, and blockchain technology in establishing a harmonized, secure, and accurate land information management system for sustainable development (Lemmen et al., 2012; Nissi et al., 2021; Unger et al., 2021).

However, despite the empirical claims of positive relationships between ICT and sustainable land administration, existing literature in Southeast Nigeria provides minimal evidence to support this claim, particularly concerning LADM. For example, documentary evidence indicates that the Ministries of Lands in the Southeast geopolitical zone of Nigeria are moving towards digitized land administration systems (Ekwunife et al., 2022). However, there is a lack of corresponding documentary or empirical evidence pinpointing the extent of LADM application, outcomes, and challenges in tenure management, land valuation and surveys, land use management, and spatial planning systems of land administration.

This literature gap raises questions about the potential of LADM registers in enhancing effective data exchange, cost-effective information management processes, service responsiveness, access to accurate land information, duplication management, and better understanding of land rights—essential components for sustainable development in the study area. Additionally, there is a significant knowledge gap regarding the identification of infrastructural, legal, economic, and administrative challenges associated with LADM in addressing process delays, customer complaints, document loss and falsifications, corruption, transaction duplicity, and their probable consequences on adverse environmental footprints, dwindling investor confidence, and sluggish land markets.

The lack of empirical research on the applicability of LADM to land administration in the study area highlights the need for further investigation. Existing studies, although limited, do not provide evidence of considerations regarding the application of rights, administration, and spatial LADM registers in sustainable land administration within the geopolitical zone. To avoid speculative adoptions of LADM and promote an informed decision-making approach, this study is necessary as it will generate insights into the extent of LADM application and its realities. This will provide evidence for policymakers and practitioners to make informed decisions.

The justification for this research lies in the argument that in today's dynamic, globalized, over-populated, and ecologically threatened business environment, where land is at the center of everything, land administration becomes a delicate activity. Poorly managed administration can lead to consequences such as

land disputes, environmental degradation, and investor pessimism, which can negatively impact economic prosperity and environmental well-being in the Southeast. The prevalence of issues such as flooding, erosion, land transaction duplicity, prolonged litigations, and a gloomy investment climate further emphasize the relevance and urgency of filling the existing knowledge gap. Thus, this study aims to address this gap and provide motivation for further research in this area.

1.1   Objectives of the Study
The objectives of the study were to:
  i.   Investigate the existing land administration system in the southeastern region of Nigeria.
  ii.   Determine the capabilities of the Land Administration Domain Model (LADM) in addressing land administration challenges in the study area.

II.   LITERATURE REVIEW

Land administration systems are critical for sustainable development, environmental management, and economic growth; however, complex information and diverse frameworks challenge implementation. The LADM, an ISO standard, addresses these challenges by providing a standardized conceptual model for land administration (Lemmen, 2012). Comprising cadastral systems, registration, planning, and management, land administration is essential for secure land rights, efficient markets, and informed decision-making. The LADM's development was driven by the need for interoperability, data exchange, and integration across jurisdictions and contexts (Lemmen et al., 2015). It offers a standardized, comprehensive, and adaptable framework for efficient, integrated land administration systems, fostering information exchange and sharing. Its four-package model enhances flexibility, extensibility, and adaptability for diverse contexts (Kalogianni et al., 2020).

The LADM consists of parties, spatial, rights, administrative, surveying, and other packages (Lemmen, 2012). The parties package represents entities and their relationships, capturing complex tenure arrangements. The administrative package addresses operational aspects, integrating land administration processes and data. The Spatial Unit Package defines spatial components, enabling the modeling of complex configurations. The Surveying and Representation Subpackage focuses on the geometric and topological representation of spatial units, ensuring accurate and consistent representation for integration with other spatial data infrastructures and advanced spatial analysis.

LADM's applications and benefits extend across land administration facets, contributing to improved efficiency, interoperability, and resource management (Alkan and Polat, 2017). It standardizes and enhances interoperability among land administration systems, facilitating seamless data exchange, integration, and collaboration. The LADM serves as a reference model for database design, ensuring consistent and efficient practices for high-quality land information systems. Its Spatial Unit Package and Administrative Package support efficient and accurate cadastral systems, essential for secure land tenure, land market operations, and informed decision-making processes related to land use and development. According to Buuveibaatar et al. (2022) and Chipofya et al. (2020), the model's flexibility and extensibility allow for the representation of various land tenure forms, particularly valuable in regions with complex or pluralistic tenure systems.

Likewise, the spatial components of LADM can be seamlessly integrated with other spatial data infrastructure components, enabling the effective management, visualization, and analysis of land-related information within broader spatial data ecosystems. In developing countries, implementing and adapting the LADM can be challenging due to limited resources, fragmented systems, and complex land tenure arrangements (Ekwunife et al., 2022). The process requires extensive consultations, legal analyses, and country-specific profiles and extensions.

Integrating existing land administration data into LADM-based systems, particularly in developing countries, can also be challenging due to incomplete, inconsistent, or diverse data formats (Nissi et al., 2021). Data transformation, cleaning, and harmonization processes are often required, and these pose technical challenges. Incorporating informal land tenure data, which is often undocumented or based on oral traditions, further complicates the process. Successful LADM implementation, therefore, necessitates capacity building and training for land administration professionals, policymakers, and stakeholders, which can be hindered by limited resources and the need for multidisciplinary expertise.

Ewurum et al. (2019) is of the view that effective governance mechanisms, stakeholder engagement, and collaboration among different organizations and sectors are crucial for LADM adoption, but weak institutional frameworks, fragmented responsibilities, and limited coordination can impede these efforts in developing countries. The implementation of LADM-based systems may require advanced technologies and the

integration of various data sources and systems, which can be challenging due to limited access to these technologies, inadequate infrastructure, and the lack of technical expertise (Ekwunife et al., 2022; Nissi et al., 2021). Following these issues, the study examined the application of LADM in sustainable land administration system in southeastern, Nigeria.

Studies following this approach in other countries present conflicting outcomes not enough to inform consistent empirical driven decision making on LADM application in the study area. For instance, Alkan et al. (2017) conducted an investigation into the potential benefits of integrating the Land Administration Domain Model (LADM) specified in ISO 19152 into the Turkey Land Information System (TLIS) data model. They initiated their research by outlining the current land information system in Turkey and the challenges associated with establishing a national information infrastructure. Subsequently, they detailed the adaptation of LADM for Turkey, which involved a review of the TLIS core data model against the corresponding LADM basic classes. Despite some semantic differences and mismatches, the proposed LADM for TLIS was found to adequately describe land administration information in Turkey. The authors emphasized the importance of proper integration of data, encompassing the analysis of existing data sets, identification of key registers, and establishment of a linkage system between them to ensure the effective functioning of the information infrastructure.

Chipofya et al. (2020) presented a paper that combined the application of LADM into the Kenyan land administration system with the introduction of a model. They developed a Local Domain Model (LDM) for a Maasai community in Kenya as a conduit for adapting the system with LADM. The LDM is a structured ontology that systematically captures indigenous knowledge related to land administration. The integration with LADM was achieved through an ontological schema known as the Adaptor Model, which incorporates the concept of conditional RRR (Rights, Restrictions, Responsibilities) to reflect the complexities of social tenures. These three domain models (LDM, LADM, and Adaptor Model) were employed in the community-based land tenure recording tool called SmartSkeMa. The paper illustrates four implementation examples that demonstrate how the LDM, tailored to the specific context of the Maasai community, extends the range of concepts that can be represented in LADM, thus meeting the land administration needs from the local community's viewpoint. Results from land administration experts showed that the LDM model and the Adaptor Model were well-suited for the Kenyan context.

Rajabifard et al. (2021) aimed to create a 3D Land Administration System (LAS) for Malaysia that adheres to the Land Administration Domain Model (LADM) standard, building on previous studies on LADM implementation in the country. The proposed approach involved modifying existing workflows for collecting 3D survey data, developing a new architecture to accommodate 3D land parcels, and creating a new database that aligns with data requirements in Malaysia to establish an LADM-based 3D LAS. The primary focus of the transition from a 2D to a 3D environment was on collecting, processing, and managing the elevation data of survey points that define the boundaries of parcels. The study demonstrates that the LADM standard plays a significant role in enabling the implementation of a 3D-enabled system for land administration in Malaysia.

Lisjak et al. (2021) proposed a conceptual model for the management of state-owned agricultural land in Croatia, based on the Croatian Land Administration Domain Model (LADM) country profile and the International Organization for Standardization (ISO) standard LADM 19152:2012. The study aimed to evaluate the potential of using the LADM extension to effectively manage state-owned agricultural land, as over half of it is currently not being used. The disposition process was complex and regulated by legal regulations, making it difficult for organizations to implement. Therefore, a successful management model was needed. The model was divided into two phases: the development of the Program of Disposition of State-Owned Agricultural Land, which includes a multi-criteria decision analysis (MCDA) for land potential analysis, and the realization of the disposition. A Unified Modeling Language (UML) model for the LADM extension was presented, and a potential for improvement of the agricultural land management system and related processes was found.

Xu et al. (2022) examined how the LADM model can be used to manage residential lands in rural China, which have gone through several changes since 1949. The current reform of the homestead tenure system was based on collective ownership by local communities, qualification rights to ensure social security, and use rights to promote economic development. It was possible to use the LADM profile to represent this tripartite entitlement reform, with four sub-packages: Party, Administrative, Spatial Unit and Surveying and Representation. The study found that using the LADM-based model to administer China's rural homesteads could help with the land tenure reform, enable interoperability with other land administration aspects, and support national efforts to achieve poverty eradication, rural revitalization, and intensive land use goals of the United Nations Sustainable Development Goals (2015).

Buuveibaatar, Lee and Lee (2022) aimed to create a LADM-based cadastral data model–Country profile for Mongolia, tailored to the cadastral system's legal and systematic requirements. To do this, they studied the current cadastral system in Mongolia, implemented the LADM Country profile, and conducted an LADM conformance test for the developed model. The Country profile was divided into two parts– Administrative and Spatial. The model was found to conform to all classes from the low and medium levels, and several classes from the high level of the Abstract Test Suite. The study also provided object-instance diagrams to illustrate how the model can be applied in real-world scenarios. They recommended that the results of this study can be used when considering the adoption of the standard and transitioning to modern cadastral requirements (e.g., multi-dimensional cadastres) in Mongolia.

Kalogianni et al. (2021) presented the design of a methodology to develop LADM-based country profiles, structured in three phases: scope definition, profile creation, and profile testing. The scope definition phase was based on the set of six characteristics that were developed from key publications and expert consultation. These characteristics were found to be generic and applicable to all country profiles, and referred to the lifecycle of the development and implementation of a country profile, including legal, institutional, and technical aspects. Additionally, the methodology also took the scope of the country profile into consideration.

Govedarica et al. (2021) aimed to provide an overview of the experience gained in the design and implementation of LADM-based cadastral information systems in Serbia, Montenegro, and the Republic of Srpska. The research involved four phases, including conceptual modeling and development of LADM-based country profiles, defining real estate cadastre business processes, implementing databases and migrating data, and implementing the country profiles in the form of a technical solution used in cadastral offices and on the web. The paper also outlined challenges encountered and findings reached during each of these steps, with the aim of providing a basis for further work and a more general methodology that can be applied to other countries and regions.

Ghawana et al. (2020b) utilized the conceptual components of the Land Administration Domain Model (LADM) in the Municipality of Maputo as a means of meeting the demands of the municipality. To do this, an Integrated Municipal Management System (SIGEM) was developed. With the rapid urban development, three value chains were proposed: (1) a national-level portal for Urban Land Development that integrates services; (2) a municipal-level public access portal that supports several land administration functions such as plot/building purchases; and (3) a local infrastructural level for water and sanitation services, through a single-window online system that supports client-driven services. Upon observing positive outcomes from applying LADM in the system, it was recommended that in order to make a successful application of the model, municipalities must go for public-private partnership (PPP) mode projects, and they must consider international standards, ICT, and Geo-ICT to modernize their land administration arrangements.

Unger et al. (2023) examined the gender sensitivity of the Land Administration Domain Model (LADM) from a technical standpoint. The research type 'modelling' was employed to determine the requirements from related land administration literature and compare them to the current version of the LADM. The assessment revealed that the LADM has the necessary features to support women's access to land and help implement a gender-sensitive land administration system. The importance of standards like the LADM in recognizing women's land rights is highlighted, and future developments and adoption of such standards are seen as essential for the 2030 Agenda for Sustainable Development.

2.1 Critique of the Literature: Research Gap

Alkan et al. (2017), Chipofya et al. (2020), and Rajabifard et al. (2021) provide valuable insights into the application of LADM in Turkey, Kenya, and Malaysia, respectively. However, the context of their studies may not be directly applicable to a developing nation like Nigeria, as they lack a discussion on the socio-economic, cultural, and legal context of Nigeria. Nigeria, like many developing nations, faces challenges such as weak institutions, limited resources, and a lack of widespread digital literacy, which could hinder the successful implementation of LADM-based solutions.

Lisjak et al. (2021) and Xu et al. (2022) focus on specific land management issues in Croatia and China, respectively. While the models they propose could be adapted to Nigeria, they do not address the unique challenges of the Nigerian context, such as land grabbing, land disputes, and informal land markets.

Buuveibaatar, Lee, and Lee (2022) develop a LADM-based cadastral data model for Mongolia. However, their study does not address the issue of land tenure insecurity, which is a significant challenge in

Nigeria. Moreover, the study does not provide a comprehensive methodology for adapting the LADM to a developing country context.

Kalogianni et al. (2021) propose a methodology for developing LADM-based country profiles. While this could be useful for Nigeria, the methodology does not address the unique challenges of developing countries, such as the need for low-cost, low-tech solutions and the importance of community participation in land administration.

Govedarica et al. (2021) provide valuable insights into the implementation of LADM-based cadastral information systems, but their study is focused on Serbia, Montenegro, and the Republic of Srpska, which have different institutional and legal frameworks compared to Nigeria.

Ghawana et al. (2020b) focus on the Municipality of Maputo in Mozambique, which, like Nigeria, is a developing country. However, their study does not address the issue of informal land markets, which are prevalent in Nigeria.

Unger et al. (2023) examine the gender sensitivity of the LADM, which is a critical issue in Nigeria, where women often face discrimination in land ownership. However, their study does not provide a practical methodology for implementing a gender-sensitive LADM in a developing country context.

In summary, while the studies reviewed provide valuable insights into the application of LADM in various contexts, they do not adequately address the unique challenges of a developing nation like Nigeria. There is a need for further research that specifically focuses on the application of LADM in the Nigerian context, taking into account the socio-economic, cultural, and legal context of the country. This research could explore issues such as the adaptation of LADM to the Nigerian legal framework, the development of low-cost, low-tech solutions, the engagement of local communities in the land administration process, and the implementation of a gender sensitive LADM.

III.   METHODOLOGY

The study employed a triangulation mixed methods research design, which involves sequential collection, analysis, and description of quantitative and qualitative data. This approach was chosen to develop comprehensive insights into the research problem through the synergy between quantitative and qualitative survey research methods, ultimately enhancing evidence-driven policymaking. The study was conducted in Southeast Nigeria, comprising five states: Abia, Anambra, Ebonyi, Enugu, and Imo (Figure 1).
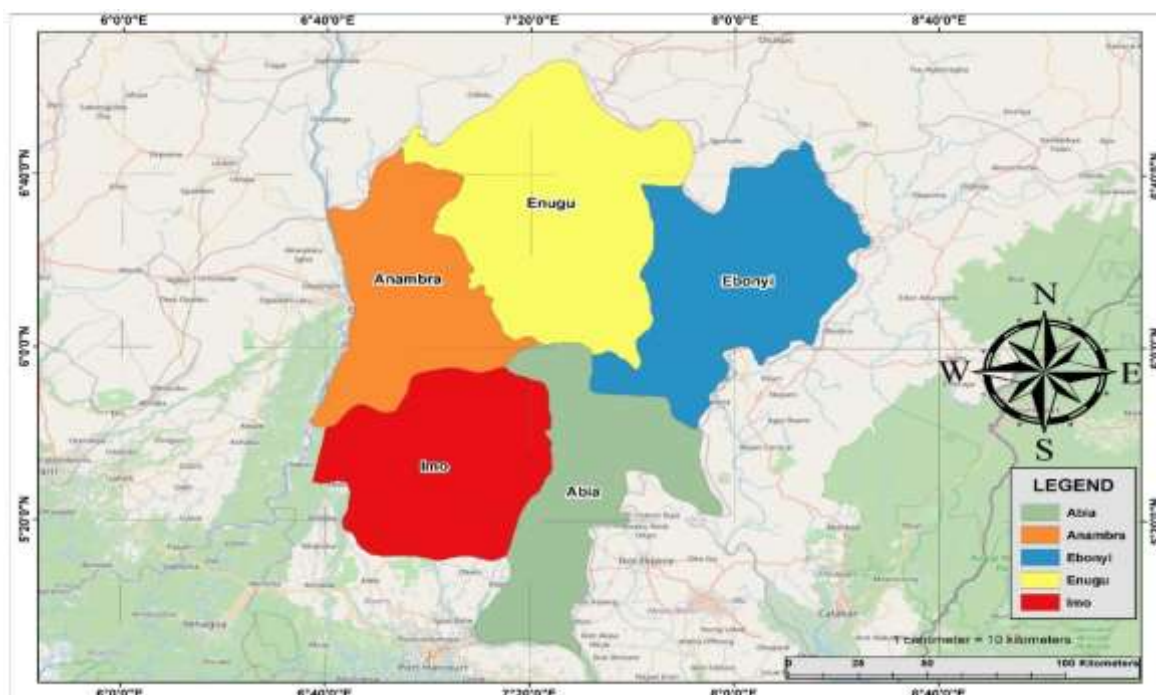
Figure 1: Geospatial Data of Southeast Geopolitical Zone of Nigeria.
Source: Kingsley Chukwu and Associates, Land Surveyors (2024)

Figure 1 shows the southeast region, which is predominantly inhabited by the Igbo ethnic group, whose language, Igbo, is one of the three most widely recognized and spoken languages in the country. The peculiarities of the Southeast Nigeria region have significant implications for the application of the Land Administration Domain Model (LADM) to sustainable land administration systems. These peculiarities include multiple land ownership claims, inadequate record-keeping systems, weak enforcement of land rights, land grabbing, encroachment, and inadequate land use planning. In the context of LADM, these peculiarities present specific challenges that need to be addressed to ensure the successful implementation of sustainable land administration practices.

Primary data were collected from a population of 960 operational employees of the Ministry of Lands in the study area. This was further reduced to a sample size of 574 which was determined using the Finite Population Correction Factor (Kandethody, 2012). The instruments for data collection were a 5-point Likert-scale structured electronic questionnaire and an oral interview schedule. Quantitative data obtained from the questionnaire were analyzed using Kruskal-Wallis Test and Ordered Logistic Regression (Equation I), at a statistically significant p-value of less than 0.05 at a 95% confidence level.

$\text{Logit}(P/1\text{-}P) = a + b1*I_S + b2*S_{LUP}$ Equation (I)

Source: Issa and Kogan (2014)

Where,

P/1-P refers to Logit predictors

a + b represents Logit coefficients

1 is constant

I_S represents land information standardization

S_{LUP} represents sustainable land use planning

IV. Analysis and Results

The first hypothesis, arising from objective one, posits that the land administration system in the study area is devoid of data falsification, process inefficiencies, information mismanagement, document loss, and transparency issues. To investigate this hypothesis, the responses were condensed and aggregated to facilitate statistical analysis. The Kruskal-Wallis H test, a non-parametric statistical technique, was employed via SPSS software to examine the variables relevant to the research objective, as informed by existing literature. This test was deemed suitable due to the characteristics of the variables under investigation. The outcomes of the Kruskal-Wallis H test are presented in Table 1, providing insights into the validity of the hypothesis.

Table 1: Kruskal-Wallis Test

Ranks

	Land Administration Issues in the Study Area	N	Mean Rank
Response	Data falsification	480	182.60
	Process delays	480	235.80
	Information mismanagement	480	205.10
	Transparency issues	480	237.50

Test Statistics (a,b)

	Response
Chi-Square	15.720
Df	3
Asymp. Sig.	.001

a Kruskal Wallis Test

b Grouping Variable: institutional issues

An examination of the results presented in Table 1 reveals that the calculated chi-square value (X2c = 15.720) exceeds the critical chi-square value (7.815) at a significance level of p < 0.05. This outcome necessitates the rejection of the null hypothesis, thereby indicating that the land administration system in the study area is indeed plagued by a multitude of challenges, including data falsification, process inefficiencies, information mismanagement, document loss, and transparency issues.

The second hypothesis, emanating from objective two, posits that the implementation of Land Administration Domain Model (LADM) would not effectively address the land administration challenges in Southeast, Nigeria, specifically in terms of standardizing land information and promoting sustainable land use planning. To investigate this hypothesis, the responses were condensed and aggregated to facilitate statistical analysis. An Ordered Logistic Regression Analysis was employed, as guided by Equation (I), to examine the relationships between the variables. The outcomes of the regression analysis are presented in Table 2.

Table 2: Parameter Estimates for Hypothesis Two

Parameter Estimates								
		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Rating = 1.00]	-1.590	.328	23.501	1	.000	-2.233	-.947
	[Rating = 2.00]	.412	.311	1.762	1	.184	-.196	1.021
	[Rating = 3.00]	1.997	.339	34.654	1	.000	1.332	2.662
Location	[Factor=Info_Std]	.107	.406	.069	1	.003	-.689	.903
	[Factor=Access]	-.903	.395	5.216	1	.022	-1.678	-.128
	[Factor=Responsive]	.050	.391	.017	1	.008	-.715	.816
	[Factor=Accuracy]	.070	.414	.029	1	.005	-.742	.882
	[Factor=Cost_Redn]	.952	.412	5.334	1	.021	.144	1.760
Link function: Logit.								

An examination of the estimates presented in Table 2 reveals that the null hypothesis can be rejected, as the results indicate that the Land Administration Domain Model (LADM) is a significant predictor of various land administration outcomes. Specifically, the findings suggest that LADM has a significant impact on data standardization (p =.003), access (p =.022), accuracy (p =.005), service responsiveness (p =.008), and cost reduction (p =.021).

These results collectively imply that the implementation of LADM would have a profound impact on addressing the land administration challenges in Southeast, Nigeria. By standardizing land information and enhancing sustainable land use planning, LADM would significantly mitigate the problems plaguing the current land administration system. The statistical significance of these findings, with p-values <.05, provides strong evidence to support this conclusion.

V.   SYNOPTIC OVERVIEW OF RESEARCH OUTCOMES

The empirical results are presented in consonance with the study's objectives, yielding the following key findings:

i.   A statistically significant determination (p < 0.05) reveals that the prevailing land administration system in the Southeast region of Nigeria was unsustainable, thereby underscoring the need for reform.

ii.   The implementation of the LADM is posited to effectively address the land administration challenges in Southeast Nigeria, primarily by standardizing land information and fostering enhanced sustainable land use planning, as supported by a statistically significant outcome (p < 0.05).

5.1   Conclusion

This study has contributed to the existing body of knowledge on land administration systems by providing empirical evidence on the unsustainability of the current land administration system in the Southeast region of Nigeria. The findings unequivocally suggest that the implementation of the LADM is a viable solution to the land administration problems in the region. The standardization of land information and enhancement of sustainable land use planning through LADM are critical steps towards ensuring a more efficient, effective, and sustainable land administration system.

5.2   Academic Implications

This study has several academic implications. Firstly, it underscores the need for a paradigm shift in land administration systems in Nigeria, from traditional, fragmented, and unsustainable approaches to more modern, integrated, and sustainable ones. Secondly, it highlights the importance of adopting standardized

models, such as LADM, in land administration to ensure consistency, accuracy, and reliability of land information. Finally, the study contributes to the ongoing discourse on sustainable development, emphasizing the critical role of effective land administration systems in achieving sustainable development goals.

5.3 Practical Implications

The practical implications of this study are far-reaching. The findings of this study have significant policy and practical implications for land administration in Nigeria. Specifically, the study recommends the adoption and implementation of LADM in the Southeast region of Nigeria to address the land administration challenges. This requires the collaboration and commitment of government agencies, policymakers, and stakeholders in the land sector. Additionally, the study highlights the need for capacity building and training of land administrators, policymakers, and other stakeholders on the principles and applications of LADM. In due course, the implementation of LADM is expected to lead to improved land governance, enhanced sustainable land use planning, and more efficient land administration systems in the region.

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Ekwunife Chidubem Azie[1], Charles Chukwunwike Egolum[2], Fidelis Ifeanyi Emoh[2]
[1]Ministry of Lands, Survey and Town Planning, Anambra, Nigeria
[2]Department of Estate Management, Nnamdi Azikiwe University, Awka, Anambra Nigeria