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Citation:

Adebayo, A (2025) Exploring the Potentials of GIS and AI Integration in Tackling Property Market Transparency in Nigeria. In: 4th International Land Management Conference, 27-28 Feb 2025, Online. (Unpublished)

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Exploring the Potentials of GIS and AI Integration in Tackling Property Market Transparency in Nigeria.

Paper presented at the 4th International Land Management Conference 2025

By

Adebayo A. A.

School of Built Environment Engineering and Computing

Leeds Beckett University UK

Abstract

The Nigerian real estate market is among the least transparent globally, characterized by undocumented transactions, unreliable market data, and inadequate property registration systems. This lack of transparency fosters corruption, reduces market efficiency, hinders socio-economic development, and deters foreign direct investment in the property sector. This study addresses these challenges by exploring the potential integration of Geographic Information Systems (GIS) and Artificial Intelligence (AI) for real estate data capture, storage, analysis, and management to enhance market transparency in Nigeria. It evaluates the current state of transparency in Nigeria's property market and identifies key factors contributing to its opacity. Additionally, the study examines the opportunities that GeoAI presents for improving market transparency. Insights from this research will be valuable for implementing GeoAI technology in other countries facing similar challenges related to real estate market transparency.

Keywords: GeoAI, market transparency, Nigerian real estate market, property data management

Introduction

The relevance of the availability of real estate market transaction data cannot be overstated. A lack of substantial market information can lead to resource waste, inefficiency in professional judgments, loss of time and resources, and other professional and socio-economic challenges (Adilieme et al., 2024; Olaleye and Adebara, 2019). In other words, timely access to reliable real estate transaction data can support professional judgments in real estate valuation and other built environment practices. Similarly, access to accurate market transaction data can aid investment, development, and occupation decision-making while improving transparency, attracting foreign direct investments, and, in turn, boosting the economy and the social well-being of citizens (Newell, 2016). Therefore, serious attention needs to be paid to improving the transparency of real estate market transactions in many nations, particularly in countries like Nigeria, which have vast resource potential, including a

growing young population, increasing human intellectual capacity, technological advancements such as 5G networks, and other untapped resources.

This paper focuses on evaluating the potential of GeoAI technology in improving the transparency of Nigeria's real estate market. The broader objective is to enhance the transparency spectrum of real estate market transactions through the integration of GIS and AI applications. The paper discusses common challenges that could impede the adoption of GeoAI technology in enhancing transparency in Nigeria's real estate market and explores its possible benefits and potentials. Insights from this study will provide valuable considerations for adopting GeoAI technology to improve property market transparency.

The role of data access for GeoAI Technology implementation

The integration of Geographical Information Systems (GIS) and Artificial Intelligence (AI) algorithms to analyse, interpret, and make informed decisions across various aspects of the built environment depends heavily on the availability of accurate data (Foody, 2001). In geospatial analysis, inaccuracies in input data increase the likelihood of incorrect outputs. One of the key reasons for integrating AI algorithms is to enhance decision-making efficiency by speeding up analysis and conserving resources. For GeoAI to be successfully implemented, accurate location-based data is essential. Adebayo (2024) emphasizes the importance of location-based data in understanding the complexities of the built environment, particularly the dynamic nature of real estate markets. His work argues that AI algorithms can help make reasonable inferences in situations where data is inadequate or inaccurate. In other words, AI algorithms can be trained to make intelligent assumptions when dealing with incomplete or inconsistent data, which is often characteristic of opaque real estate markets.

Access to accurate location-based data remains a significant challenge. Fields such as engineering and biological sciences have successfully applied GeoAI technology to analyse data patterns and support intelligent decision-making for various purposes (VoPham, 2018; Xie, 2020; Li, 2022). However, the effectiveness of GeoAI in improving real estate market transparency depends heavily on data availability. In Nigeria, where market data is often scarce or incomplete, AI algorithms can be leveraged to generate valuable insights and make informed inferences from limited datasets, helping to bridge data gaps and enhance transparency.

Nonetheless, location-based data remains fundamental to the successful implementation of GeoAI technologies. This raises a critical question: *Can AI-integrated algorithms in GIS be trained to minimize the risks associated with incorrect or incomplete real estate market data?* Addressing this challenge will be vital for unlocking the full potential of GeoAI in Nigeria's property sector.

Challenges and Dynamics of the Nigerian Property Market

The Nigerian property sector features numerous market players, including both corporate and individual participants who regularly demand and supply various types of property, primarily residential. Planning regulations in Nigeria are relatively relaxed, and construction activities are not strictly governed or delayed by planning application processes, as is common

in more advanced economies. While property development does require approval, the process is generally less stringent and faster compared to countries like the UK and the USA (Uneagua et al., 2024).

Cultural factors significantly influence the supply of residential properties, particularly the widespread desire for freehold ownership. In many parts of the country, owning real estate is seen as a symbol of social prestige. Additionally, the financialization of property rarely relies on mortgage systems. Instead, property development is often financed through equity provided by individual developers rather than corporate entities. This financial structure has implications for property transactions, as individual sales are less common in major cities, except in key economic hubs such as Lagos, Abuja, and Port Harcourt, where rental transactions dominate the market.

Social considerations often overshadow economic rationale in decisions related to property ownership, especially outside major commercial centres. Furthermore, there is a prevalent practice of withholding transaction details, largely due to the absence of legal requirements for disclosure.

A significant challenge in the sector is the lack of a centralized property stock database. The absence of such a system limits transparency and hampers market efficiency, as information about property units is fragmented and not centrally managed by government agencies. Addressing this gap is crucial for the successful implementation of GeoAI technology, which requires both spatial and aspatial data to enhance market transparency. By improving data availability and management, GeoAI could play a transformative role in addressing the opacity of Nigeria's real estate market.

The Possibilities of GeoAI Technology in Enhancing Property Market Transparency

Enhancing real estate market transparency in Nigeria through GeoAI technology requires addressing data-related challenges and institutional reforms. Below are key opportunities for implementing GeoAI to improve transparency in the Nigerian property market:

- *AI for Data Capture Using Remote Sensing*

GeoAI can leverage remote sensing technology to capture aerial imagery and generate accurate spatial data about buildings and infrastructure. This would significantly enhance the availability of robust property information. However, one key challenge to address is integrating missing non-spatial (aspatial) data, such as property ownership and transaction records.

- *AI for Financial Transaction Tracking*

AI can play a crucial role in capturing and analysing financial transactions related to real estate, using intelligent systems to track large monetary flows associated with property sales and mortgage applications. Given Nigeria's robust financial regulatory framework, transactional data from banks and financial institutions could be effectively traced and analysed to support transparency efforts.

- *Property Stock Geo-Database Development*

There are significant opportunities for public-private partnerships to develop comprehensive property stock databases in Nigeria. Existing government institutions, such as the Abuja Geographical Information System (AGIS), focus primarily on land administration in Abuja. Expanding their scope to collaborate with private institutions could improve the availability and management of real estate transaction data, enhancing market transparency.

- *Digital Footprint Data Capture*

Nigeria can learn from the UK's ongoing efforts to utilize digital footprint data, such as mobile phone signals, to gather and analyse location-based data for socio-economic research. GeoAI algorithms can be trained to infer real estate market trends from digital footprint data. However, ethical challenges surrounding data acquisition, processing, and management need to be carefully addressed to ensure compliance with privacy regulations and public trust.

By addressing these areas, Nigeria can harness the potential of GeoAI to foster greater transparency and efficiency in its real estate market.

Conclusion

Data is central to the successful implementation and integration of GIS and AI technologies. Achieving and sustaining success requires key stakeholders in the property sector to recognize the importance of market transparency and collaborate to ensure openness and security in property-related transactions. This cooperative effort is essential to fully harness the potential of GeoAI technology in enhancing property market transparency in Nigeria.

A key question arises from this assertion: *How can AI facilitate the gathering of property market information quickly, responsibly, efficiently, and intelligently?* Addressing this question will be critical to overcoming data challenges and unlocking the transformative possibilities of GeoAI for Nigeria's real estate sector.

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