

AfRES 2021



20th Annual African Real Estate Society Conference

Abstracts and Refereed Papers



The Future of the African Real Estate Sector: What Next?

8 – 10 SEPTEMBER, 2021

LUSAKA, ZAMBIA

THE 20TH ANNUAL AfRES CONFERENCE

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Compiled by:

Aly Karam and Chioma Okoro

PREFACE

Dear Conference Delegates,

In our edition of the proceedings, we are happy to welcome you to our twentieth AfRES annual conference for 2021 and the first virtual conference we hold. We still called it the Lusaka conference as the organizing team is mainly based here in Lusaka and it is the city where it should have been held in 2020. Lusaka is the capital and major commercial city of Zambia. Lusaka is also one of the fastest developing cities in the Southern African region. It is situated on a plateau of about 1280 meters above sea level with beautiful view all around. It is well connected to the country's road infrastructure in all four directions, north, south, east, and west. Lusaka is named after a village of Chief Lusaka in the Manda Hill. In 1905 the British built the railway and Lusaka took off as a major center. By 1935 it replaced Livingstone as the capital of Northern Rhodesia as Zambia was called then.

Since the federation of Northern and Southern Rhodesia in 1953, Lusaka became the center for independence movements. In 1964 Lusaka became the capital of the independent Republic of Zambia. In recent years it has become a popular destination for Zambians to settle and for tourists who enjoy the beautiful climate of Lusaka. Lusaka has the largest learning institutions in Zambia and some of the best schools in the country. It is surrounded by several tourist attractions which include Lusaka National Park, Presidential Burial Site National Monument, Lilayi Elephant Nursery, Lusaka National Museum, Chaminuka Nature Reserve and many more. Lusaka is also about an hour's flight to Livingstone, the home of the mighty Victoria Falls and the tourist capital of Zambia.

As usual, we have to thank the numerous sponsors who have assisted in different ways; the conference would not have been possible without their contributions. We trust that we will all benefit from the gathering through discussions, debates and networking both of a professional and academic nature.

Today, as maturation in the African real estate sector is happening, we look at the future of the sector and see what next for our beloved continent. Real estate markets are starting to show growth and higher levels of maturity. From the papers and presentations, data is starting to reflect a much-needed understanding of the futures of these markets. The theme of this conference, appropriately "***The future of the African real estate sector: what next?***" shows that we are heading towards a new era.

This year we are a good proof that we are growing stronger and stronger. We had 46 submitted abstracts of which 38 will be presented and available for your reading in the proceedings. We had 17 papers for reviewing of which 12 were accepted, reviewed, and are published here. We appreciate the Scientific / Technical committee of the conference for their work in reviewing the submitted abstracts and papers. The feedback to the authors assisted greatly in finalizing them in the format presented in these proceedings. The papers

printed in these proceedings were double-blind reviewed to ensure the highest standards and international comparability. The abstracts were reviewed, and in some cases, guidance given to authors.

The South African Real Estate Society (SAfRES) chapter is grateful to those who assisted and contributed to bringing this conference together and making it happen. We are appreciative of the hours of work which some of our members dedicated to the process.

Professor Kabunda Ephraim Munshifwa

On behalf of the Organizing committee

September 2021

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ABSTRACTS

An Analysis of the Relationship between the COVID-19-induced Remote Working and Future Office Space Demand

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Purpose: Many businesses and organisations were forced to adopt remote working following the COVID-19 induced lockdown.

Design/Methodology: Using data from a survey of 376 global office space occupiers, this paper analyses the relationship between the COVID-19-induced remote working and the potential changes to office space use and demand going forward.

Findings: The results suggest that the experience of employees while working remotely is closely related to organisations' future workspace plans. The results specifically show an inverse relationship between employees' remote working experience and future space requirements i.e. positive employee remote working experience increases the probability that organisations will demand less space going forward.

Practical implications: These insights are essential for office space planning, management, forecasting and investment.

Keywords: COVID-19, remote working, office space, organisations, planning, forecasting

Macroeconomic Dynamics in Real Estate Market amid Covid-19 Pandemic in Abuja, Nigeria

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Purpose: Quite a substantial number of academic studies have investigated dynamics of macroeconomic factors in real estate markets across the world. While these studies are valuable in the field of macroeconomic dynamics in real estate markets, a gap still exist in the literature on the recent disruption in the economy caused by covid-19 pandemic and subsequent impact on real estate market of emerging economy in Abuja, Nigeria.

Design/Methodology: Monthly returns on real estate investment from sampled registered real estate firms in addition to data on macroeconomic indicators were obtained for the period (February 2020 and April 2021). These data were then analysed using econometric analysis - Augmented Dicker Fuller (ADF), Engle Granger cointegration and cointegrating regression analysis.

Findings: The empirical evidence shows a long run negative impact of macroeconomic indicators on real estate market caused by covid-19 disruption in the economy. The study further understood that correction in market disequilibrium caused by economic disruption would require a slow adjustment. The real estate investor should exercise caution in investing into real estate due market disruption or disequilibrium that would take long period to correct.

Practical implications: This paper provides empirical evidence of interrelationship between covid-19 driven macro economy and real estate markets. The result showed that the real GDP, exchange rate, inflation and interest rates have been found to have a significant explanatory influence on property return across the markets. The result further suggested that the impact of covid-19 in the economy requires government intervention to correct future abnormalities in the real estate market.

Keywords: Real estate returns, macroeconomic indicators, stationarity test, Engle-Granger cointegration

Brownfield Regeneration: A possible Panacea to Zambia's Housing Deficit and Urban Decay?

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Purpose: Zambia is grappling with a housing deficit officially estimated at 1.5 million units and projected to reach 3.3 million by 2030. To address the current deficit, the government anticipates constructing about 149,000 units per annum or 222, 000 to avoid the 2030 projection. Simultaneously, many African cities are struggling to deal with urban decay, a condition that can be attributed to urban sprawl, poor planning, urbanization, increased population growth and many more. It has been observed that combating the housing deficit does not consider the current stock of properties which are now degenerated. New construction focuses on the use of greenfields and neglects the positives offered by the reuse of brownfields. It has further been observed from developed countries that after huge parcels of greenfields have been developed into '*concrete jungles*', development is being re-directed to incorporate nature-based practices to combat societal challenges.

Design/Methodology: This paper therefore questions whether Africa, after taking stock of existing properties that have become derelict, could contemplate ways to regenerate them to combat the housing deficit.

Findings: This paper finds that challenges such as re-zoning, contamination and ownership issues will need to be addressed to ensure a sustainable process of regeneration. Additionally, greenfields require provision of services which tends to be a costly exercise while brownfields are often properties with services already in place.

Practical implications: This paper argues for the inclusion of already existing stock in spatial planning and housing plans and further suggests the increased maintenance and refurbishment of existing real estate is a possible solution to the urban decay challenge.

Keywords: Urban decay, housing deficit, brownfield regeneration, Zambia

All-Inclusiveness and End-User Satisfaction in Student Housing Nexus: Cognitive Dissonance Perspective

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Purpose: Drawing on the social support role's research gap of the cognitive dissonance theory, this study assessed the satisfaction of all-inclusiveness among Student with Disability living in off-campus student housing in Ghana.

Methodology: SWD satisfaction data were collected through survey, face-face interview, and participant observation among off-campus student housing in six public and private universities in Ghana. Using the universal building design requirements (UDRs), a confirmatory factor analysis and multivariate regression were used to determine UDRs satisfaction among SWD.

Findings: The results showed that there exist 11 inbuilt and 9 external UDRs among off-campus student housing in Ghana. The satisfaction level revealed that out of 11 inbuilt UDRs, SWD are satisfied with only 5. Aside, SWDs were satisfied with 5 out of 9 external UDRs. Among them, only 50.5% off campus student housing has slip-floor resistance in the buildings which forms the highest availability among the inbuilt UDRs. Again, 33% of student housing has a clear signage which was the highest among the external UDRs. These provided some psychological effects on SWD across the study locations.

Practical implications: Results suggested that effective review of structural design and permitting process may influence all-inclusiveness and compliance among student housing investors in Ghana.

Originality: This study uniquely adds to all-inclusiveness among off-campus student housing studies than earlier studies which focusses mostly on on-campus educational facilities. The assessment of UDRs satisfaction among SWD contributes to the social support discourse of cognitive dissonance theory in the housing subsector. Again, this study deviates from health and legal studies associated to disabilities in Ghana.

Keywords: user satisfaction, student housing, social support, universal building design requirements

What Property Attributes are important to UK University Students in their Online Accommodation Search?

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Purpose: This paper analyses the relationship between the potential demand for purpose-built student accommodation (PBSA) properties and their online displayed attributes. Using data from 12 major UK cities, we analyse the effect of the online displayed property information on the popularity score of a PBSA.

Design/Methodology: The data used is from an online student accommodation listing platform – student.com which contains tangible and non-tangible property attributes, and the data is analysed using a hedonic regression model.

Findings: The results show that PBSAs' tangible and non-tangible attributes are important to students in their online accommodation search, although, these attributes vary in impact. The study also reveals that failure to display key information of a PBSA may reduce the attractiveness of the property. The results suggest that PBSAs' tangible and non-tangible attributes are important to students in their online accommodation search, although, these attributes vary in impact. The study also reveals that failure to display key information of a PBSA may make the property less attractive.

Practical implications: These insights are valuable in developing student accommodation investment, development and management strategies.

Keywords: Operational real estate, student accommodation, PropTech, online search, hedonic model; investment

Exploring the correlation between cost perception and uptake of solar energy solutions in the Zambia Housing Sector

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Purpose: Like many countries, Zambia is challenged to adopt clean energy solutions to meet its ever-increasing energy demand. The perceived cost of adoption is argued to be a potential hindrance to residential solar energy uptake. A review of the literature suggests that, while there is an increase in research on solar energy transitioning in sub-Saharan Africa, no such studies have been undertaken in Zambia. It is argued that solutions to promote the use of solar energy in the owner-built residential sector in Zambia are crucial to solve this energy dilemma, as over 50% of residences in urban areas are self-built housing. Considering that a significant proportion of houses are owner-built, households must clearly understand their financial commitments when considering solar energy solutions. Therefore, this study aimed to explore the extent to which the perception of the cost of adopting solar energy solutions was an influencing factor in the uptake of solar energy in the residential sector in Zambia.

Design/Methodology: Data was collected through a questionnaire survey from 83 households in the Lusaka and Copperbelt provinces of Zambia.

Findings: While the findings did not show a significant correlation between cost perception and adoption of solar energy solutions, the households who had adopted solar energy solutions had a relatively higher income than those who had not adopted solar energy.

Limitations: The study focused on a small number of potential explanatory variables for solar energy adoption. Future studies should explore the inter and intra relationships between the variables and solar energy adoption.

Practical implications: The findings have practical and policy implications as they help understand factors that can increase the uptake of solar energy solutions in the housing sector.

Originality: The study contributes to the understanding of factors impacting on solar energy adoption in the Zambian housing sector

Keywords: solar energy; sustainable development, renewable energy, the housing sector

The State of the Retail Industry in Kenya – A Property Manager’s Role

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Purpose: Under the Kenya Vision 2030, the Government targeted to raise the share of products sold through the formal retail channels, such as supermarkets from 5% in 2007 to 30% in 2012. The retail sector was among priority sectors projected to make up the largest part of Kenya’s Gross domestic Product and create approximately 50% of the total formal employment. The formal retail market in Kenya is estimated at 33% of these supermarkets and hypermarkets chains constitute at least 20% of the formal retail spaces. Within this period, developers responded and constructed new malls. In Kenya, many of the newer shopping centres offer a mix of shopping, leisure and even hotels. This is to match other countries’ developments as well as new consumer shopping habits. In 2010 to 2015, most of the shopping centres had their anchor tenant as local players. In 2015, however, the country has seen the entry of several international brands, such as GAME, Carrefour, Shoprite and Choppies, which was made easier by the exit of major brands such as Nakumatt, Uchumi and Ukwala. These first two were anchor tenants in most of the shopping malls. Nakumatt had 66 branches across Kenya, Uganda, and Rwanda. Uchumi had 25 branches spread out in Kenya, Uganda, and Tanzania. The effect of their going down left many shopping malls without an anchor tenant, left landlords with huge rent arrears and left their suppliers in so much debt, that some have had to close business. In time some of these shopping malls found new anchor tenants in Carrefour and Foodplus. Then the COVID-19 pandemic hit and though the anchor tenants seem to be doing well, many line tenants have had to close their businesses. The paper examines the main factors leading to the collapse of these major supermarkets some of which have been there since 1975 and had the backing of the Government and were considered low risk. The paper also examines the effect of this collapse and the COVID-19 pandemic on shopping malls.

Methodology: This was done through literature review and interviews with identified groups.

Findings: Findings indicate that some of these supermarkets expanded too quickly meaning the growth was unsustainable. Their failure has negatively impacted many groups in the retail sector. These groups include the landlord where they had rented premises and rents were unpaid, suppliers who in some cases have gone bankrupt because of unpaid invoices. Also affected are other tenants in the shopping centres who were attracted to take up space in a shopping centre, because of the presence of a strong anchor. These tenants are now struggling, and some have had to close shop. Tenants who survived the loss of the anchor tenant, may now not survive the COVID-19 pandemic.

Practical implications: The paper recommends that the property manager has a role to play in monitoring tenants and identifying a struggling tenant as early as possible. Secondly, that there should be a code of practice between retailers, their supplier, and their landlords. Thirdly the property manager had a role to play in making shopping malls safer by making sure shoppers and retail stores adhere to the standard distancing protocol, traffic monitoring, & face mask wearing.

Keywords: Retail, property management, Shopping centres, anchor tenant, COVID-19, landlords

Theoretical and Conceptual Models of Critical Success Factors and Key Performance Indicators for Real Estate Professional Business in Lagos, Nigeria

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Purpose: This paper aimed to equip real estate practitioners in developing countries with critical success factors (CSFs) and key performance indicators (KPIs) for keeping track of their activities to develop sustainable practice. It will model CSF and KPIs that can be effectively used to run an enduring real estate practice.

Design/Methodology/Approach: The paper reviewed and analysed previous related papers in respect of the subject in other industries both locally and in advanced countries as a guide to real estate practitioners in developing countries. The paper identified the various theories of business management that suggest how business performance is measured. The paper continued to identify CSFs and KPIs that are used in other industries to model CSFs and KPIs for use in real estate industry.

Findings: The practice of corporate real estate management is still relatively new to African countries like Nigeria. The implication is the collapse of many real estate firms with its untold negative effect on the profession. Understanding CSFs and KPIs in real estate business is a major pathway to developing sustainable real estate practice.

Originality/Value: The paper is a useful guide to real estate managers in developing countries towards employing CSFs and KPIs to increase the overall performance of their companies.

Keywords: Critical Success Factors, Key Performance Indicators, Real Estate Business, Business Performance, CSFs, KPIs.

Standing Tall beyond the Pandemic: Business Continuity Plan and Processes for Hospitality Business Operations

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Purpose: Coronavirus pandemic popularly known as COVID 19 pandemic came into the global world as a huge surprise to disrupt all forms of human activities ranging from economic, social and health. There is no doubt that COVID-19 is novelty pandemic that has brought the global economy to its knees as every aspect of the business world suffers the impact. In other to curb or slow down the spread of COVID-19 pandemic companies across the globe briefly close their doors. However, many organizations are able to continue doing business, although in a reduced volume, by having their staff work remotely while practicing social distancing or self-isolation. This experience is a wakeup call for business owners across the globe to take the issue of business continuity plan and processes serious. As this will enable business owners to keenly reconsider their approach to business recovery system rather than the popular palliative measure by way of engaging insurance policies and the likes. In this unprecedented new reality, we will witness a dramatic restructuring of the economic and social order in which business and society have traditionally operated. This research work therefore seeks to examine the level of emergency preparedness in some selected hotels and guest houses operation in Abuja, Nigeria.

Design/Methodology: It carefully examined the degree of effects of COVID 19 on hospitality Business world and analysed the level of disruption of Business Operations, as well carried out Risk Analysis of business disruption and economic loss in terms of disaster and recovery.

Practical implications: The research also assessed the level of emergency preparedness for Hospitality Business Operations and recommend ways to ameliorate the time and degree of business disruption during and after disaster.

Keywords: Hospitality; COVID 19; Pandemic; Business Operations; Risk Analysis; Disaster; Emergency management; Business Continuity plan

A Chronicle on the Mainstreaming of Land Management and Sustainability into Estate Surveying and Valuation Education: A Case Study of Rivers State University

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Purpose: Currently, climate change effects, in the form of incessant flooding is experienced within the inner cities mostly as a result of the destruction of wetland for developments thereby capable of hampering property investment. This environmental injustice could be attributed to uninformed real estate practice which seeks to secure the optimal use of land and its associated resources in order to meet social and economic needs without considering environmental consequences. This phenomenon indicates the possibility that land management, which addresses the tripartite needs (economic, social and environmental) was not factored in decision making for property development in flood prone areas. The purpose of this study is to describe how Land Management and sustainability indicators can be mainstreamed into the Real Estate Education.

Design/methodology: Ethnographic research design was adopted since the researcher was an active participant observer. Data collection was by observation, interviews, and documents from university and departmental academic curricular sampled purposefully and theoretically using triangulation analysis by describing, examining relationships, factors and linkages.

Limitations/implications: Although the research design is highly recommended by educational researchers, it requires a lot of time since it takes time to build trust for honest discourse. Since data is limited to the researcher's workplace, there is every likelihood that it may lead to false assumptions about behaviour patterns.

Practical implications: This study will influence the practice of real estate profession capable of reducing climate change effect on property investment by introducing sustainability thinking into decision making.

Originality: The research is original birthed by the researcher in the test professional competence and adopted for the purpose of this research.

Keywords: land management, sustainability, real estate profession, estate surveying and valuation education

Measuring Performance of Risk-Return in Residential and Commercial Real Estate Investments in South-South, Nigeria

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Purpose: The paper measures risk-return performance of residential and commercial real estate investments in South-South, Nigeria (Calabar, Uyo and Port Harcourt) from 2009 to 2018. To achieve the aim of the study, research objectives were formulated to guide the study. The paper looks at the performance of both residential and commercial real estate investments about their risk-return characteristics.

Design/Methodology: The study adopted the descriptive survey research design and questionnaire was used to collect primary data through purposive sampling technique. The data collected was analysed using statistical tools such as descriptive statistics and the Analysis of Variance for testing the research hypotheses formulated.

Findings: The results showed the performance of the residential and commercial real estate investments based on risk and return and which of the investment performed better. Residential property in Calabar performed better than commercial property. In Uyo, commercial property investments performed better than Residential and Port in Harcourt, residential property performed better than commercial. At city level, residential property in Port Harcourt outperformed Calabar and Uyo while for commercial Property; Uyo outperformed Calabar and Port Harcourt.

Research limitations: The scope is limited to Calabar, Uyo and Port Harcourt (South-South, Nigeria) and data collection is only from practicing estate surveying and valuation firms in the study area.

Practical implications: The study has implications for real estate investors/developers especially in an emerging market like Nigeria where real estate investment is very active.

Originality/value: This study on measuring risk-return performance of residential and commercial real estate investments have not been conducted in the study area to the best of my knowledge. The study will contribute to the existing knowledge on real estate investment performance and risk analysis.

Keyword: Real estate, performance, return, risk, investment, Nigeria

Exploring Occupants' Comfort and Indoor Environmental Qualities in Green Office Buildings

Thabelo Ramantswana, Yamkela Blou, Ntombi Mtshali, Kabelo Modise

Purpose: People spend about 80% to 90% of their time indoors, and studies have shown that a range of comfort and health-related effects are related to building's features. The idea around green buildings is to ensure that the indoor environment is favourable to the occupants. Green buildings have been increasing in the US, Australia, and Europe for several years. However, in South Africa, green building is still a relatively new concept although its direct impact on occupants' safety, well-being, and efficiency on problems of both physical and non-physical indoor environmental quality (IEQ) (thermal, acoustic, visual, and air quality, etc.) has been studied. Although there are several studies conducted focussing on different aspects of Green Buildings, there is still not enough consideration given to IEQ of green buildings on occupants' comfort in South Africa. This paper explores the effects of IEQ in green office buildings on occupants' comfort.

Design/Methodology: This study targets all (69) GBCSA certified green office buildings in South Africa. The respondents were all employees of accredited green office buildings. The survey was used to gather information on the occupants' satisfaction regarding the IEQ factors of the green office building space they are using.

Findings: The results show that many participants developed sicknesses from the buildings they work from, and they were not satisfied with the ability to alter the lighting in their workspace. Regardless of these factors, the overall perception of occupants in green office buildings regarding IEQ factors is that they are satisfied. The results show that occupants may not be overly satisfied with some IEQ factors in their green offices, but they are still satisfied with their workspace in general.

Practical implications: This research will assist in identifying IEQ factors that have an effect on occupants' comfort and well-being in South African certified green office buildings. The findings might help designers incorporate IEQ factors into their design plan and life cycle of the building and use the study results to improve on the IEQ areas where the occupants were dissatisfied.

Keywords: green buildings, post occupancy evaluation, indoor environmental quality, wellbeing, occupant satisfaction

The Role of Effective Market Research in Sustainable Commercial Real Estate Investment Decisions in Developing Economies

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Purpose: Positioning the commercial real estate sector as alternative and complementary foreign exchange earner will not only help to relieve the stress on Nigeria's oil sector, but also support diversification in the economy. This, however, requires effective and efficient conduct of quality market research which seems to be lacking in the study area and in developing economies generally. The aim of this study was to examine the quality of market research report being conducted for commercial real estate investment to ascertain whether same is in line with international best practices and in achieving this, several objectives were set.

Design/Methodology: The study area is Lagos Metropolis. Cross-sectional survey research design was applied. Data were screened, coded, and analysed using the Statistical Package for the Social Sciences (SPSS) version 23.0. Results were presented using descriptive statistics. Pearson Product Moment Correlation and Multiple Regression Analysis were used to test the stated null hypothesis at 0.05 level of significance.

Findings: Results from the study shows as follows: that the cost of research ($\bar{X} = 4.31 > 3.0$) is the most factor militating against conducting effective market research; market research influences the marketability of the investment by increasing financial performance ($\bar{X} = 4.03 > 3.00$); the quality of market research is positively related to real estate investment decision as evidenced with a yield of the calculated "r" ($r - \text{cal.} = 0.645$; $p=0.00 < 0.05$) which is significant at 5%, there is a significant correlation between marketability of commercial real estate (mean score of 29.73) and real estate investment decisions (mean score of 31.04).

Practical implications: This study recommends standardization of market research framework for more efficient market research reports to guide investment decisions.

Keywords: Market Research, Commercial Real Estate, Investment decisions, Developing economies, Pre-investment studies.

Modelling of Daily Price Volatility of South Africa Property Stock Market Using GARCH Analysis

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Purpose: The study examined the volatility of the daily market price of listed property stocks on the Johannesburg Stock Exchange (JSE) for a 10year period (2008-2017). The primary aim of the study is to investigate the volatility pattern of the daily market price; in an attempt to document and model the nature of volatility characterised by the daily price of the listed property stock market for informed investment decision making.

Design/Methodology/Approach- The study used daily prices from January 2, 2008, to December 29, 2017 of twelve (12) quoted property companies out of the twenty-seven (27) listed on Johannesburg Stock Exchange (SA REIT Association, 2020). The property stocks were selected based on the quoted property companies that have sufficient published data on daily prices for the period under review. The data were obtained from the JSE published statistical bulletin. The study computed the average daily price of the selected (12) property stocks and was used as a proxy for the daily market price for the property stock market in the analysis. The study deployed mean, standard deviation, maximum and minimum analytical tools for descriptive statistics, Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS); Jarque-Bera, Breusch-Godfrey LM and Heteroskedasticity tests for unit root, normal distribution, autocorrelation, and ARCH effect tests respectively. The diversification benefits and modelling of SA-REIT market price volatility were analysed using correlation matrix and generalised autoregressive conditional heteroskedasticity (GARCH 1, 1)

Findings: Analysis of residual estimate of the series documents the evidence of volatility characterised by prolonged high and low clustering patterns for the period under review. The GARCH model reported that the previous day's information of both the daily market price (ARCH term) and the volatility (GARCH term) have a positive and significant ($p < .05$) effect on the current day's daily market price volatility in the property stock market. The result of the model implies that investment in the property stock market is strongly driven by positive news on daily price than a negative shock; meaning that South Africans' investors are more sensitive and exhibit a sharp response to good news on daily market price than bad news when thinking of investing in listed property company shares on Johannesburg Stock Exchange.

Practical implications: The study documents and models the statistically significant influence of conditional variance (volatility) of the daily price of the South Africa property stock market.

Originality/Value: The study added to the existing body of knowledge by documenting the volatility pattern and model structure of SA-property stock markets for informed investment decision making.

Keywords: GARCH, Property stock, Stock Market, Volatility, Model

Perception on Modular Construction for Low-Income Housing in South Africa

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Purpose: Modular Construction is touted as a panacea to low-income housing for its speed in delivery, yet its use is still scanty in those countries that have the greatest shortage of low-income housing. The paper identifies this alternative construction method as a research gap on whether the product can be acknowledged and accepted by built environment stakeholders.

Design/Methodology: In depth interviews showed some themes on what delays the implementation of this technology in building the much-needed low-income housing in South Africa.

Findings: Results show that developers are ready to embrace non- traditional construction techniques for the development of low-income housing. The main concern raised is that modular construction creates the impression that modular housing are temporary solutions than a permanent solution for the masses. Further, modular housing is associated with low quality and this perception precludes the engagement of the financial sector in financing a supposedly 'valueless asset'. The finding is that government as a stakeholder is highly likely to embrace modular housing for low-income people should they be persuaded of their value.

Practical implications: The paper recommends more incentives by government for developers to start building good quality examples of modular housing. These examples will have potential to appeal to local communities and help raise awareness of modular construction as a solution to mass production of low-cost housing.

Keywords: Built environment stakeholders; Johannesburg; low-income housing; mass production, modular construction; South Africa

An Appraisal of the Adoption of Innovative Technologies for Sustainable Real Estate Practice in Edo State, Nigeria

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Purpose: The introduction of various technologies in the real estate market has led to the disruption in the traditional practice of real estate globally. The adoption of innovative technologies such as blockchain, IoT, drone technology is limited in Nigeria to sustain the future of real estate practice. This study, therefore, appraises the adoption of innovative technologies for sustainable real estate practice in Edo State, Nigeria.

Design/Methodology: Structured questionnaires were randomly administered to 43 selected registered Estate Surveying and Valuation firms in Benin Metropolis while all retrieved questionnaires were found suitable for analysis. The data collected were analysed using descriptive statistics.

Findings: Findings revealed that online residential brokers, increasing space utilization, and smart city applications were the most aware innovations in real estate practice. However, websites and geospatial technologies were the most adopted technologies for sustainable real estate practice in the study area.

Practical implications: Therefore, Nigerian Institutions of Estate Surveyors and Valuers should educate real estate professionals on the adoption of innovative technologies for sustainable real estate practice in Nigeria.

Keywords: PropTech, Innovation, Sustainability, Smart Real estate, Technology, Nigeria

Facilities Management of Sports Infrastructure in Tanzania: A Case Study of the Stadia in Dar Es Salaam

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Purpose: The growth of sports industry comes with increased infrastructures which required reliable management for their sustainability. The research aimed at exploring the management of sports infrastructure with special reference to stadia. It assessed the management practice, explored the policies supporting the management of the sports facilities and associated challenges towards suitable management practice in the sports infrastructure in Tanzania.

Design/Methodology: The study involved a qualitative research approach with alignment to the case study method. Purposive sampling was used to obtain respondents whereas interview guide and observation were adopted as data collection tools. This paved way for thematic analysis with the help of methods for data presentation.

Findings: The research revealed the difference in facilities management practice of stadia facilities and other properties due to peculiarity of installed facilities and the use of the infrastructure. Also, the facilities management was not addressed by the sports development policy; consequently, there were no facility managers which lead to inadequate maintenance plan and threaten sustainability of infrastructure.

Research Implications/Limitations: The paper creates a compound eye to researchers on the management of sports infrastructure. The major limitation of the paper was lack of one-to-many relationship (user versus stadia) which has narrowed the probability of one user having visited both stadia.

Practical implications: The research guides facilities managers on the stadia management roles and various management aspects for a successful management of the sports infrastructure.

Originality/Value of work: The paper makes an original contribution to stadia management practice in association with challenges and policies involved in the process.

Keywords: Stadia; Management; Sports infrastructure; Facilities

The Effect of a Polycentric System of Governance on the Building Approval Process

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Purpose: Building approvals are a key determinant of real estate development in Kenya. These approvals are nested at different jurisdictional levels leading to a complex institutional arrangement of building approval decision making. This leads to a cumbersome, and in some instances, duplicated process. This paper examines the experience of real estate developers in Kenya with the institutional arrangement of the building approval process.

Design/Methodology: Using qualitative research methods, we analyse 30 questionnaires administered to real estate developers in Nairobi County. Our findings indicate that the approval process is governed by a complex institutional arrangement. In its current form, this complex institutional arrangement is unable to deliver the building approval permits in a timely manner leading to delayed real estate project commencement and development cost variations.

Limitations: While the paper is limited to the real estate developer's perspective of the approval process it makes two key contributions. First, it offers empirical insight into the need to streamline the approval process to enhance real estate investment. Second, the paper provides important empirical evidence on the need to have an integrated building approval one-stop shop where all approvals can be integrated and housed in a central location.

Contribution/Value: This paper therefore contributes to the policy justification for streamlining and integrating the real estate development approval processes in Kenya.

Keywords: Building Approval Process, Polycentric Governance, Developers, Real Estate Development

Interventions of Customary Land Secretariats in Ghana

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Purpose: Since 2003, the Ministry of Lands and Natural Resources of Ghana has been assisting customary land authorities to establish customary land secretariats as a step towards improved customary land administration and management. The support for Customary Land Administration is to develop a more effective and accountable system of land administration at local level based on a collaborative approach, building on existing customary institutions, with the support of central government. The work seeks to provide an understanding of the customary land secretariat concept in Ghana. The work achieves this by observing several customary land secretariats and demonstrating the outcome of their implementation in Ghana over a decade from 2003 to 2020. The specific objectives are to assess the effectiveness of Customary Land Secretariats in terms of: 1) Maintaining reliable and up-to-date record of land transactions at the customary level, 2) Providing the expected linkage between landowners and prospective investors, and 3) Resolving land disputes through Alternative Dispute Resolution mechanisms. The work seeks to unveil the successes and failures of the customary land secretariats based on the above thematic areas.

Methodology: The study employs a case study approach within a Quantitative and Qualitative data analysis paradigm. The research and its findings and conclusion hinges on robust empirical evidence with analysis of quantitative and qualitative data collated from 20 CLSs randomly selected across the country. Overall, 60 respondents were selected and interviewed using the purposive sampling technique. Some telephone and Email correspondence were used but to a limited extent. Visits were made to 18 of the CLSs to verify and confirm conflicting data collated from the different data sources.

Findings: Results show a reduction in the number of ownership disputes in areas where CLSs have been established and that there is an increase in public education and sensitization of community people on land documentation and that there is an increase in the number persons registering lands including the proportion of women registering titles to their lands.

Implications: In Ghana like many other African countries, land is central to livelihood for majority of the population which is largely agrarian subsistence farmers. An efficient land administration system at the local level has the potential to activate local economic development. Second, over 70% of lands in Ghana is customarily owned and held in trust by traditional leaders (i.e., family heads, clan heads, chiefs, and priests) for their subjects. The effectiveness of customary land secretariat implementation will greatly aid the fiduciary relation and promote accountability at the local level.

Keywords: customary land secretariats, subsistence farmers, accountability

Sustainable Land and Food Security in Female-Led Agrarian Households of Tula, Nigeria

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Purpose -This study examined the nexus between land tenure security (LTS) and food security (FS) in female-led households of Tula agrarian settlements.

Design/Methodology – The study used a qualitative research design, which was based on the constructivist paradigm. The researchers conducted in-depth interviews with female household heads cutting across the three 'yaati' (villages) of Tula Baule. Analysis of data collected from the interviews was done employing transcriptions, creation of semantic networks and employing thematic content analysis.

Findings –The study revealed that all but few respondents believed that they had LTS based on “Feloh’s” (ancestral gods) supremacy without recourse to documentary evidence of ownership. Similarly, all but few participants do not have access to three square meal per day throughout the study period. The study also found a strong relationship between LTS and FS in the study area.

Practical Implication - It provides an empirical base to equip policymakers with valuable information for making policies relating to female's access to land and food in agrarian settlements.

Originality/Value - This study is one of the first to empirically analyse in an eclectic context land and food security in female-led agrarian households of Tula, Nigeria.

Keywords: Access to land; female-led household; food sustainability; gender equality; land tenure; Tula.

Gender Land Right Issues under the Customary System of Ile-Ife, Nigeria

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Purpose: This study examines women's land rights under the customary system of Ile-Ife, Nigeria, intending to provide information that could inspire efforts to change women's lives and inform land policy.

Design/Methodology: A qualitative research approach was used in this study. Four key informant interviews and 13 structured interviews with rural women farmers were conducted during fieldwork in Ajebandele village, Ile-Ife, Nigeria. Purposive and stratified sampling were used, respectively. In both cases, the interviews were conducted in the local language (Yoruba). The respondents' opinions were recorded using an audio recorder, interpreted, transcribed, and analysed through content analysis.

Findings: The study discovered, among other things, that the customary land tenure system in Ajebandele village, Ile-Ife, Nigeria, has been refined over the last four decades to benefit women. Men and women have equal access to land rights in terms of land availability and affordability. Despite the progress, the study concludes that gender equality has not been wholly realised because rural women farmers lack tenure security.

Practical implications: The findings confirm custom and tradition as a principal barrier to women's secure land rights. Governments and society can address women's insecure land rights through advocacy and awareness campaigns to revolutionise the community's mind-sets and practices.

Originality/Value: This study appears to be the first that examines women's customary land rights in Ile-Ife, Nigeria, thus contributing to the knowledge base on this topic.

Keywords: Access to and control over farmland, land administration, gender inequality, tenure security.

Analysing the Effectiveness of the Delivery of Learning Materials to the Fourth Year Real Estate Class at University of Botswana

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Purpose: The purpose of the study was to analyse the effectiveness of the delivery of learning materials to fourth year real estate class. This was based on the research problem derived from the literature that low retention of learning materials by learners is attributed to the challenges that human beings face in absorbing what they have learnt through listening. The study wanted to establish if what students learn through listening, reading, visualisation and demonstration can be remembered in a class exercise. This was conducted based on the above learning materials to establish the level at which they recalled what they had learnt using different methods of pedagogical mode of instructions.

Design/Methodology: Learning materials were presented to the class for the past two weeks for twelve hours session using different pedagogical methods. In week one, students were given learning materials in form of a presentation covering the skills of listening and visual images. In week two, the learning materials was delivered using reading notes and demonstrations with examples. Based on the literature reviewed, on how to prepare a good oral presentation, it identified the level of absorption by learners through listening to be around 40%, reading about 30% and seeing around 60% to 80% and demonstration about 30% and that the amount of data that they are likely to remember will be in that range. These models were used to assess the learning achieved by the learners. An exercise was administered to 24 students in a class of 27 students to test and validate what the above theories had indicated in the literature.

Findings: It was discovered that on the question that was prepared based on the listening theory, students did not do well because their ability to recall what they had listened was constrained as per what the theory stated. Only about less than 42% of students were able to retain what they had listened and read to during the delivery of the lecture. On the visualisation theory, about 75% were able to remember what they had seen with their own eyes and the images that were presented to them. Finally, 92% were able to remember what they had demonstrated in class in form of an example.

Practical implications: When using pedagogical strategies, lecturers should be cognisant of the blended learning by varying the teaching styles so that learners have a higher chance of remembering what they were taught in class. Students have a higher tendency to remember materials that involved them in demonstrating how the concept was done than listening to the lecturer. Lecturers should develop learning materials that will help students understand without much difficult.

Value of the study: The study identifies deficiencies in the pedagogical model of delivery of learning materials and how the assimilation of materials can be improved through blended learning.

Keywords: learning aids, teaching materials, skills, visualisation, demonstration, pedagogical strategy, blended learning.

Developing an Integration Framework for Property Technology (PropTech) and Innovation in Real Estate Education

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Purpose: In the last decade, IT and digital systems have silently become pervasive in traditional real estate markets, creating a contemporary branch of real estate typically referred to as “PropTech” (property technology). Despite the advancement of property technology and innovations over the last few decades, there has been a disproportionate growth in related scholarly work, particularly in PropTech education. Furthermore, there is no evidence-based approach to developing a Property Technology and innovation educational framework for higher institutions. This research, therefore, develops a practical and pedagogical framework to enhance and sustain the integration and delivery of technology and innovation in real estate higher education.

Design/Methodology: Using a stakeholder and analytical approach, we conduct several interviews and focus group sessions with senior managers and CEOs of leading real estate and PropTech firms in the UK. In addition to these, we conduct further interviews with heads of real estate departments, senior real estate educators and professional bodies (RICS and UK PropTech Association). We thereafter design a practical and pedagogical framework for PropTech and real estate innovation in real estate higher education (referred to as PEIF).

Findings: The PEIF proposes a blended approach of integration, involving the development of a module to introduce property technology and innovation in the real estate higher education curriculum, while simultaneously incorporating technology and innovation in the already existing real estate modules.

Practical implication: This framework, to the best of our knowledge, is the first PropTech education integration framework that has been developed using extensive empirical evidence; it is thus valuable to real estate educators and higher education institutions.

Keywords: Real estate education; PropTech, education; innovation; higher education

Examining Zimbabwe's Expropriation and Compensation Process through the Lens of Procedural Fairness

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Purpose: This paper is an addition to the sparse academic works on the procedural fairness in compulsory acquisition and compensation of land and properties in Zimbabwe. Discovering a pragmatic way of resolving the centuries-long compensation disputes in Zimbabwe is the main motivation for this study.

Design / methods followed/ approach: The existing expropriation and compensation process was examined using the principles of procedural fairness which include representativeness, neutrality, accountability, consistency, correctability and grievance management. Data were collected through literature and questionnaire surveys. Content analysis was used to analyse the collected data with the aid of Atlas.ti8 and thematic analysis was done on data from questionnaires survey.

Findings: The result of this paper shows that the current expropriation and compensation process fall short to meet the standard of procedural fairness which include but not limited to representativeness, consistency, neutrality, accountability, correctability and grievance management. To correct the observed gaps in the existing expropriation and compensation procedure in Zimbabwe, a novel expropriation and compensation framework (ECF) was designed for Zimbabwe to bring fairness in the current process.

Research limitations / implications: The major limitation of this study was that data collection coincided with the COVID-19 induced lockdowns inhibited the planned face-to-face interviews. This would have made it possible for the researchers to make more enquiries as follow-up to preceding questions. This however did not impede the quality of research because the online platform was used to distribute questionnaires to the targeted research subjects.

Practical implications: Results of this study came at the most appropriate time, given the fact that the GCA has just been signed and is about to be implemented. Furthermore, the time can be considered ripe since the Parliament of Zimbabwe is currently working on aligning existing statutes with the 2013 constitution. While the new Zimbabwean government is making appreciable progress, it is hoped that the contributions made in this study would lead to lasting solutions to age-long crisis.

Originality / Value of work: Several studies exist on the subject matter; however, this is the first study that focuses on procedural fairness in compulsory acquisition and compensation in Zimbabwe. This study designed an ECF to operationalise the proposed legal amendments and bring transparency and consistency in property valuation for expropriation in Zimbabwe and improve the level of satisfaction of affected people.

Keywords: Compensation, Expropriation, Fairness, Procedure, Zimbabwe

Impact of Rail Transit Stations and Value Capture Planning for Transit in Johannesburg, South Africa

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Purpose: The interaction between rail transit and the urban property market is a crucial foundation for transit orientated development and policy planning in Metropolitan Cities. However, there are only a few studies which report on the impact transit access has on commercial property value in African cities. This paper presents an empirical study from the City of Johannesburg's inner-city, to contribute to this subject matter.

Design/Methodology: The paper utilises multiple regression models to determine statistical significance relating to the impact that a rail transit station has on commercial property values due to proximity and access. This is based on 87 observations of commercial properties located within a 1km radius of the Jeppestown PRASA railway station located in Johannesburg CBD. The paper also discusses the possible impact of other amenities found around close to the commercial properties.

Findings: The findings of the study were that proximity to a railway station alone does not significantly impact commercial property values within a 1km radius. The results also show that there are other determinants which influence commercial property value, namely distance to schools, property age, industrial, and abandoned property. Hence, there is limited impact of the railway station on commercial property value.

Implications: The discussion in this paper also delves deeper into providing gaps in knowledge on how railway stations relate to urban property market, especially commercial real estate values in Metropolitan cities. Finally, the findings will contribute towards more effective transit-oriented development policies and a better understanding of how public sector investments can help create value for properties.

Keywords: commercial property, planning, property value, railway transit, South Africa

The Extent of Mortgage Financing in the Supply of Commercial Space: A Review of WA Space Market

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Purpose: The supply of real estate space is decreasing at an increasing rate mostly in developing countries where monetary policies do not support borrowing. High rate of interest rate charges and adjustable nature of mortgage rates continues to dwindle real estate development in Ghana. However, the use of equity financing in producing real estate space is scarcely reliable. The study explores the contribution of mortgage financing in the supply of commercial space in Wa. It aimed at knowing the number of commercial space suppliers in Wa space market who have had access to mortgage financial support.

Design/Methodology: The study employed field survey design and personal observation as techniques for data gathering. Questionnaires, focused group discussion and face to face interviews were adopted in getting primary information from the field. As such, respondents were purposively sampled to aid in getting appropriate information to suit the objective of the study.

Findings: The study reveals that only 3.41% of the sampled commercial space suppliers had access to mortgage. As such a general conclusion was drawn to the fact that equity financing is prominent among commercial space suppliers in Wa even though the willingness to get mortgage by participants are high.

Practical implications: The study makes recommendation for improving the accessibility of commercial real estate developers to mortgage facilities.

Keywords: Commercial Real Estate, Debt Finance, Leverage, Collateral

A Framework for Financing Housing Development and Ownership in Africa

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Purpose: There is a need for the modification of mortgage finance to embrace new innovative finance options that will facilitate access to housing by low- and middle-income earners in Africa. Thus, this paper seeks to evaluate the suitability of informal finance options for incremental housing development in Africa.

Design / methods followed/ approach: A desktop survey of the literature was carried out to consider mortgage financing in contrast to other housing financing options. The approach was used to critically appraise and consolidate existing studies on innovative financing (informal finance option) in Africa. The Mendeley app was used to collate and organize the literature chronologically spanning 24 years of 1994-2018. Thematic content analysis was used to appraise positions, gaps, and lapses in the implementation of different informal housing financing solutions.

Findings: In most African countries like Kenya, Rwanda, Nigeria, and Malawi, mortgage finance research continues to grow as a major part of affordable housing finance. However, there are considerable interests in innovative affordable housing finance tools and incremental housing for the low-income groups.

Research limitations / implications: This study is limited by the low volume of quantitative literature and data gaps about incremental housing in the African context. However, this motivates the need for a more elaborate exploration of the research and knowledge available.

Practical implications: This study adds to the growing discussion of exploring available research on innovative housing finance in Africa.

Originality / Value of work: To our knowledge, this study provides insight into the opportunities for a diverse pool of formal and informal financing options to build an acceptable house finance framework for the African housing market.

Keywords: Incremental, housing, finance, framework, mortgage, loans, affordability, developing, economies, Africa.

The South African Municipal Valuation Standards for Property Rating

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Purpose: The Local Government: Municipal Property Rates Act No 6 of 2004 (MPRA) heralded a new era for property rating for South Africa. There are no existing localised Standards for Property Rating in South Africa. The purpose of the project was therefore to develop a set of municipal valuation standards which are appropriate to the South African context. In this space there are varying performance by appointed Municipal Valuers and recurring issues relating to the inconsistent delivery of the property register/valuation roll. Together with the lack of expertise in the Municipalities due to the high turnover of staff and different interpretations of legislative requirements, the aim was to therefore customise the South African Municipal Valuation Standards for Property Rating.

Design/Methodology: The MPRA is the primary reference point. This legislative framework has supported the development of these standards. It provides the specific legislative requirements in the valuation of property and the compilation and maintenance of valuation rolls for the levying of property rates. It also provides a legislative platform for compliance and assigns responsibilities to the property valuation profession (municipal valuers) and the municipalities. The structure and format of the standard have included the applicable MPRA sections that relate to the municipal valuer function, responsibilities, and obligations, and includes professional valuation practice notes with the applicable corresponding standard. The Practice Note: Templates and Annexures in the standard is intended as supporting best practice in the interpretation and understanding of a particular standard.

Findings: Due to the evolving nature of mass valuations and technological advancements in this field. The Standard has a bias towards data and management of data which forms the basis of modern mass valuation principles and the application of computer assisted mass appraisal techniques. The valuation profession must have mass appraisal training if the municipalities, are to benefit from this competency.

Practical Implications: The Standards will therefore promote standardisation, efficiency, uniformity and consistency through rules and benchmarks in the preparation and maintenance of valuation rolls (municipal rating), to improve quality and standards for equitable municipal rating. The document also includes setting limits, rules and benchmarks for monitoring and applying the standard and provides for practice notes, guidelines, and technical guidance to support implementation, interpretation and understanding of the standard. Today, we have the customised version known as the STANDARD: MUNICIPAL VALUATIONS FOR PROPERTY RATING (sMVPR), version 8.3 after being reviewed by the International Valuation Standards Council (IVSC). This version with associated appendices has been adopted by SACPVP for the implementation of the Local Government Municipal Property Rates Act and is driven by International best practice which was adapted for use in South Africa. Similarly, a Monitoring Framework has now been developed, the focus is on the Professional Performance and Conduct

within the Municipal valuation and rating space. The Investigations and Ethics Committee of SACPVP will monitor any transgressions by the Municipal Valuers.

Keywords: SACPVP; Mass Appraisal; Municipal Rating; Municipal Valuations for Property Rating.

An Assessment of the Predictive Performance of Moving Average, Regression Analysis, Exponential Analysis and Natural Logarithm in Determining Future Property Values

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Purpose: The purpose of this study was to measure the accuracy of performance of the prediction of moving average, regression analysis, exponential analysis, and natural logarithm in determining future value of a property.

Design/Methodology: Historical property value data was obtained from an investment over a period of 16 years. The time series data was used to plot the charts and derive equations for the four models that were used for predicting the next year's value and forecasting of values for the next ten years in MS Excel. Residuals, percentage errors and ratios were used to establish the accuracy performance of the models using actual value minus predicted value.

Findings: It was revealed that the four models had capabilities to predict value in the short term, however the three series moving average had no capabilities of forecasting of values in the long run. From the findings, it was established that the most accurate model in predicting the value of property in the short term was exponential analysis with (100%) of the errors in the acceptable range of 0% to $\pm 10\%$. This was followed by the regression analysis model with 69% of errors falling within the acceptable margin of error. The natural logarithm was third with 38% of errors falling within the acceptable margin of error. Finally, the moving average with 31% of errors within the range of margin of error. The measures of appraisal uniformity were all within the acceptable margins for COD, COC, COV, MAD, AAD, MAPE and PRD and also supported the results that were obtained based on the margin of error. This was further confirmed using coefficient of determination where $R^2 = 98.7\%$, 97.0% for regression and 76.6% for natural logarithm.

Research limitations/implications: These models though useful, they have little appreciation by the users in the property industry for decision making purposes as most of the assessments are based on subjective assessment of value. These could be useful in predicting and forecasting of value for investment decision making purposes.

Practical implications: If adopted by practitioners these can be good models to use in predicting of values in the short term as well as forecasting of future values in the long term for decision making purposes.

Originality/value of the work: It is noted that there are no studies that have compared performance of models in predicting and forecasting of values in the short and long terms. The contribution to the body of knowledge is the introduction of the four models in predicting and forecasting of property values in the short and long terms.

Keywords: Property values, moving average, regression analysis, exponential analysis, natural logarithm.

An Assessment of Factors that lead to the Non-Application of GIS Infused Automatic Valuation Models in Property Valuation in Gaborone

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Purpose: Geographical information systems (GIS) is widely applied in valuing property using computer assisted mass appraisal (CAMA) or automated valuation models (AMV). However, the use of GIS infused AVMs in Botswana is limited. This has led to long turnaround time as most valuations are done manually and using traditional valuation methods. The purpose of this research was to assess the factors that lead to the lack of application of GIS infused automated valuation models in property valuation in Gaborone.

Methodology- For this study, both secondary and primary data were utilised. The primary data was collected through the use of a questionnaire which was distributed to various Property Valuers. The secondary data was retrieved from journals, articles as well books. Analysis of data was done using software packages like SPSS. These packages were used later on to present the findings in charts and graphs for easy comprehension of the data by readers.

Findings- The findings show that the variables that have an impact on the lack of usage of GIS infused AVMs include lack of computerized models of valuation, high costs of computer software and hardware, lack of infusion of GIS in school curriculum, lack of interest in GIS as well as fear of change from traditional valuation approaches among others. However the findings reveal that the economic factors are the ones with great impact on the lack of usage of GIS infused AVMs during property valuation in Gaborone.

Practical Implication: This research bridges the knowledge gap of the subject matter by availing issues pertaining to the lack of application of GIS infused AVMs in property valuation in Botswana.

Keywords: Property valuation; Geographical information systems; automated valuation models; Gaborone; Botswana

Property Valuation Theory: Implications to Practice

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Purpose: Property valuation has evolved to become an important economic strategy and dispute resolution tool for individuals, public institutions, and private corporations. However, in the face of uncertainties and immediate economic impacts, the practice of property valuation has been called to question. An extensive real estate literature has indicated that property values can become a great motivation for investment and can establish the basis of negotiation for compensation. Less study, nonetheless, has investigated the extent of the impact of value theories to the property valuation practice.

Design/Methodology: Reviewing literature, this paper explores the property valuation theory evolution and its implication to the property valuation practice.

Findings: The paper notes that value is a product of its time and place and should be understood contextually. The present understanding is a contextualized deduction of the past reasoning. It can be assumed that since value is illustrated in a numerical figure, there are processes for value determination that emanated from the value theory reasoning. Further, the paper argues that, the value theory is evolving slowly to the expense of the valuation profession in the face of contemporary challenges such as economic crises, pandemics and compensations after expropriation.

Practical implications: The issues are important in the general evolution of the property valuation practice and national debates involving practices like expropriation and compensation.

Keywords: property valuation, value theory, valuation practice, real estate

An Assessment of Impediments to Access to Serviced Tribal Land

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Purpose: The purpose of the study was to assess impediments of access to serviced tribal land by citizens on the waiting list of Mogoditshane sub-land board in Kweneng District.

Design/Methodology: Both primary and secondary data sources were used to collect data. Primary data was collected using questionnaires administered to land applicants in the Mogoditshane sub-land board waiting list. Secondary data was collected from journal articles, books, conference papers and newspaper articles. Data collected was subsequently analysed using Microsoft Excel; ANOVA, regression analysis, t-test analysis, and correlation.

Findings: the study revealed 3 classes of the impediments that affect serviced tribal land accessibility; institutional, physical, and financial factors. Institutional factors include; unrecorded transactions, no overall regulation of how to administer tribal land, inappropriate distribution of power, poor land policies, lack of complete records of tribal land, corruption, lack of proper Land Information Systems (LIS), poor record keeping, poor governance, lack of accountability, frequency of incompetence, lack of skilled labour, low qualification requirement, inadequate institutional capacity, unregistered old allocations and lack of data networks among land boards. Financial factors include poor pay, inadequate funds and high cost of serving land. Shortage of land and difficulty of determining land available were characterized under physical factors.

Practical implications: The main implication of the study is if serviced tribal land is not accessible land issues and conflicts will persist in Mogoditshane sub-land board. In addition, lack of accessible land may lead to poverty among citizens.

Recommendations: The study recommends that to enhance access to serviced land, proper record keeping and registration of land, improving land administration and land tenure security and recognizing that good governance of land is essential for peace and security.

Value/contribution of the study: This study has provided a context on how land can be made available and accessible for all individuals. The study is not only significant to people in the real estate industry, but also to everyone. Land is a core resource to every essential human activity and an excellent management of it is an indicator of a healthy economy. The study will help people understand land management as an important entity towards a sustainable and healthy economy.

Keywords: Land administration, land delivery, serviced tribal land, land management, land access

Are Secondary Equity Offerings of BEE REITs Less Underpriced than Non-BEE REITs?

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Purpose: Using real estate investment trusts as a unique laboratory, we investigate the impact of the Black Economic Empowerment policy on seasoned equity offering (SEO) price dynamics.

Methodology: 52 SEOs issued by 29 REIT firms (based on availability of data) from January 1, 2010, to December 31, 2020 were retrieved from the Stock Exchange News Service (SENs) of the Johannesburg Stock Exchange (JSE).

Findings: Using OLS regression in analysing our data, evidence indicates that BEE is positively related to SEO underpricing; in other words, SEOs of BEE compliant REITs are less underpriced compared to non-compliant BEE REITs.

Implication: Evidence also suggests that the BEE policy needs to be recalibrated owing to its politicization as this will enhance compliance from REITs.

Originality: This is a pioneer attempt at providing insights for subsequent studies of this nature.

Keywords: Economic policy, Black Economic Empowerment, Seasoned equity offerings, Underpricing

Do REITs Hedge against Inflation? Evidence from an African Emerging Market

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Purpose - This study examines how returns on Nigerian REIT (N-REIT) behave in relation to inflation changes from 2008 to 2019 to provide information for investment decisions.

Design/Methodology/Approach – Eleven years monthly return data from 2008 to 2019 were collected from databases and annual reports of the three active REITs in Nigeria. Inflation rates covering the study period were collected from the Central Bank of Nigeria’s database. The authors adopt the Fama and Schwert model, an extension of the Fisher hypothesis, to test N-REIT's inflation-hedging capability.

Findings –The empirical results suggest that N-REIT has perverse hedging-characteristics (poor inflation hedges) across all inflation exposures (actual, expected, and unexpected). The Engle-Granger causality tests conducted corroborates these results.

Practical Implication - This study reveals the peculiar nature of Nigerian REITs in relation to inflation, which could have profound investment implication for domestic and foreign investors.

Originality/Value - This study is one of the first to empirically analyse the inflation-hedging characteristics of REITs in the second-largest African REIT market (N-REIT).

Keywords: Emerging economies, inflation-hedge, investment, real estate, returns, risk.

Developed Practices in the African Real Estate Investment Trusts as a Conduit for improving Capital Investment in the African Real Estate Market

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Purpose: The establishment of Real Estate Investment Trusts (REITs) has propelled the real estate industry to gain traction as a feasible investment vehicle for both the individual and institutional investor. The purpose of this paper is to assess how the further development of the African REIT market can form a channel to increasing capital investment in the African real estate market. There has been a range of REITs developed which could improve the African real estate market such as Affordable Housing, Healthcare and Green bond REITs. As much as such a variety of beneficial REIT options might seem like an attractive and viable conduit for capital injection into the African REIT sector, many individual investors remain sceptical of choosing African REITs as an investment vehicle. Research has shown that there is a small fraction of individual investors in Africa looking at REITs as an investment option among which, the black middle-class investors form the smallest portion of this group of investors. Such is concerning as these investors happen to form much of the population in the African continent.

Design/Methodology: We look at how these challenges can be curbed by developing practices such as implementing sustainable real estate methods or incorporating new trends such as Property technology as part of the management and marketing style for African REITs. The use of these practices are evaluated to assess the impact on property values and increasing investor satisfaction.

Value/Contribution: The paper reflects that with the success and evidence of these kind of practices, it will be reasonable to raise the much-needed public awareness about African REITs in the market.

REFEREED PAPERS

Macroeconomic Dynamics in Real Estate Market amid Covid-19 Pandemic in Abuja, Nigeria

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Purpose: Quite a substantial number of academic studies have investigated dynamic of macroeconomic factors in real estate markets across the world. While these studies are valuable in the field of macroeconomic dynamics in real estate markets, a gap still exist in the literature on the recent disruption in the economy caused by covid-19 pandemic and subsequent impact on real estate market of emerging economy in Abuja, Nigeria.

Design/Methodology: Monthly returns on real estate investment from sampled registered real estate firms in addition to data on macroeconomic indicators were obtained for the period (February 2020 and April 2021). These data were then analysed using econometric analysis - Augmented Dicker Fuller (ADF), Engle Granger cointegration and cointegrating regression analysis.

Findings: The empirical evidence shows a long run negative impact of macroeconomic indicators on real estate market caused by covid-19 disruption in the economy. The study further understood that correction in market disequilibrium caused by economic disruption would require a slow adjustment. The real estate investor should exercise caution in investing into real estate due market disruption or disequilibrium that would take long period to correct.

Practical implications: This paper provides empirical evidence of interrelationship between covid-19 driven macro economy and real estate markets. The result showed that the real GDP, exchange rate, inflation and interest rates have been found to have a significant explanatory influence on property return across the markets. The result further suggested that the impact of covid-19 in the economy requires government intervention to correct future abnormalities in the real estate market.

Keywords: Real estate returns, macroeconomic indicators, stationarity test, Engle-Granger cointegration

1.0 INTRODUCTION

Real estate market is an integral part of the nation's economic market. Real estate market and the economy are highly interdependent, such that overall nation's economic performance has significant effects on real estate market performance. Real estate market is, therefore, susceptible to both short- and long-term changes in local demand caused by shift in the economy. The level of demand in the market is reflection both long trend and short-term fluctuation in the economy as a result of usual business cycle. However, due to time required to produce real estate, there is usually a time lag between general economic cycle and real property cycle (Belo & Agbatekwe 2002).

Real property investment as an aspect of investment portfolio has therefore expressed interdependency with economy, and inseparable in making global investment decisions (Giussani *et al.*, 1992). Real estate cycle is established on political decision, technical changes and economic event, and therefore, property cycles are directly tied to local business cycles and macro economy cycles. Macroeconomic indicators such as Real GDP, interest rate, exchange rate, inflation employment and unemployment rates have been proved by many studies to have dictated the direction and magnitude of demand and supply of space in the real estate investment market (Apergis, 2003; Ge, 2009). The magnitude of excess demand and excess supply in real estate market are primarily affected by macroeconomic policy of national, regional, and local economy (Born & Pyhrr, 1994; Apergis, 2003).

Studies all over the world have proved that macroeconomic factors affected real estate market at different level and magnitude depending on the established institutional framework of each of the country's economy as shown in the findings of several studies in Europe (Lizieri & Satchell, 1997; Brooks & Tsolacos, 1999; Giussani *et al.*, 1992; De Wit, and Van Dijk, 2003; Sinbad & Mhlanga, 2009), America (Abraham & Hendershott, 1996; Ling & Naranjo, 1997; Eldelstein & Tsang, 2007), Asian (Peng & Hudsins-wilson, 2002; Peng *et al.*, 2005; Joshi 2006) and in Africa as developing continent (Clark & Daniel 2006; Kwangware, 2010; Bouchouicha & Ftiti, 2012; Ojetunde *et al.*, 2011; Ojetunde, 2013; Udoekanem *et al.* 2014; Udoekanem *et al.*, 2015; Wahab *et al.*, 2017; Akinsomi, Mkhabela, & Taderera (2018)). Therefore, since real market is an aspect of global investment market, the recent development associated with covid-19 global pandemic and general economy shutdown and subsequent disruption in the global economy and impact on real estate investment as a global investment market required a careful investigation.

Dynamic operation of macroeconomic indicators in real estate market amid covid-19 formed basic premise of this study, it needs to be investigated. Since covid-19 is global pandemic that affect virtually every sector of countries' economy including real estate sector, studying dynamic effect of macro economy disruption caused by covid-19 in real property market is a focal point of this study. Since real estate sector is linked to national economy, therefore, examining the dynamic changes in covid-19 driven macroeconomic factors on real estate market becomes sacrosanct to every stakeholder's property market to understand the future implication. Firstly, the study established causal linkage between rate of covid-19 infections and macro-economic

indicators in Nigeria and finally the effect of covid-19 driven macroeconomic factors on real estate market in Nigeria.

2.0 LITERATURE REVIEW

Property market and the economy are interdependent, there is a reverse linkage between property market and the macro economy, which implies that, whatever affects the economy also affect the property market, vice versa (Peng, Tan,& Yiu, 2005). In the period of economy instability or macroeconomic fluctuation, disequilibrium in the property market is caused by exogenous factors originated from government structural adjustment and deregulations in the country's economy (Dehesh & Pugh 1998). An important characteristic of the property market is that it is localised in nature; therefore, it has to be utilized wherever it is located. Furthermore, an oversupply in one locality cannot be utilized to meet demand in another. Real property development is, therefore, susceptible to both short- and long-term changes in local demand caused by shift in the economy (Brooks, 2002). The level of demand at any point in time reflects both long and short terms fluctuation because of usual business cycle. However, due to time required to produce real estate, there is usually a time lag between general economic cycle and real property cycle (Belo & Agbatekwe, 2002). Property cycles simplifies business cycles in both upward and downward direction, therefore property cycles lag turning point of an economic boom but resulted to business recession (Case, 1992). Furthermore, Kondratieff (1951) explained that property development takes time to start during economic boom, while property market experiences a sharp declining during business downturn. And also, property cycles is established on political decision, technical changes and economic event. Also, property cycles are directly tied to local business cycles and macro economy cycles.

Dynamics of property return occurs when macroeconomic factors change, and slow adjustment of return to changes in macroeconomic policy creates a lag time, this generally makes property market to exhibit low price fluctuation. Besides, house rent sluggishness also leads to irrational exuberance bubble or influence in the property market during economic booms. Unexpected changes in macroeconomic factors such as money supply, GDP, interest rate and inflation affects house return with a lag therefore lead to fluctuation in property investment, depending on the speed of transmission mechanism. The speed of transmission depends on the efficiency and effectiveness of the institutional framework of Nigeria which includes the speed of administrative process, credit supply, and land availability for investment and so on. Conversely, property return also exhibits feedback reaction to macro economy, the reappraisal effect is that increasing nominal rent also causes wealth effect which raise consumption, and decreasing house rent might shrink consumption (Parker, 2000).

Residential housing market is referred to market where housing services are distributed by demand and supply mechanism and housing services are generally inelastic and the most expensive household expenditure. Housing or property market also constitutes a significant share of total household expenditure, and it therefore endures significant cyclic volatility movement emanated from economic conditions that influenced property market (Leung, 2004). Development of property market has become increasingly important element of national

economy due to global crisis, the need for constant monitoring and scrutiny for its potential disruptive effect on financial economy (Renigier-Bilozor & Wisniewski, 2013).

The dual role residential housing as a consumption and investment goods has created an increase in demand within the space market. Fundamentally, demand and supply factors are major determinants of residential property market cycle, in that, the relationship between demand for and supply of residential housing space in the space market can be measured by unique economic characteristics (Pyhrr, Webb & Born, 1990). The study therefore submitted that market equilibrium is an economic characteristic which is defined at any point in time where aggregate demand and supply are in balance, (see figure 1). The market equilibrium is the peak of the real property cycle, and the peak of the market is therefore a proxy for market occupancy rate and the point of low demand and supply is characterized by low occupancy rates (Rosen & Smith, 1983).

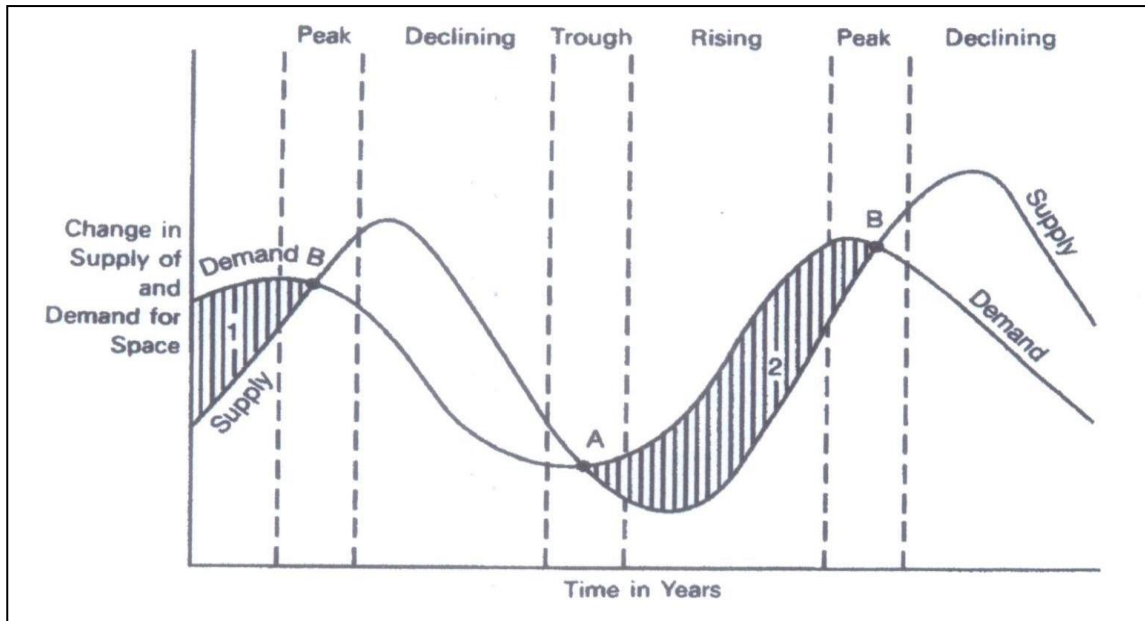


Figure 1: Phases of Real Estate Supply and Demand Cycles.

Source: Born and Pyhrr, (1994)

Market fundamental determinants are forces of demand and supply factors. Demand determinants factors are macroeconomic factors such as GDP, interest rate, inflation rate, mortgage rate, employment (Leung, 2004; Miregi & Obere, 2014; Tang & Xu, 2014). They are exogenous to property market, and they expected to granger because the changes in property return (Zainuddin 2010). He therefore discovered that the bi-causal relationship between market fundamentals and property price is simultaneous. House price return is determined by market fundamentals are described as macroeconomic factors. Chen and Patel (1998) have explained the fact that lack of proper comprehension of fundamental determinants of property price and return has led to failure in previous house price model. Residential housing is regarded as special form of asset because of its dual role as consumption commodity and investment good. De Wit

and Van Dijk, (2003) investigated direct office real estate returns in the major cities of Asia, Europe, and US between 1986 to 1999, and the study adopted Generalized Method of Moment (GMM) estimate panel data in the model. It was therefore found that inflation; unemployment and vacancy rate had explanatory effect on real estate office returns. As consumption commodity, it is the total sum of the implicit or intrinsic value of rental services and as investment good, it is regarded as capital return or income return derivable and it therefore affected by macroeconomic variable (Leung, 2014). Akinbola (2012) stated that general price level is a function of demand and supply factors. Market demand factor includes level of economic activities e.g money supply, unemployment, employment.

Ge (2009) has submitted that macroeconomic determinants dictate the direction and magnitude of demand in the housing market. Akinsomi, Mkhabela, and Taderera (2018) investigated the role of macroeconomic indicators in direct real estate returns in South Africa between 1995 and 2014. The study employed regression analysis, it was found that GDP, unemployment rate and interest rate had explanatory influence on real estate returns. Therefore, market fundamental variables have classified as fundamental value and market (macroeconomic), fundamental value is described as asset that is determined by income flows, sale or terminal value and the market rate for which the future value is converted to the present or current value, while fundamental market is the property investment determined by market value in line with trend in macroeconomic influences (Gerding, 2007). Therefore, analysis of the aforementioned literature has proofed that real estate sector is linked to national economy, and integral part of nation's wealth development, thereby, examining the dynamic changes in covid-19 driven macroeconomic factors on real estate market becomes sacrosanct to every stakeholders in order to future threats posed in real estate sector.

3.0 METHODOLOGY

The study employed simple random sampling technique to collect data on commercial office rental values and capital values from 153 registered estate firms in Abuja and from which returns on commercial properties were computed. The study computed monthly returns on commercial office properties from Garki and Wuse districts using the formula shown in equation 1. Monthly information from macroeconomic indices were sourced directly from Central Bank of Nigeria and National bureau of Statistics in addition to data on macroeconomic indicators were obtained for the period (February, 2020 and Feb; 2021). These data were then analysed using econometric analysis - Augmented Dicker Fuller (ADF), Engle Granger cointegration and cointegrating regression analysis. The model for commercial real estate returns (R) is described as in the equation 1.

$$R = \frac{p_t - p_{t-1}}{p_{t-1}} \quad eq. 1$$

R is commercial office returns indices, P_t is commercial office returns at end of period t, P_{t-1} is the commercial office returns beginning of period t. Monthly data on macroeconomic economic variables between February 2020 and Feb; 2021 were sought directly from both Central Bank of Nigeria (CBN) annual Bulletin and National Bureau of Statistics (NBS).

VAR model: Vector autoregression is a system in which each variable is expressed as a function of own lags as well as lags of each of the other variables. A VAR is an n-equation, n-variable model in which each variable is in turn explained by its own lagged values, plus (current) and past values of the remaining n -1 variables. Therefore, stationarity test and Granger causality test are properties of VAR.

Stationarity Test: Econometric data is a time series based and they are usually non-stationary. The test of stationarity of the series was carried out for the study to detect the presence of unit root (non-stationary) or not, and to determining the order of integration of the variables in the model. Augmented Dicker fuller (ADF) test was employed for the study to test for unit roots. The time series properties or variables included in the model were examined using Augmented Dicker Fuller as expressed as follows:

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \sum_{i=1}^k \pi_i \Delta Y_{t-1} + U_t \quad \text{equ. 2}$$

Where Y_t represents vector of time series, t represent time, U_t represents the error terms and π represents the coefficient matrix of the variables, Δ represents differences in variables.

Granger Causality Test: this is a test of causal linkage among the variables. Granger causality is employed to determine causal linkage or relationship between the variables included in the model. The test was adopted to examine the null hypothesis that the movement of macroeconomic variables does not cause immediate change in property market price over a period of time.

Granger Causality test postulates that if y_2 has any influence on y_1 ($\alpha_{12} \neq 0$), one can say y_2 Granger causes y_1 . On the other hand, if y_1 has any influence on y_2 ($\alpha_{21} \neq 0$), one can say y_1 Granger causes y_2 .

$$y_t = \beta_1 y_{t-1} + \beta_2 y_{t-2} \dots \dots + \beta_n y_{t-n} + U_t \quad \text{equ. 3}$$

Where Y_t represents vector of time series, t represent time, U_t represents the error terms and β represents the coefficient matrix of the variables.

4.0 RESULT AND PRESENTATION

Figure 2 shows the rising cases of COVID-19 pandemic in the study area. the trend revealed that from February 28th, 2020, to April 28th, 2020, there was slow raising cases covid-19, and after April 28th, there was high rising in number of cases recorded. This was attributed to poor response of government to the pandemic, in term of safety guide and measures against the spread. The sharp raising recorded after April 28th was associated to the fact that the lack preparedness in the case of pandemic. The rising continues till September 19th, 2020, and after which there was slow rising in number of cases. This is therefore attributed high of compliance to lock down measures. The gradual reopening from lockdown had suddenly led to sharp rising in number of cases from

November 30th till date. The implication is that the global and local economy and financial markets have been severely affected due to the significant reductions in income, a rise in unemployment, and disruptions in the transportation, service, and manufacturing industries caused by the covid-19 pandemic. Consequently, the correction of the damage in the economy required a slow adjustment over a period.

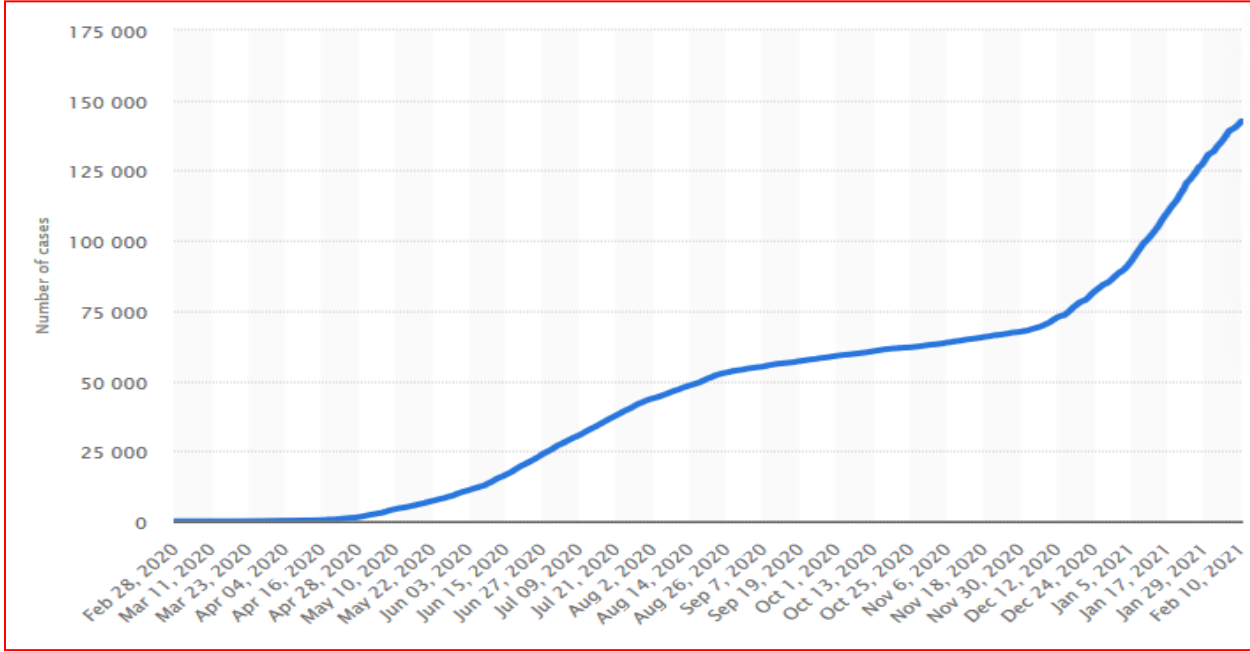
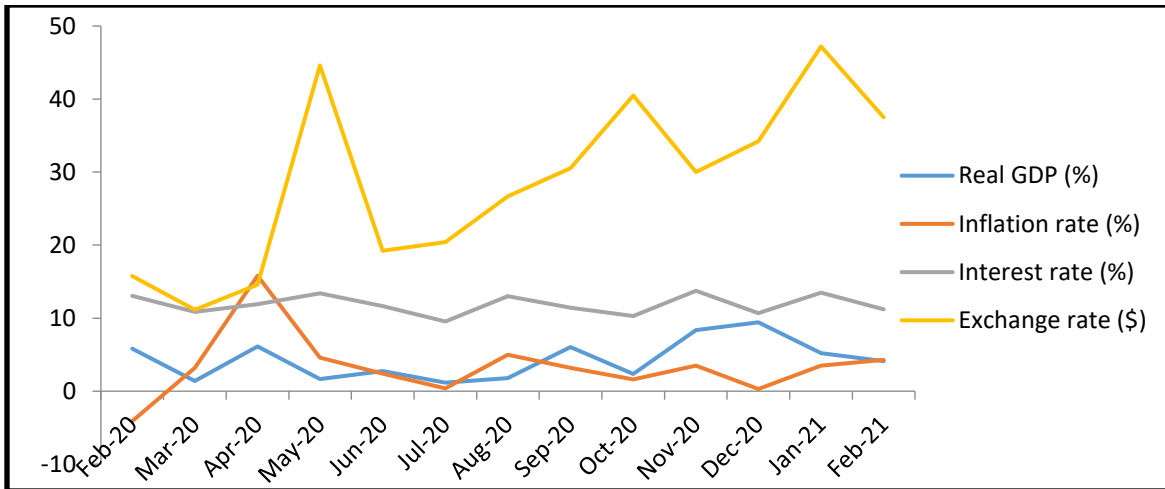


Figure 2: Cumulative Number of Confirmed Coronavirus Cases (COVID-19) in Nigeria from February 28, 2020, to February 10, 2021
 Source: Computed from NCDC Monthly Report

Figure 3 revealed the monthly trend in macroeconomic variable between February 2020 and February 2021. The study utilized real GDP, inflation rate (consumer price index), exchange rate and interest rate as macroeconomic variable. Trend in macroeconomic showed continuous fluctuation in the economy, this signifies instability especially the exchange, interest rate and inflation rate. Interest rate in the economy maintained high fluctuated rate at period lockdown and gentle slope in inflation rate in the economy.



The result in Table 1 showed the pairwise correlation between monthly macroeconomics indices and covid-19 rate of infections. The result revealed that there is negative and significant correlation between real GDP and covid-19 rates at -0.628 which indicates an inverse relationship between Real GDP and covid-19 rate of infection. Inflation rate is positively correlated to covid-19 rate of infection. Interest and exchange rates are negatively significant correlation with covid-19.

Table 1 Pairwise Matrix Correlation Between Macroeconomic Variables and Covid-19 rate

		Covid-19 rate	Real GDP	Inflation rate	Interest rate	Exchange rate
Covid-19 rate	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	13				
Real GDP	Pearson Correlation	-.628**	1			
	Sig. (2-tailed)	.025				
	N	13	13			
Inflation rate	Pearson Correlation	.729**	.020	1		
	Sig. (2-tailed)	.013	.949			
	N	13	13	13		
Interest rate	Pearson Correlation	-.548**	.245	.124	1	
	Sig. (2-tailed)	.036	.419	.686		
	N	13	13	13	13	
Exchange rate	Pearson Correlation	.731**	.097	-.085	.242	1
	Sig. (2-tailed)	.005	.753	.783	.425	
	N	13	13	13	13	13

** . Correlation is significant at the 0.01 level (2-tailed).

Real GDP and interest rates maintained an inverse relationship with covid-19 rate such that covid-19 causes negative changes in real GDP and Interest rate. Inflation and exchange rates direct relationship such that covid-19 causes positive changes in inflation and exchange rate. Conclusively, covid-19 rate has therefore caused changes in macroeconomic indices in Nigeria. Since real estate sector is linked to national economy, therefore, examining the dynamic changes in covid-19 driven macroeconomic factors on real estate market becomes sacrosanct to every stakeholder's property market to understand the future implication.

Figure 3 showed the trend in returns of office properties in Gariki and Wuse markets. The returns in Gariki and Wuse markets exhibited the same pattern of movement and directions. The trends revealed that at beginning of covid-19 there was high returns on office properties and after the second month, there was a continuous fluctuated fall in returns on commercial offices in both Gariki and Wuse markets showing the effect of lockdown associated with covid-19 pandemic. There was fluctuated decrease in returns of offices properties through the period of covid-19 pandemic, this therefore was caused by the distortion in the economy caused by the general economic lockdown associated with covid-19 pandemic.

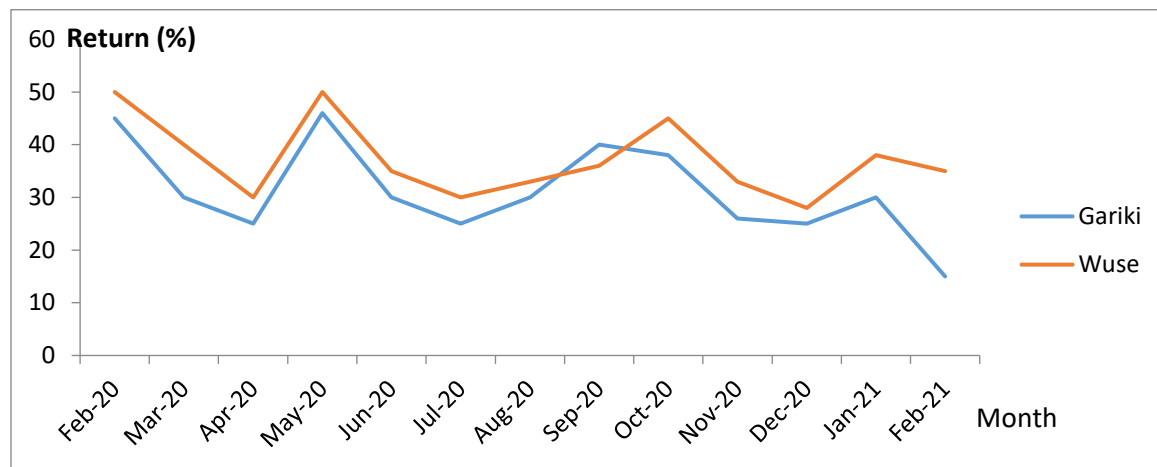


Figure 3 Trends in Returns of Office Properties in Gariki and Wuse market amid Covid-19

Table 2 shows the result of unit root test carried out through Augmented Dicker Fuller (ADF) on all the variables employed for the study. The result of ADF unit root test showed that real GDP, inflation rate and interest rate are stationary at first-order difference, only exchange rate is stationary at second-order difference, and while property returns from different markets are stationary at level. The implication of this test is that the time series data employed for this study is suitable and appropriate for further analysis. Technically, it implies that the time series variables have no unit root.

Table 2 Stationary or Unit Root Test

Variables	Computed t-statistic	ADF @0.05	Critical	Prob.*	Order of integration
Δ Real GDP	-4.003335	-3.133930		0.0025	I(1)
Δ Inflation Rate	-4.346006	-3.133920		0.0075	I(1)
Δ Interest Rate	-7.556113	-3.133920		0.0001	I(1)
ΔΔ Exchange Rate	-6.514055	-3.164352		0.0255	I(2)
Gariki Market	-3.582900	-3.118810		0.0066	I(0)
Wuse Market	-3.768111	-3.118810		0.0023	I(0)

Source: Author's Computation

Table 3 showed Granger causality test in between macroeconomic variables and returns on office properties. The test revealed the short run causal linkage between the dependent variable and independent variables, the result revealed the result both the test of statistic (f-stat) and p-value of the statistic. The analysis of causal linkage in between macroeconomy and commercial office properties in Gariki and Wuse revealed that there is one directional causal linkage among the variables, in other word, macro-economic variables granger cause change returns on office properties in Gariki and Wuse. Real GDP, inflation, interest and exchange rates granger cause change in returns on office properties. Returns could not granger cause changes in macroeconomic variables because short periods of disruption in the market caused by insurgency of covid-19. These findings are consistent with previous studies (Giussani *et al*, 1992; Lizieri & Satchell,1997; Brooks & Tsolacos,1999; Peng & Hudsin-wilson, 2002; Clarke & Daniel, 2006; Ojetunde, 2013; Udoekanem *et al.*, 2014; Belej & Cellmer, 2014; Belke & Keil, 2018; Tripathi, 2019).

Table 3: Granger Causality Test between Macroeconomic Variables and Price in Northern Housing Market

Null Hypothesis:	Gariki Market		Wuse Market	
	F-Stat	(Prob)	F-stat.	(Prob)
REAL_GDP does not Granger Cause RETURN	5.1909	0.0303*	5.0163	0.0047*
RETURN does not Granger Cause REAL_GDP	0.1251	0.7140	2.7787	0.2324
INTE_RATE does not Granger Cause RETURN	5.5593	0.0460*	3.8394	0.0096*
RETURN does not Granger Cause INTE_RATE	0.0218	0.9785	0.3637	0.7094
EXCH_RATE does not Granger Cause RETURN	8.8859	0.0002*	4.1140	0.0078*
RETURN does not Granger Cause EXCH_RATE	1.0582	0.3967	2.1776	0.1945
INFLATION does not Granger Cause RETURN	7.1757	0.0024*	5.8335	0.039*
RETURN does not Granger Cause INFLATION	0.1145	0.8934	0.8032	0.4908

Source: Field Survey, (2021) Significant at 0.05 level. P-value (Prob) in parenthesis.

In Gariki market, 65.5% variation in office returns explained by model. All the macroeconomic variables had (real GDP, exchange rate, inflation, and interest rates) significant explanatory power on the future movement in property returns. The result suggested that any change in Real

GDP of the economy result in 35.09% change in returns in office properties. The result further suggests that appreciation in Nigerian currency against US Dollar (exchange rate) by 1% results in 85.6% increase in property returns, ceteris paribus. A general increase in price level (inflation rate) by 1% results in 24.25% increase in property returns, ceteris paribus. Any change in interest rate to make loan attractive to real estate investors results in 46.09% increase property return, ceteris paribus. The result of Durbin-Watson statistic at 2.02 exceeds the critical value (0.389) at 0.05 level. This suggests no autocorrelation in the residuals.

In Wuse market, 80.6% of the variation in property return is explained by the model, and all macroeconomic variables included in the model have significant explanatory power on the future movement of office returns, such that any increase in overall performance in general economy (real GDP) by 1%, result in 84.3% increase in office returns, ceteris paribus. Any appreciation in Nigerian currency against US Dollar (exchange rate) by 1% results in 7.7% increase in property returns, ceteris paribus. Any change in cost of finance or borrowing (interest rate) to the loan attractive in the economy by 1% results in 75.3% increase in property returns, ceteris paribus. A general increase in price level (inflation rate) by 1% results in 16.2% increase in property returns, ceteris paribus. The result of Durbin-Watson statistic 2.12 exceeds the critical value (0.389) at 0.05 level; this suggests no autocorrelation in the residuals.

Table 4 Results of Co-integrating Regression Analysis

Markets	Variables	Coefficients	Std. Error	t-statistic	Prob	R ²	DW
Gariki	REAL_GDP	0.3509	0.2597	0.9664	0.3782	0.655	2.02
	EXCH_RATE	0.8566	0.0228	3.7478	0.0133		
	INTE_RATE	0.4609	0.2279	2.0229	0.099		
	INFLATION	0.2425	0.0505	2.8218	0.037		
	C	19.728	9.0664	2.1759	0.0815		
Wuse	REAL_GDP	0.0772	0.2128	4.4334	0.1068	0.806	2.12
	EXCH_RATE	0.8430	0.0187	3.6015	0.0155		
	INTE_RATE	0.7535	0.1867	4.0354	0.01		
	INFLATION	0.1627	0.0414	3.9319	0.011		
	C	-32.6039	7.4294	-4.3885	0.0071		

5.0 IMPLICATION OF FINDINGS AND RECOMMENDATIONS

The study therefore established the causal linkage between covid-19 rate of infection and macroeconomic variables, the result therefore revealed that covid-19 rate caused changes in macroeconomic factors. the study thereby established effect of changes created by covid-19 driven macroeconomic on real estate market in Gariki and Wuse. The dynamic influence of covid-19 driven macroeconomic variables on office commercial properties in Gariki and Wuse markets of Abuja showed that the real GDP, exchange rate, inflation and interest rates have been found to have a significant explanatory influence on the change in commercial office returns in Gariki and Wuse markets. Also, it was discovered that covid-19 driven exchange rate, interest and

inflation rates significantly caused a change in commercial office returns, this finding is consistent with De Wit, and Van Dijk, (2003), Akinsomi, *et al.*, (2018), Belej and Cellmer, (2014), Belke and Keil, (2018) and Tripathi, 2019. Therefore, the implication of this outcome is that the continuous effect of covid-19 driven macroeconomic indicators would provide negative impact in commercial office market especially Real GDP and interest rate. Therefore, the continuous intervention of government in the economy in order to correct effect of covid-19 driven macroeconomic indicators would cause positive change in commercial office market. Property investors tend to have an increase in commercial office returns whenever government intervention in macroeconomic policy is made to secure the economy by improving GDP base, increasing exchange rate to encourage local demand, decrease in interest and inflation rates increase the housing rent and prices thereby positively influence the investor's return. Property return is negatively influenced by prolong lock-down of the economy, but the result suggested that the covid-19 driven macro-economic indicator has a future effect in the property market, this is because there is evidence of variation in returns induced by covid-19 driven economic indicators.

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Brownfield Regeneration: A possible Panacea to Zambia's Housing Deficit and Urban Decay?

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Purpose: Zambia is grappling with a housing deficit officially estimated at 1.5 million units and projected to reach 3.3 million by 2030. To address the current deficit, the government anticipates constructing about 149,000 units per annum or 222, 000 to avoid the 2030 projection. Simultaneously, many African cities are struggling to deal with urban decay, a condition that can be attributed to urban sprawl, poor planning, urbanization, increased population growth and many more. It has been observed that combating the housing deficit does not consider the current stock of properties which are now degenerated. New construction focuses on the use of greenfields and neglects the positives offered by the reuse of brownfields. It has further been observed from developed countries that after huge parcels of greenfields have been developed into '*concrete jungles*', development is being re-directed to incorporate nature-based practices to combat societal challenges.

Design/Methodology: This paper therefore questions whether Africa, after taking stock of existing properties that have become derelict, could contemplate ways to regenerate them to combat the housing deficit.

Findings: This paper finds that challenges such as re-zoning, contamination and ownership issues will need to be addressed to ensure a sustainable process of regeneration. Additionally, greenfields require provision of services which tends to be a costly exercise while brownfields are often properties with services already in place.

Practical implications: This paper argues for the inclusion of already existing stock in spatial planning and housing plans and further suggests the increased maintenance and refurbishment of existing real estate is a possible solution to the urban decay challenge.

Keywords: Urban decay, housing deficit, brownfield regeneration, Zambia

1. INTRODUCTION

Zambia population is growing at a rate of 2.8% per annum, with 40% living in urban areas (Habitat for Humanity, n.d.). This population growth presents the government with the challenge of providing infrastructure such as for housing, transportation, energy systems, health and education (UN-DESA, 2018). The National Housing Policy developed for 2020 – 2024 reveals that the country is experiencing an urbanization rate of 4.5% per annum. Grappling with a housing deficit officially estimated at 1.5 million units and projected to reach 3.3 million by 2030, the government anticipates constructing about 149,000 units per annum or 222, 000 from 2015 to avoid the 2030 projection (MHID, 2020). The Ministry of Housing and Infrastructure Development (2020) reports that the projected housing deficit requires at least 196,000 hectares of land for human settlement.

To make available better provisions for the development and control of housing in the Country, the National Housing Authority (NHA) established by an Act of Parliament in 1971, was assigned to be the main housing developer in Zambia. But the NHA is grossly affected by erratic funding causing it to fail to service plots and develop a sizeable inventory (UNCTAD, 2015). Additionally, the establishment of the NHA led to the direct housing function being taken away from Local Authorities leaving them with the control over planning regulations and enforcement of building standards.

Zambia has a dual land management system where land is either state land controlled by Government Departments or customary land in the hands of chiefs or traditional leaders. These are both recognized as legitimate, however, tenure under the customary land remains insecure due to the restrictions to obtain official title. The Ministry of National Development Planning (2020) reported that most urban areas are experiencing land scarcity and are extending into customary areas. However, traditional leaders are reluctant to release land for development and thus the provision of serviced land for housing development is being impeded by the customary tenure system. The Zambia Habitat III (2015) further stated that the insufficient access to land by Local Authorities and individuals was a challenge that has led to the increase in informal settlements and land encroachments.

The Government of Zambia recognizes that the demand for serviced land is increasing and that a weak legal framework cannot address challenges. Through the Ministry of Lands and Natural Resources the National Land Policy (2021) was developed to provide a comprehensive framework for the management of land within the Country. This is also in response to the call made by the Zambia Habitat III (2015) for adequate, creative, and implementable planning and a supporting legal and institutional framework in order to counter the challenges hindering housing provision.

With funding to the responsible organizations being erratic and insufficient, and servicing of land being a challenge, it becomes an insurmountable task to meet the housing needs of the country. Thus, the MHID and other housing developers responsible for the provision of housing need to find creative ways to carry out the mandate. Therefore, this paper explores the use of derelict previously developed infrastructure also known as brownfields, to try and address this housing challenge.

1.1 Background to the study

The World Bank (2016:1) suggests that “every city has pockets of underused land and distressed urban areas often the result of changes in urban development and productivity patterns”. Many cities are therefore experiencing what scholars are terming urban decay, urban shrinkage, or urban decline (Fol & Cunningham-Sabot, 2010; Haase et al., 2014; Hyra & Rugh, 2016). This condition of urban decline is an inevitable stage of the life cycle of cities, which is attributed partly to deindustrialization, age of cities, and changes in economic status (Alias, et al., 2016; Hwang & Woo, 2020). Thus, as cities cannot evade the onset of decay, understanding the way cities function can assist in managing its impact as it arises (Czamanski & Broitman, 2016; Fink, 2019). Concepts such as urban renewal, gentrification and regeneration have been suggested as solutions to the urban decay challenge (Amirtahmasebi et al., 2016; Kobayashi, 2020).

Visual evidence in the major Zambian central business districts (CBDs) and industrial areas located on the periphery of cities, reveal unused and underutilization of infrastructure. And yet the housing deficit continues to rise to alarming levels, and people continue to reside in unpleasant settlements, without adequate services and infrastructure.

1.2 Problem identification and description

Zambia's growing population has resulted in high rural-urban migration which has also intensified the housing shortages (Habitat for Humanity, n.d.; Population Reference Bureau, 2019; MHID, 2020). This forces more people to live in unplanned settlements where housing is more affordable but often lack services such as electricity, water, and sanitation. The Centre for Affordable Housing Finance (CAHF, 2020) reports that although there are currently an estimated 3.6 million households available in Zambia, the country has a housing deficit of 1.5 million. In Lusaka and Copperbelt Provinces, an average of 85 percent of the population live in the urban areas while the other eight provinces of the Country have about 45 percent of their population living in urban areas. Although 89.2 percent of urban households had access to improved water sources, 64.9 percent use pit latrines as a toilet facility that is either owned or shared (CAHF, 2020). Thus, provision of suitable housing continues to be a challenge for the Zambian Government.

On the other hand, Zambian cities are experiencing urban decay and underutilization of infrastructure, and yet the country is battling with a growing housing deficit. Thus, this paper explores the use of these underutilized properties to address this housing deficit.

1.3 Research aim, objectives, and questions

This paper aims to investigate the possibility of using brownfields to address the housing challenge in Zambia. It intends to expose how Africa, after taking stock of existing properties that have become derelict, could contemplate ways to regenerate them to combat the housing deficit.

The research seeks to answer the following questions:

1. What characteristics of brownfields make them suitable options for consideration to combat the housing deficit?
2. What challenges need to be addressed to ensure a sustainable regeneration process of the brownfields?

The issue of decaying urban environments is not a new one and has thus been in existence for a long time (Fol & Cunningham-Sabot, 2010; Cuthbert, 2017). This implies that predictably, there will be properties that are unused and underutilized due to impacts of urban decay. Spatial planning systems and processes must therefore include ways to manage it. With a growing housing deficit, and an unavoidable decaying urban landscape, Zambia imminently needs solutions to tackle both challenges. Research has shown successful renewal projects that have been able to provide housing using regenerated properties. Thus, this paper seeks to demonstrate that embracing the properties that are going through the urban decay process can combat the housing deficit challenge in Zambia.

2. LITERATURE REVIEW

2.1 Conceptual and Theoretical Framework

The literature review conducted focused on the concept of urban renewal as a solution to deteriorating urban landscapes. Brownfields' characteristics were examined, and challenges explored that would hinder the successful application of regeneration.

Couch (1990) suggested that urban renewal was a concept that was growing in importance due to the increasing urban population, as well as the continued expansion of cities into periphery areas. As the demand for urban space for development grows, this results in older areas being abandoned and derelict (Fatemi & Rahman, 2015). However, greenfields for development are limited hence the need for regeneration of derelict environments. Zijun (2019) therefore, suggests that urban renewal aims to improve the quality of the environment and solve urban decay. Tallon (2010) adds that urban renewal is no longer about the removal of derelict buildings but the multi-dimensional process of rejuvenating the community.

2.1.1 Theoretical framework

To understand brownfields and their impact on the urban landscape the theories of urban regeneration and new urbanism are considered. Urban regeneration has been suggested as one of the measures or solutions to managing the urban decay problem (Huiying et al., 2017; Ji & Oh, 2018). Roberts & Sykes (2008:17) define urban regeneration as the “comprehensive and integrated vision and action which leads to the resolution of urban problems, and which seeks to bring about a lasting improvement in the economic, physical, social and environmental condition of an area that has been subject to change”. This implies that regeneration must focus beyond the physical and include the revitalization of the economic, social, and environmental aspects of the society. Tsenkova (2002) adds that regeneration must include balanced incremental development which will attract new uses of the revitalized properties, as well as new investors and partnerships to ensure a progressive process. Thus, Lovering (2007:344) concluded that urban regeneration is creating improved living spaces by bringing about the New Urbanism in urban design.

New Urbanism is described as an alternative to conventionally developed suburban sprawl characterized by single use buildings and low-density zoning (Heins, 2015; Overstreet, 2021). It aims to create mixed-use, walkable communities which cause minimal damage to the environment and have greater density than conservative sprawl (Jacobsen, 2006). New Urbanism is an urban planning theory that seeks to redefine the nature of urban areas and create cohesive communities by incorporating traditional concepts of community participation, affordable housing; and social and economic diversity (Fulton, 1996). New Urbanism attempts to implement progressive zoning codes and other regulatory changes by suggesting an all-encompassing framework for developing the whole community and not individual buildings (Heins, 2015). According to the New Urbanists, traditional communities both urban and suburban, offer a better alternative because even though they may be crowded and busy, their physical forms are more adaptable and hence allow a more satisfying life. Thus, it is suggested that regeneration of decaying sites or properties adopt the New Urbanism perspective which promotes the greater integration of different land uses (Fulton, 1996).

2.2 Characteristics of brownfields

Inevitably, all cities will get to a point of decline, since studies have shown that it is an inexorable process (Haase et al., 2014; Alves et al., 2016). Fabiyi (2011) describes urban decay as a physical development which at times contains the social, economic and cultural dimensions. It is defined as the consequence of social and economic interactions that lead to physical decay of the urban landscape (Hwang & Woo, 2020). The Northeast Quadrant Specific Plan (2019:4.16-2) defines urban decay as “physical deterioration to properties or structures that is so prevalent, substantial, and lasting for a significant period of time that it impairs the proper utilization of the properties and structures, and the health, safety, and welfare of the surrounding community”. Indicators of urban decay include, among others, boarded up buildings, empty lots, and derelict properties, as well as social and economic distresses such as high crime and unemployment rates and closed businesses (Udeh & Okeke, 2018). Thus, urban decay can be described as a condition where previously productive properties are unusable due to their derelict state.

Previously productive properties that are currently in a dilapidated state and require some work to make them useful are often termed brownfields (Antucheviciene & Zavadskas, 2008; Science for Environment Policy, 2013). As a considerable number are often previously industrial properties, the aspect of factual or perceived contamination is sometimes included in the definition (National Round Table on the Environment and Economy, 2003; United States Environmental Protection Agency, 2019). Far (2011) suggests that there are various classifications of brownfields which are determined by the definition ascribed to them by a country or region. An example of the classifications is shown in Figure 1 below.

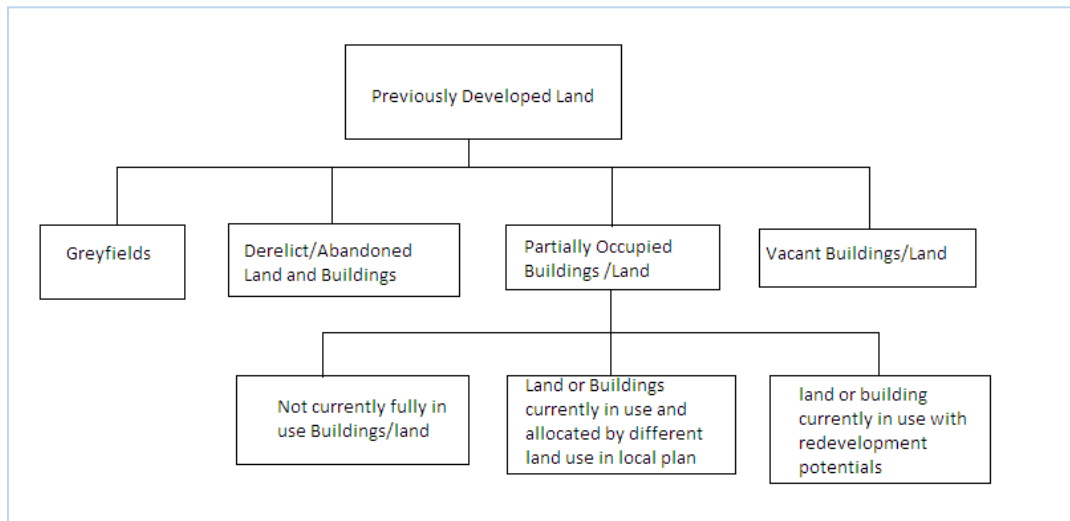


Figure 1: Classification of Brownfields according to Far, 2011.

Literature shows that brownfields are caused by deindustrialization, wars, and military operations as well as lack of finances for maintenance purposes (Franz et al, 2006; Pahlen & Glockner, 2004; Dokic & Sumpor, 2011). They have been known to cause environmental degradation due to contamination from manufacturing processes and the decline of neighbouring property values, as well as being havens for criminal activity (Hollander, 2010;

Wison, 2012; Elrahman, 2016). Thus, brownfields are often considered liabilities due to their negative impact on the quality of life of inhabitants of communities where they exist.

Despite these undesirable aspects associated with brownfields, the areas are considered assets due to several characteristics that make them suitable for consideration in spatial planning. They are often located in already developed and prime areas; thus, they are in close proximity to good road networks, commercial and residential zones and consequently accessible to potential sources of labour and other resources (Turvani & Tonin, 2008; Pippin, 2009; Papageorgiou & Kakana, 2018).

Additionally, information about the extent of urban decay or actual size of space being occupied by brownfields needs to be determined. With urban decay and the issue of brownfields being challenges that have existed for centuries, the extent of the problem is seldom understood. However, for countries that have carried out investigations to determine the extent, their findings are that brownfields are occupying considerable portions of land which have then been considered in developmental plans. Table 1 below shows the extent of brownfields in countries that have conducted surveys.

Table 1: Extent of brownfields in various countries.

Country	Brownfield extent
Germany	128,000 hectares
France	100,000 hectares
The Netherlands	Between 9,000 and 11,000 hectares
Belgium	9,000hectares
Lithuania	7,400 disused buildings on about 732hectares
Canada	30,000sites
United Kingdom	17,656 sites on about 28,000 hectares

Sources: Antucheviciene & Zavadskas, 2008; Environment and Energy Management Agency 2014; Greenland, 2018.

Development of Greenfields (new land) for infrastructure requires land that must be planned, surveyed, and serviced (Kasala & Burra, 2016). Iracheta et al. (2000) described serviced land as that provided for urban use and equipped with basic infrastructure which includes access to roads, electricity, water, sanitation, drainage systems, even telephone services. Although referring to site and services schemes, Akinsola et al (2014) and Ivanovic & Tamura (2014) discussed subdivision and preparation of urban land for residential buildings and the provision of various combinations of public utilities and community facilities. This implies that for any new development, the provided land must bring together a host of services by the local authorities and various service providers to ensure that the basic services are available. This can be a very costly exercise and local authorities or government organizations responsible for providing serviced land often fail to meet the demand (Akinsola et al, 2014; Kasala & Burra, 2016). Hence, the proposition of using brownfields which in most cases, already have these services in place as they were once productive properties. Additionally, restoring brownfields relieves the strain of

new land as many countries are dealing with restricted supply of land for development (Franz et al, 2006).

It has further been observed from developed countries that huge parcels of greenfields have been developed into 'concrete jungles' (Eldredge & Horenstein, 2014; Bingbing, 2017). UNESCO (2019:2) reports that "90percent of natural areas that host endemic species could disappear in the coming years as a result of urban sprawl". Elrahman (2016:28) provides that the US Council of Environmental Quality declared that "every acre of rectified brownfields saves 4.5acres of green space from being developed". Many cities have nothing much to offer in terms of natural beauty as waterways have been drained, forests chopped up, hills flattened and wildlife displaced and driven to extinction, resulting in high urban temperatures, increased air, water and soil pollution and unhealthy citizens (Fisher, 2016; McDonald et al, 2018). Therefore, development is being redirected to incorporate nature-based practices to combat societal challenges. Green spaces are being created under and above high-rise buildings, parks are being re-staffed and the environment that had been disturbed by urban development is steadily being improved (Eldredge & Horenstein, 2014; Izabela, 2016). Thus, this paper asserts that Africa needs takes stock of existing properties and reuse those that are underutilized, to prevent this 'concrete jungle' from being a future challenge for the continent.

2.3 Challenges of Brownfield regeneration

Solutions to the challenge of brownfields includes redevelopment, regeneration, and remediation (as suggested by Perovic & Folic, 2012; Elrahman, 2016). Despite the various terms being suggested, they all refer to the process of making the derelict properties usable through application of corrective measures and activities. Thus, this paper suggests the regeneration of brownfields as a solution to dealing with the housing deficit being experienced in Zambia.

While understanding the characteristics of brownfields that make them suitable for consideration for housing development is important, it does not ensure a smooth regeneration process. A number of challenges have been identified by various studies, as provided below.

- **Size of brownfields:** as mentioned in Section 2.1 above, the extent of the urban decay and brownfield challenge cannot be grasped without an actual survey being carried out. And thus, many countries do not know how big a challenge they have to face. Additionally, the various definitions of brownfields pose the challenge of what constitutes a brownfield and what does not (Urkmez, 2016). This implies that some properties though derelict, unused or underutilized may not be considered as brownfields. Thus, the true extent of the problem will continue to evade those with the mandate to manage brownfields.
- **Ownership status of brownfields:** brownfields are properties that may be publicly or privately owned. In some instances, the owners might be insolvent or no longer existing or just not known, hence the term 'orphan brownfields or sites' (Dixon, 2000). The ownership of brownfields is a critical aspect to regeneration as the responsible party needs to spearhead the process. If the owner does not take a leading role, the organizations responsible for governance systems such as local authorities, may need to intervene through engaging the owner or even expropriation (Papageorgiou & Kakana, 2018).

- **Contamination:** this may be actual or perceived depending on the previous use of the brownfields. It is necessary to address this because clean-up of contaminated properties can be a very expensive exercise (United States Environmental Protection Agency, 2019).
- **Legal framework to support brownfield regeneration:** Beltrao & Kessler (2013) and the World Bank (2016) state that zoning and development controls are essential spatial planning tools that can support the creation of affordable housing. The legal framework available within a country will contribute to the success of housing development. Without suitable policies and laws to govern the process, brownfield regeneration may not be conducted in a sustainable manner. Bah et al, (2018) add that inadequate land policies result in backlogs of serviced land for housing development. With many countries dealing with derelict sites and brownfields from the public health and environmental management stances due to the issues of contamination and occupational health, deliberate policies, and laws to manage the challenge are limited. This offers countries such as Zambia the opportunity to examine the characteristics of its brownfields and formulate localized regeneration plans.
- **Use of regenerated brownfields:** although it may seem obvious that the objective of regeneration is to have usable properties, the use after the regeneration may be a challenge. Far (2011: 55) proposes the use of the regenerated properties for mixed use, recreational facilities, and commercial uses, since they are mostly used for housing in both the developed and developing countries. Pahlen & Glockner (2004) advise that there should be a relevant need for rehabilitating brownfields so that white elephants are not created.

2.4 Success stories of brownfield regeneration

Studies have shown that regeneration projects can be carried out successfully, such as in Colantonio & Dixon (2011); Tang (2013) and the World Bank (2016). Key to the process is the collaboration of key stakeholders and the active participation of the private sector to complement governments' efforts. The World Bank (2016) stresses the need to identify processes that are localized as no one approach is applicable to all situations, even within a country. Amirtahmasebi et al (2016) add that rehabilitating urban areas provides the opportunity for developing a new stream of affordable housing and public infrastructure that would benefit the community at large. Therefore, the regeneration process should be seen as an opportunity to do things better and for the good of the community. A few success stories are presented below.

In the United Kingdom, the growing trend between 1988 and 1993 was to convert brownfield into green spaces. Silverthorne (2006) stated that in that period 19% of the brownfield redevelopments were converted into green spaces which were more than any other use. An example of a brownfield redevelopment is the Salts Mill in Bradford, where a former textile mill was converted to mixed use incorporating an Information Technology Research facility, retail, cultural and commercial outlets with over 750 people employed on the site (Silverthorne, 2006).



<http://letsgowiththechildren.co.uk/places-to-go/salts-mill-at-saltaire-village/>

Date accessed: 20 May, 2021.

In Egypt, the Al Azhar Park, a public park, was rehabilitated under the Historic Cities Support Programme. The Park included the 12th Century Ayyubid Wall, 14th Century Umm Sultan Shaban Mosque, the 13th Century Khayrbek Complex and the Darb Shoughlan School. The US\$30million project evolved beyond the park to include the restoration of local housing in the surrounding area. Many jobs were created as the Aga Khan Trust for Culture, the organization responsible for the project, stimulated rehabilitation by keeping residents in their location, and helping create viable business through the provision of micro-credit and assisting owners restore crumbling houses (Ebrahim 2016).



https://en.wikipedia.org/wiki/Al-Azhar_Park#/media/File:CairoAzharParkAyyubidWall.jpg

Date accessed 20 May 2021.

In South Africa, the City of Johannesburg began to decline in the 1950s when the City Council moved to Braamfontein, a suburb north of the inner city. Many other businesses also moved out

of the inner city, leaving many buildings vacant and deteriorating services and infrastructure. Several attempts were made to rehabilitate the city such as the Central Johannesburg Partnership (CJP) a collaboration of the public and private sectors and community; as well as the Urban Renewal Strategy spearheaded by the Provincial government. Thus, many projects have been conducted which have changed the appearance of the city. An example is the Jewel City Precinct which covers six city blocks. The precinct was virtually closed due to the decline of the CBD. Diversity Urban Property Fund, a private venture, has invested almost R2billion (about US\$142.9million using R14 to US\$1 exchange rate, source Bloomberg.com 20/05/2021) to turn the old office buildings and warehouses into a secure inner-city neighborhood which includes 1,500 residential units, 10,000m² office space, as well as convenience retailer and food outlets. The project also includes the construction of two new residential blocks (Naidoo, 2020).



<https://urbanspace.org.za/2020/09/21/joburgs-jewel-city-set-for-further-r1bn-investment/>

Date accessed 20 May, 2021.

The above examples show the benefits of regeneration and its ability to eradicate urban decay. Examples of brownfield regeneration from Zambia, however, have focused on maintaining the use of the old industries and derelict blocks of properties. For instance, the derelict Nkana Hotel in Kitwe was redeveloped into Nkana Mall (below) which will house various commercial entities once the redevelopment process has been completed.



<https://twitter.com/iamkabamba/status/1268474718144921601/photo/1>

Date accessed 17 August 2021

As mentioned in Section 2.1.1 above, the New Urbanism theory suggests the regeneration of derelict properties by embracing mixed-use practices to create more aesthetically harmonious communities. With regeneration seeking to “turn insufficient land back to beneficial use”, proper coordination, supporting legislature and the participation of the community and other stakeholders will ensure a successful and viable process (Fatemi & Rahman, 2015:134).

3. METHODOLOGY

The content analysis technique was adopted for this paper. Various data sources were reviewed which provided in-depth insights into the issues of urban decay and regeneration. The technique was selected due to its suitability for analyzing written and verbal messages to make valid inferences from data (USGAO, 2013; Erlingsson & Brysiewicz, 2017). A literature review of books, journal articles, reports both national and international, and various websites was conducted. Then the data was analysed, and inferences drawn to support the arguments made by this paper.

4. RESULTS AND DISCUSSION

This paper set out to examine the management of brownfields and the general urban landscape in Zambia, with a view to provide evidence to support their re-use for housing. Various documents that showed the Zambian housing situation and plans developed for its administration were reviewed as presented below. The documents were reviewed based on the characteristics and challenges of brownfields as presented in Section 2 above.

Table 2: Various documents relating to the Zambian Housing Industry

Documents reviewed	Information required from the document
The 7 th National Development Plan (7NDP) - 2017-2021 The Revised 6 th National Development Plan (RSNDP) - 2013-2016 The Zambia Vision 2030	Zambia’s strategic direction with regards to housing development and management
The National Housing Policy 2020 – 2024 The National Housing Policy Implementation Plan 2020-2024 Ministry of Housing and Infrastructure Development Strategic Plan 2018 to 2021	Ministry of Housing and Infrastructure Development’s plan to execute its mandate of housing and infrastructure development
The National Housing Authority Act CAP 13 of 1994 The Housing (Statutory and Improvement Areas) Act, CAP 194, No 42 of 2010	Zambia’s definition of housing and the organizations responsible for housing development
The Urban and Regional Planning Act CAP 3 of 2015	The planning framework, guidelines, systems and processes for urban and regional planning for the Country.
Zambia Sustainable Development Goals Voluntary National Review 2020 The Habitat III Policy Paper The National Urban Policy Sub-Saharan African Report	Regional and global housing protocols, goals and directions
Zambia Housing Sector Profile (CAFH, 2020) 2015 Living Conditions Monitoring Survey Report	Housing industry performance and statistics

For brownfields to be addressed, they must be identified according to the definition determined by a country or region. In Zambia, brownfields are defined as “land that has been previously used but has subsequently become vacant, neglected or contaminated” (Zambia National Housing Policy, 2018 – 2021:vi). The National Housing Policy and the Policy Implementation Plans are the only documents that mention brownfields explicitly. In the National Housing Policy, the term only appears under the list of working definitions. In the National Housing Policy Implementation Plan however, the Ministry of Housing and Infrastructure Development aims to develop densification plans for greenfields and brownfields in Lusaka and Ndola Cities only. Thus, other policy documents and plans do not include brownfields management, development, or their use. The Revised 6th National Development Plan (2013-2016) mentions urban renewal as one of the growth areas under construction of housing. Although referring to urban shrinkage (urban decay), Haase et al. (2016: 106) state that explicit mention of the term creates a ‘stronger voice’. Thus, if brownfields were stated more in the various documents developed for urban management and housing, they would get more recognition and be considered more in spatial planning and management. Also, adding brownfields to the plans of urban renewal would also ensure they are considered for regeneration.

As a result of the poor consideration of brownfields, most of the plans for housing are for greenfields development. The Revised 6th NDP, 7th NDP, the National Housing Policy all refer to the provision of serviced land for housing development. Housing projects that have been undertaken and worth noting include the People's Process on Housing Poverty in Zambia (PPHPZ) 2019 launch of the 1,000 housing units for the vulnerable across the Country; 5,000 home development for the Zambian Air Force in Kabwe and Lusaka; 2,000 home development for the Zambian Army in Luapula; and the 2,350 housing units constructed for Civil Servants in 2020 by the Chinese firm AVIC International. The government also intends to carry out significant infrastructure development including housing in newly established districts. This also implies the considerable greenfields development plans for housing development.

One of the challenges of brownfields development mentioned in Section 2.2 above refers to the extent of the brownfields. None of the documents reviewed include the size of the brownfields. If the size is unknown, chances of the problem being trivialized are high and thus it may be assumed not to be a challenge worth undertaking. Thus, the extent of the brownfields needs to be known for proper spatial planning to be conducted.

Contamination is one of the key determinants of brownfields and thus it is included in the Zambian definition. However, most of the contamination in the Country refers to that brought about by mining operations such as lead in Kabwe and Mufulira towns (MMMD, 2016; Kribek et al, 2019). Therefore, limited information exists on contamination that would be found in commercial brownfields. And thus, contamination issues would be dealt with on a case-by-case basis for each brownfield.

Another challenge posed by brownfields is the use of the regenerated property. This determines the success of the process as the creation of white elephants so to speak would entail an unsuccessful regeneration process. According to the Urban and Regional Planning Act No 3 of 2015, one of the roles of the Regional Planning Authority is to plan and co-ordinate the provision of infrastructure and facilities for the region under its mandate. However, the practice often occurs in an ad hoc manner and is evidenced by informal dwellings. Taylor & Thole (2015) and Mulolwa (2016) also bemoan the seemingly randomized zoning of land for various purposes. Therefore, careful consideration must be made of the use of regenerated properties to ensure conformity with the regional plans established by the local authorities. This will also ensure functional efficiency and socioeconomic integration of activities, uses and facilities of the different regions as stipulated by the Urban and Regional Planning Act.

Governance responses to challenges play a critical role in ensuring their successful eradication. Without the support of a legal framework, implementation remains a strain as organizations mandated to deal with the challenges do not have the authority to enforce compliance. The Government is committed to facilitate the renewal of urban settlements by establishing the National Urban Renewal Programme (RSNDP, 2013 – 2016). However, it seems to lack the supporting policies and plans to ensure resources are provided for its implementation as well as evaluation systems to monitor and ensure its success. Therefore, the legal framework supporting the regeneration of brownfields remains limited. Brownfields are hence not recognized as either a challenge that needs to be dealt with, nor are they considered an opportunity that needs to be

explored. It is thus the view of this paper that the housing deficit continues to be a challenge because deliberate steps are not being taken to carry out regeneration of brownfields.

This paper is advocating for the use of brownfields to combat the housing deficit. The National Housing Policy 2018 – 2021 and the National Housing Policy Implementation Plan include densification of brownfields as a strategy for housing development. This includes the identification, mapping, and re-planning of blighted zones as an objective to promote the effective management of urbanization. However, all the other documents reviewed do not have similar plans to include brownfields and in particular for housing development.

5. CONCLUSION AND RECOMMENDATIONS

This paper set out to explore the issue of brownfield regeneration with the view to suggest its use to combat the housing deficit being experienced by Zambia. It was observed from developed countries that the constant use of greenfields for infrastructure development leads to the creation of concrete jungles. The bulk of the documents examined also indicate that the focus of development lies in the use of greenfields. A review of the Zambian legal framework revealed that the issue of brownfields is not being sufficiently managed due to the lack of its inclusion. It was further revealed that the lack of explicit mention of brownfields in policies and strategies often result in poor consideration of brownfields. Despite the challenge of an inadequately structured legal framework, the Government of Zambia remains committed to ensuring that the urban spatial planning occurs within sustainable and efficient confines. With the additional challenge to supply serviced land for housing development, brownfields which often have services, makes their consideration a logical option.

This paper therefore recommends the adoption of brownfields in regional spatial plans and further proposes that steps be taken to assess the possibility of considering already existing infrastructure was presented. It is also anticipated that the Zambian policy makers could make more deliberate steps to address the issue of brownfields in general and specifically to address the housing deficit. An area for future research proposed by this paper is an exploration of the actual extent of Zambia's brownfields. This is suggested based on the finding that one of the challenges of brownfield management is the underestimation of the problem as the actual extent is not known.

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All-Inclusiveness and End-User Satisfaction in Student Housing Nexus: Cognitive Dissonance Perspective

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Purpose: Drawing on the social support role's research gap of the cognitive dissonance theory, this study assessed the satisfaction of all-inclusiveness among Student with Disability living in off-campus student housing in Ghana.

Methodology: SWD satisfaction data were collected through survey, face-face interview, and participant observation among off-campus student housing in six public and private universities in Ghana. Using the universal building design requirements (UDRs), a confirmatory factor analysis and multivariate regression were used to determine UDRs satisfaction among SWD.

Findings: The results showed that there exist 11 inbuilt and 9 external UDRs among off-campus student housing in Ghana. The satisfaction level revealed that out of 11 inbuilt UDRs, SWD are satisfied with only 5. Aside, SWDs were satisfied with 5 out of 9 external UDRs. Among them, only 50.5% off campus student housing has slip-floor resistance in the buildings which forms the highest availability among the inbuilt UDRs. Again, 33% of student housing has a clear signage which was the highest among the external UDRs. These provided some psychological effects on SWD across the study locations.

Practical implications: Results suggested that effective review of structural design and permitting process may influence all-inclusiveness and compliance among student housing investors in Ghana.

Originality: This study uniquely adds to all-inclusiveness among off-campus student housing studies than earlier studies which focusses mostly on on-campus educational facilities. The assessment of UDRs satisfaction among SWD contributes to the social support discourse of cognitive dissonance theory in the housing subsector. Again, this study deviates from health and legal studies associated to disabilities in Ghana.

Keywords: user satisfaction, student housing, social support, universal building design requirements

1. INTRODUCTION

The World Health Organisation (WHO, 2011), informs that, of the 150 million children with disability globally, 80% live in developing world. Africa has suffered disability issues among youth in years past. According to UNESCO (2000) and ACPF (2011), one in every ten youth in Africa has some form of disability. This has necessitated the rethinking of the need for all-inclusive school environment (Ruijs, Van der Veen & Peetsma, 2010). Unfortunately for many years, disability studies in education have persistently received narrow discussions most especially within the student housing subsector (Tudzi et al., 2017). Hitherto such studies were limited to health and psychological education where all disability-related problems were inevitably positioned. Student housing forms a subsector of commercial real estate that aims to enhance intellectual competence, satisfy living experiences, and reform student's personal behaviour (Hassanain, 2008). One area within this sector, i.e, satisfying the living experiences of students have received huge coverage in academic discourse because, it helps to identify the supportive opportunities that student housing offer to all manner of persons. However, students with disabilities experience huge obstacles to becoming quality adult than their friends and academic achievement when their study and living environment are not satisfactory (Johnson, Thurlow, & Stout, 2007; National Center for Secondary Education and Transition, 2004; Newman, 2006; Newman, Wagner, Cameto, Knokey, & Shaver, 2010; Wagner, Newman, Cameto, & Levine, 2005). This usually creates the probability of academic failure and dropout among students with learning disabilities. Meanwhile, the Sustainable Development Goals (SDG), goal 11, 10, and 4 seeks to promote safe human settlements and cities, inclusive, and sustainable to deliver equitable education for all of which Ghana is no exception. In Ghana's quest to help in this call, the government of Ghana in recent times have established agencies that helps to enforce the implementation of the Persons with Disability, with the promulgation of the Ghana Disability Act of 2006 (Act 715) which enjoins owners of facilities to provide appropriate facilities and services that ensure easy accessibility to the facility by person with disability. Yet, the enforcement of these regulations particularly in the educational sectors including the provision of easy access to libraries and information centres, and lecture theatres, are done without focusing on student housing.

Studies on disabilities in Ghana have predominantly focused on health and safety, psychology, and law (Asamoah, Ofori-dua, Cudjoe, Abdullah, & Nyarko, 2018). Few studies have centred on all-inclusive buildings in Ghana. The few ones concentrate on educational facilities such as libraries and lecture theatres without focusing on student housing where these disabilities live (Asamoah et al., 2018; Tudzi et al., 2017). According to Simpeh and Shakantu (2019), in Ghana student housing plays a marginal role in supporting higher education learning, and as such apart from the spaces it provides, the quality of services and the incorporation of students needs markedly affect its functionality. The current study therefore, assesses the satisfaction of all-inclusive off-campus student housing in Ghana.

2. REVIEW OF RELATED LITERATURE

2.1 Cognitive Dissonance Theory

The cognitive dissonance theory emanated from Leon Festinger in the mid-1950 at the University of Minnesota. The theory posits that, a state of discomfort among individuals occurs when an individual holds two or more essentials of knowledge that are pertinent to each other but are uneven with one another. The theory goes further to admonish that until the individuals are able to resolve their state by shifting their cognitions, their discomfort will continue to happen (Festinger, 1957). The theory defines dissonance as a negative emotional condition that results from an individual experiencing two incompatible perceptions. Cognitions on the other hand, broadly explains the mental representation, such as knowledge, belief, attitudes or behaviour. The theory suggests that uncomfortable circumstance inspires individuals to pursue a way to reduce the degree of dissonance experienced. Alternatively, individuals need to reduce dissonance through discrepancy reduction. This can be achieved by changing cognitions to minimise the cognitive inconsistency. Aside that Festinger indicated that individuals require to adopting to new attitudes and beliefs that support their well-being. The theory in an attempt to discuss discomfort among individual in places where they find themselves, presents four distinct paradigms within the academic space. These include: the role of social support influence on people, the effects of exposure to information, force compliance, and the effects of involuntary and voluntary exposure to information among individuals. While the last two paradigms have received huge research attention, the first two do not. Following that the connection of the theory in student with disability studies provides additional contribution to the paradigm. The theory has been widely applied in sociology and psychology. In housing perspective, the theory has limitedly been applied among the lifestyle theories of housing. The theory has had huge impact in social and psychological discipline, but also have a link to student housing research since it involves the interaction between students and management on accommodation usage. This implies that the continued dissonance may lead to dissatisfaction and distress when student housing management do not provide the required facilities for student with disability. Essentially, students with disabilities desire a friendly accommodation that do not escalate their health complication and increase their vulnerability. The theory brings to bare in this study the importance for reduction in dissonance amongst students with disability. It also motivates persons with disability to adopt to new behaviours. As opined by Eddie and Cindy (2007), in decision situations, affected SWD require alternative to self-support that have numerous distinguishing features. These makes the theory relevant to disability satisfaction in student housing discourse as student housing owners require to provide all-inclusive housing that do not increase dissonance.

2.2 Theoretical perspectives of all-inclusive housing satisfaction of persons with disability

Satisfaction in housing studies describes several conditions that occupants associate with. These conditions should be conducive and welcoming to all manner of persons including persons with disability. All-inclusive housing provides social support role to persons with disability. All-inclusive housing has been a pertinent issues in recent times in the housing discourse due to discomfort faced by person with disability. In higher learning institutions, all-inclusiveness have gained much

attention in discussing the provision of access to libraries and the services (Ayoung, Baada, & Baayel, 2021). The universal design principles have been the general principle aimed to achieve all-inclusiveness. Zając (2016) in a study presented seven principles of universal design which includes the need for flexible design that supports wide range of abilities, design that minimise the risk of hazard, need for equitable use, low physical effort and size, intuitive use and simple use of the environment, and easy mobility. Clarkson, Coleman, Keates, and Lebbon (2013) supports that universal design is one of the most widely known methods in determining housing accessibility among people with disability. Adam (2019) also used these universal design requirements to evaluate the accessibility of person with disability in Ghana. However, the implementation of these principles has failed over the years. Taking inspiration from Festinger, the need to recognise and adopt new attitudes and beliefs that support their well-being is necessary. The universal design principles have been classified into both inbuilt and environmental factors. The Inbuilt design is made to cater for the internal usage of the building. According to Lieberman (2016), the inbuilt design requirements are expected to physically provide accessibility to configured rooms and specially designed part of the interior to meet the physical needs of people. Supporting design includes provision of unimpeded lobby, configured elevators, controlled button fitted at reasonable height, baths and toilet with grab rails, and slip-resistant floor covering (Lieberman, 2016). Studies have shown that persons with disability do not spend all their time in their individual rooms, but also spend some of their time in the common areas in the building for relaxation. However, the role of common area usage should be designed differently to cater for the disabled. For example, the corridors, lobby's, and lifts should be easily accessible to disabled persons. However, studies have not examined the satisfaction level of disabled persons using these facilities. Karunasena (2018) study measured both inbuilt and environmental design factors and found that person living with disability were not satisfied due to their inability to open their doors to make way for the movement of wheelchairs. In sum, most buildings were inaccessible to persons with disability beyond the main entrance of the structures. Further, persons with disability expressed dissatisfaction with the nature of their toilet facilities. Tudzi, Bugri, and Danso (2017) studied the right to physical accessibility among Ghanaian public universities and found that about 70% of students living with disability are not satisfied with their built environment and thinks their rights are not being given serious attention. Adams (2019) studied the physical accessibility of hotel buildings and found that most persons with disabilities were not satisfied because only (13.6%) of the hotels in Ghana have installed automatic or swinging doors, (53.2%) have their corridors meeting the minimum suitable width of 120 cm, 2.4% of two-storey or more have elevators, 42.1% of hotels with free vestibules having slip-resistant floor coverings, and only 1.5% of hotels met the physical accessibility requirement of accessibly rooms for disables. Elsewhere, Owusu & Owusu-Ansah, (2011) study found that 46.15% of housing consider only clutches and wheel chairs in their building. Also, distances between common areas and lightening quality in building affects the perception of accessibility among disables (Granzer, et al., 2010). Chan, Lee, and Chan (2008) study found corridors as not wide and sufficient to support room movement. Within the building (Chou et al., 2001; Leung et al., 2015), provided realistic situations to suffice best needs of persons with disability. These includes: natural in common areas, distance of individual room and fire exits, and artificial lights in staircase areas. Leung, Zhen, and Pynoos (2018) also considered space, distance, and building

services as main factors of common areas in buildings. Their study found that distances factor in common areas was positively affected.

The environment design perspective of universal design principle by disabled people include common areas linked to information accessibility and physical accessibility (Mudrick et al., 2012; Jacobs et al., 2012). Considering the universal limitations confronted by the persons with disability, all the facets of the environment design of housing accessibility should be essential and pertinent for them. The common areas require regular accessibility to solve emergency cases, maintain the well-being of the disabled, and provide convenience to them. According to Leitner and Leitner (2012), environmental design such as the ease of distance to functional spaces in common areas determines whether mobility is declined. Specific environmental design access indicators include accessible entrance, accessible parking, tactile markings, clear signage, and rational counter heights for disable persons with wheelchair. Among these indicators, empirical studies have provided divergent views on its applicability. For instance, in a study conducted by (Adam, 2019) on physical accessibility in hotel housing in Ghana showed that about 40% of the hotels have visibly marked entrances to their lobby and parking, (50.6%) had handrails on ramps, (22.2%) hotels had access ramps landing at the top, and (39.8%) of hotels had bottom of ramps. Although the Disability Act 715 in section 26 in Ghana precisely enjoins facility owners to provide an exclusive special parking places for persons with disability', Adams (2019) study do not investigate its applicability. Tudzi et al, (2017) application of the Act found that even where the parking spaces were provided in universities, there were no clear signage which resulted in the competition of student with disabilities using wheel chair for parking space with other students. In other studies, Leung et al. (2018) assessed the indicators using handrails, signage, security, and barrier-free facilities as the environmental design factors. Their studies found that the overall environment design for the disabled was positively forecasted. However, the use of signage and security provided highest impact on information acquisition for persons with disability.

Similar studies from (Castell, 2014) also used the accessibility to parking and found that the extent of access to parking does not provide unbending directions on how to accomplish required access. However, the identification and use of tactile signs was mainly of benefit for the vision impaired. (Samson, 2010) also conducted a study on access of disable student to university library. According to his study, while parking as an environmental design indicator was exceptional in addressing 50% needs of disabled students in accessing the library, interestingly, distance from the entrance to the library was greater. Similar study by (Hamzat & Dada, 2014) found low accessibility of buildings among students as wheelchair-mobile students did not have access to the several services being provided in the school libraries. Barth (2005) study on perception of post-secondary students with disabilities on using secondary school housing. His study found that parking spaces are far and there was lack of signage to provide information and guideline to students. Chan et al. (2008) study measured all environmental indicators among university buildings and found that tactile strip was not provided at foot and head of ramps even, access ramps found in all locations was substandard, handrails did not have all directional signs raised, and notification and detection sensors were not upgraded to support people with visual impairment. (Bodaghi, 2012) similarly measured environmental design indicators of housing accessibility of persons with disability using ramps, parking lot, and exclusive sites using 5-point

Likert scale. The results showed that disabled students indicated that issues related to the availability of ramps, exclusive space and, availability of parking spaces, poses the most difficulties in accessing campus housing. (Karunasena, 2018) study also found that excessive slopes across direction of the building entrance makes control of the wheelchair difficult, and scarce provision of doorway spaces outside and within rooms makes turning circles of wheelchair difficult.

2.3 Conceptualizing student housing satisfaction through Cognitive dissonance theory

Studies have over the years established the relationship between satisfaction and dissonance constructs (Mao & Oppewal, 2010; Rutner, Hardgrave, & Mcknight, 2008; Tewksbury & Higgins, 2006). According to their studies, cognitive and dissonance is possible to happen when consumers are dissatisfied or when satisfaction is low. Student housing forms a vital component of facilities that support higher educational institutions to train and build the career of students. Different scholars have defined student housing to include facilities that constitute; kitchen, bedroom, toilet, canteen, bathroom, and laundry. In Oke, Aigbavboa, and Raphiri (2017) view, student housing constitutes bedroom, bathroom, kitchen, and special facilities such as gym, DSTV room, cafeteria, study room, and phone booth. Aside these, Najib and Yusof (2009) also define student housing as a facility that provides privacy and security to sees student housing as a place that offers security and privacy to students. Ulyani, Najib, and Yusof, (2011) on the other hand, in his study defined student housing as a set of space provided by the university management to house the students at chargeable fee with rules and obligations to observe the attitudes students towards the use of the accommodation. However, Attakora-Amaniampong et. al, (2020) uniquely do not support Ulyani, Najib, and Yusof, (2011) idea of student housing. According to their study, student housing provision are shared facilities and special facilities that are provided by both university authorities and private individuals both within and outside the university premises. This distinction has been the current trend among most developed and developing universities across the globe. The provision of these facilities does not intend to provide shelter alone to students, but required to provide significant benefit that aims to inure to their academic advantage. Hassanain (2008) indicated that student housing is aimed to achieve three major objectives. First, to aim in forming personal behaviour and aiding in forming personal character. Second, to attain intellectual competence. Third, to create imaginations that leads to a satisfying living experience among students. These students, especially students with disability from negative emotional condition that may results from living in student accommodation as indicated by the cognitive dissonance theory. That's to say, the facility must provide comfort to students. Scholars have hinged the successes of this aim on the provision of good management operations and environmentally friendly indoor design. Willoughby et al. (2009) further buttresses that a suitable student housing facility is required to provide a suitable environment that enhances security, sense of sharing, and togetherness among the students and in return brings social cohesion and help them become responsible citizens in future (Hassanain, 2008). Student housing studies have provided divergent views on the component of satisfaction across different countries. In Nigeria, students are very satisfied with study bedroom that contains two double beds. According to Mellor et al. (2008), students perceive that living alone might lead to loneliness which can negatively affect the mental condition of the student. Martin and Allen (2009) and Kaya and Erkip (2001) supports Mellor et al. idea because they believe that the double

bedroom offers student relief from loneliness and permits socialization and academic communication. Elsewhere in Europe and Asia, students are satisfied with student accommodation that provides rooms equipped with tables and chairs, mattresses and pillows, air-condition, paper boards, railing towel hangers, wardrobes, adequate electric outlet, dressing mirror, shoe racks, and waste bins (Revington, Moos, Henry, Haider, & Moos, 2018; Wesselmann, 2018). Even though these qualities may be commonly found in some African countries, additionally, Africa university authorities are very keen on the security and safety of students and so provision of burglary proof housing and effective security locks. Studies in US and Australia shows that students are much happy living in student housing that provides access to cafeteria, ATM machines, mini-markets, and parking spaces. Several scholars have outlined different measures of measuring the satisfaction of student in using student housing (French, Bhat, Matharu, Guimarães, & Solomon, 2018; Khozaei, Ramayah, Hassan, & Surlenty, 2012; Oke et al., 2017; Ulyani et al., 2011). POE and SERVQUAL are the widely used measure because it is based on the student's actual experience while living in the accommodation (Gajewska, Zimon, Madzík, & Kaczor, 2019; Gu, Smith, & Smith, 2019). These models also take into account the interaction with the students in relation to the use of the accommodation. These models have been criticised because of the incapability of getting the actual expectations of the students. However, these models are still in use in extreme circumstances on on-campus student housing where student have resided in the facility for all the study period. Different models have emerged to modify the existing ones. In connection with the cognitive dissonance theory, with the passage of time, individual's adaptation to new strategies and tend to selective in elements of their total perception and experiences in where they live. According to Festinger (1957), as expectations increase, the perception of satisfaction and quality of preceding service delivery declines. Amole (2009) relative satisfaction (RSAT) index was introduced to fit into the student housing context grounded on the universal level of satisfaction of living in the student accommodation as a whole. The index further investigates rating of study bedroom based on sleeping, and relaxation and entertainment. Also, dependability and reliability of student mobility was another requirement when assessing satisfaction.

The study employed the use of the universal building design requirements (UDR) for all-inclusiveness. The inbuilt design requirements used include: available of slip resistant floor covering, ability for corridor to support wheelchair movement, configured elevation, availability of seats at the reception, availability of unisex toilet, availability of artificial and natural lightening, distance of individual rooms to fire exist, availability of clear and accurate visual signs in the building, provision of alarm signals, provision of baths and toilet with grad rails, controlled fitted button at reasonable height, installed automatic swinging doors (Adam, 2019; Karunasena, 2018; Leung, Zhen, & Pynoos, 2018; Lieberman, 2016). The external building design requirements variables include: accessible entrance, tactile markings, clear signage, visible marked entrance at the lobby, access ramps landing at the button, availability of directional signals on handrails, accessible entrance, accessible parking, access ramps landing at the top, and provision of door spaces outside (Adam, 2019; Karunasena, 2018; Hamzat & Dada, 2014; Castell, 2014; Bodaghi, 2012). These requirements were measured during physical observation and interview with the student housing managers. The psychological effects on satisfaction variables used in this study include: privacy, loneliness, emotional support, good relationship, managerial

control, managerial support, socialization, reliability, social cohesion (Ulyani, Najib, and Yusof, 2011; Willoughby et al., 2009; Martin & Allen, 2009; Kaya & Erkip, 2001). These were measured using a 5-point Likert scale spanning from (very satisfied to dissatisfied)

3. METHODOLOGY

3.1 Concept building

The study is situated within the social support role of cognitive dissonance theory. The uncomfortable circumstance that people go through inspired individuals to pursue a way to reduce the degree of dissatisfaction. Adopting to new attitudes and beliefs that support their physical, social, and psychological well-being is key (Festinger, 1957). Delving on, first, the psychological impact of satisfaction on SWD, the study relied on the constructs in literature made by (Ulyani, Najib, and Yusof, 2011; Willoughby et al., 2009; Martin & Allen, 2009; Kaya & Erkip, 2001). Secondly, the study adopted the physical aspects (facilities) that provide social support to student with disability. Based on that the study relied on the constructs of universal building design requirements in literature by (Adam, 2019; Karunasena, 2018; Leung, Zhen, & Pynoos, 2018; Lieberman, 2016). These concepts served as the predictors of the satisfaction of all-inclusive buildings among SWD.

3.2 Research design

The study used a mixed research method based on survey, face-face interview, and participant observation among off-campus student housing managers and student with disability in selected public and private universities in Ghana. The study used four (4) public and one (1) private university campus across the northern and southern part of Ghana. Across the six campuses, 823 purpose-built hostels were assessed. Out of that 262 facilities were selected based on the availability of SWD. Among them, 276 SWD were engaged due to their willingness and availability to respond to questions aside their psychological and health issues. In the engagement, students were asked to describe their satisfaction with the use of their facility considering the universal building design requirements. Again, we assessed the students on the psychological effects on the satisfaction derived on the availability and unavailability of all-inclusive facilities across the study location. More so, 30 student housing managers were interviewed to understand their perception on the adherence to the universal design requirements for SWD. In doing so, we physically examined the spatial properties and architectural design following the universal design requirements. Based on the large geographical scope of the study, we employed 12 field research assistants and trained them on the use of kobo collect tool to facilitate survey.

Table 1 Demographic data of respondent

AGE OF DISABILITY	18-22	22-24	24-26	26-30	30-32	32-34	34-36	36-40	40+	TOTAL
UDS	13	17	10	21	0	1	0	0	0	62
SDD-UBIDS	19	14	23	14	2	0	0	0	0	72
KNUST	11	10	21	15	17	0	0	0	0	74
UEW	12	4	7	11	11	0	1	0	0	46
GCUC	8	7	3	0	2	2	0	0	0	22
TOTAL	63	52	64	61	32	3	1	0	0	276
GENDER		%								
Male	77	27.9								
Female	190	68.8								
TOTAL	276	96.7								
FACILITIES SELECTED										
UDS	57									
SDD-UBIDS	71									
KNUST	73									
UEW	40									
GCUC	21									
TOTAL	262									

3.3 Study area description

The study universities were classified into two sectors. The southern (Accra, Kumasi, and Winneba) and Northern sector (Tamale and Wa). The southern universities selected includes: University of Professional Studies, Kwame Nkrumah University of Science and Technology, University of Education, Winneba, and Garden City University. The Northern sector universities include: University for Development Studies, and SD-Dombo University of Business and Integrated Development Studies. The nature of student accommodation in the southern Ghana universities are hugely off-campus based due to increase in student enrollment. Structurally, most facilities are storey buildings provided with basic student useable areas such as shared study room, kitchen, washroom, and bedroom. Preliminary survey indicated that due to the cosmopolitan nature of the cities within which these universities are found, student housing managers rent the facilities to other tenants who are not students. Thus, the student housing market is well developed compared to the Northern sector Universities. The nature of Northern sector universities is 90% off-campus student housing characterized with compound-houses and few storey buildings. The reason is that these are developing universities with huge infrastructure deficit (Tudzi et al., 2017). Common facilities among off-campus student housing are bedroom, kitchen, and bathroom. Table 1 and figure 1 shows the composition of student housing selection across the study locations.

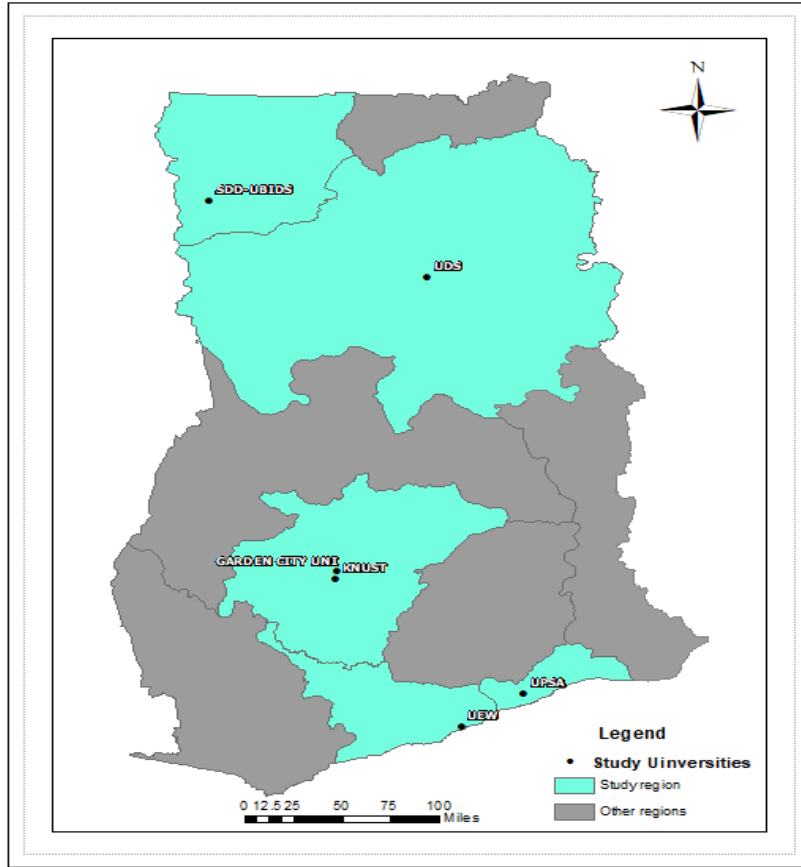


Figure 1 Map showing study locations

3.4 Data analysis

The study used the confirmatory principal component analysis to derive the satisfaction of inbuilt and environmental building design support systems across the study locations. Descriptive statistics were utilised to differentiate the availability and unavailability of universal building design support systems in off-campus student housing. The analysis also includes the tests for homogeneity to determine the possibility of distinct missing values and non-missing values of universal design variables (UDV) across the study locations. Data suitability test was conducted to circumvent multicollinearity and to ensure satisfactory internal reliability of variables using the Cronbach's Alpha (Attakora-amaniampong, Miller, & Aziabah, 2020). Varimax rotation was conducted to identify the underlying elements of satisfaction of UDV. UDV with eigenvalues above 1.00 were retained. Also, the predictor for psychological effects of satisfaction was analysed using based on predicted variables in (section 3.1). All variables that have significance (p -value) more than 0.05 were extracted.

4. RESULTS

The study assessed the satisfaction of student living with disabilities in using all-inclusive buildings of off-campus student housing. Using the universal building design characteristics, the

study found that there is a negative balance in the availability of both inbuilt and external building support systems among off-campus student housing in support of SWD. The results show that inbuilt design characteristics such as slip resistant floor covering (50%), availability of artificial and natural lighting (45.1), availability of unisex toilet (41.8), provision of baths and toilets with grab rails (34.7), and availability of clear and accurate visual signs in the buildings (31.4%) were available in some student housing (see table 2).

According to “investor 9, “.....hostels are built before recognizing the need to provide toilet aside for visitors or student friends. Also the disabled students who rent their facility are not many as such when they build they usually don’t consider a lot of things in favour of persons with disability” [sic] (investor-9).

This reflects why most buildings provide limited inbuilt design systems that support students with disability. Concentrating on facilities with limited support systems, it was discovered that most student housing do not provide seats (81%) at their reception to support student with disability who may be tired from long distance walks from lecture theatres. This notwithstanding, about 72% of the corridors of off-campus student housing do not support wheelchair movement. This implies that SWD will find it easy to move or escape during disaster. Second, it requires the support of other students to assist in their movement. Again, 78.7% of student housing rooms were far from fire exits, provision of alarm signals (77.2%), and controlled fitted button at reasonable height (70.5%).

The study found that student housing investors are very keen on inbuilt space management in order to create more rooms for rent. Hence, the authors further investigated whether these investors had building permits before putting up the building. To the author’s dismay, some investors informed that, the high demand for student housing has made it difficult for them to follow the bureaucracy in acquiring building permits (investor-5).

Investor 2 also lamented on the cost of acquiring these permits makes it unattractive to pursue. “.....Because of the cost involved in acquiring a permit, I don’t disclose the intent and purpose of the housing” (investor-2).

In line with the specific objective of providing student housing by Hassanain (2008), it can be observed that the unavailability of inbuilt design characteristics in most off-campus student housing has the potential to affect the intellectual competence of SWD. The results also revealed that the entrance to most off-campus student housing provided little accessibility for SWD with less visible marked entrance at the lobby. Again, physical accessibility to parking space was very low across the study location (17.1%). More so, there was high unavailability of tactile markings (77.2%), directional signals on handrails (66%), clear signage (64.3%), access ramps landing at the button (71.7%), and access ramps landing at the top (66.6).

Table 2 Universal building design characteristics among off-campus student housing

Universal building design support systems	With	Without
Inbuilt building design availability		
Slip resistant floor covering	50.5	49.5
Configured elevation	26.1	73.9
Availability of seats at the reception	18.3	81.7
Availability of unisex toilet	41.8	58.2
Distance of individual rooms to fire exits	21.3	78.7
Availability of clear and accurate visual signs in the buildings	31.4	68.6
Provision of alarm signals	22.8	77.2
Provision of baths and toilet with grab rails	34.7	65.3
Controlled fitted button at reasonable height	29.5	70.5
Installed automatic swinging doors	29.4	70.6
Ability for Corridor to support wheelchair movement	27.3	72.7
Availability of artificial and natural lightening	45.3	54.7
External building environment design availability		
Access ramps landing at the button	28.3	71.7
Tactile markings	22.8	77.2
Accessible entrance	23.9	76.1
Availability of directional signals on handrails	34	66
Accessible parking	17.1	82.9
Access ramps landing at the top	33.4	66.6
Clear signage	35.7	64.3
Visible marked entrance at the lobby	31.3	68.7
Provision of door spaces outside	25.6	74.4

5. DISCUSSION OF RESULTS

5.1 Satisfaction of all-inclusive inbuilt student housing for student with disability

The study test of the availability of inbuilt support systems are significant to SWD (see table 3). Among the inbuilt design support variables, the factor analysis retained only 5 as being satisfied by SWD which explained a total accumulative variance of 56.31%. According to the factors retained, SWD are satisfied with the provision of resistant floor coverings, contributing a good reliability (Cronbach $\alpha=0.861$) and the highest total variance explained (13.657%) from table 4. The availability of artificial and natural lightening was retained as the second inbuilt design support system satisfied by SWD. The factor presented a reliability (Cronbach $\alpha=0.972$) and a total variance explained of 12.031%. The third factor, "availability of unisex toilet" also provides a good reliability (Cronbach $\alpha=0.908$) and a total variance explained of 10.57%. SWD also expressed satisfaction for baths and toilet with grab rails (Cronbach $\alpha=0.853$; total variance=10.036). The last factor, "availability of clear and accurate visual signs in the buildings"

also provided a reliability test results of (Cronbach $\alpha=0.884$) and a total variance explained of 10.23%.

Table 3 Data suitability among inbuilt building design support systems

KMO and Bartlett's Test			
Kaiser-Meyer-Olkin Adequacy.	Measure of Sampling		.590
Bartlett's Test of Sphericity	Approx. Chi-Square		447.470
	Df		55
	Sig.		.000

Table 4 satisfaction of inbuilt building design support systems among off-campus student housing

Factors retained	Eigenvalues of variance	Reliability (Cronbach α)	Average rotation coverage among factors	Total variance explained
Slip resistant floor covering	13.859	0.861	0.003	13.657
Availability of artificial and natural lighting	12.198	0.972	0.009	12.031
Availability of unisex toilet	10.927	0.908	0.006	10.57
Provision of baths and toilet with grab rails	9.844	0.853	0.046	10.036
Availability of clear and accurate visual signs in the buildings	9.94	0.884	0.044	10.23
Total cumulative loadings				56.318

5.2 Satisfaction of all-inclusive environmental design support systems among off campus student housing

The factor analysis used 9 variables of environmental building design of off-campus student housing, which together provided a total variance explained of 60.165%. Among the nine, 5 variables were retained. This implies that students were satisfied with these systems. With regards to the 5 variables, the provision of door spaces outside the entrance provided the highest satisfaction level (Cronbach $\alpha=0.943$; total variance=13.308%). Second variable, “accessible parking”, also provided a reliability with (Cronbach $\alpha=0.911$; total variance=12.099%). This contradicts the study of Adam (2019) and Tudzi et. al. (2017) where persons living with disability were dissatisfied with parking space. Thirdly, the availability of tactile markings provided a satisfaction reliability of (Cronbach $\alpha=0.879$) and total variance explained of 12.045%. The fourth factor, “availability of directional signals on handrails” contributed an acceptable reliability (Cronbach $\alpha=0.905$) and total variance=11.605%. The fifth variable, “visible marked entrance at the lobby” provided a reliability (Cronbach $\alpha=0.866$) and total variance explained of 11.107%.

Table 5 Data suitability among environmental building design support systems

KMO and Bartlett's Test			
Kaiser-Meyer-Olkin Adequacy.	Measure of Sampling		.561
Bartlett's Test of Sphericity	Approx. Chi-Square		287.62
	Df		45
	Sig.		.000

Table 6 Satisfaction of environmental building design support systems among off-campus student housing

Factors retained	Eigenvalues of variance	Reliability (Cronbach α)	Average rotation coverage among factors	Total variance explained
Provision of door spaces outside	14.405	0.943	0.001	13.308
Accessible parking	12.472	0.911	0.003	12.099
Tactile markings	11.898	0.879	0.007	12.045
Availability of directional signals on handrails	11.016	0.905	0.042	11.605
Visible marked entrance at the lobby	10.374	0.866	0.048	11.107
Total cumulative loadings				60.165

5.3 Psychological effects on satisfaction of all-inclusions among off-campus student housing.

Table 5 shows that the unavailability of most all-inclusiveness among off-campus student housing across the study locations have provided some psychological effects on the SWD. These includes: emotional support, good relationship, managerial control, managerial support, privacy, security, socialization, reliability, social cohesion, loneliness. Emotional support ($\beta=0.083$) according to the student are counselling support given SWD when they face challenges of unavailability of UDRs. Good relations ($\beta=-0.056$) on the other hand include the ability of student housing managers to respond to basic facility issues student face. Managerial control ($\beta=0.030$) from the field showed the restrictions on the use of some common areas in the building for academic activities. Managerial support ($\beta=0.013$) are the expectations such as regular check on SWD, availability of wheelchair, and other disability support equipment's. Among the variables; good relations ($\beta=-0.056$, $p<0.001$) and loneliness ($\beta= -0.048$, $p<0.001$) contributed a strong psychological predictor among SWD (see table 7). The other 8 variables provided a moderate psychological effect on SWD. This confirms with the cognitive dissonance theory which opined that a continued dissonance may lead to dissatisfaction and distress when student housing management do not provide the required facilities for student with disability.

Table 7 Psychological predicted effects of satisfaction among SWD

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.342	0.365		3.677	0.000
	Emotional support	0.075	0.044	0.083	1.691	0.009
	Good relation	-0.075	0.061	-0.056	-1.220	.0002
	Security	0.005	0.045	0.005	0.111	0.000
	Managerial support	0.011	0.040	0.013	0.283	0.007
	Privacy	0.023	0.041	0.030	0.547	0.003
	Managerial control	0.029	0.049	0.030	0.600	0.005
	Socialisation	0.038	0.047	0.046	0.809	0.004
	Reliability	0.024	0.042	0.030	0.558	0.006
	loneliness	-0.058	0.062	-0.048	-0.931	0.004
	social cohesion	0.004	0.043	0.004	0.090	0.009

a. Dependent Variable: effect: * $\rho < 0.05$, ** $\rho < 0.01$, *** $\rho < 0.001$

6. DISCUSSION

The study aimed to assess the satisfaction of SWD of all-inclusive off-campus student housing using confirmatory factor analysis. Relative residential satisfaction index was measured using the universal design building requirements as the dependent variable. This approach was used to test the theoretical underpinning of the cognitive dissonance, which Festinger (1957), indicated that as expectations increase, the perception of satisfaction and quality of preceding service delivery declines. Truly, the results of this study support this claim. This study found that there is limited adaptation and implementation of universal design building requirements among off-campus student housing in Ghana. In line with the social support role that exert significant impetus to student with disability, off-campus student housing found across the study location seems to depend on facilities that enhances their investment welfare than providing facilities that supports UDR. That is to say, it is easy to find that student housing managers mainly focuses on the provision of basic services such as bedroom, toilet, kitchen, study room as defined to constitute “student housing” in (Oke, Aigbavboa, and Raphiri, 2017; Ulyani, Najib, and Yusof, 2011; Najib and Yusof, 2009). This contradicts the Ghana Disability Act, 2006, which enjoins all owners to provide services and facilities that are easily accessible to everyone. Even with that, the satisfaction of these basic services by SWD is questionable which requires further studies. With respect to satisfaction with the use of inbuilt UDR across the study locations, most off-campus UDR’s suffered implementation gap which is in line with earlier studies of (Karunasena (2018) study where person living with disability were not satisfied because disabled persons cannot open their doors to make way for the movement of wheelchairs. This means that contention that cognitive dissonance has a relation with dissatisfaction and distress is true, contrary to earlier dissonance studies in job satisfaction in the management discipline (Festinger, 1957). Notwithstanding, the factor analysis showed that SWD are very satisfied with few environmental building design factors. The factor analysis showed that provision of door spaces outside, accessible parking, tactile

markings, availability of directional signals on handrails, visible marked entrance at the lobby are satisfactory UDRs among SWD. Thus, these facilities are capable of providing external top supports SWD. However, the unavailability of clear signage, accessible entrance, access ramps landing at the top and button is a threat to off-campus student housing. This results is in line with studies of Bodaghi (2012) and Chan et al. (2008) who found that tactile strip was not provided at foot and head of ramps, substandard access ramps at all locations, handrails did not have all directional signs raised, and notification and detection sensors were not upgraded to support people with visual impairment.

Using the multi-variate regression, this study finds that the satisfaction of both inbuilt and environmental UDRs predicted the psychological effects SWD go through in off-campus student housing. Psychological effects such as emotional support, good relationship, managerial control, managerial support, privacy, security, socialization, reliability, social cohesion, loneliness contributed largely to dissatisfaction. Among them, good relation and loneliness provided negative effect to SWD. The results depicts that student housing manager does not understand that the provision of all-inclusive suitable student housing facility enhances privacy, security, sense of sharing, and togetherness among the students and in return brings social cohesion among students (Leung, Zhen & Pynoo, 2018 ; Leitner and Leitner, 2012; Willoughby et al., 2009). By contrast, SWD are vulnerable and as such student housing managers must have a good relationship with students and also provide unavailable UDR services that discourages loneliness among the students.

7. CONCLUSION

The study concludes that the mix of relative residential design index and the universal design requirements makes it a useful tool for understanding the satisfaction of SWD in all-inclusiveness among off-campus student housing; perspective of cognitive dissonance theory. The availability of few inbuilt and environmental UDRs among off-campus student provides minimal support to SWD. These appears to be indirectly linked with psychological effects which affects SWD satisfaction. In similar fashion, it has a long-standing emotional effect when SWD are unable to physically access UDRs. The study generalises by further accentuation its practical, design, and policy implications for all-inclusive student housing. Practically, student housing managers needs to enhance the reception capacity to cater for additional seats for SWD to relieve their tiredness from long distance walk from lecture theatre. Existing off-campus student housing will require to open up common areas like corridors to support wheel-chair movements. As part of privacy, controlled alarm systems should be provided in the building to facilitate easy entry and exit and avoid disturbances among their peers. Again, SWD should be assigned to rooms that have easy reach of fire exits. Aside from that, student housing managers requires provision of externally supported systems such as clear signage at the entrance of the facility to provide direction to SWD. This signage should be clear and easy to read and interpret. Entrances of the facility should be easily accessible among SWD. This strongly suggests that improving upon the available inbuilt and external UDRs, and implementation of unavailable UDRs can support the activities of SWD, which should improve their satisfaction. Especially, the inbuilt UDRs captured in the building plans and their relationship with student housing satisfaction requires much attention.

Secondly, the building inspectorate unit of Metropolitan, Municipal, and District Assemblies have a gate-keeping role in ensuring that student housing managers adhere to structural design and implementation that captures details of student housing by following UDRs. In addition, policy makers need to train managers on the person with disability law to enhance their understanding of the living experiences of SWD, most especially by providing innovative means of ensuring good relation, security, convenience, privacy, and social cohesion in the student housing environment. In addition, future studies should endeavour to access the overall satisfaction of basic building services provided by student housing investors as that has been their main investment drive of them. Such study is likely to provide valuable contribution to facilitate the off-campus student housing market and perhaps ensures positive cognitive among SWD. Finally, this study contributes to the social support paradigm of the cognitive dissonance theory by using SWD who are vulnerable to living in off-campus student housing that is socio-culturally diversified.

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What Property Attributes are important to UK University Students in their Online Accommodation Search?

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Purpose: This paper analyses the relationship between the potential demand for purpose-built student accommodation (PBSA) properties and their online displayed attributes. Using data from 12 major UK cities, we analyse the effect of the online displayed property information on the popularity score of a PBSA.

Design/Methodology: The data used is from an online student accommodation listing platform – student.com which contains tangible and non-tangible property attributes, and the data is analysed using a hedonic regression model.

Findings: The results show that PBSAs' tangible and non-tangible attributes are important to students in their online accommodation search, although, these attributes vary in impact. The study also reveals that failure to display key information of a PBSA may reduce the attractiveness of the property. The results suggest that PBSAs' tangible and non-tangible attributes are important to students in their online accommodation search, although, these attributes vary in impact. The study also reveals that failure to display key information of a PBSA may make the property less attractive.

Practical implications: These insights are valuable in developing student accommodation investment, development and management strategies.

Keywords: Operational real estate, student accommodation, PropTech, online search, hedonic model; investment

1. INTRODUCTION

1.1 Background

The PBSA market is one of the fastest, most matured and liquid of the operational real estate (OPR) sectors in the UK. Savills Research (2019) reveals that, as of 2019, there were about 1,844,500 students in the UK and a stock of the 640,000 rooms valued at £51.2bn. The report further indicates that investment capital flow to the PBSA sector from 2016 to 2018 was estimated at £4.1bn. Despite the COVID-19 pandemic-induced economic challenges and the political uncertainty associated with Brexit, UK's university student enrolment remained high in 2020 (Guardian, 2020; Staton, 2020; UCAS, 2020); thus, the market has maintained a positive outlook.

Despite the rapid growth and positive outlook, there is insufficient scholarly insight on the student accommodation market, particularly for PBSA assets. Literature on student accommodation is generally skewed to the investment side of the market (see French *et al.*, 2018 and Newell and Marzuki, 2018), the morphology of the accommodation (see Amole, 2009) and student satisfaction and academic performance (see Oke *et al.*, 2017; Ong *et al.*, 2013; Thomsen, 2007; Thomsen and Eikemo, 2010). These studies, however, do not offer insight on student accommodation search and selection. This paper, therefore, attempts to address this knowledge gap by providing insights on how the listing or non-listing of key property information can affect the attractiveness of a property to UK university students. This can also extend the knowledge on the property attributes that are most important to UK students in their online accommodation search, and by extension, the potential demand drivers for PBSAs.

This study investigates the following key questions:

1. What listed property attributes are important to university students in their online accommodation search?
2. What category of the property attributes (tangible or non-tangible) has the most profound effects on the popularity score of a PBSA¹?
3. How does the non-listing of tangible and non-tangible attributes affect the popularity score and by extension the potential booking of a PBSA?

The data used in this study is sourced from Student.com – one of the major online marketplaces for student accommodation search and booking in Europe and the UK. We adopt a hedonic modelling approach, and the results reveal that the tangible and non-tangible displayed attributes of a PBSA are important to UK university students in their online accommodation search. We do not observe clear differences in the magnitude of the effects of tangible or the non-tangible property attributes. The results also suggest that students may find properties with fewer displayed information less attractive, and they are more likely to save properties with more displayed information on their wish list. These results imply that displaying more property

¹ The popularity score of a PBSA is the number of students that have saved the property to their wish list.

attributes can increase the booking potential of an online listed PBSA.

The insight from the study can aid the development of more effective PBSA investment and development strategies. Portfolio managers who hold PBSA assets can also use the insight to identify the property attributes with higher potential to add value to the assets and maximise portfolio efficiency. Furthermore, asset and property managers can develop strategies to ensure optimal asset performance, and also identify the property attributes that their marketing should highlight and emphasise when listing their properties online.

1.2 Student Accommodation as an Asset: evolution and prospects

University student accommodation in the UK was conventionally provided and managed by the higher institutions. However, the inability of universities to meet the growing student accommodation demand (Newell and Marzuki, 2018) created a market for private investment, mainly through houses in multiple occupation (HMOs) and PBSAs. With the returns on student accommodation assets (9.4% in 2018) surpassing total return of all commercial assets in the UK, coupled with the positive market sentiments, the UK student accommodation market continues to attract huge domestic and international funds (CBRE Research, 2019).

International students constitute 23% of the UK's full-time university student population, representing a growth of 54% in the last decade (Cushman & Wakefield, 2019). Savills Research (2020) further reveal that the international students' growth rate is 10 times faster than the growth rate of domestic students. The continuous increase in the enrolment of international students may be associated with the high standard of the UK higher education system, increased funding in UK higher education sector and the removal of student number caps (Cushman and Wakefield, 2019). Savills Research (2020) further reveals that 60% of international students are more likely to live in PBSAs than domestic students, suggesting that the continued increase in international students' enrolment can further expand the PBSA market.

Investment in the UK PBSA market in 2020 defied the COVID-19 pandemic crises and the Brexit-related political uncertainty. PBSA investment flow to the UK in 2020 increased with Blackstone paying £4.66bn to acquire IQ (Savills Research, 2020). Given the rising international student numbers, and the positive PBSA market outlook, investors, developers, and managers of PBSAs need to ensure that they have sufficient knowledge of students' accommodation preferences to adopt the appropriate strategies to develop and manage their assets to produce optimal returns. The evidence-based insight that this paper offers will therefore be valuable to investors, developers, portfolio managers and asset managers as they attempt to understand and manage students' accommodation needs and preferences.

2. LITERATURE REVIEW

This study aligns to two interconnected strands in the existing body of literature: the first is the information and search process; and the second is student accommodation.

2.1 Information and Search Process

Classic competitive theory suggests that parties on different sides of a transaction can transact in a frictionless world with complete information. However, markets and economic systems are riddled with imperfections and information asymmetry; thus, scholars have studied the role of information in markets with a plethora of alternatives. The classic consumer behaviour theory underscores the complexity of consumers' decision making and selection processes, particularly those relating to a large number of offerings and high-priced goods associated with economic and financial commitments. The search theory further provides insight on individuals' conscious and unconscious optimal strategy when choosing from a series of potential opportunities of random quality with a combination of attributes that require trade-offs among a set of offerings. Economists initially applied the search theory to labour economics (Jovanovic, 1979; McCall, 1970) and this was further applied to macroeconomics through the matching theory (see Diamond, 1984). The main point of convergence in these studies is the role of cost and search friction associated with factors such as time, consumer's circumstances and the quality and quantity of information in important decision making, particularly for high involvement goods.

The search theory has also been extended to housing economics with insight on the search and selection of different segments of the housing market, albeit a significant proportion seems to be directed at the sales market. For instance, Albrecht *et al.* (2016), Turnbull and Sirmans (1993) and Williams (2018) focus on links between information, search, sales/purchase and house prices. Other studies (such as Blowers *et al.*, 2014; Kim, 1992; Read, 1993, 1997) have also shown that the lack of information in the rental segment of the market may be costly, particularly for potential tenants. Given the acute information asymmetry in real estate markets arising from heterogeneous and multiple players in the market, the level of information plays an important role in the search process. Qiu and Zhao (2018) particularly argue that access to a better pool of information will be beneficial to individuals in search of accommodation. This study further highlights the impact of asymmetric market information on households' housing choices and empirically examine the varied behaviour between better informed and less informed individuals in a housing market.

The advancement in information technology has minimised information asymmetry in real estate search process (Palm and Danis, 2002), with individuals increasingly relying on information listed on a property to make their housing decision. This area of research has not been extended to student accommodation search; it will therefore be valuable to analyse the relationship between the information listed on student accommodation websites and students' accommodation

preferences. Considering the growth in investment capital to this market, this insight can aid asset managers and marketers to identify the values that students attach to property information displayed on listing website and how their investment potential can be maximised.

2.2 Student Accommodation Research

Real estate market reports are important sources of current data and information on student accommodation market². These reports are however descriptive, typically providing aggregated market information, albeit without rigorous empirical analysis. The research by French *et al.* (2018) also provides useful insight into the student accommodation market, although this paper also is also without empirical data analysis. Newell and Marzuki (2018) make an important contribution by providing empirical analysis to data on investment returns. These articles and reports offer a macro-level perspective to the market, mainly focusing on investment and development markets; thus, the insight may be more suitable for top-down investment approach. Although these insights are important for investment, there is a need for investors, developers, fund managers, asset managers and property managers to gain deeper insight on the user/occupier segment of the market which may require a more micro-level approach.

Some scholars provide more micro-level insight on the student accommodation market, with a general focus on student satisfaction, living environment, and academic performance. These studies reveal that students are significantly affected by tangible/physical attributes³ and non-tangible/abstract features⁴ of their accommodation. Studies show that the size of the wardrobe/closet, laundry services and window quality affect students' satisfaction (see Amole, 2009; Thomsen, 2007; and Oke *et al.*, 2017). Studies also show that students are more satisfied with their accommodation if they have private rooms, and if they find the physical environment, aesthetics, architectural and morphological features of the property to be pleasing, particularly if the building is newly constructed or renovated (Amole, 2009; Thomsen, 2007). Khozaei *et al.* (2014) further reveal that students prefer single to double-sharing rooms, even if they must share bathrooms. Another study (Khozaei *et al.*, 2011) did not find sharing of kitchen facilities statistically significant, although they observed that students prefer properties with good security systems, room privacy and flexibility.

Non-tangible attributes of student accommodation have also been found to affect students. Khozaei *et al.* (2011); Magni *et al.* (2019); and Thomsen and Eikemo (2010) find that location and distance (to the commercial centre and amenities) are important to students. Kobue *et al.* (2017) and Kolawole and Boluwatife (2016) also buttress the importance of location to students, although, their findings suggest that students may be more concerned about the distance to their

² Student accommodation market analysis now features prominently in the periodic market reports of leading real estate firms such as JLL, Knight Frank, Savills etc.

³ Tangible attributes are the physical elements of the students' rooms (such as the bed size, desk, chair, etc) and their flat/house (such as number of people in the house, number of rooms in the flat/house etc).

⁴ Non-tangible attributes relate to non-physical elements of the property (such as rating scores, rent, reviews etc).

university of study, and other factors such as perceived security, rent, and peer' opinion and recommendation. It would therefore be valuable to analyse these attributes in the context of the students' online accommodation search.

2.3 Summary of Research Gaps, Contributions and Hypotheses

The review of literature highlights the advancement of knowledge in the related themes to our study. We however identify some gaps in the literature and thus make contributions to these areas. First, we make a unique contribution to the literature on the student accommodation preferences ex-ante, with valuable insight for student accommodation investment, development, and management. Second, we provide insight on the role of digital technology in students' accommodation search and selection through the identification of the property attributes that are most important to students. Deeper insight is also provided on the effects of not listing some property attributes. Third, our study covers a broader scope and a larger sample size compared to previous studies⁵. Fourth, much of the literature on micro-level student accommodation are skewed to Asia and Africa; our study will therefore make a valuable contribution to the European context, and more specifically, the UK.

Following the review of literature and the identification of the gaps in knowledge, the hypotheses have been developed based on several theory-backed propositions. The first proposition is that the tangible and non-tangible attributes of student accommodation properties are important to the students (Khozaei *et al.*, 2011; Kobue *et al.*, 2017; Kolawole and Boluwatife, 2016; Magni *et al.*, 2019; Thomsen and Eikemo, 2010), and this can affect different areas of their lives and education (Khozaei *et al.*, 2014; Ong *et al.*, 2013). It is therefore expected that students will consider these property attributes carefully when they are searching for their accommodation. The second proposition is that students in search of accommodation may be more attracted to properties with more information, compared to properties with less (in alignment to the search theory).

The hypotheses are summarised below:

Hypothesis 1: the listed attributes of a PBSA can significantly affect students' preference for a property during their search process.

Hypothesis 2: the popularity of a UK PBSA listed on a student accommodation website is significantly affected by the displayed tangible and non-tangible attributes of the property.

Hypothesis 3: PBSAs with more information on property attributes on the online listing page are more popular than properties with less information.

⁵ Related studies are typically limited to a single university in a city and often with a small sample. For instance, Magni *et al.* (2019) uses a sample size of 339 students in a single university while Kobue *et al.* (2017) uses a sample size of 55 student- also in a single university.

3. DATA AND METHODS

3.1 Data

This study analyses the link between the potential demand for a student accommodation property and the property's online displayed attributes. There is therefore the need to identify a student accommodation web-based listing platform that displays a suitable demand indicator and the attributes of the properties. Student accommodation listing platforms typically display the attributes of the listed properties but do not display the actual number of bookings for the properties (which would be the ideal demand indicator). Student.com however provides an alternative demand indicator i.e., the popularity score for properties listed. This popularity score is in a sense, an indication of the booking potential of a listed PBSA.

Student.com is an online student accommodation search and booking platform with global coverage and has been operational for more than six years. In addition to displaying the attributes of the listed properties, this platform enables students to save rooms of interest to their wish lists and request to book the room. The wish list is a particularly important feature of this platform as it enables students to shortlist properties of interest and save them while continuing their online search. The number of students that save on a property to their wish list on Student.com is the popularity score of the property, and this is displayed as "popular" on the listing page of each property. This study adopts the popularity score as the outcome variable, and this is utilised as the demand proxy. Suffice to state that ideally, the data on the number of actual bookings for each property would be suitable as the outcome variable; however, this information is not displayed on the website⁶.

The data from student.com was retrieved using an automated cloud-based web/data scrapping procedure (described in Appendix 1)⁷. The data covers the listed student accommodation properties in 12 major UK cities. The rationale for the city selection is two-fold: first, we select the seven UK cities ranked in the top-10 most popular student cities in the world (based on the Times Higher Education ranking, 2018): London, Manchester, Glasgow, Liverpool, Nottingham, Sheffield, and Birmingham. In addition to these, we include five other UK cities which, though having the highest population in the UK, were not listed in the Times Higher Education (2018) top-10 most popular cities ranking: Bristol, Leicester, Edinburgh, Leeds, and Cardiff. The dataset contains a total of 4,195 rooms in 960 student accommodation properties (see Appendix T1 and Figure 1 for further information). The variation observed in Appendix T1 suggest that city market indicators and performance vary across the UK- an indication of the potential city-level heterogeneity in the data, and the need to introduce controls for city-fixed effects in the empirical analysis.

⁶ A potential issue with the popularity score as a demand proxy is that the addition of a room/property to a wishlist may not translate to actual demand i.e. booking the property. Whilst this may be true, we argue that the properties saved to the wishlist the most, although not effective demand, can serve as an indication and reflection of students' preference for that property.

⁷ The data was scraped from the platform on 17 December 2020.

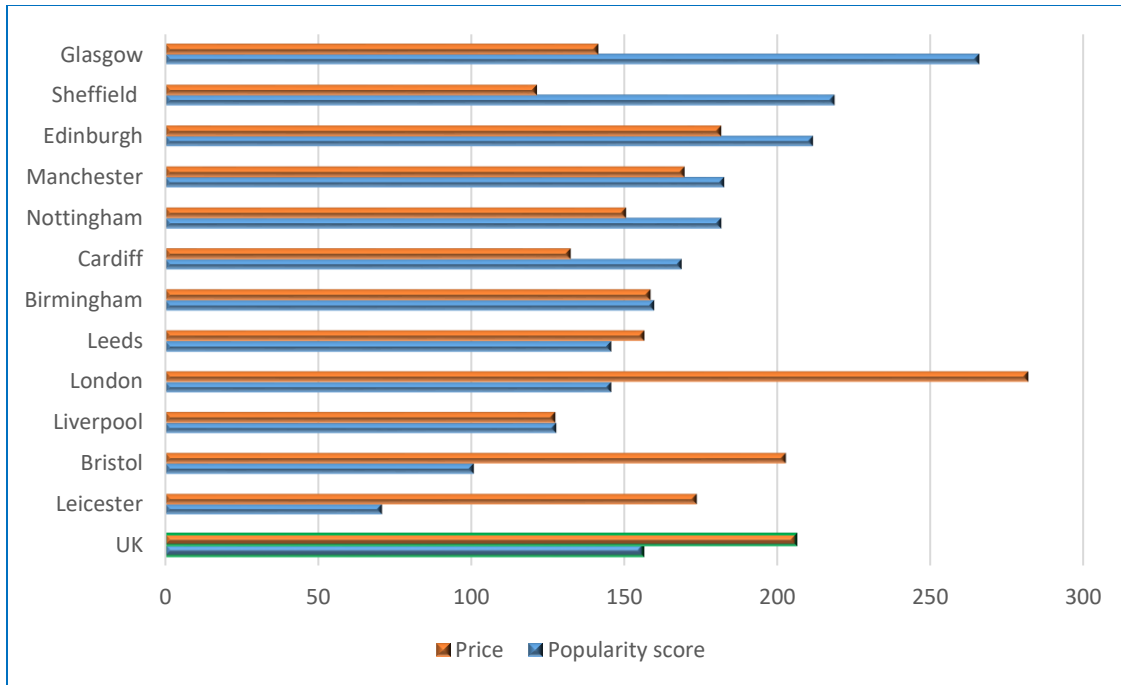


Figure 1: Mean Popularity Score and Price/Rent (£) in the UK and 12 Cities
 Source: *Authors' Illustration, 2021 (using data from student.com)*

To make the data compatible with the empirical exercise, we transform and recalibrate the outcome and explanatory variables. The outcome variable (popularity score) has a wide distribution of values (0-2045) and a standard deviation of 358. To minimise the effect of the high variability in this variable, a positive value of 1.5 is added uniformly to all the value of the popularity score, after which the natural logarithms of the new popularity score values are derived. This approach addresses the issues associated with zero values and heteroscedasticity, particularly with 10% of the popularity scores in the dataset having zero values (see Appendix T2 for details, description, configuration and summary statistics for the outcome and explanatory variables).

Most of the explanatory variables are either in binary or continuous variable forms and some of these variables have zero observations. The zero observations in the categorical and binary variables are however handled differently from the dependent variable. These zero observations are categorised as a valid category, as they capture the number of properties where the property attributes were not displayed at the time of pooling the data. Suffice to state that the non-display of some attributes is of particular interest to us in this study. Apart from the location (city) variable (which does not have missing observations) all the other categorical variables have a category for “no information displayed on the attribute” =0 (for $x_0, x_1, x_2, \dots, x_n$). Furthermore, we convert the “transition time to HEI 1” variable (originally continuous variable) to a categorical variable to also enable us to capture the effects of not displaying the transit time. In addition to

this, the binary variables capture the effect of “displaying a property attribute” =1, relative to “no information displayed on the attribute” =0 (for x_0, x_1).

The categorisation above is mainly set to capture the effect of different measures of the variables relative to not providing information on the variable and other categories. Some explanatory variables however do not have missing information and are therefore not re-categorised. These variables are price, reviews, private bathroom, and private kitchen. The “price of the room” (rent per week) variable is a continuous variable, and it is transformed using natural logarithms. The number of reviews written on each property is also a continuous variable and although the variable has some “zero” values, these “zeros” imply that no student has written a review on the property; thus, the zero values are not classified as “missing” and due to the low variance in the variable, the linear form is maintained. The other two features (private bathroom and private kitchen) are binary variables, although, these are relative to shared bathroom and shared kitchen respectively.

3.2 Empirical Framework

This study adopts the hedonic model approach which is conventionally used to break down the utility of a property into the value of the it’s individual components. Using the Rosen (1974) model, a differentiated good can be described by a vector of its characteristics

$$Q = (q_1, q_2, \dots, q_n) \dots \dots \dots (1)$$

Our empirical analysis aims to estimate the effect of the listed attributes of a PBSA property on the property’s popularity score. In this study, these attributes are characterised as tangible (such as bed size) and non-tangible (such as distance and price). It can therefore be inferred that the popularity score of property i in market j is a function of K number of characteristics measured by Z

$$Popularity\ score_{ij} = f(Z_{i1}, Z_{i2}, Z_{i3}, \dots, Z_{ik}, \varepsilon_i) \dots \dots \dots (2)$$

Where ε_i is the error term. The partial derivative of $Popularity\ score_{ij} (*)$ with respect to the k_{th} PBSA feature $\frac{\delta Popularity\ score_{ij}}{\delta Z_k}$ is referred to as the marginal implicit popularity score which represents the marginal popularity score of the k_{th} property feature in the overall popularity score of the PBSA property. To estimate the marginal contribution of each characteristic using traditional regression techniques, we need to specify equation (2) as a parametric model. There are two major specifications for the hedonic model in the literature – the linear specification and the log-linear specification (IMF, 2013). Although there is no consensus in the literature on the appropriate functional form, some studies suggest that choosing between these two functional forms should be determined by a priori expectations and empirical testing (see Cassel and Mendelsohn, 1985; Halvorsen and Pollakowski, 1981; Triplett, 2006). Furthermore, a large body of research has also examined semi-parametric and non-parametric specifications (see Bontemps

et al., 2008; Parmeter et al., 2007). We implement the log-linear functional form due to the definition of our outcome variable as stated in the data section. The log-linear function form allows each attribute of the PBSA property to be interpreted as a percentage of the marginal utilities of the accommodation which is an added advantage (Cropper et al, 1988).

The log-linear hedonic model is specified

$$\ln(\text{Popularity score}_{ij}) = \alpha + X'_{ir}\beta + Z'_i\delta + n'_i\gamma + f_j + \varepsilon_i \dots \dots \dots (3)$$

Where $\ln(\text{Popularity score}_{ij})$ is the natural logarithm of the popularity score of PBSA property i in market j , α is the intercept term, β , δ , and γ are the slope parameters associated with different tangible and intangible characteristics of the property. X'_{ir} is a vector of room-specific tangible characteristics, Z'_i is a vector of property-specific tangible characteristics, n'_i is a vector of non-tangible property characteristics, f_j is city fixed effects and ε_i is the error term. The room-specific tangible characteristics include room furniture, number of beds and bed size, while the property-specific tangible characteristics include the number of rooms in flat, bathroom use, kitchen use, laundry, access control, security, cinema room, entertainment room and television. The intangible characteristics are rating, the number of reviews, bills, rules, having a site manager on the property and the transit time.

We estimate equation (3) using the ordinary least squares (OLS) linear regression model and include city fixed effects in all the models. This is important because of variation in indicators (as shown in Table 1) and because housing markets are location specific, thus, results from one location may not easily be generalised to other locations. In addition to this, the fact that some properties may have more rooms represented in the sample than others implies that the error terms are likely to be correlated within the properties, thus, the standard error is clustered at the property level in all models.

We estimate four different models using OLS for the pooled analysis. The first specification is a regression of the natural log of PBSA property score on non-tangible attributes of the property. Next, we estimate a model for the room-specific tangible characteristics and another model for the property-specific tangible characteristics. After this, we estimate a model on both the room-specific and property-specific tangible characteristics, and finally, we estimate a model with all the room and property-specific tangible and non-tangible characteristics. This is the full specification and is thus our preferred model. The results of the analysis are presented in the next section.

4. RESULTS AND DISCUSSION

This section presents and discusses the results from the empirical analysis in four sub-sections: the first sub-section analyses key displayed property attributes and their effects on the popularity score of PBSAs; the second sub-section analyses the effects of displaying/not displaying key

property attributes on the property’s popularity score; the third sub-section focuses on the analysis of locational sub-markets, and finally, further robustness tests are reported and discussed in the fourth sub-section.

4.1 The Effects of Displayed Property Attributes on the Popularity Scores of PBSAs

The OLS regression estimations in this sub-section show the effects of the tangible and non-tangible property attributes on the popularity scores of PBSAs (reported in Table 1). The natural logarithm of the PBSA popularity score is the dependent variable in all the models. Column (1) presents the results for the OLS regressions with the non-tangible attributes, while Columns (2) and (3) presents the results for the OLS regressions with the tangible room-specific and property-specific attributes respectively. Column (4) presents the OLS regression results for the combined tangible attributes (both room-specific and property-specific) and finally, Column (5)- the full (base) model specification combines all non-tangible and tangible property attributes.

Table 1: Base Models (Log Popularity score): OLS Regression Estimates

		(1)	(2)	(3)	(4)	(5)
	VARIABLES	Non-tangible	Tangible House/property	Tangible Room	Tangible- House and room	Full spec-tangible and non-tangible
Non-Tangible features	Log of Price	-0.662***	NO	NO	NO	-0.744***
	Rated between 1 and 1.99	-	NO	NO	NO	-
	Information not provided	-0.649***	NO	NO	NO	-0.683***
	Rated between 2 and 2.99	0.351***	NO	NO	NO	0.0175
	Rated between 3 and 3.99	0.663***	NO	NO	NO	0.256**
	Rated between 4 and 4.99	0.657***	NO	NO	NO	0.367***
	Rated 5*	0.325***	NO	NO	NO	0.0877
	Number of Reviews	0.00863***	NO	NO	NO	0.00640***
	All bill inclusive	-	NO	NO	NO	-
	Information not provided	-3.248***	NO	NO	NO	-1.123***
	Some bills included	0.00266	NO	NO	NO	0.106*
	Alcohol and smoking prohibited	-	NO	NO	NO	-
	Information not provided	-0.560***	NO	NO	NO	-0.362***
	Only one of alcohol or smoking prohibited	-0.00640	NO	NO	NO	-0.0531
	Having an onsite manager	0.234***	NO	NO	NO	-0.0235
	30 or more minutes to transit to HEI 1	-	NO	NO	NO	-
	Information not provided	0.317**	NO	NO	NO	0.291**
	Less than 10 minutes	0.135	NO	NO	NO	0.0842
	10-19 minutes	0.118	NO	NO	NO	0.124
20-29 minutes	0.134	NO	NO	NO	0.265*	

Tangible features (house/property)	Information on number of rooms in the house	NO	0.372***	NO	0.0435	-0.168***
	Private bathroom	NO	0.905***	NO	-0.412***	0.475***
	Private kitchen	NO	-0.216***	NO	-0.333***	-0.186***
	Laundry operation is free	NO	-	NO	-	-
	Information not provided	NO	-1.433***	NO	-0.944***	-0.706***
	Laundry coin operated	NO	-0.157**	NO	-0.0799	-0.134*
	Automated access control	NO	-	NO	-	-
	Information not provided	NO	-0.658***	NO	-0.651***	-0.0705
	Access with fob/swipe key	NO	-1.582***	NO	-1.235***	-0.422***
	24- hour patrol	NO	-	NO	-	-
	Information not provided	NO	-0.830***	NO	-0.767***	-0.525***
	Night patrol only	NO	-0.173***	NO	-0.190***	-0.150***
	Cinema Room	NO	0.428***	NO	0.366***	0.351***
	Entertainment Area	NO	0.595***	NO	0.340***	0.237***
Television	NO	0.0860	NO	0.103*	0.0126	
Tangible features (room specific)	Chair, desk and closet available	NO	NO	-	-	-
	Information not provided	NO	NO	-0.00782	-0.0493	-0.00281
	1 or more piece of furniture in the room	NO	NO	0.304	0.0201	0.0647
	1 bed per in one room	NO	NO	-	-	-
	Information not provided	NO	NO	-3.551***	-2.083***	-1.228***
	2 or more beds in one room	NO	NO	-0.150	0.0538	0.332***
	Double bed in room	NO	NO	-	-	-
	Information not provided	NO	NO	-0.138	0.0640	0.0641
	Small bed	NO	NO	0.728***	0.604***	0.308***
	Small double	NO	NO	0.474***	0.232***	0.0901**
Other sizes	NO	NO	-0.0841	-0.00864	0.424***	
Location Fixed effects	London	-	-	-	-	-
	Birmingham	-0.667***	-0.120**	-0.321***	-0.336***	-0.795***
	Bristol	-1.766***	-1.273***	-1.102***	-1.493***	-1.849***
	Cardiff	-0.260***	0.121	-0.396***	-0.0324	-0.593***
	Edinburgh	-0.665***	0.0484	-0.0609	-0.141*	-0.580***
	Glasgow	-0.817***	3.32e-05	0.227***	-0.0615	-0.879***
	Leeds	-1.038***	-0.727***	-0.562***	-0.811***	-1.209***
	Leicester	-1.601***	-0.969***	-1.352***	-1.201***	-1.646***
	Liverpool	-1.538***	-1.146***	-1.100***	-1.289***	-1.764***
	Manchester	-0.743***	-0.220**	-0.660***	-0.532***	-0.782***
	Nottingham	-0.518***	-0.257***	-0.419***	-0.442***	-0.692***
	Sheffield	-1.005***	-0.583***	-0.537***	-0.732***	-1.175***
Constant	8.961***	6.149***	4.985***	6.202***	10.04***	
Observations	4,195	4,195	4,195	4,195	4,195	
R-squared	0.670	0.588	0.468	0.657	0.735	

Notes: Standard errors clustered at property level; *** p<0.01, ** p<0.05, * p<0.1

In comparing the coefficients of Columns (1) to (4) with base model (Column 5) in Table 1, it can be observed that the coefficients of the property attributes are generally consistent in terms of sign and statistical significance, although, a few variations are observed. We adopt the full-specification model (Column 5) for further analysis and discussion. The results in Column (5) suggest that the non-tangible attributes of PBSAs are important to students in their online accommodation search. For instance, on average, *ceteris paribus*, an increase in the price of a PBSA by 1% is associated with a 0.74% decline in the popularity score and this is statistically significant at the 1% level. The results further show that having a rating score that is higher than 1.99 generally has a positive effect on the popularity score, although, this is statistically insignificant for properties with rating scores between 2 and 2.99, and 5* rated properties. In addition to these, we find that the number of reviews that have been written on a PBSA property can increase its popularity score, although the magnitude of this effect is relatively small. These results are generally consistent with the findings of (Kobue *et al.*, 2017; Kolawole and Boluwatife, 2016) that rent and peers' recommendation matter to students' accommodation satisfaction.

The results also reveal that information on the composition of bills on the property is valuable to students. It specifically shows that properties which indicate that some bills are included in the rent are more likely to be added to the wish list than properties which indicate that all bills are included. The results also show that properties where only alcohol or smoking is prohibited are less popular than properties where both alcohol and smoking are prohibited, although, interestingly, this effect is statistically insignificant. The results further show that properties which indicate that there is an onsite manager are preferred to properties that do not indicate this, although, this effect is statistically insignificant. In addition to this, our analysis also shows that properties that are less than 30 minutes from the closest institution of study are more likely to be added to the wish list than properties that are further away, although, this distance element is not statistically significant⁸. The result on transit time to HEI 1 aligns to the studies of Kobue *et al.* (2017) and Kolawole and Boluwatife (2016), although this does not present as one of the most important considerations of students particularly at the stage of their online accommodation search.

The result on the tangible features shows that displaying information on the number of rooms in a property has a negative and significant effect on the popularity score compared to having no information. The results further show that having a private bathroom (relative to having a shared bathroom) increases the popularity of a property, although, having a private kitchen (relative to having a shared kitchen) can make a property less popular. These significant effects contrast to previous studies (such as Khozaei *et al.*, 2011, 2014) and suggest that students may place a higher value on privacy in elements of the building that relate to personal care, whilst simultaneously preferring to share other facilities (such as kitchen) that foster social interaction. This inference is further supported by the results which indicate that having a cinema room and entertainment room can significantly increase the popularity of a PBSA. The result also shows that displaying the

⁸ This is with the exception of transit time of 20-29 minutes which is statistically significant.

availability of a television on a property can make the property more popular, although, this is statistically insignificant. In addition to these, properties with coin-operated laundry are found to be 13% less popular on average than properties where laundry is free; and properties with fob/swipe key access are 42% less popular than properties with automated access, while properties with only night patrol are 15% less popular than properties with 24-hour security patrol. The general importance of security to students in their accommodation search is consistent with past studies (see Khozaei *et al.*, 2011; Kobue *et al.*, 2017; Kolawole and Boluwatife, 2016).

The results for room-specific features indicate that properties that have 2 or more beds per room are 39% more popular on average than properties that have 1 bed per room. Furthermore, having small beds, small double beds and beds of other sizes in a room can increase the property's popularity score, relative to having a double bed in the room. These results may reflect possible concerns by students that bigger beds may decrease space for circulation and other furniture, as well the potentially higher rent for rooms with bigger beds.

In general, the results in this sub-section reveal that both tangible and non-tangible attributes of PBSAs are important to students in their online accommodation search and can thus affect the properties' booking potential. The results also show that PBSAs located outside London are on average, less popular than properties located in London. These results generally indicate that links exist between PBSA property features and the popularity of a PBSA listing. The effect of the features such as bills composition, rules within the property, having a property manager on site, the type of laundry operation and city location of the PBSA have particularly not been previously explored in the literature.

4.2 The Effects of Displaying/not displaying Information on Property Attributes on the Popularity Scores of PBSAs

In this section, we analyse the effects of displaying/not displaying information on the PBSA's attributes on the property's popularity. We maintain the same model specification and form in (Table 1, Column 5), although all the non-binary variables that have some non-displayed information are converted to binary form: (i.e., $x=1$ if information on the property attribute is provided; $x=0$ if this information is not provided). Some attributes, specifically price, number of reviews, bathroom, kitchen, and location are displayed on all the properties listed; it is, therefore, impossible to estimate the effects of not displaying their attributes. The results for this empirical exercise are reported in Table 2.

Table 2: Models Estimating Effects of Displaying (vs not displaying) Information on Property Attribute (Log Popularity score): OLS Regression Estimates

		(1)
	VARIABLES	All cities
Non-tangible features	Log of Price [#]	Yes
	Rating information	1.008***
	Review [#]	Yes
	Bill information	1.316***
	Rules	0.363***
	Having an onsite manager	-0.00834
	Transit time	-0.212***
Tangible features (property)	No of rooms in property	-0.165**
	Private Bathroom [#]	Yes
	Private Kitchen [#]	Yes
	Laundry	0.610***
	Access	-0.0560
	Security	0.429***
	Cinema Room	0.275***
	Entertainment Area	0.242***
Tangible features (room)	Furniture	0.0966**
	No of beds in room	1.314***
	Bed size	0.00597
	Location [#]	Yes
	Constant	5.094***
	Observations	4,195
	R-squared	0.724

Notes: Standard errors clustered at property level; *** p<0.01, ** p<0.05, * p<0.1

[#]The variable retains its original form as in the base model because it does not contain missing information

Table 2 shows that indeed, not displaying a vast majority of the property attributes in our model can make a property less popular which generally aligns to theoretical expectations (similar to Turnball and Sirmans, 1993; Albrecht et. l., 2016; Read, 1993; 1997 and Kim, 1992). For non-tangible attributes, PBSA properties that display information on ratings, bills and rules are on average more popular, relative to properties that do not display the information. Interestingly, however, properties that display transit time and that there is an onsite manager are on average less popular, although, indicating that there is an onsite manager is not statically significant. For the tangible attributes, we observe that PBSAs with displayed information on laundry, security,

cinema room, entertainment area, furniture, number of beds and bed size are on average more popular, although this is not significant for bed size information. In contrast, properties that display the number of rooms in the property, access control and television are less popular, although, this effect is not significant for information on access control and television. The results validate our proposition that not displaying property attributes on a listing platform can adversely affect the booking potential for PBSAs, consistent with the findings of Qiu and Zhao (2018). We, however, do not observe clear differences between tangible and non-tangible attributes.

4.3 Locational sub-market Analysis

Given the heterogeneity of housing markets by location (see Oladiran *et al.*, 2019) and the variation in student accommodation market indicators (Appendix T1), we disaggregate our analysis by location, using the model specification in Table 2 (now reported in Appendix T3 , Column 1). Considering that London accounts for about 42% of the overall sample, we estimate a “non-London” model (reported in column 2) to examine whether the results are driven mainly by the London property market. We then estimate a “London-only” model (column 3), and the other regional groups (columns 4-7). We control for the city locations within the sub-samples in all models.

The results for the non-London model (Column 2, Appendix T3) is not substantially different from those observed in the base model (Column 1, Appendix T3), although, the model fit decreases from 72% to 45%, suggesting that other unobserved factors may be affecting the popularity score in the non-London cities. We also observe a general decrease in the magnitude of the coefficients in the non-London model, and the coefficient for bills changes from positive to negative, and for TV, it changes from negative to positive, although these variables in the non-London model are statistically insignificant.

In general, we observe a variation in the model fit, magnitude, and statistical significance in the coefficients for the sub-locational models (Columns 3-7 in Appendix T3). Some effects are however identical across locations. For instance, a higher price will make a property less popular in all the sub-markets, and displaying information on rules, laundry and security can increase the popularity score of a property in all sub-markets. These results validate our proposition that PBSA market demand indicators vary by location, although some attributes (such as price, rules, laundry, and security) have identical effects across the locational sub-markets.

4.4 Further Robustness Tests

We carry out further empirical exercises to examine the robustness and potential biases in the results. The first set of tests examine the sensitivity of our result to the model specification. First, we check for model dependence in our results by estimating a linear hedonic model (Column 2, Appendix T4) and comparing the results to the log-linear hedonic base model (Column 1, Appendix T4). We do not observe significant variation in both results, suggesting that the

estimates are not sensitive to changes in functional form. We also estimate a model without clustering the standard error at property level (Column 3, Appendix T4) and the results also show no variation from the results in the base model. We further examine the possibility that the estimates may be biased by the properties with more rooms in the dataset, and we assign the attributes of the first room listed on a property as the room attributes for that property, thus limiting the sample to one room per property (Column 4, Appendix T4). Overall, the results for this exercise are similar to our baseline model in terms of sign and significance, although, changes can be observed in the sign of the coefficient for the onsite manager variable, number of rooms in a property, television and furniture, although these attributes are statistically insignificant.

The second set of tests are carried out to examine the commute time from the property to HEI 1 (a proxy for distance). This is important, considering the role of location and distance in previous studies (see Khozaei *et al.*, 2011; Thomsen and Eikemo, 2010). Although the dataset does not capture the actual distance; we substitute two other “commuting time” variables in the base models and report the results in Appendix T5 (“walking time” Column 2 and “driving time” Column 3), comparing this to the “transit time” coefficient in the base model (Column 1). The results show that the sign, magnitude, and statistical significance of the estimated coefficients in the three models are very similar, although a few exceptions can be observed.

Finally, we expand our models to control for several other factors to test for the potential effect of omitted variable bias, considering that the listed PBSAs have a plethora of displayed attributes. Literature has shown that attributes and facilities such as gym, WIFI, elevator etc can affect students’ satisfaction level for a property (Kobue *et al.*, 2017). We therefore estimate the base model with the inclusion of these variables. This exercise presents a potential problem of multicollinearity, as most of these attributes have a high correlation. The results (not reported) generally show that these variables are statistically insignificant and their introduction to the model does not improve the model fit, suggesting that these omitted variables may not be essential to students in their online accommodation search. Additionally, we also attempt to control for the type of bedroom. The dataset however contains a few rooms with the indication of room types and overlapping categories in some cases. We therefore are unable to include this in the model.

Despite the rigorous empirical analysis and the robustness of the results in this study, some limitations and potential issues are identified. The first issue relates to the potential effects of the COVID-19 pandemic on students’ academic engagement and other health/social policies. Because the automated web scrapping exercise was conducted in December 2020, the data may capture COVID-19-related student search patterns. Another potential issue is that the data does not provide information on the distance to the city centre which is also an important element in students’ satisfaction. Additionally, the cumulative nature of the popularity score suggests that properties that have been listed on the platform for a longer period may potentially have higher number of saves to the wish list, compared to more recently listed properties. A potential

solution to this problem is to control for the time that the property has been listed on the platform; however, this information is not available.

5. SUMMARY AND CONCLUSION

This paper estimates the effects of online displayed property attributes on the potential demand for purpose-built student accommodation (PBSA) using a hedonic framework. The results suggest that the tangible and non-tangible online displayed attributes of PBSAs are important to UK university students in their online accommodation search. We do not observe a clearly defined higher weight of influence for either the tangible or non-tangible property features; hence, submit that both tangible and non-tangible features are important to students in their online accommodation search. The results also suggest that students are more likely to save PBSAs with more displayed information on their wish list, which by extension, increases the booking potential of the listed PBSA. This particularly sheds more light on the application of the search theory to real estate, further extending the work from the traditional residential market (see Qiu and Zhao, 2018) to the student accommodation market. Furthermore, the paper provides a unique ex-ante perspective to student accommodation preferences, further adding to already existing ex-post literature. Additionally, this study makes a valuable contribution to the micro-level student accommodation literature with a larger and more representative sample in the UK and European contexts

Despite the limitations associated with the study, the results are robust to several models and variable specification; thus, reliable, and valuable for the niche PBSA market which is currently characterised by insufficient evidence-based micro-level insight. The study provides useful insight for developing more effective and efficient PBSA investment, development, and management strategies. With investors, developers, and asset and property managers having a better knowledge of the PBSA features that matter to students the most, they can maximise the return on their assets. PBSA online listing and marketing plans and strategies can also focus on the attributes that matter to students the most and thereby increase the booking and occupancy rate of the properties.

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Appendices

Appendix 1: Summary of the automated cloud-based web/data scrapping for data retrieval and storage.

Data stored in databases or presented in some standard exchange formats i.e., extensible mark-up language (XML) or JavaScript object notation (JSON) are forms of structured data that can be retrieved and queried by machines. The unstructured nature of the data on Student.com however presents some data retrieval and storage difficulties. The data in its raw form (as displayed on the platform) is represented as a hypertext mark-up language (HTML) document which although comprehensible by humans, is not understandable by machines/programs. We therefore implement an automated cloud-based web/data scrapping for the retrieval and storage of the unstructured data which translates it to a machine processable format. In contrast to the manual web scrapping method of visiting individual property pages and recording the required information by a human user, this automated web scrapping procedure is more efficient because it only requires a seed URL and information about objects that need to be retrieved and stored from multiple webpages. The automated procedure then follows the link path for navigating between webpages, particularly when there is pagination on the webpage.

Appendix T1: UK and City Aggregate Values of Key Property features

	City	Number of rooms	Number of properties	Average Number of rooms per property*	Mean Price	Mean Popularity score (based on property)
1	Birmingham	268	53	10	£158	160
2	Bristol	49	12	6	£202	101
3	Cardiff	162	21	11	£132	169
4	Edinburgh	144	20	9	£181	212
5	Glasgow	244	39	8	£141	266
6	Leeds	158	38	6	£156	146
7	Leicester	242	52	8	£173	71
8	Liverpool	276	50	9	£127	128
9	London	1773	552	9	£282	146
10	Manchester	353	82	7	£169	183
11	Nottingham	182	34	12	£150	182
12	Sheffield	344	55	9	£121	219
	Total (all cities)	4195	960	9	£206	156

Note: *Aggregated to the nearest whole number

Source: Authors' Illustration, 2021 (using data from student.com)

Appendix T2: Description, Configuration and Summary Statistics of Outcome Variable and Explanatory Variables

	Category	Variable name	Variable Description	N*	Mean	SD
Outcome Variable	Popularity Score	Log of Popularity Score	Log of (popularity score +1.5)	4,195	4.651	1.903
Explanatory Variables	Non-tangible features	Location (City)	Categorical variable for location fixed effects: 1= if the property is located in Birmingham; 2= if in Bristol; 3= if in Cardiff; 4= if in Edinburgh; 5= if in Glasgow; 6= if in Leeds; 7= if in Leicester; 8= if in Liverpool; 9= if in London; 10= if in Manchester; 11= if in Nottingham; 12= if in Sheffield	4,195	7.894	2.872
		Price (Rent per week)	Log of the price (rent) per week of the room	4,195	5.208	0.445
		Rating	Categorical variable: 0= if the property does not have any rating information; 1=if rated from 1-1.99; 2=if rated from 2-2.99; 3=if rated from 3-3.99; 4=if rated from 4-4.99; 5=if rated 5	4,195	1.952	1.959
		Reviews	Continuous variable: measures the number of reviews that have been written on a property	4,195	7.299	15.685
		Bills included in rent	Categorical variable: 0=no information provided on bills included in the rent; 1= if information is provided on some but not all of the bills; 2= if information is provided to indicate that all bills (water, electricity, heating, gas, WiFi, content insurance and cleaning services) are inclusive	4,195	1.022	0.484
		Rules (alcohol and smoking)	Categorical variable: 0=no information provided on rules; 1= if information is provided on either smoking or alcohol prohibition, but not both; 2= if information is provided to indicate that both alcohol and smoking are prohibited within the property	4,195	0.616	0.687
		Onsite manager	Binary variable: 1= if information is provided that there is an onsite manager; 0= if this information is not provided	4,195	0.368	0.482
		Transit time to the closest (target) Higher Education Institution	Categorical variable: 0= if there is no record of the transit time; 1=if transit time is less than 10 minutes; 2=if transit time is between 10-19 minutes; 3=if transit time is between 20-29 minutes; 4=if transit time is more than 30 minutes	4,195	1.360	0.877

	Number of rooms in flat/apartment	Binary variable: 1= if this information is provided; 0= if this information is not provided	4,195	0.980	0.297
	Bathroom use	Binary variable: 1= if private bathroom; 0= if this shared bathroom	4,195	1.233	0.423
	Kitchen use	Binary variable: 1= if private kitchen; 0= if kitchen is communal	4,195	0.303	0.460
	Laundry	Categorical variable: 0= if the there is no information on the laundry operation; 1=if laundry operation is free; 2= if the laundry is coin operated	4,195	1.379	0.885
	Access control	Categorical variable: 0= if the there is no information on the access control; 1=if there is controlled access; 2= if access is with a fob or swipe key/card	4,195	0.7387	0.654
	Security	Categorical variable: 0= if the there is no information on the security; 1=if there is 24-hour patrol; 2= if night patrol only	4,195	0.443	0.701
	Cinema room	Binary variable: 1= if there is a cinema room; 0= if this information is not provided	4,195	0.282	0.450
	Entertainment room	Binary variable: 1= if there is an entertainment room; 0= if this information is not provided	4,195	0.379	0.481
	Television	Binary variable: 1= if there is a television; 0= if this information is not provided	4,195	0.106	0.308
	Room furniture (chair, desk and closet)	Categorical variable: 0= if the there is no information on all three furniture; 1=if information is provided on atleast one of the three; 2= if information is provided on all three furniture	4,195	0.558	0.511
	Number of beds in the bedroom	Categorical variable: 0= if the there is no information on number of beds; 1=if 1 bed; 2= if 2 or more beds	4,195	0.953	0.412
	Bed size/type	Categorical variable: 0= if the there is no information on type/size of beds; 1=if single bed; 2= if small double bed; 3= if double bed; 4= if other sizes/types (king size, bunk, double bunk)	4,195	2.001	1.044

* N refers to the total number of rooms in the dataset.

Source: Authors' Illustration, 2021 (using data from student.com)

Appendix T3: OLS Regression Estimates with Locational sub-markets (Log Popularity score): displaying information vs not displaying information

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VARIABLES	All cities	Non-London	London	Midlands	South Eng/Wales	Scotland	Northern England
Non-tangible features	Log of Price [#]	-0.736***	-0.767***	-0.673***	-0.451**	-1.096*	-0.699***	-0.428***
	Rating	1.008***	0.829***	1.401***	0.515***	1.081***	0.426***	1.139***
	Review [#]	0.00850***	0.00930***	0.000422	0.00555***	-0.00605	0.0211***	0.00957***
	Bills	1.316***	-0.260	1.337***	0.287	-0.290	NO	-1.505***
	Rules	0.363***	0.553***	0.0163	0.0826	0.707**	0.193***	0.938***
	Onsite Manager	-0.00834	-0.0684	0.199***	-0.223***	0.576**	0.440***	-0.0785
	Transit time	-0.212***	-0.300***	-0.120*	0.0521	-0.745***	-0.0575	-0.489***
Tangible features (property)	No of rooms in property	-0.165**	-0.336***	0.333***	0.137	0.124	-0.128	-0.414***
	Private bathroom [#]	0.419***	0.410***	0.210***	0.517***	0.00480	-0.163	0.296**
	Private kitchen [#]	-0.237***	-0.190***	-0.285***	0.0148	-0.306***	0.111*	-0.345***
	Laundry	0.610***	0.405***	0.681***	0.664***	0.520***	0.0798*	0.237**
	Access	-0.0560	-0.0777	0.0819	0.302***	-1.182***	-0.132	-0.147
	Security	0.429***	0.239***	0.709***	0.448***	0.724**	0.269***	-0.173**
	Cinema Room	0.275***	0.365***	0.0887	-0.135	0.262**	-0.0271	0.692***
	Entertainment Area	0.242***	0.125**	0.426***	0.203**	0.0275	0.0945	0.101
	Television	-0.00873	0.0498	0.0890	0.109	-0.493***	-0.00159	0.0244
Tangible	Furniture	0.0966**	0.119**	0.0553	-0.221**	-0.162	0.133**	0.211**
	No of beds in room	1.314***	0.185	1.235***	0.267	NO	0.105	0.344
	Bed size	0.00597	0.00616	0.0156	0.0421	-0.737***	-0.0252	0.385*
	Location [#]	Yes	Yes	-	Yes	Yes	Yes	Yes
	Constant	5.094***	7.431***	4.515***	5.080***	10.19***	8.010***	5.429***
	Observations	4,195	2,422	1,773	692	211	388	1,131
	R-squared	0.724	0.453	0.856	0.564	0.652	0.602	0.433

Notes: Standard errors clustered at property level; *** p<0.01, ** p<0.05, * p<0.1

[#]The variable retains its original form as in the base model because it does not contain missing information.

-The variable- "number of beds in room" has no missing information in Cardiff and Bristol, hence no coefficients are reported for that variable in column 5; and the variable "bills" has no missing information for Scotland.

Appendix T4: OLS Regression Estimates (Log Popularity score): base model and other specifications- displaying information vs not displaying information

		(1)	(2)	(3)	(4)
	VARIABLES	Base model (log Y)	Linear Model	No cluster (log Y)	One room only (log Y)
Non-tangible features	Log of Price	-0.736***	- 160.1***	-0.736***	-0.889***
	Rating information	1.008***	155.3***	1.008***	1.065***
	Review	0.00850***	3.965***	0.00850***	0.0101***
	Bill information	1.316***	77.64***	1.316***	0.838***
	Rules	0.363***	71.24***	0.363***	0.287***
	Having an onsite manager	-0.00834	46.14***	-0.00834	0.142
	Transit time	-0.212***	-11.62	-0.212***	-0.141
Tangible features (property)	No of rooms in property	-0.165**	-25.12*	-0.165***	0.255
	Private bathroom	0.419***	36.11***	0.419***	0.999***
	Private kitchen	-0.237***	- 41.36***	-0.237***	-0.166
	Laundry	0.610***	72.80***	0.610***	0.610***
	Access	-0.0560	- 39.59***	-0.0560	-0.00200
	Security	0.429***	107.0***	0.429***	0.373***
	Cinema Room	0.275***	92.36***	0.275***	0.303***
	Entertainment Area	0.242***	48.13***	0.242***	0.262***
	Television	-0.00873	- 64.81***	-0.00873	0.164
Tangible features (room)	Furniture	0.0966**	67.56***	0.0966**	-0.209**
	No of beds in room	1.314***	126.1***	1.314***	1.219***
	Bed size	0.00597	-6.812	0.00597	0.0216
Location fixed effects	London	-	-	-	-
	Birmingham	-0.830***	- 415.1***	-0.830***	-0.780***
	Bristol	-1.778***	- 470.8***	-1.778***	-1.650***
	Cardiff	-0.643***	- 419.6***	-0.643***	-0.679***
	Edinburgh	-0.579***	- 364.0***	-0.579***	-0.476*
	Glasgow	-0.948***	- 451.7***	-0.948***	-0.822***
	Leeds	-1.236***	- 455.0***	-1.236***	-1.461***
	Leicester	-1.659***	- 442.1***	-1.659***	-1.444***
	Liverpool	-1.784***	- 563.3***	-1.784***	-1.773***
	Manchester	-0.776***	- 319.3***	-0.776***	-0.851***

	Nottingham	-0.718***	-385.1***	-0.718***	-0.922***
	Sheffield	-1.148***	-411.4***	-1.148***	-1.247***
	Constant	5.094***	879.8***	5.094***	5.731***
	Observations	4,195	4,195	4,195	960
	R-squared	0.724	0.602	0.724	0.782

Notes: Standard errors clustered at property level; *** p<0.01, ** p<0.05, * p<0.1

Appendix T5: OLS Regression Estimates (Log Popularity score): Commuting Time Variables

	VARIABLES	(1) Base (Transit time)	(2) Walking time	(3) Driving time [#]
Non-Tangible features	Log of Price	-0.744***	-0.726***	-0.754***
	Rated between 1 and 1.99	-	-	-
	NI	-0.683***	-0.735***	-0.693***
	Rated between 2 and 2.99	0.0175	-0.0393	0.000617
	Rated between 3 and 3.99	0.256**	0.219**	0.253**
	Rated between 4 and 4.99	0.367***	0.301***	0.339***
	Rated 5*	0.0877	0.00225	0.0613
	Number of Reviews	0.00640***	0.00675***	0.00642***
	All bill inclusive	-	-	-
	NI	-1.123***	-1.145***	-1.142***
	Some bills included	0.106*	0.104*	0.120**
	Alcohol and smoking prohibited	-	-	-
	NI	-0.362***	-0.357***	-0.377***
	Only one of alcohol or smoking prohibited	-0.0531	-0.0450	-0.0549
	Having an onsite manager	-0.0235	-0.0175	-0.0169
	Less than 10 minutes to transit to HEI 1	-	-	-
	NI	0.207***	NO	NO
	10-19 minutes	0.0399	-0.0322	-0.0435
	20-29 minutes	0.181*	0.0149	0.0822
30 or more minutes	-0.0842	0.193***	NO	
Tangible features (house/property)	Info on number of rooms in the house	-0.168***	-0.177***	-0.171***
	Private bathroom	0.475***	0.467***	0.472***
	Private kitchen	-0.186***	-0.189***	-0.186***
	Laundry operation is free	-	-	-
	NI	-0.706***	-0.670***	-0.690***
	Laundry coin operated	-0.134*	-0.114	-0.130*
	Automated access control	-	-	-
	NI	-0.0705	-0.0760	-0.0736
	Access with fob/swipe key	-0.422***	-0.444***	-0.436***
	24- hour patrol	-	-	-
	NI	-0.525***	-0.523***	-0.527***

	Night patrol only	-0.150***	-0.145***	-0.156***
	Cinema Room	0.351***	0.347***	0.352***
	Entertainment Area	0.237***	0.234***	0.228***
	Television	0.0126	0.0184	0.0155
Tangible features (room specific)	Chair, desk and closet available	-	-	-
	NI	-0.00281	-0.0252	-0.0105
	1 or more piece of furniture in the room	0.0647	0.0463	0.0625
	1 bed per in one room	-	-	-
	NI	-1.228***	-1.216***	-1.218***
	2 or more beds in one room	0.332***	0.348***	0.362***
	Double bed in room			
	NI	0.0641	0.0656	0.0685
	Small bed	0.308***	0.306***	0.300***
	Small double	0.0901**	0.0899**	0.0937**
	Other sizes	0.424***	0.433***	0.439***
Location Fixed effects	London	-	-	-
	Birmingham	-0.795***	-0.739***	-0.780***
	Bristol	-1.849***	-1.764***	-1.794***
	Cardiff	-0.593***	-0.568***	-0.615***
	Edinburgh	-0.580***	-0.560***	-0.566***
	Glasgow	-0.879***	-0.832***	-0.881***
	Leeds	-1.209***	-1.184***	-1.205***
	Leicester	-1.646***	-1.512***	-1.563***
	Liverpool	-1.764***	-1.686***	-1.744***
	Manchester	-0.782***	-0.741***	-0.784***
	Nottingham	-0.692***	-0.663***	-0.706***
	Sheffield	-1.175***	-1.151***	-1.203***
	Constant	9.647***	9.650***	9.797***
	Observations	4,195	4,195	4,195
	R-squared	0.735	0.734	0.733

Notes: Standard errors clustered at property level; *** p<0.01, ** p<0.05, * p<0.1

#Driving time to HE1 (column 3) categories are as follows: Category 1: 0-5 minutes (hold out category), Category 2: 6-10 minutes, category 3: 10 minutes or more; the "driving time variable" does not contain missing information.

Modelling of Daily Price Volatility of South Africa Property Stock Market Using GARCH Analysis

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Purpose: The study examined the volatility of the daily market price of listed property stocks on the Johannesburg Stock Exchange (JSE) for a 10year period (2008-2017). The primary aim of the study is to investigate the volatility pattern of the daily market price; in an attempt to document and model the nature of volatility characterised by the daily price of the listed property stock market for informed investment decision making.

Design/Methodology/Approach- The study used daily prices from January 2, 2008, to December 29, 2017 of twelve (12) quoted property companies out of the twenty-seven (27) listed on Johannesburg Stock Exchange (SA REIT Association, 2020). The property stocks were selected based on the quoted property companies that have sufficient published data on daily prices for the period under review. The data were obtained from the JSE published statistical bulletin. The study computed the average daily price of the selected (12) property stocks and was used as a proxy for the daily market price for the property stock market in the analysis. The study deployed mean, standard deviation, maximum and minimum analytical tools for descriptive statistics, Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS); Jarque-Bera, Breusch-Godfrey LM and Heteroskedasticity tests for unit root, normal distribution, autocorrelation, and ARCH effect tests respectively. The diversification benefits and modelling of SA-REIT market price volatility were analysed using correlation matrix and generalised autoregressive conditional heteroskedasticity (GARCH 1, 1)

Finding: Analysis of residual estimate of the series documents the evidence of volatility characterised by prolonged high and low clustering patterns for the period under review. The GARCH model reported that the previous day's information of both the daily market price (ARCH term) and the volatility (GARCH term) have a positive and significant ($p < .05$) effect on the current day's daily market price volatility in the property stock market. The result of the model implies that investment in the property stock market is strongly driven by positive news on daily price than a negative shock; meaning that South Africans' investors are more sensitive and exhibit a sharp response to good news on daily market price than bad news when thinking of investing in listed property company shares on Johannesburg Stock Exchange.

Practical implications: The study documents and models the statistically significant influence of conditional variance (volatility) of the daily price of the South Africa property stock market.

Originality/Value: The study added to the existing body of knowledge by documenting the volatility pattern and model structure of SA-property stock markets for informed investment decision making.

Keywords: GARCH, Property stock, Stock Market, Volatility, Model

1. INTRODUCTION

Prior studies have linked volatility to the occurrence of the unexpected swing of events in the stock market (Hanousek, Kocenda & Kutan, 2008; Mitra, Iyer & Joseph, 2015; Mashamba & Magweva, 2019 and Trivedi et al., 2021). While the stock market is geared towards wealth creation, investors are more confused and lose confidence in the investment potentials of the stock market and by extension listed property stock and property company shares amidst striking market volatility. Early studies including Shiller (1990) explained that increasing striking events in the stock market have been happening time immemorial but the concern on unexpected events started gaining the attention of market experts and academicians following the crash of the stock market on October 19, 1987.

In recent time, Quoreshi, Uddin & Jienwatcharamongkhol (2019) expressed that the reoccurrence of unpredicted events associated with high-level volatility has continued to pose a big threat to investment goals and property stock market potential. Generally, volatility measures the variability of price or expected returns to its mean value. A high volatile stock implies that the price moves greatly up-and-down around the average price per time. Mamtha and Srinivasan (2016) explained volatility clustering in stock price to mean a period of prolonged low volatility for a period that is followed by prolonged high volatility for another in that series. The author attributed the main future of volatility clustering mean to collections of small and large fluctuations in stock prices sequentially preceding one another.

During the volatile marker period, the stock prices behave irrationally, fluctuate, and made market predictions less significant. In some cases, the fundamental and technical analyses are difficult to proof, and a large number of the participants are left to uncertain market condition. The changes in the volatility clustering contributed to the frightened stock market risk and uncertainty. Lahaye, Laurent & Neely (2009) and Haritha & Rishad (2020) stressed that rapid fluctuations in stock price have resultant effects on the investors' trust, confidence, and volume of trading activities in the general stock market.

Meanwhile the fluctuation of the stock price amidst volatile market period is attributable to some factors which include economic factors, market news and investment sentiments (Ramanathan & Gopalakrishan, 2013; Mamtha & Srinivasan, 2016; Haritha & Rishad, 2020). Engle and Rangel (2008) concluded that emerging stock market is characterised by higher volatility of unpredicted events compared to developed ones. However, the volatility of stock price has been modelled by authors in different markets across globe (Cavalcante & Assaf, 2002; Mondher, Chaker & Ezzeddine, 2005; Quoreshi, Uddin & Jienwatcharamongkhol, 2019 and Quoreshi & Mollah, 2019). Trivedi et al. (2021) posited that modelling of volatility in stock market helps the market participants such as investors, investment/financial analysts and

fund managers to predict the possibility of great risk loss as well as the opportunity of higher return during the unpredictable market condition.

2. LITERATURE REVIEW

2.1 Stock Exchange Market and Volatility Pattern

In real estate economics, risk management, finance and investment literature, a number of studies have examined the relationship between volatility and the stock market, and its attendance implications. Some of the studies in recent decades include Samanta (2010), Wang, Tianyi & Huang (2012), Abbas, Khan & Shah (2013), Bhowmik (2013), Issam, Achraf & Boujelbene (2013), Gospodinov & Jamali (2014), Li & Giles (2015), Mitra, Iyer & Joseph (2015), Ghufuran, Awan, Khakwani & Qureshi (2016), Sehgal & Garg (2016), Chung, Fung & Shilling (2016), Melo-Velandia (2017), Olbrys & Majewska (2017), Hussain, Murthy & Singh (2019), Quoreshi, Uddin & Jienwatcharamongkhol (2019), Saranya (2019) and Trivedi et al. (2021).

The findings from these studies have shown a different behavioural pattern of volatility in stock markets owing to the peculiarities of local stock markets and varying degrees of physical, social, economic, and political development. Chung, Fung & Shilling (2016) concluded that despite the huge studies; the relationship between the stock market and volatility is still subject to debate. Mitra, Iyer & Joseph (2015) examined the characteristics of volatility transmission in 10 international stock markets (Australia, Brazil, China, Egypt, China, Egypt, France, India, Israel, Japan, United Kingdom and United State). The primary aim of the study is to capture the spill-over effect of volatility during crisis and non-crisis economic periods. To achieve this, the study reviewed period spanned over 20yrs i.e. from January 1995 – December 2014 (total observation of 3,465); with data obtained from Bloomberg Database. Statistical evidence of spill-over volatility was observed during crisis and post-crisis economies and described the volatility pattern among the observed international stock markets to be non-random in nature.

Ghufuran, Awan, Khakwani & Qureshi (2016) study addressed the causes of volatility in the Karachi stock exchange market of Pakistan. The study examined the volatility pattern of the KSE index and the prominent causes. The authors observed the clustered nature of the KSE index market volatility over the reviewed period. The authors identified the political situation and investors herd behaviour as the most prominent causes of volatility in the Pakistan stock market. Sehgal & Garg (2016) analysed the cross-sectional volatility of stock markets in the BRIICKS (Brazil, Russia, India, Indonesia, China, South Korea, and South Africa) economies. The study investigated the systematic and unsystematic variation in expected stock returns because of stock exposure to market volatility in the regions. The authors found that systematic volatility showed low stock returns in Brazil, South Korea, and Russia with a significant negative risk premium. While Unsystematic volatility exhibited high returns with negative risk premium in all the BRIICKS countries except China.

Olbrys & Majewska (2017) studied the largest European stock markets (the United Kingdom, France and Germany) to examine the asymmetry effects of market volatility. The authors employed EGARCH to analyse the log form of daily percentage changes in London FTSE100, Paris CAC40 and Frankfurt DAX stock indexes for the period of 2007 to February 2009. The study found statistical evidence of asymmetry volatility in the European stock markets, but

the degree varies with time. The authors concluded that European stock markets were more responsive to bad news than good news.

In a more recent similar study, Hussain, Murthy & Singh (2019) reviewed over forty empirical studies to examine the issues surrounding the volatility of different stock markets across the globe. Some of the volatility issues assessed by the authors include heteroscedasticity, asymmetric effect, risk-return framework, spill-overs and forecasting accuracy. Parts of the major findings were the evidence of statistical weak interaction between conditional volatility and expected returns. The study noted the significant level of economic development as a determinant of systematic shock among stock market volatility.

Quoreshi, Uddin & Jienwatcharamongkhol (2019) expanded the scope of volatility assessment to cover the BRIICKS, the major stock markets including United States, United Kingdom, Euro Zone and others totalling 35 stock markets across the globe. The study assessed return volatility equity stocks with a major focus on unexpected events during the Eurozone crisis and global financial crises (GFC). The authors used fractionally integrated generalized autoregressive conditional heteroskedasticity (FIGARCH) and found that all the 35 sampled stock markets exhibited long memory in equity stock returns and statistical evidence of intensive contagious (volatility) but at varying degrees across stock markets.

2.2 Volatility of Property stocks Market

The real estate sub-sector of the stock market in developing economies including South Africa has received little attention and debate on volatility. Li (2012) posited that the incorporation of REIT components into the broader stock market has contributed to the exposure of property stock to varying degrees of volatility, attributable to structural changes in market fundamentals, portfolio adjustments and macroeconomic shock. In Australia, Lee (2010) evaluated the effect of volatility dynamics on REIT features with the primary aim to inform investors on the extent to which REITs react to market news. The study analysed the Australian stock index from 2004-2008 and discovered that REITs features showed a stronger reaction to negative news than positive news in the market. The author concluded that news emanated from the general stock market exhibited a strong influence on REIT features than that news originated from REIT stock.

The work of Li (2012) attempted to identify the effects of market and economic trading activities on equity REIT components such as dividend yield (DY) and return on average equity (ROAE) in the US capital market. The author analysed US-REITs data from 1995 to 2009 and found a higher impact of systematic risk of REIT return volatility in the bull (up) than the bear (down) market periods, but dividend yield and return on average equity were negatively affected. The findings corroborated by the work of Kawaguchi, Aadu & Shilling (2016). The authors investigated the implication of volatility on equity REIT stock amidst financial crisis in the US Stock market. The REIT data reviewed period were from October 1985 to October 2012; the study found a significant increase in average equity REIT returns volatility at pre-and-post Greenspan era due to the leverage effect that was trigger by wealth transfer (from equity to debt) and declining interest rate.

Fei, Ding & Deng (2010) analysed the dynamic nature of volatility among returns on REITs, stock and direct real estate asset classes. The authors documented the time-vary implication of volatility among the asset class. A strong relationship was noted between stock (S&P) and REITs; and the future return of equity REIT and the direct real estate. The authors noted that the dynamism in volatility is explained by macroeconomic indicators. The work of Chung, Fung, Shilling & Simmons-Mosley (2016) probed the relationship between REIT stock market volatility and expected returns. The author revealed that REIT volatility has a negative relationship with stock returns but exhibited a significant positive relationship with future expected returns. The authors revealed a trading potential in REIT implied volatility in the stock market.

In Africa, there is a dearth of empirical evidence on volatility dynamics and property stocks in the stock market, including the South-Africa property stock market and constituted a major gap in the literature. The few available studies focused on volatility in the general stock markets. For instance, Emenike & Aleke (2012), Emenike & Okwuchukwu, (2014) worked on volatility in the Nigeria stock exchange market, Ndwiga & Muriu (2016) and Owidi & Mugo-Waweru (2016) investigated the Nairobi securities exchange of Kenya. In the Johannesburg stock exchange of South Africa, Niyitegeka & Tewar (2013), Mashamba & Magweva (2019) documented stock market volatility. For instance, Uyaebo, Atoi & Usman (2015) explained that the South Africa stock market has high volatility while the volatility in Nigeria and Kenya is low. Therefore, study on property stock market volatility from the African context becomes imperative owing to the fragility of the market and the need for local and international investors to be informed when thinking of investing in the property stock market especially in South Africa.

2.3 South Africa Stock Market

South Africa stock market is one of the fastest developing markets and its property sector is the only globally reported on the Africa continent. Akinsomi, Kola, Ndlovu & Motloung (2015) reported that South Africa is the only African country that was represented in the FTSE EPRA/NAREIT and the S&P Global REIT indexes. Generally, stock markets in Africa are characterised to be fragmented and ill-operational efficiency (Ntim, 2012). Ncube & Mingiri (2015) posited that Africa stock markets have been witnessing improvement with the significant level in Egypt and South Africa. However, the strong performance of South Africa stock indicates its significant contribution and prominence in the Africa continent and global property stock market. Generally, the SA market is the only African market ranked among transparent markets in 2018 (Global Real Estate Transparent Index 2018).

By extension, SA property stock and listed property company share have recorded significant performance especially since the introduction of real estate investment trust; where PUL and PUT stocks were listed as REIT in 2013. SA REIT Association (2016) report showed that between 2014 and 2015, SA REIT capitalization rose by 43%; by the end of 2015, SA REIT capitalization was worth 340 billion in SA currency (Rand). As of 2016, nine SA REITs were listed among the 100 most empowered companies in the world. As reported by FTSE Russell (2017), SA-REITs worth 16.863USD, ranked 9th position and accounts for 1.74% of REIT global market share.

3. DATA AND METHOD

The study is econometric and relies solely on published secondary data. The study focussed on the South Africa stock market with a major concentration on property stock prices. Daily stock price data from January 2, 2008, to December 29, 2017, of twelve (12) quoted property companies out of the twenty-seven (27) listed on Johannesburg Stock Exchange (SA REIT Association, 2020). The property stocks were selected based on the quoted property companies that have sufficient published data on daily prices for the period under review. The data were obtained from the JSE published statistical bulletin. The study computed the average daily price of the selected (12) property stocks and was used as a proxy for the daily market price for the property stock market in the analysis. Their acronyms as used in the study are presented in Table 1.

Table 1: Data Description and Acronym

Listed REITs	Acronym
EMIRA Property Fund Ltd	EMIP
EQUITIES Property Fund	EQUP
FAIRVEST Property Holdings Ltd	FAVT
FORTRESS REIT Ltd	FORT
GROWTHPOINT Properties Ltd.	GRTP
HOSPITALITY Property Fund Ltd	HOSP
HYROP Investment Ltd	HYRP
INTU Property Plc	INTU
INVESTEC Australia Property	INTA
INVESTEC Property Fund Ltd	INTP
OCTODEC Investment Ltd	OCTD
RESILIENT REIT Ltd	RESR
JSE Property Sector	JSE_Prop

The study deployed mean, standard deviation, maximum and minimum analytical tools for descriptive statistics, Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS); Jarque-Bera, Breusch-Godfrey LM and Heteroskedasticity tests for unit root, normal distribution, autocorrelation, and ARCH effect tests respectively. The diversification benefits and modelling structure of SA-REIT market price volatility were analysed using correlation matrix and generalised autoregressive conditional heteroskedasticity (GARCH 1, 1) respectively.

3.1 Property Stock Price Volatility Index (VIX) Measurement- GARCH (1, 1) Approach

Measurement of the price volatility index (VIX) of stocks is fundamental to the underlying market information, trend pattern and prediction of future events in the capital market. Cavalcante & Assaf (2002), Mondher, Chaker & Ezzeddine (2005), Quoreshi, Uddin & Jienwatcharamongkhon (2019) and Quoreshi & Mollah (2019) noted that studies on stock volatility index are considered necessary in the estimation of capital asset pricing, portfolio and risk management including the formulation of the model to assess both the present and the future performance of the financial capital market. In an attempt to capture the volatility behaviour of stock prices, a number of studies have deployed different conditional variance models in different capital markets across the globe.

For instance, Fractionally Integrated Generalized Autoregressive Conditional Heteroskedasticity (FIGARCH) was adapted to measure VIX in Tunisian Stock Market (Chung, 1999) and the UK, US and BRICS countries (Quoreshi & Mollah, 2019). Quoreshi, Uddin, & Jienwatcharamongkhon (2019) deployed Fractionally Integrated Moving Average Conditional Heteroskedasticity (FIMACH) to document VIX in US, UK, Euro Zone and BRICS (Brazil, Russia, India, China and South Africa) stock markets. In the Pakistan stock market, Ghufuran, Awan, Khakwani & Qureshi (2016) employed Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH). Similar, Mitra, Iyer, and Joseph (2015) used the same VIX model (i.e., EGARCH) to analyse stock markets across Australia, Brazil, China, Egypt, France, India, Israel, Japan, United Kingdom and the United States.

The use of Generalized Autoregressive Conditional Heteroskedasticity (GARCH) is another VIX model that has increasingly gained the attention of researchers in recent times. The model was introduced in the mid-1980s by an economist Bollerslev Tim (Bollerslev & Mikkelsen, 1996) to redress the limitation of predictability power of ARCH parameters to explain the dynamic structure of real-time financial capital condition. Adeniji (2016) posited that the popularity and the widespread usage of the GARCH model are attributable to the ability of the model to provide a solution to the problem of finding cluster volatility in financial market, thicker tail stock price distribution pattern and aid the prediction of volatility using past information of the stock price. Also, Bera & Higgins (1993), Floros (2008) and Ghufuran, Awan, Khakwani & Qureshi (2016) concluded that the GARCH model is characterised with good predictability power and gives significant results.

3.2 Descriptive Statistics

A descriptive statistical model is used to explain the characteristics of the property stock prices over the study period (i.e., 2008-2017). The statistical descriptive tools include the mean, standard deviation, minimum and maximum statistics. The mean–standard deviation model is use to obtain the average prices for individual and the market property stock. The minimum and maximum statistics help to reveal the highest and lowest property stock prices for the study period.

3.2.1 Unit Root Test

The nature of stationary of a data series over the observed period is very key to the reliability and validity of the result of any econometrics analytical models. The presence of unit root in a series signifies that the data is non-stationary and not fit for the model and vice-versa. Thus, in an attempt to know the stationarity nature characterised with the price of the property stock over the study period, the study deployed Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) unit root test. For ADF unit root test, the null hypothesis of the presence of unit root is rejected in favour of the stationary of data series when the p-value of the t-stats is significant ($p < .05$), while in the KPSS test, the data is said to be stationary when the calculated t-stats is less than any of KPSS critical vale at 1, 5 and 10%. The ADF and KPSS models are mathematically expressed in eqn. (i) and (ii).

Augmented Dickey-Fuller (ADF) test

$$y_t = \alpha \Delta y_{t-1} + x_t \delta + \epsilon_t \text{ ----- (i)}$$

The Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test

$$y_t = x_t \delta + u_t \text{ ----- (ii)}$$

3.3 Residual Diagnostics Test

Residual diagnostics test is a prerequisite test conducted to verify the appropriateness of the time-varying data for GARCH analysis. The test ascertains three things. First, if the residual estimate of the series is characterised with autocorrelation i.e., the previous days' estimates influence today's estimates. Second, if there is the presence of ARCH effect in the residual estimate of the series i.e. whether the series exhibit clustering volatility and move in a non-linear pattern and; Third if the series is normally distributed over the study period. Therefore, for the series to be fit for GARCH analysis, there must be evidenced of the ARCH effect and autocorrelation in the series over the study period.

Autocorrelation test: This test shows if the residual estimate of market prices of property stock is autocorrelation in nature i.e. the current day price (u_t) is influenced by the previous days' price of property stock (u_{t-1}). The autocorrelation test is conducted by using the Breusch-Godfrey LM test Autocorrelation Test. The test is computed mathematically as expressed in eqn. (iii).

$$u_t = \rho u_{t-1} + \epsilon_t \text{ ----- (iii)}$$

The null hypothesis of *no serial correlation* is rejected if the p-value is less than 5% confidence level ($p < 0.05$).

ARCH effect test: The study employed Heteroskedasticity Test to verify if the market price of the property stock exhibited a clustering volatility pattern, move randomly and in a non-linear pattern (ARCH effect). The ARCH effect test is computed mathematically as shown in the eqn. (iv).

$$e_t^2 = \beta_0 + \left(\sum_{\delta=1}^q \beta_{\delta} e_{t-\delta}^2 \right) + v_t \text{ ----- (iv)}$$

The null hypothesis of *no ARCH effect* is rejected if the p-value of the series is less than 5% confidence level ($p < 0.05$).

Where e_t^2 is the squared residual up to order of lag q .

A normality test: To ascertain the pattern of normal distribution characteristics of the residue series for the period under review, the study deployed the Jarque-Bera test. The acceptance rule for a normal distribution data series of Jarque-Bera statistics states that series exhibit a normal distribution if the calculated JB value is less than or equal to the critical value of 5.99 (JB Cal. $V \leq 5.99$). Jarque-Bera test is mathematically express as thus in eqn. (v);

$$T \left[\frac{SK^2}{6} + \frac{(KUT - 3)^2}{24} \right] \text{ ----- (v)}$$

Where SK- Skewness and KUT –Kurtosis

3.4 Generalised Autoregressive Conditional Heteroskedasticity (GARCH 1, 1)

GARCH (1, 1) model is specifically developed to perform two major functions i.e. to model volatility and to forecast the future occurrences in the stock market. The model analysis returns two results: the conditional mean equation and conditional variance (volatility) equation in a VAR environment. The conditional mean equation is synonymous with the autoregression analysis modelled after the ARIMA process, while the conditional variance equation (heteroscedastic error term) measures the volatility index (VIX). Thus, the (1, 1) GARCH specification indicates the presence of the ARCH term and GARCH term at the first order of lag length (ARCH 1 and GARCH 1). In a simple term, GARCH (1, 1) is mathematically expressed in equations (vi) and (vii).

Condition Mean Equation (eqn. vi)

$$Y_t = X_t \theta' + \epsilon_t \quad \text{----- (vi)}$$

Condition Variance Equation (eqn. vii)

$$\sigma_t^2 = \omega + \alpha \epsilon_{t-1}^2 + \beta \sigma_{t-1}^2 \quad \text{----- (vii)}$$

From the GARCH (1, 1), the conditional variance equation (volatility) specification could be explained as thus

- i). σ_t^2 is current day/today's volatility
- ii) ω is the constant term
- iii). $\alpha \epsilon_{t-1}^2$ - ARCH term: previous day's information about volatility with coefficient α
- iv) $\beta \sigma_{t-1}^2$ - GACH term: Previous day's residual volatility or forecast variance with coefficient β
- iv) Significant p-value at 5% confidence level ($p \leq 0.05$) indicate the statistically significant effect of the GARCH (1, 1) effects on the series at period t (Y_t)

Therefore, in this study, σ_t^2 is the information on today's volatility of the market price of the property stock, $\alpha \neq 0$ is the co-efficient of previous days' information about the stock market price volatility ϵ_{t-1}^2 while $\beta \neq 0$ is the co-efficient of previous days' information about the market price variance or volatility σ_{t-1}^2

4. RESULT AND DISCUSSION

4.1 Summary of Descriptive Statistics

Table 2 presents the summary of descriptive statistics such as mean, standard deviation, maximum and minimum analyses of the price of the listed property stocks on the JSE stock market for the year under review (2008-2017). Property stocks with an average stock price above 5,000Rands were HYPR (7583.51Rands); RESR (6204.58Rands) and INTU (5930.38Rands). This category of the stocks was also characterised with a high level of risk as reported by their corresponding standard deviation. For instance, the risk level recorded in

the price of RESR is 3949.27 and the price varies from 1730.00 to 15,116.00Rands having a range value (difference) of 13,386Rands. HYRP has a standard deviation of 3076 and the price swings between 3,080.46 and 14,143.00Rands having a difference of 11,062.54Rands of range. This result implies that the price of the two property stocks experienced turbulence over the reviewed period but at varying levels i.e., the prices of RESR stock experienced rapid fluctuation over a longer period compared to HYRP and made the stock price of RESR to be more risk-prone than HYRP in the property stock market. Other categories of the property stocks with average price and standard deviation such as HOSP (2,686.99Rands; 1968.66), GRTP (2,108Rands; 517.67), OCTD (1,899.56Rands; 401.14), INTP (1,469.06Rands; 194.37), FORT (1,428.30; 234.73), EQUIP (1,417.07Rands; 295.69), INTA (1,242.90Rands; 122.06) were traded at price above 1,000.00Rands, with relatively lower risk over the study period. FAVT stock recorded the lowest average price of 134.04Rands, the standard deviation of 34.58 and the prices vary from 70.00 to 225.00Rands. This result (for FAVT) could be attributed to many reasons including low volume of the stock being traded, low patronage and relatively low returns compared to its contemporaries in the market.

However, the estimation of the general market (JES_Pr) i.e., the mean, stand deviation and price range shows that the average price of traded property stock stood at 2,957.31Rands, risk level (standard deviation) of 544.51 and the market prices range from the least price of 2,035 to the highest price of 4,868.57. The study observed that HYPR (7583.51Rands; 3076.00); RESR (6204.58Rands; 3949.27) and INTU (5930.38Rands; 2649.69) enjoyed higher prices above market price (2,957.31), but their prices were highly risk-prone. HOSP stock price (2,686.99) is lesser than the market stock price but has a higher level of risk than the market risk. The associated higher risk level may be due to the influence of the stock-specific characteristics on the stock pricing. In summary, the price of the listed property stock exhibited fluctuations over the reviewed period as indicated by the standard deviation and range analyses. This result signals the likelihood of the presence of price volatility (either short or prolong or a combination of both) in the property stock.

Table 2: Summary of Descriptive Statistics of Property Stock Price on Johannesburg Stock Exchange (JSE) Market

Property Stocks	Descriptive Statistics			
	Mean	Std. Dev.	Max.	Min.
EMIP	1342.64	223.54	1949.00	806.00
EQUIP	1417.07	295.69	2205.00	1030.00
FAVT	134.04	34.58	225.00	70.00
FORT	1428.30	234.73	1858.00	940.00
GRTP	2108.34	517.67	3049.00	1090.00
HOSP	2686.99	1968.66	7858.00	595.00
HYRP	7583.51	3076.46	14143.00	3080.46
INTU	5930.38	2649.69	16039.00	3460.00
INTA	1242.90	122.06	1543.00	1021.00
INTP	1469.06	194.37	1879.00	1010.00
OCTD	1899.56	401.14	2852.00	1000.00
RESR	6204.58	3949.27	15116.00	1730.00
<i>JSE_Prop</i>	2957.31	544.51	4868.57	2035.91

Note: Standard Deviation (S.D), Maximum (Max.), Minimum (Min.)

4.2 Correlation Analysis to Measure Diversification Benefits

The study conducted a correlation analysis of the property stocks to examine their level of diversification benefits in the property stock market and the result were presented in Table 3. According to Modern Portfolio Theory, Markowitz (1952) expressed that a negative correlation coefficient above 70% (>-0.70) indicate strong and 30% and below means weak diversification relationship. As indicated in Table 4.2, a strong negative correlation coefficient was observed between paired property stock: EQUI-INTU (-0.809). Paired property stock of EMIP-HOSP (-0.685), FORT-INTU (-0.676), EMIP-EQUI (-0.648) and EMIP-INTA (-0.632) showed a moderate correlation relationship, while a very weak correlation coefficient was observed between paired property stock price of AVGP-EMIP (-0.071), EMIP-FAVT (-0.068), and FORT-OCTD (-0.011). This result signals good diversification benefits especially between EQUI and INTU stocks. This means that the price of the two stocks moves in the opposite direction i.e., the rise/fall in the price of EQUI stock is strongly associated with the fall/rise in INTU stock. Therefore the investor can leverage it as a risk hedge when combined pairing property stock to achieving optimal diversification benefits in the asset. However, the correlation coefficient with positive sign showed poor diversification indicating a non-pairing diversification relationship because both prices moved in the same direction.

Table 3: Correlation Analysis to Measure the Diversification benefits among the property Stocks in the market

	EMIP	EQUI	FAVT	FORT	GRTP	HOSP	HYRP	INTA	INTP	INTU	OCTD	RESR
EMIP	1											
EQUI	-0.648	1										
FAVT	-0.068	0.659	1									
FORT	-0.268	0.653	0.470	1								
GRTP	0.509	-0.135	0.298	0.336	1							
HOSP	-0.685	0.354	-0.041	0.322	-0.339	1						
HYRP	0.030	0.337	0.467	0.195	0.290	-0.209	1					
INTA	-0.632	0.543	0.136	0.134	-0.342	0.261	0.465	1				
INTP	0.443	0.080	0.524	0.427	0.748	-0.310	0.227	-0.353	1			
INTU	0.747	-0.809	-0.463	-0.676	0.025	-0.551	-0.099	-0.437	-0.140	1		
OCTD	0.702	-0.323	0.300	-0.011	0.591	-0.396	0.355	-0.329	0.555	0.390	1	
RESR	-0.373	0.721	0.482	0.291	-0.170	0.002	0.654	0.662	-0.163	-0.326	-0.172	1

4.3 Unit Root Test for the Stationary of the Data Series

In Table 4, the study investigated the stationary status (unit root) of the data series as a pre-conditional test for time series data. Two different unit root tests i.e., Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) were conducted at a 5% level of significance. The results of the tests are to complement one another to substantiate the stationary status of the data series. As shown in the Table, the ADF test rejected the null hypothesis of the presence of unit root in favour of stationarity of the data i.e. the p-value in all cases were greater than 5% significant level ($p>0.05$) at the first order of lag $I(1)$ for the listed property stocks. The complementary KPSS test exhibited a similar result. The calculated t-stat values of all the listed property stocks were lower than the critical value (CV) at 5% indicating no unit root in the series. The rejection of the presence of the unit root test by KPSS further ascertained the stationarity of the data series over the study period, suggesting that the data series are fit and suitable for model estimation in a VAR environment.

Table 4: Unit Root Tests of the Listed Property Stock Price

Property Stock	Augmented Dickey-Fuller				Kwiatkowski-Phillips-Schmidt-Shin			
	I(0)		I(1)		I(1)			
	t-stat	Sig	t-stat	Sig	1%	5%	10%	t-stat
EMIP	-2.1617	0.2207	-50.0832	0.0001	0.7390	0.4630	0.3470	0.0756
EQU	-0.0584	0.9518	-35.3734	0.0000	0.7390	0.4630	0.3470	0.1667
FAVT	-1.5437	0.5113	-23.269	0.0000	0.7390	0.4630	0.3470	0.0274
FORT	-1.4816	0.5430	-38.5552	0.0000	0.7390	0.4630	0.3470	0.0266
GRTP	-1.2159	0.6698	-52.8970	0.0001	0.7390	0.4630	0.3470	0.0474
HOSP	-2.3516	0.1559	-39.6324	0.0000	0.7390	0.4630	0.3470	0.2744
HYRP	-0.5915	0.8701	-32.4577	0.0000	0.7390	0.4630	0.3470	0.0601
INTU	-3.3776	0.0119	-48.3953	0.0001	0.7390	0.4630	0.3470	0.4372
INTA	-2.3052	0.1705	-26.2878	0.0000	0.7390	0.4630	0.3470	0.3394
INTP	-1.6616	0.4507	-35.3525	0.0000	0.7390	0.4630	0.3470	0.0944
OCTD	-2.0857	0.2506	-33.4328	0.0000	0.7390	0.4630	0.3470	0.0702
RESR	1.0635	0.9973	-52.8210	0.0001	0.7390	0.4630	0.3470	0.3905

4.4 Residual Diagnostics Tests of Series for GARCH (1, 1) Model

The suitability of the data series for computing the GARCH model is of utmost concern in this type of study. To ascertain this, the study conducted residual diagnostics tests such as autocorrelation, heteroskedasticity, and normality tests to verify the presence of ARCH effects which are the preconditioned requirement for computing the GARCH model. The results of the residual diagnostic tests were presented in Table 5. The results of the tests showed that the price of the selected property stocks was strongly characterised with ARCH effects as reported by the p-value of the observed R-square (Obs*R-squared) of the Lagrangian multiplier (LM) autocorrelation and heteroskedasticity tests ($p > 0.05$). The result of the ARCH effect characterised with the price of the property stocks indicates that the residual of the series exhibited an irregular pattern of variance, clustering prices volatility nature of the property stocks and the variance of the series error term moved in a non-linear pattern. However, the result of randomness in the variance of series error term further suggest the appropriateness of the GARCH model for estimating and modelling the price volatility in the property stock market. However, the Jarque-Bera test on a normal distribution of the property stock price for the reviewed period reports the non-linear distribution of the property stock price as indicated by the significant p-value ($p < 0.05$). The non-conformity of time series data with normal distribution is expected since the distribution of the time-varying series is characterised by clustering of price and random movement.

Table 5: Residual Diagnostics Tests

Property Stock	Breusch-Godfrey LM Test: Autocorrelation Test		Heteroskedasticity Test ARCH Effect		Jarque-Bera Normality Test	
	Obs*R-squared	Prob.	Obs*R-squared	Prob.	Coefficient	Prob.
EMIP	2480.77	0.0000	2453.68	0.0000	10200.11	0.0000
EQU	878.95	0.0000	873.00	0.0000	11169.01	0.0000
FAVT	2465.87	0.0000	2385.85	0.0000	22657.43	0.0000
FORT	2030.44	0.0000	2017.41	0.0000	11135.38	0.0000
GRTP	2489.89	0.0000	2450.23	0.0000	3961.42	0.0000
HOSP	2489.51	0.0000	2478.93	0.0000	84248.8	0.0000

HYRP	2494.17	0.0000	2469.08	0.0000	6521.463	0.0000
INTU	2480.98	0.0000	2480.32	0.0000	40296.01	0.0000
INTA	886.51	0.0000	107.18	0.0000	9047.894	0.0000
INTP	1639.71	0.0000	1616.59	0.0000	142724.4	0.0000
OCTD	2472.36	0.0000	2374.88	0.0000	35639.40	0.0000
RESR	2496.42	0.0000	2484.69	0.0000	2317.154	0.0000

4.5 Volatility of Market Price of Property Stock on JSE

Having verified and ascertained the fitness and suitability of the selected property stocks to model the volatility of market price on JES, the study computed the average price of the selected property stocks as a proxy for the market price of the property stocks and analysed the volatility of residual error term of the market price by GARCH (1, 1). The result of the analysis is presented in graphical illustrations (Fig 1&2). The value on the x-axis measures days of trading activities of property stock on JSE (January 2, 2008, to December 29, 2017, i.e., 2,499 observations). The daily trading price (excluding Saturdays and Sundays) have an interval of 100unit, starting from trading day 1 in 2008 to the last trading day in 2017; meaning that year 2008 represent 0, the year 2009 represents 100, the year 2010 represents 200 ditto to others up to 2016 and 2017 representing 800 and 900 unit respectively on the graph. The y-axis calibrated the fluctuations in the market price of property stocks through positive and negative swings especially for the volatility index (VIX) in the residual error term of the series (Fig.2). For the lines on the graph, the actual line (red) represents the trend in the market prices (i.e., movement of price in property stocks market), the fitted line (green) measures trend in the conditional mean-variance while the residue line (blue) measures trend in the conditional variance (volatility) in the residual (error terms) of the series.

However, to better understand the trend in volatility pattern of the price of property stock market, the study computed the residual estimates (volatility) of the series and the analysis was presented in Fig. 2.

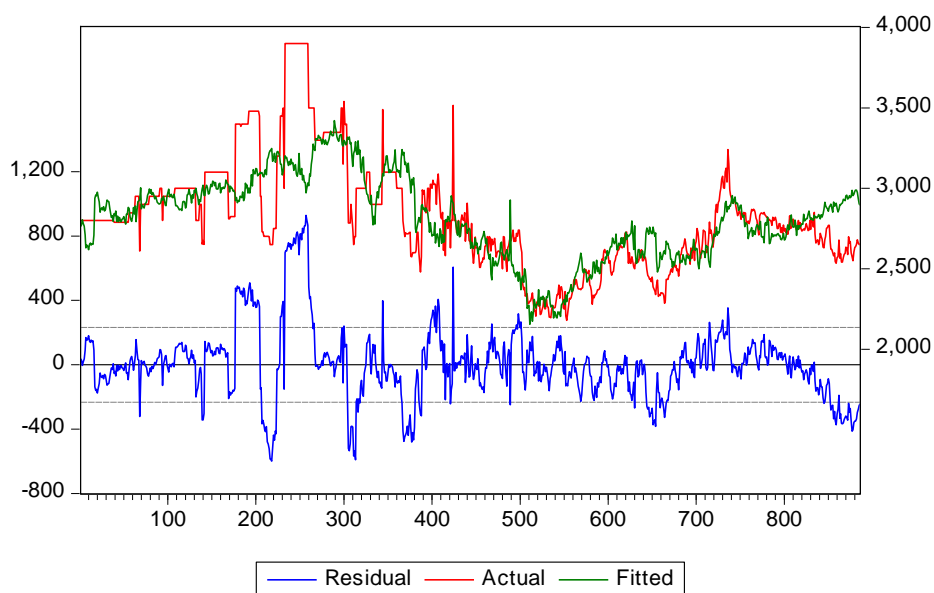


Figure 1: Actual, Fitted and Residual Estimates of the Data

As empirically evidenced from the graphical illustration in Fig. 2, the market price of property stocks on JES experienced turbulence as the price swings up and down frequently over the study period in a mixed pattern (i.e., high, and low level of volatility). The volatility of the market price started low from 2008 till the end of 2010. Prolong high volatility set in; as the market price began to experience high fluctuations between 2010 and 2012 with the noticeable high volatility occurrence between 2010 and 2011. Sharp fluctuations of market price were also recorded from 2011 to early 2012 but at a relatively lower rate compared to high occurrences in previous years. Thereafter, the market price began to experience prolong low volatility especially from mid-2013 to late 2017. By implications, it means that the market price of property stock on JSE experienced both low and high prolonged volatility. The up and down swings of market price signal the reactions of property stock investors/breakers to the sentiment, technical, fundamental, news/pronouncement and sentiment in the stock market. However, the high level of volatility in the market price of property stock sends caution of high risk-prone of investment in property stocks in the volatile trading period.

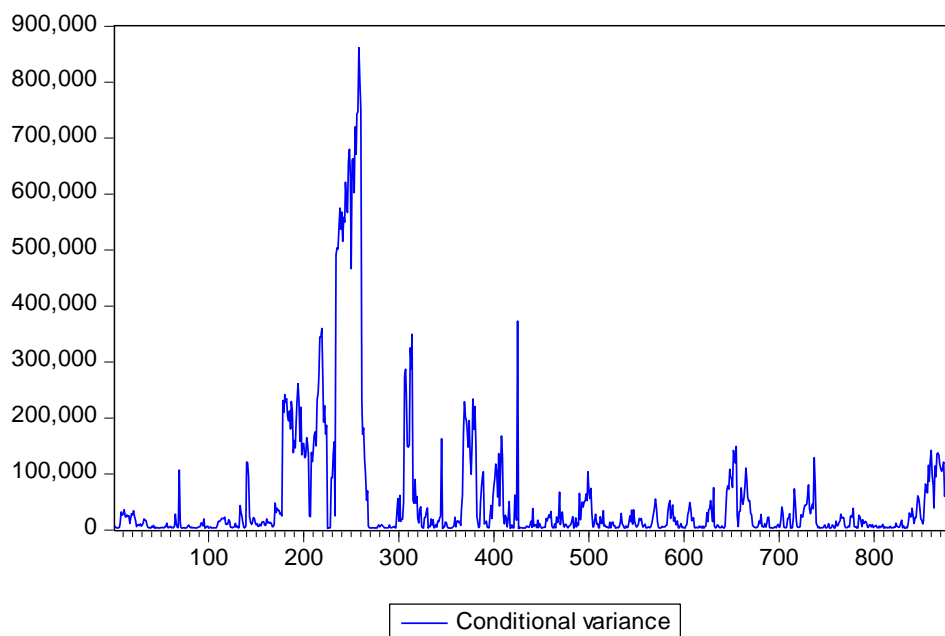


Figure 2: Market Price Volatility of Property Stock

However, evidence of volatility in property stock price on JSE market aligns with extant studies who have identified volatility patterns characterised with general property stock market and by extension property stock in different countries: For example, in Australia (Lee, 2010), India (Ramanathan & Gopalakrishnan, 2013; Ghufuran, Awan, Khakwani & Qureshi, 2016; Saranya, 2019). European stock markets i.e., United Kingdom, France, Germany and BRIICKS regions (Sehgal & Garg, 2016; Majewska, 2017; Kawaguchi, Aadu & Shilling, 2016; Quoreshi, Uddin & Jienwatcharamongkhol, 2019). Local studies including Uyaebo, Atoi & Usman (2015), Ndwiga & Muriu (2016) and Mashamba & Magweva (2019) have documented the evidence of volatility in Nigeria, Kenya, and South Africa general stock exchange market. On the attributable causes, Ramanathan & Gopalakrishnan (2013), Mamtha & Srinivasan (2016), Ghufuran, Awan, Khakwani and Qureshi (2016) noted the prominent effect of stock-specific

information, public information, economic indicators such as inflation, interest and exchange rates being the prominent, market strength i.e. size, volume traded and peers, herd behaviour and market sentiment, demand-supply interplay, speculations and uncertainty of the future prices on stock price volatility but at varying degree across countries.

4.5 Price Volatility Model of Property Stock Market on JES

In Table 6, the study modelled the volatility pattern of the market price using GARCH (1, 1) analysis at first-order lag and 5% level of significant specifications. The result of the analysis showed that the resid (-1) and the GARCH (-1) has a p-value of 0.000 and 0.0085 respectively which are less than a 5% level of confidence ($p < 0.05$). The result of the positive and significant ($p < 0.05$) of the ARCH term (resid) and GARCH evidenced the significant effects of information on historic market price and variance on the property stock market volatility. The resid (-1) which represents the ARCH effect is the previous day's market price information about volatility while the GARCH (-1) reports the previous day's residual volatility in the property stock (*see eqn. viii*). This means that both the previous day's information of the market price and the associated risk (variance) has a significant influence on the property stock market.

By implication, it means that investment in property stock on JSE is driven by good news rather than negative shock. The result is on one hand in agreement with some extent literature; while on the other hand, it opposed the findings of other studies reported in different property stock markets. This study corroborates with the findings of Gopal, Mahalakshmi & Thiyagaraja (2019) that document the direct positive influence of volatility on future price stock in the New York Stock Exchange (NYSE) market. But contradict the findings of Chung, Fung, Shilling & Simmons-Mosley (2016), Sehgal & Garg (2016), Olbrys & Majewska (2017) and Mamtha & Srinivasan (2016) that reported the faster response of investors to bad news than the good news in the general stock market. However, Simmons-Mosley (2016) reported a negative relationship between REIT volatility and stock returns.

Table 6: Price Volatility Model of Property Stock Market on JES

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	285.5508	59.46454	4.802036	0.0000
RESID(-1)^2	0.873473	0.120069	7.274757	0.0000
GARCH(-1)	0.144308	0.054805	2.633130	0.0085

Dependent variable market price residue (H_t), Significant level at 5%

$$JES_{Vol} = 285.55 + 0.87\epsilon_{t-1}^2 + 0.144\sigma_{t-1}^2 \text{ ----- eqn. (viii)}$$

5. CONCLUSION AND RECOMMENDATIONS

The study examined the volatility pattern characterised by the daily market price of property stock on the Johannesburg Stock Exchange (JSE). This was done to document and modelling the volatility pattern of the daily price of the property stock market. The study analysed the 10years (January 2, 2008 to December 29, 2017) daily price of property stock which was obtained from JSE published statistical bulletin using the GARCH (1, 1) model. The study computed the average daily price of the selected (12) property stocks and was used as a proxy for daily market price in the analysis. The result of the analysis showed the daily market price

of property stock is characterised by autocorrelation and ARCH effects, but the series was not normally distributed over the study period. The study documents the evidence of volatility in the daily market price of the property stock characterised with prolonging high and low clustering patterns. The GARCH model reported the significant effect of period days information of both the stock market prices and the volatility on the current day market price volatility. By implication, it suggests that investors of property stock react more to good news than bad news when considering the option of investing in listed property company stocks on the Johannesburg Stock Exchange market. This result signals the reactions of investors to the property stock market and provides a caution for the financial/investment analysts, regulatory bodies and policymakers on risk conditions and management of the market.

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An Appraisal of the Adoption of Innovative Technologies for Sustainable Real Estate Practice in Edo State, Nigeria

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Purpose: The introduction of various technologies in the real estate market has led to the disruption in the traditional practice of real estate globally. The adoption of innovative technologies such as blockchain, IoT, drone technology is limited in Nigeria to sustain the future of real estate practice. This study, therefore, appraises the adoption of innovative technologies for sustainable real estate practice in Edo State, Nigeria.

Design/Methodology: Structured questionnaires were randomly administered to 43 selected registered Estate Surveying and Valuation firms in Benin Metropolis while all retrieved questionnaires were found suitable for analysis. The data collected were analysed using descriptive statistics.

Findings: Findings revealed that online residential brokers, increasing space utilization, and smart city applications were the most aware innovations in real estate practice. However, websites and geospatial technologies were the most adopted technologies for sustainable real estate practice in the study area.

Practical implications: Therefore, Nigerian Institutions of Estate Surveyors and Valuers should educate real estate professionals on the adoption of innovative technologies for sustainable real estate practice in Nigeria.

Keyword: PropTech, Innovation, Sustainability, Smart Real estate, Technology, Nigeria

1. INTRODUCTION

The occurrence of the COVID-19 pandemic has further demanded the full adoption of disruptive technologies in the real estate industry. Without recourse to sustainability, real estate firms with the traditional practice of real estate may lose their relevance in service delivery. Feth and Gruneberg (2018) suggested the need for sustainable real estate practice in the service industry with the adoption of various innovative technologies (such as IoT, drone technologies, Blockchain etc.). Whether the innovative technologies are perceived as disruptive or upgrade in real estate services, the majority of practitioners in real estate opine that real estate technology such as PropTech is the solution for an improvement in the real estate sector (RICS, 2019; Aihie, 2019). PropTech encompasses three main markets, namely, smart real estate, real estate FinTech, and shared economy (ING, 2018).

Smart real estate adopts the use of smart technology to support real estate assets (this include both single property units and cities). Considering the adoption of technologies in financial services, the real estate sector is laggingbehindwith the dynamics of the real estate market and its investment. It's anticipated that many startups innovative FinTech companies

could intervene to resolve the setbacks facing the real estate markets in digital transformation (Aihie, 2019). PropTech companies (such as Digital Realty, Equinix, PropertyGuru, Zoopla, Nestpick, and Propertyfinder among others) are leveraging on technologies to deliver online real estate services that promote healthy living and conservation of energy for its customers (Baum, 2017). Globally, it was reported that investment in PropTech Companies hit \$14 billion in the first half of 2019. Furthermore, studies had shown that real estate and its associated segments accounted for about 17-20% of global gross domestic product, which makes the real estate sector more significant than the securitized debt and equity market globally (Phillips, 2019). Therefore, smart technologies are needed to sustain quality service delivery and achieve customers' satisfaction in real estate practice.

Customers' demand for sustainable technological services in the real estate industry is increasing at a fast pace in most developed countries, however, Africa countries are not left out (Aihie, 2019). Presently, Africa is faced with challenges investing in PropTech due to a high level of poverty, corruption, and political instability (Adebiyi *et al.*, 2019). In Nigeria real estate industry, it's noteworthy that the adoption of PropTech for sustainable real estate practice is limited due to the lack of technical know-how, costs involved, lack of property data, lack of skills and knowledge, and the panic of data monopoly of technology-driven innovations in real estate sector (Olapede & Olaleye, 2019). Most real estate practitioners and firms would rather prefer the traditional practice of real estate to the technology-driven methods (Akinwamide, 2021b). Therefore, it could be argued that practitioners in Nigeria real estate firms are not fully prepared to harness the opportunities offered by PropTech for sustainable real estate practice (Oyetunji, *et al.*, 2018). To benefit from the effectiveness and efficiency advantages associated with the adoption of innovative technologies in the real estate market, real estate practitioners and customers need to become aware of the value of the data generated in real estate transaction (Braesemann & Baum, 2020). Therefore, the aim of this study is set to appraise the adoption of innovative technologies for sustainable real estate practice in Edo State, Nigeria. To achieve this, objectives consider include assessing the level of awareness of innovations, and the level of adoption of technologies for sustainable real estate practice in Edo State. Furthermore, the study also examines whether a significant correlation between the pairing of mostly adopted technologies and innovations for sustainable real estate practice in the study area.

2. LITERATURE REVIEW

The introduction of digital transformation in the service industry has demanded the application of innovative technologies to sustain real estate practice. It's noteworthy that the rapid growth of technological-driven innovations in the real estate industry can turn out to be disruptive, causing real estate practitioners to either adapt or remain obsolete in practice. In the real estate industry, real estate practitioners are compelled to compete for business to achieve customer's loyalty, satisfaction, and retention. Real estate firms therefore strive to maintain a competitive edge over others, especially when innovative technologies are introduced or the real estate market changes (Aihie, 2019). Real estate technology such as PropTech is the latest innovation in the real estate industry, where huge investment is needed to remain relevant in a competitive market. Investment in PropTech enables information sharing, marketplace/transactions, or control/management, obtainable through the industry horizontals of real estate FinTech, shared economy, and smart real estate (Baum, 2017).

The benefit of applying innovative technologies in real estate practice has upgraded the profession in the service industry. The various areas of specialization in real estate practice that innovative technologies are applied include property valuation, property maintenance, construction design and management, real estate marketing, facility management, portfolio management, real estate investment, and administrative record keeping (Oyetunji, *et al.*, 2018; Akinwamide & Bello, 2019). To sustain the practice of real estate, the innovations introduced include smart real estate (such as online residential brokers, increasing space utilization, smart city applications, Building Information Modelling (BIM), smart buildings, smart materials, increasing occupant wellbeing, smart logistics, green buildings, smart residential, 3D printing and robotics) (Baum, 2017; Deloitte, 2017; Kejriwal and Mahajan, 2018; Deloitte, 2018; Obando, 2019; Hughes, 2019), Real Estate FinTech (such as Automated Valuation Models (AVMs) and iBuyers, digital twins, smart retail, Legal processes and PropTech, modular construction, commercial real estate data, crowdfunding and peer-to-peer lending, real estate tokenisation, instant mortgages), among others (Phillips, 2019; Altus Group, 2019; Saull and Baum, 2019; Aihie, 2019; Baum, 2020; Baum, Saull & Braesemann, 2020).

However, real estate technologies (such as Websites, Geospatial technologies, Cloud computing, Wearables and environmentally-friendly building materials, 3D printing, Data analysis and visualization, Smartphone apps, Blockchain and Distributed Ledger Technology (DLT), The Internet of Things (IoT), Sensors, Artificial intelligence and Machine Learning, Application Programme Interfaces (APIs), Transportation tech: drones, autonomous vehicles and Hyperloop, Virtual and Augmented reality) are adopted to enhance the effectiveness and efficiency of service delivery in real estate transaction (Saull & Baum, 2019; Baum, 2020; Baum, Saull & Braesemann, 2020). As a result of the relevance and integration of technologies in real estate transaction, real estate professional bodies hugged real estate practitioners on the adoption. However, most real estate practitioners prefer to execute their real estate jobs within the traditional practice (Oyetunji, *et al.*, 2018).

Several studies on the adoption of innovative technologies and their relevance to the practice of real estate have been carried out both in developed and developing countries (Aihie, 2019; Saull & Baum, 2019; Baum, 2020; Braesemann & Baum, 2020; Baum, Saull & Braesemann, 2020). For instance, the study of Braesemann and Baum (2020) investigated whether PropTech is turning real estate into a data-driven market. Using quantitative analysis from over 7,000 PropTech firms, findings depicted that high-income countries focused on turning real estate into data-driven market trends are at work in PropTech. Furthermore, the relevance of PropTech is increasingly a global phenomenon with data analytics technologies at the centre of the real estate technologies network. The study of Aihie (2019) examine the emerging PropTech trends and their challenges in Nigerian real estate practice. The study suggested that real estate practitioners need to adapt to innovative technologies to embrace change in the real estate sector. The findings of most of the studies though focused on the relevance of innovative technologies in the real estate sector but failed to examine the level of adoption of real estate technologies in the practice of real estate. This study, therefore, set to fill the gap in the literature.

Table 1. Summary of Literature Review on Technologies and Innovations for Sustainable Real Estate Practice

Innovations in Real Estate Practice	Author(s)	Technologies	Author(s)
Innovations in Smart Real Estate	Baum (2017); Deloitte (2017); Kejriwal and Mahajan (2018); Deloitte (2018); Obando (2019); Hughes (2019); Phillips (2019); Altus Group (2019); Saull and Baum (2019); Aihie (2019); Baum (2020); Baum, Saull, and Braesemann (2020)	Websites	Olukolajo et al., (2015); Bamidele, Adenusi&Osunsanmi (2018); Oyetunji et al. (2018); Baum (2020); Akinwamide (2021b)
Online residential brokers	Baum (2017); Saull and Baum (2019); Baum (2020); Baum, Saull, and Braesemann (2020)	Geospatial technologies	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)
Increasing space utilization	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)		
Smart city applications	Saull and Baum (2019); Aihie (2019)	Cloud computing	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)
Building Information Modelling (BIM)	Saull and Baum (2019)	Wearables and environmentally-friendly building materials.	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)
Smart Buildings	Saull and Baum (2019)	3D printing	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)
Smart materials	Saull and Baum (2019)	Data analysis and visualization	Saull and Baum (2019); Aihie, (2019); Baum (2020); Baum, Saull&Braesemann (2020)
Increasing occupant wellbeing	Saull and Baum (2019); Aihie (2019)		
Smart logistics	Saull and Baum (2019)	Smartphone apps	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020); Akinwamide (2021b)
Green buildings	Saull and Baum (2019)	Blockchain and Distributed Ledger Technology (DLT)	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)
Smart residential	Saull and Baum (2019)		
3D printing and robotics	Saull and Baum (2019)		
Innovations in Real Estate FinTech	Saull and Baum (2019); Aihie (2019); Baum (2020); Baum, Saull, and Braesemann (2020)	The Internet of Things (IoT)	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)
Automated Valuation Models (AVMs) and iBuyers	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)	Sensors	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)

smart real estate	Saull and Baum (2019); Aihie (2019); Baum (2020); Baum, Saull&Braesemann (2020)	Artificial intelligence and Machine Learning	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)
Digital twins	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)		
Smart retail	Saull and Baum (2019); Baum (2020); Baum, Saull, and Braesemann (2020)		
Legal processes and PropTech	Saull and Baum (2019); Aihie (2019), Baum (2020); Baum, Saull, and Braesemann (2020); Braesemann and Baum (2020)	Application Programme Interfaces (APIs)	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)
Modular construction	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)		
Commercial real estate data	Saull and Baum (2019); Aihie (2019).	Transportation tech: drones, autonomous vehicles and Hyperloop	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)
Crowdfunding and peer-to-peer lending	Saull and Baum (2019); Aihie (2019); Baum (2020); Baum, Saull&Braesemann (2020)		
Real estate tokenisation	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)		
Instant mortgages	Saull and Baum (2019); Baum (2020); Baum, Saull&Braesemann (2020)	Virtual and Augmented reality	Saull& Baum (2019); Baum (2020); Akinwamide (2021a)

3. METHODOLOGY

Registered estate surveying and valuation firms authorized by the Nigerian Institutions of Estate Surveyors and Valuers (NIESV) were the target population for this study. Benin Metropolis in Edo State was chosen as the study area. The rationale for choosing the study area lies in the fact that, Benin metropolis is one of the foremost cultural and innovative cities in Nigeria experiencing fast and rapid commercial growth and urban development. Edo Development and Property Authority (EDPA) was created to manage Edo State Government assets for the purpose of planning, development, acquisition, and sales of landed properties. EDPA has developed notable estates in Benin metropolis with innovative engagement of private sector investors and developers to meet real estate demands in the State (EDPA, 2021). The need for effective delivery of real estate services has therefore demanded for the full adoption of innovative technologies among practicing real estate firms, to sustain the development of smart city suggested by the state government. According to NIESV (2020), there are Fifty-One (51) registered Estate Surveying and Valuation (ESV) practicing firms in Edo State. However, 43 out of 51 (84%) registered Estate Surveying and Valuation firms well known for adopting innovative technologies in Benin Metropolis were purposively sampled for data collection. The sample size of this study consists of the 43 registered Estate Surveying and Valuation firms in Benin Metropolis, Edo State, which is within a manageable size.

Purposive sampling technique was adopted for the data collection. Structured questionnaires were purposely administered to 43 selected registered Estate Surveying and Valuation firms in Benin Metropolis while all the retrieved questionnaires were found suitable for analysis. The data collected were analysed using descriptive statistics (i.e., weighted mean score and frequencies) and paired samples correlation. Descriptive statistical methods were used to assess the level of awareness of innovations, and the adoption of technologies for sustainable real estate practice in Edo State. Paired samples correlation was employed to examine whether a significant correlation exists between the pairing of mostly adopted technologies and innovations for sustainable real estate practice in the study area.

4.0 Result and Discussions

The discussion of results generated from the analysis is presented in this section. The socio-economic characteristics of Estate Surveying and Valuation Firms in the study area are shown in Table 2 below.

Table 2. Socio-economic Characteristics of Estate Surveying and Valuation Firms

Characteristics	Frequency	Percentage (%)
Years of Experience		
1 – 5 years	10	23
6 – 10 years	18	42
11 – 15 years	10	23
15 years and Above	5	12
Total	43	100
Educational Background		
ND/Diploma	2	5
HND/B.Tech/B.Sc	10	23
Post Graduate	31	72
Total	43	100
Professional Qualification		
ANIVS/RSV	41	95
FNIVS	2	5
Total	43	100

Table 2 above indicates that 72% of the respondents had studied up to post graduate level (this include Master degree and PhD degree), 23% were either Higher National Diploma (HND), Bachelor of Technology (B.Tech) or Bachelor of Science (B.Sc) and 5% were National Diploma (ND) holders. This implies that the majority of the respondent’s qualification were masters and PhD degree holder. Professional qualifications indicate that 95% of the respondents were associate members of NIESV/ESVARBORN while 5% were fellow members. It is noteworthy that the majority of the respondents are professionally registered, affiliated and recognized by the NIESV and ESVARBON. Furthermore, all respondents had adequate work experience; 42% had experienced between 6 – 10 years, 23% had worked within 1 – 5 years, 23% within 11 – 15 years, while 12% had over 15 years of experience.

Table 3. The level of awareness of innovations in real estate practice in Edo State

Innovations	N	Mean	Std. Deviation	Rank
Innovations in Smart Real Estate				
Online residential brokers	43	4.56	.734	1 st
Increasing space utilization	43	4.23	1.043	2 nd
Smart city applications	43	4.12	1.219	3 rd
Building Information Modelling (BIM)	43	3.60	.979	4 th
Smart Buildings	43	3.26	1.093	5 th
Smart materials	43	3.26	1.432	5 th
Increasing occupant wellbeing	43	3.19	1.097	7 th
Smart logistics	43	3.19	1.296	7 th
Green buildings	43	3.16	1.174	9 th
Smart residential	43	3.02	1.422	10 th
3D printing and robotics	43	2.88	.981	11 th
Innovations in Real Estate FinTech				
Automated Valuation Models (AVMs) and iBuyers	43	2.60	1.256	12 th
smart real estate	43	2.58	1.220	13 th
Digital twins	43	2.56	1.201	14 th
Smart retail	43	2.53	1.162	15 th
Legal processes and PropTech	43	2.49	1.352	16 th
Modular construction	43	2.33	.892	17 th
Commercial real estate data	43	2.30	1.301	18 th
Crowdfunding and peer-to-peer lending	43	2.28	1.469	19 th
Real estate tokenisation	43	1.70	.773	20 th
Instant mortgages	43	1.70	.803	20 th
Valid N (listwise)	43			

Table 3 above shows the level of awareness of innovations in real estate practice in the study area. Findings depicted that online residential brokers (4.56), increasing space utilization (4.23), and smart city applications (4.12) were the most aware innovations in real estate practice with the rank of 1st, 2nd and 3rd respectively. This implies that the respondents are familiar with the adoption of these innovations in real estate practice. Building Information Modelling (BIM) with a mean score of 3.60 ranked 4th while smart buildings and smart materials with the same mean score of 3.26 ranked 5th. Other innovations in smart real estate (such as increasing occupant wellbeing, smart logistics, green buildings, smart residential, 3D printing and robotics) with lower mean scores were the slightly aware innovations in real estate practice in the study area. Findings also indicated that innovations in real estate FinTech (such as Automated Valuation Models (AVMs) and iBuyers, smart real estate, digital twins, smart retail, legal processes and PropTech, modular construction, commercial real estate data, crowdfunding and peer-to-peer lending, real estate tokenization, instant mortgages) with the lowest mean scores were the least ranked aware innovations in real estate practice. These findings are consistent with the literatures of this study (Olukolajo, Babajide & Akinwamide, 2015; Akinwamide, 2021b) that most practicing estate surveyors and valuers are adopting various online platforms (such as websites, social media channels etc.) for real estate transactions in Nigeria. Furthermore, the development of Eko Atlantic city and

Akwa Millennium city has led to the application of smart city in Nigeria to upgrade its major cultural and innovative cities (such as Lagos, Abuja, Benin, and Port Harcourt etc).

Table 4. Assessment of the level of adoption of technologies for sustainable real estate practice in Edo State

Innovative Technologies	N	Mean	Std. Dev.	Rank
Websites	43	4.23	.571	1 st
Geospatial technologies	43	4.21	.989	2 nd
Smartphone apps	43	3.53	1.486	3 rd
Wearables and environmentally friendly building materials.	43	2.42	1.220	4 th
Cloud computing	43	2.26	1.449	5 th
Data analysis and visualization	43	2.26	.727	5 th
3D printing	43	2.26	1.274	5 th
Blockchain and Distributed Ledger Technology (DLT)	43	2.14	1.125	8 th
The Internet of Things (IoT)	43	2.00	1.134	9 th
Sensors	43	1.91	.921	10 th
Artificial intelligence and Machine Learning	43	1.72	.908	11 th
Application Programme Interfaces (APIs)	43	1.33	.606	12 th
Transportation tech: drones, autonomous vehicles and Hyperloop	43	1.12	.448	13 th
Virtual and Augmented reality	43	1.00	.000	14 th
Valid N (listwise)	43			

Table 4 above shows the level of adoption of technologies for sustainable real estate practice in the study area. Findings indicated that websites (4.23), geospatial technologies (4.21), and smartphone apps (3.53) were the most adopted innovative technologies for sustainable real estate practice with the rank of 1st, 2nd and 3rd respectively. This implies that real estate firms often adopt these innovative technologies in real estate transaction to achieve effective and efficient delivery of real estate services. Wearables and environmentally friendly building materials with a mean score of 2.42 ranked 4th while cloud computing, 3D printing, data analysis and visualization with the same mean score of 2.26 ranked 5th accordingly. Furthermore, other technologies (such as Blockchain and Distributed Ledger Technology (DLT), The Internet of Things (IoT), sensors, artificial intelligence and machine learning, Application Programme Interfaces (APIs), Transportation tech, Virtual and Augmented reality) with the lowest mean scores were the least adopted innovative technologies for sustainable real estate practice in the study area. These findings agree with the submission of Aihie (2019) on re-evaluating the real estate industry to accommodate innovative technologies for sustainable practice or lose out to more innovative technology experts.

Table 5. Paired Samples Correlations between the Adoption of Technologies and Innovations for Sustainable Real Estate Practice

		N	Correlation (r)	Sig. (P value)
Pair 1	Websites & Online residential brokers	43	.552	.000
Pair 2	Websites & Smart city applications	43	.631	.000
Pair 3	Websites & Increasing space utilisation	43	-.034	.831
Pair 4	Geospatial technologies & Online residential brokers	43	.707	.000
Pair 5	Geospatial technologies & Smart city applications	43	.679	.000
Pair 6	Geospatial technologies & Increasing space utilization	43	-.204	.190

Table 5 above examines the correlation between the most adopted technologies and the most aware innovations for sustainable real estate practice in the study area. Findings depicted that a strong significant correlation exists between the adoption of websites and the awareness of online residential brokers ($r = .552, p = .000$), and smart city applications ($r = .631, p = .000$) in the study area. Furthermore, a strong significant correlation also exists between the adoption of geospatial technologies and the awareness of online residential brokers ($r = .707, p = .000$), and smart city applications ($r = .679, p = .000$). This implies that the effective use of websites and geospatial technologies in real estate transaction has a great influence on online residential brokers to achieve customers' satisfaction, loyalty and retention. These findings agreed with the submission of Aihie (2019) that the full adoption of property technology (such as websites and geospatial technologies) among practising real estate firms would contribute to the development of the smart city and sustain the future of smart real estate practice in Nigeria.

5.0 CONCLUSION

This study has appraised the adoption of innovative technologies for sustainable real estate practice in Edo State, Nigeria. It's noteworthy that online residential brokers, increasing space utilization, and smart city applications were the most aware innovations in real estate practice. Furthermore, websites and geospatial technologies were the most adopted technologies for sustainable real estate practice in the study area. Therefore, the effective use of innovative technologies (such as websites and geospatial technologies) among real estate firms has a great influence on the sustainability of real estate practice. Therefore, this study recommends that professionals in real estate practice needs to embrace the use of innovative technologies for effective delivery of real estate services and enhance customers' satisfaction. Furthermore, Nigerian Institutions of Estate Surveyors and Valuers should educate real estate professionals on the adoption of innovative technologies for sustainable real estate practice in Nigeria.

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Facilities Management of Sports Infrastructure in Tanzania: A Case Study of the Stadia in Dar es Salaam

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Purpose: The growth of sports industry comes with increased infrastructures which required reliable management for their sustainability. The research aimed at exploring the management of sports infrastructure with special reference to stadia. It assessed the management practice, explored the policies supporting the management of the sports facilities and associated challenges towards suitable management practice in the sports infrastructure in Tanzania.

Design/Methodology: The study involved a qualitative research approach with alignment to the case study method. Purposive sampling was used to obtain respondents whereas interview guide and observation were adopted as data collection tools. This paved way for thematic analysis with the help of methods for data presentation.

Findings: The research revealed the difference in facilities management practice of stadia facilities and other properties due to peculiarity of installed facilities and the use of the infrastructure. Also, the facilities management was not addressed by the sports development policy; consequently, there were no facility managers which lead to inadequate maintenance plan and threaten sustainability of infrastructure.

Research Implications/Limitations: The paper creates a compound eye to researchers on the management of sports infrastructure. The major limitation of the paper was lack of one-to-many relationship (user versus stadia) which has narrowed the probability of one user having visited both stadia.

Practical implications: The research guides facilities managers on the stadia management roles and various management aspects for a successful management of the sports infrastructure.

Originality/Value of work: The paper makes an original contribution to stadia management practice in association with challenges and policies involved in the process.

Keywords: Stadia; Management; Sports infrastructure; Facilities

1. INTRODUCTION

Sports infrastructure is an investment that utilizes large amount of funds and among the valuable national assets that reflects an investment image. Thus, requires high management attention which deems crucial for the purpose of development. The investors (public or private investors) have large expectations to yield high returns from the sports investment with least considerations on the afterlife of the sports infrastructure. Hence management becomes the epitome to enhance the high yield of the investment in the sports infrastructure and the importance of stadium management has been raised in most countries

(Megheirkouni, 2017). This can be reflected in the beginning of the twenty first (21st) century where the supply of sports facilities that build up the sports infrastructure increased due to the increase in demand for leisure services (Dugalic & Krsteska, 2013) which in turn expanded to create large investments in the world. Since then, sports infrastructure is an investment that is viewed in a global essence to yield massive profit in both developed and developing countries, hence the focus changed from getting the local community involved in sports, but was instead aimed at attracting tourists, encouraging inward investment and changing the image of the city (Barghachi, et al., 2009).

Sports infrastructure plays an important role in the economy, thus in the case of industrialized countries sport has developed into its own economic branch contributing about two percent to gross domestic product (GDP) (Chappelet, 2015), (Luiz & Fadal, 2011), (Swinnen & Vandemoortele, 2008) and due to the benefits accrued, most investors globally tend to gain interest in sports and one of the factors that attracts investing in the sports economy is a well-managed sports infrastructure. The hub between Sports infrastructure and Facilities Management is incubated in the integration of people, place, process and technology with a consensus of ensuring the functionality of the sports built environment (International Facility Management Association, 2009), whereas the sports built environment is made up of facilities including; a large multi-use center with playing surfaces catering for different sports activities, a small hall or room catering for one specific sport activity usually referred as indoor and support structures such as office buildings and store rooms used specifically for sports purpose. Multiple disciplines are incorporated in enhancing facilities management in sports infrastructure which encompass fields of value engineering for creating benefits and value for money during the utilization of the sports infrastructure, quality management, space management, maintenance, construction management, emergency preparedness in case of dangerous occasions such as fire and other relevant categories.

In the facet of people, lies consolidation of sports and facilities management for maximizing the users' utility and satisfaction in the essence of aesthetics and functionality. Currently the modern sports facilities such as stadia gather the highest numbers of sports audience which is why these facilities get proportionally more attention in management practice (Dugalic & Krsteska, 2013). In context, people are the final users of the sports services and hence safety and an attractive view is important. An example of the harm caused to users due to unsatisfactory condition of the sports facilities is whereby *Liverpool and Juventus team were facing each other in the European Cup final at Heysel Stadium in Belgium, before the match started; Liverpool supporters reacted to taunts from the Italian fans by charging through the lines of Belgian police. The Juventus fans could do nothing, but retreat as far as a wall, which collapsed under the pressure and onto their own fans below. In the ensuing panic 39 supporters died and over 600 were injured* (Eric, et al., 2009).

The facet of place encompasses the physical environment, areas constructed and support structures that enable people to interact and participate in the sports activities (Australian Sports Commission, 2009) hence paves way for facilities management that functions to maintain the sports facilities such as courts (main and secondary courts), playgrounds, change rooms, stairways, ventilation system, lightning, indoor facility. The physical environment of the stadia has encountered evolution in response to the culture of a particular country whereas (John, Sheard, & Vickery, 2013) suggest that stadia can be highly symbolic, reflecting the mindset of the times and the culture of the team, city or event with which they are

associated hence need to be well maintained to ensure the functionality of the place and this requires effective management strategies to be integrated.

Sport facility operations seek to maintain and care for public, private, and non-profit facilities used for sport, recreation, and leisure to ensure safe and secure production and distribution of products and services to users and ensure their satisfaction and utility (Eric, et al., 2009). The operations are either under the government or the sports authorities which have no interference from the government and have more resources to enhance the management activities (Megheirkouni, 2017). The manager responsible for the operations has a duty to oversee other members of the management team including marketing, facility planning, customer service, maintenance services, operations, and sales (Schwarz, et al., 2015). The dimension of technology as applied in sports facilities management is used in enhancing value of facilities and acts as a surface for smooth operations or processes that account for a smooth interaction of people and place. Currently technology is continuously used in development of the sports infrastructure and hence a modified facilities management technology becomes more essential for effective and conducive built environment. Computing power has had, and continues to have, a profound effect on the visualization and realization of both traditional and new forms of construction, including forms of sports facilities construction (Peter & John, 2009).

In summary, sports infrastructure is one of the crucial areas in development of a nation. Sport today, in all of its sectors, represents a result of state's investment into sports infrastructure, above all into facilities for training and competition (Sretenka & Ana, 2013). Hence it is a nation's investment that require more management attention. In the context of global standards of sports infrastructure, Tanzania has invested in Benjamin Mkapa stadium about 56.4 billion dollars equivalent to 130,489,192,634.68 Tanzanian shillings which was built in accordance to FIFA and Olympic standards. This investment has commenced since 2007 to date thus summing to a maximum of thirteen years. Other stadiums including Uhuru stadium and Azam complex (Chamazi) stadium were built with high construction costs.

Globally the condition of sports infrastructure in most of the countries especially developing countries is poor and unsatisfactory (Sretenka & Ana, 2013), this is also reflected in Tanzania where there is a poor condition of the sports infrastructure (Kakonge, 2016). This leads to depreciation of the income generated from the sector (Andanje & Stephen, 2013) as it will render less attraction to investors in the sports facilities. Also, literature emphasize that the poor condition of the sports facilities is prone to accidents that may cause harm to the users of the sports infrastructure.

Sports infrastructures are in a parlous state due to poor management of the infrastructure. Various literature and different authors have recommended a good management practice to be one of the sole practice towards success in the sports infrastructure investment while contrary to that leads to the delay of development in the sports industry (Christopher, et al., 2015), however a problem arises in most of developing countries that faces a challenge of poor management of the sports infrastructure (Provincial Executive Council, 2014).

The Sports Development Policy of Tanzania initiates a call of researching on the management practice of sports infrastructure. Under section one (1) (iii) of the challenges section in the Sports Development policy of Tanzania outlines poor management of the sports infrastructure including stadia as one among the problems encountered by the ministry. The

question remains on the management practice applied. Henceforth, this study aims to lift the veil of the sports infrastructure management currently enforced in Tanzania with the objectives to explore the current management practice, policies that support the management of the sports facilities and also explore the management challenges with a destination to propose and recommend a good practice on management of sports infrastructure.

2. LITERATURE REVIEW

Management of sports infrastructure refers to management of sports facilities which are areas with sports functionality where people gather for physical exercise, participate in athletic competitions, or watching sporting events. In other words, sports facilities involve individual buildings or groups of structures designed for exercising, sports training and practice, and competition in various sports. There are a number of sports facilities that are deemed to be involved including stadium, arena, gymnasium, rinks, outdoor fields, pools and supporting facilities. This research specifically addresses stadia management whereas stadia is the plurality word that refers to more than one stadium. According to Webster's dictionary stadia is defined as "a large usually unroofed building with tiers of seats for spectators at sports events". Stadium is literally described as home of sports (Megheirkouni, 2017) which basically means the built environment including sports facilities.

Henceforth, management of the sports infrastructure is in congruence with literature as to engage in: planning, drafting, and funding of the construction and daily operations of sports facilities, drafting and organization of training and business processes, leading those activities and controlling a wide range of participants, processes and sub-elements of these systems (Tapper, 2016). Thus the aspect of principles of management which includes planning, organizing, staffing, directing and controlling has to be taken in consideration, together with the management structure and the management strategies (outsourcing, inhouse or out tasked) should be selected carefully Literature then embraces the fact that management of the sports infrastructure is not equivalent to other types of facilities or properties but should be considered unique since it has unique features [(Sretenka & Ana, 2013) (Tapper, 2016)].

Notably, the existing studies have been conducted in developed economies where there has been advancement in the management of the sports infrastructure for several years, particularly in the United States of America and Europe whereas professional clubs and stakeholders developed awareness about the need for professional management and hence the influx of facilities management in the sports infrastructure this commenced in the second half of the 20th century, in different socio-economic circumstances (Sretenka & Ana, 2013). In developing countries, literature mainly addresses the development and construction of the sports infrastructure intriguing in the aspects of investment whereas there is limited research on the afterlife of the sports infrastructure leaving out the question of the management of the sports infrastructure. Furthermore, there is lack of empirical research in the Tanzania context that seeks to understand the management practice applied in the sports infrastructure. Therefore, this study explores the management of the sports infrastructure in Tanzania. It involves assessing the current management practice applied in sports facilities, exploring various policies that support management of the sports facilities, exploring challenges encountered in sports infrastructure management and how to address the problems and recommending a good practice on management of sports infrastructure in Tanzania.

The conceptual framework for this study interludes the addition of facilities management to the sports infrastructure. Sports infrastructure is a dependent variable that depends on facilities management as the independent variable. The concept delves the fact that integration of the sports infrastructure with facilities management will uphold and yield a sustainable sports infrastructure that will envisage profound benefits such as the social economic benefits in the society, in the nation as a whole and to the individuals living in the nation. Hence the figure 1 illustrates the whole concept of integrating facilities management within the sports infrastructure.

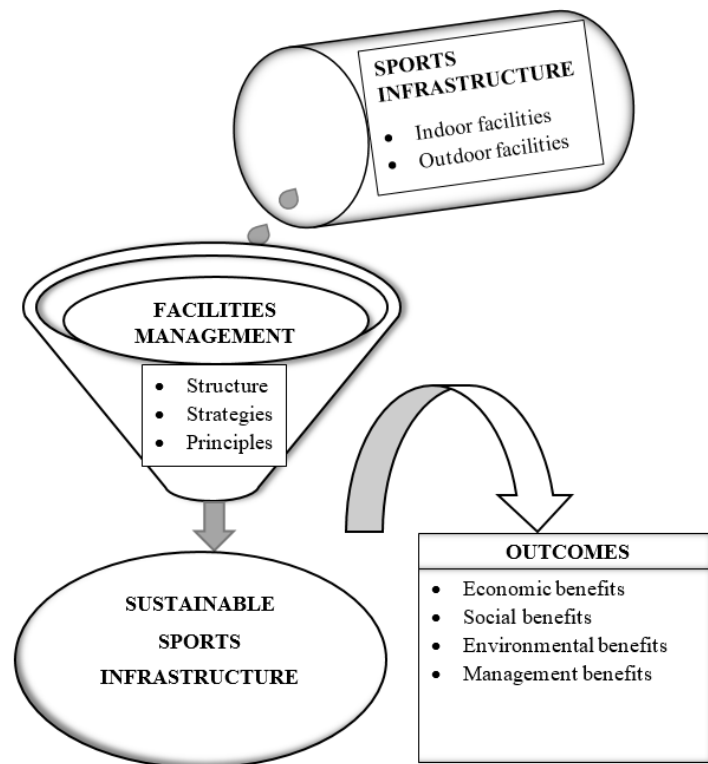


Figure 1: Diagram showing the Relationship between Sports Infrastructure and Facilities Management

3. RESEARCH METHODOLOGY

An in-depth examination of management in sports infrastructure was required to improve the condition of the sports facilities in Tanzania, hence the study adopted a qualitative approach with intention to provide exploratory statements about how management is conducted in the stadia. Case study method was applied whereas the intention was to develop an in-depth analysis of the stadia management and place more emphasize on the full analysis of the management practices (Yin, 2014), Dar es Salaam was the selected case study area because it comprises of sports infrastructure that have the stadium qualifications and also, they represent huge investment due to their high construction costs that symbolizes their economic purpose.

3.1 Study population

The population for this study includes stadium users, stadium service providers and stadium managers in a total of three stadia in Dar es Salaam, namely Benjamin Mkapa stadium, Uhuru

stadium and Azam Complex stadium. Due to the purpose of the study and the approach adopted the participants were selected using a purposive sampling to discriminately interview experts who are rich with information about the study topic. Due to the methodology selected, the sample selected for this research involved twenty-one (21) participants from three selected stadia.

- **Coding**

The stadia coding used in the analysis for the purpose of confidentiality as shown in Figure 1.

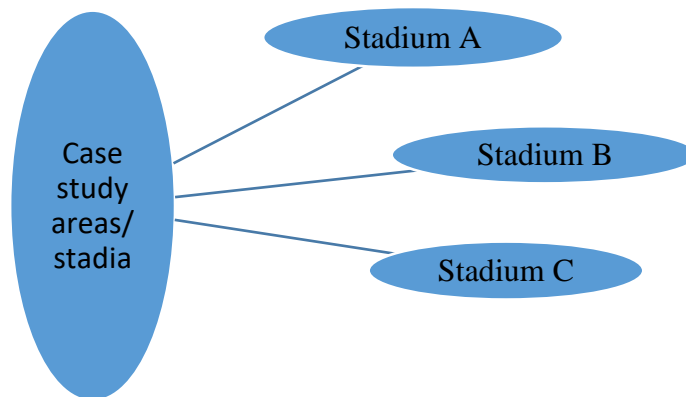


Figure 2: Case study coding

Respondents coding for confidentiality purposes in data analysis and presentation is shown in Table 1.

Table 1: Participant’s code

RESPONDENT	CODE
MANAGERS	M ₁ , M ₂ , M ₃ , M ₄ , M ₅ , M ₆
SERVICE PROVIDERS	S ₁ , S ₂ , S ₃ , S ₄ , S ₅ , S ₆
USERS	U ₁ , U ₂ , U ₃ , U ₄ , U ₅ , U ₆ , U ₇ , U ₈ , U ₉

3.2 Data collection

The constructivist paradigm behind this study has contributed to the methods that were applied for data collection whereas constructivism theory argues that humans generate knowledge and meaning from an interaction between their experiences and ideas (Mogashoa, 2014). Hence the reality was to be extracted from respondents together with their experiences and ideas on the whole aspect of stadia management. The method applied in collection of data regarding management of the sports infrastructure includes structured interview which provided opportunity to discuss managerial aspects in detail and observation method identified the current condition of the study area and to provide additional information to complement what had been said from the interviews conducted.

3.3 Data analysis

Thematic analysis was selected to allow extensive discussion about the major themes that arise from analyzing a qualitative database (Creswell, 2014). Since this research employs a qualitative approach that requires in-depth information hence thematic analysis is essential as it paves way for intensive and in-depth analysis of collected data from the field.

3.4 Validity

The study adopted a seven-point checklist (Yin, 2011) qualitative research from start to finish, (Joseph Maxwell, 2009). Furthermore, a seven-point validity checklist was included so as to strengthen validity of this research and to avoid validity threats. This was recommended by Yin (2011) who adopted the checklist from Joseph Maxwell in 2009 who is among the pioneers of qualitative case study research. The checklist includes intensive long term (field) involvement, rich data, respondent validation, search for discrepant evidence and negative cases, triangulation, quasi-statistics, comparison.

4. FINDINGS AND DISCUSSION

4.1 Participants background information analysis

This set of data was intended to describe basic information of the respondents and to assess for any influence on the research findings. The data consisted of respondents' experience, education level and professionalism. The background information was attained so as to strengthen the credibility of the data whereas respondents have diverse professions, also 67% have more than five years' experience in stadia management. The professional background, experience and educational level of the respondents is shown in Figure 3, Figure 4 and Figure 5 respectively.

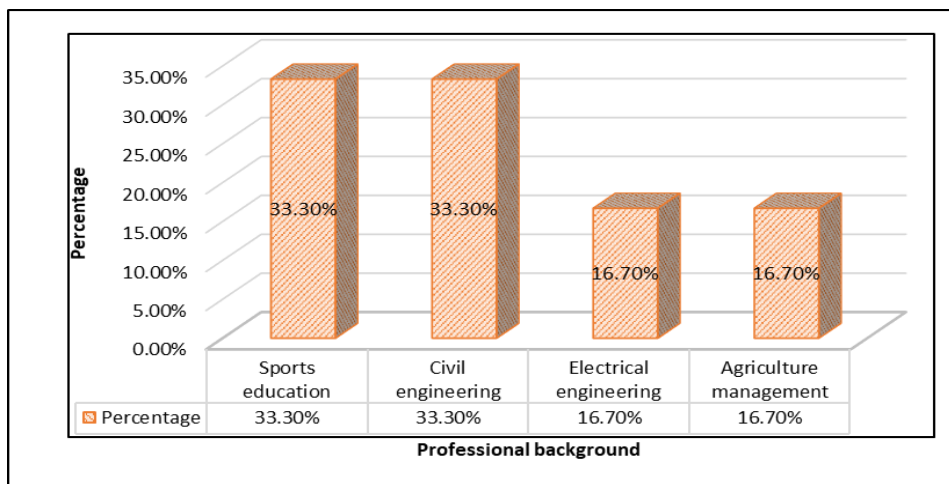


Figure 3: Professional background of participants

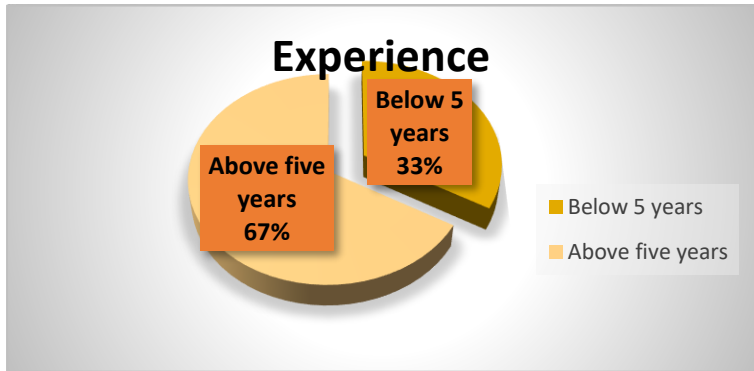


Figure 4: Respondent’s experience

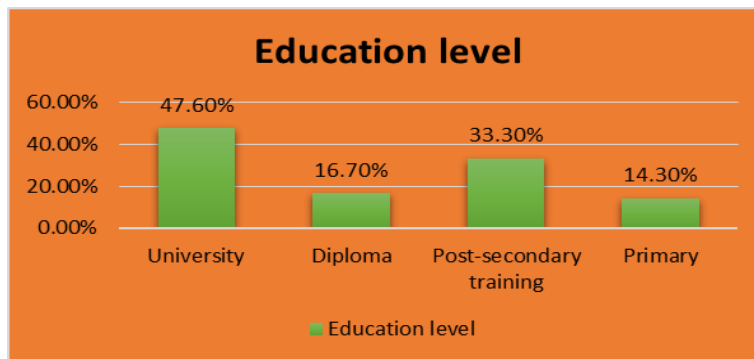


Figure 5: Respondents educational level

4.2 Thematic analysis of collected data based on the research objectives

4.2.1 Current management practice of sports infrastructure

Exploring the current management practice of sports infrastructure was done by assessing various qualitative parameters. The parameters were determining the facilities available which involved identifying what facilities are managed in the stadium, management structure of the stadium, management strategies deployed, and management functions performed in the stadium. From the interviews conducted to the management team of the stadium and documentary review, it was revealed that the facilities available in the sports infrastructure hold a slight difference in comparison to the facilities managed in commercial, residential, or institutional buildings; these include pitch, scoreboards, spectator seats, indoor courts, and playing facilities. This does not exclude the fact that the sports infrastructure also includes common facilities that can be found in any other type of property; these include vertical transportation facilities, communication facilities, ventilation and lighting facilities, solid waste facilities, ground works, plumbing, energy facilities and sanitary installation. The management structure of the stadium included the traditional / functional management structure where the management team is distributed in terms of their functions. Hence there are functional unit managers who deal with a particular task including security, environment, electrical and construction. Thus, there is a lack of integration between the professional background and the management services in the department assigned hence more professional personnel are required in alignment to the function to ensure a smooth running of the management activities in the sports infrastructure. The management strategy employed includes in-house strategy whereas the employed staff members are responsible

for the management activities. Despite the in-house strategy applied in the stadium management, some of the services are out tasked to the service providers which include the maintenance services; this means that both the stadium managers and the external managers from the outsourced firm are responsible for the maintenance activities. Also, the management has two durations namely, on-season management which refers to the management conducted during the league of different sports including the football games, basketball games, netball games, racing or marathons. In Tanzania the season begins every year from August to June. Off-season management refers to management activities conducted after the end of the league, where intense actions are exhibited to prepare the stadia for the coming season, the off-season period begins from the beginning of June to the end of July. The current management practice is illustrated in Figure 10 at the appendix section.

The study also unveiled the fact that the personnel responsible for stadia management had diverse professions that are non-related to facilities management of the stadia and hence becomes a factor causing poor management due to lack of expertism in the field. This is illustrated by figure 6 below.

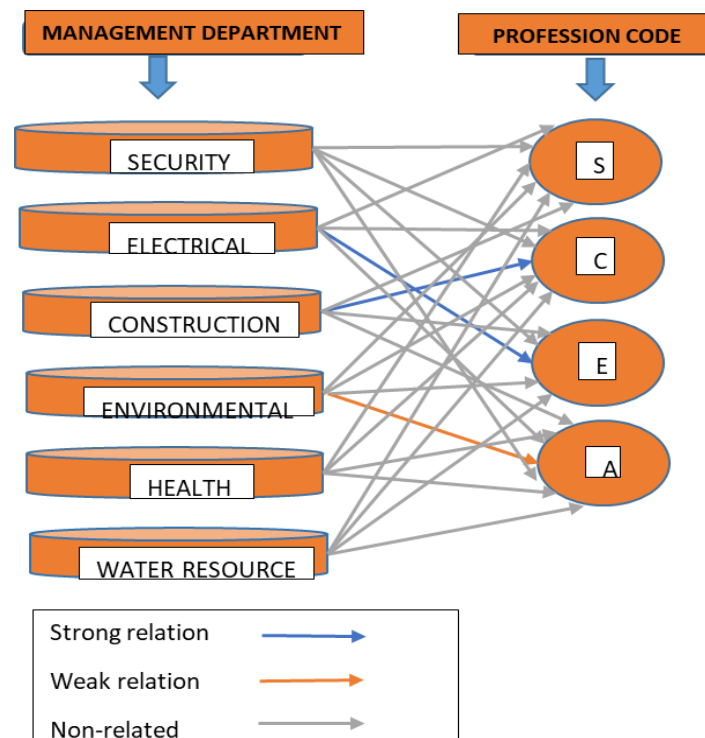


Figure 6: Pattern matching between the management departments and their profession

4.2.2 Policies concerning management of sports infrastructure

The management of sports infrastructure in Tanzania is guided by the Sports Development Policy of Tanzania, by laws formulated by the management team and a series of other legal frameworks that support the management of the sports facilities. These includes Employment and labor relations act of 2004, National health policy of 2007, National water policy of 2002, National environmental policy of 1997, public procurement act of 2004, National security act

of 1970, Tanzania investment act of 1997, public health act of 2009, The water supply and sanitation act of 2009 and the urban water supply act of 1981. Hence the management team ensures implementation, monitoring, reviewing, and updating of the legal frameworks. The categories, themes and remarks as collected from the field is shown in Figure 7.

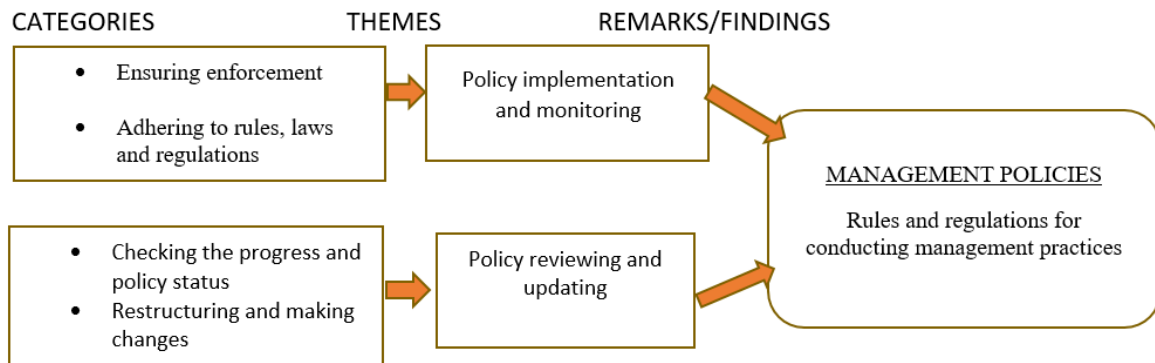


Figure 7: Respondent’s view on challenges faced in management of the sports infrastructure

Both respondents including the managers, service provider and the users of the sports infrastructure had identified challenges in each perspective whereas the security and environmental challenge was pinpointed by both facets of the participants. Figure 8 illustrates the categories, themes and remarks based on field data attained

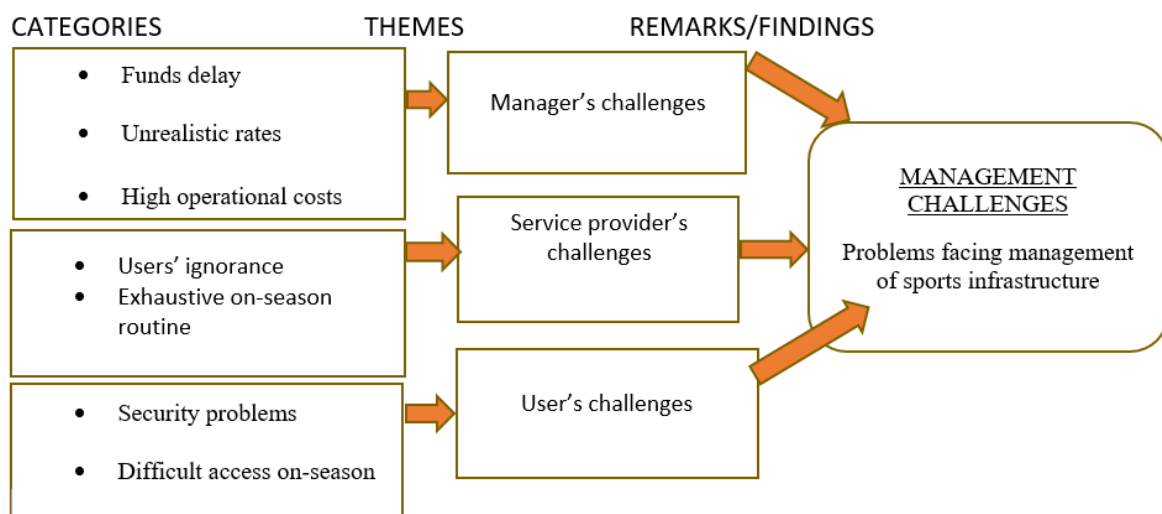


Figure 8: Arriving at themes and remarks from the interview data

5. DISCUSSION AND RECOMMENDATION

The research aimed at exploring the current management practice, policies governing the stadia management, challenges of stadia management and lastly to recommend a management practice in the stadia. The following are recommendations from the research conducted.

5.1 Facilities management approach

The sports facilities require the engagement of facilities managers so as to effectively induce an appropriate management in the structure (Table 2). The researcher recommends the implementation of the management functions in a facility management prospect since the infrastructure contains buildings that need much consideration of the management. Literature has also recommended the utilization of facility managers in the stadium.

Table 2: Respondents view on what should be done

RESPONDENT	RECOMMENDATION
M ₁ , M ₂ , M ₃ , M ₄ , M ₅ and M ₆	<ul style="list-style-type: none"> ● To engage more professionals in the management team. ● To deploy an easy way for management funds access. ● To utilize more investment opportunities.
S ₁ , S ₂ , S ₃ , S ₄ , S ₅ and S ₆	<ul style="list-style-type: none"> ● Create user awareness on hygiene, health and safety. ● Low pressure from the managers so as to perform the tasks diligently.
U ₁ , U ₂ , U ₃ , U ₄ , U ₅ , U ₆ , U ₇ , U ₈ and U ₉	<ul style="list-style-type: none"> ● To establish a reliable user complaints mechanism. ● To enroll an efficient entry mechanism for ease access of the stadium. ● To deploy strong security systems so as to avoid theft.

5.2 Investment focus (customer oriented)

Sports infrastructure is an image of investment but in most cases the infrastructure is perceived only as a recreational facility bailing out the commercial characteristics it holds. This view has to a large extent diminished the business value that the sports infrastructure holds. The managers should diversify their focus to the orientation of boosting up the investment's rate of return which will yield positive economic results to the nation and to the individual. A good benchmark is portrayed by sports infrastructure in developed countries whereas they contribute about 2% of the nation's gross domestic product as one of the economic indicators (Chappelet, 2015).

5.3 Sustainability focus

Properties and facilities of sports infrastructure require huge costs of investments for their construction and operations. These efforts used in constructing the infrastructure deserve a reward, in which maintaining its durability through an effective management is recommended. Sustainability focus will result in a durable sports building for the purpose of current needs without compromising future needs. Various literatures support the focus by establishing management frameworks that provide an integration of functions that together act as a tool for the facilities manager in the achievement of sustainable buildings. One among recommended sustainable facility management frameworks includes the one suggested by (Olaniyi, 2017) which is based on a facilities manager role in sustainable buildings. The roles

have been stipulated from the design stage, construction stage and down to the operational stage. Figure 9 below illustrates the key areas of recommendation including facilities management, investment and sustainability focus.

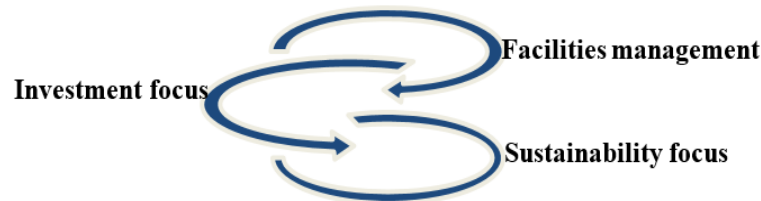


Figure 9: Recommended management practice in sports infrastructure

6. CONCLUSION

At the end it was found by qualitative analysis that the management of the sports infrastructure requires improvements so as to enhance the investment paradigm of the stadia and enable development of the sports industry. The research results vary from the findings stipulated from the commercial and other types of properties. Therefore, this study creates awareness to the facilities managers in aspects concerning the management of properties with sports purpose. In addition, the study alerts property managers on areas of concentration when managing the facilities in the sports infrastructure. This study is exploratory in nature with a purpose of extracting management knowledge. Furthermore, the author believes that this study can perpetuate further studies on how to conduct successful management activities in the stadium. The results obtained may provide useful input into the career of facilities manager so as to expand the scope of facilities management.

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APPENDIX

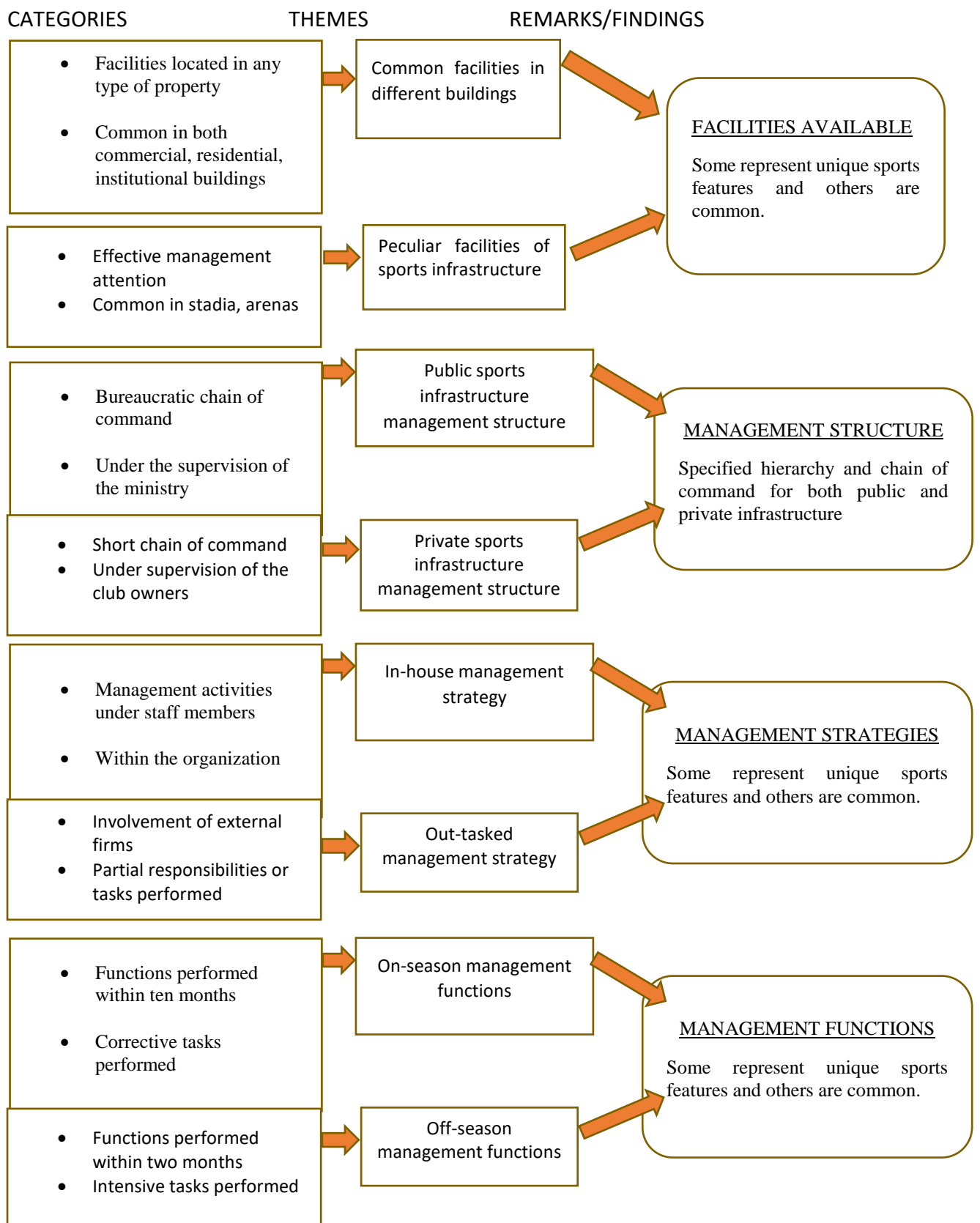


Figure 10: Arriving at themes and remarks from the current stadia management

Sustainable Land and Food Security in Female-Led Agrarian Households of Tula, Nigeria

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Purpose -This study examined the nexus between land tenure security (LTS) and food security (FS) in female-led households of Tula agrarian settlements.

Design/Methodology – The study used a qualitative research design, which was based on the constructivist paradigm. The researchers conducted in-depth interviews with female household heads cutting across the three 'yaati' (villages) of Tula Baule. Analysis of data collected from the interviews was done employing transcriptions, creation of semantic networks and employing thematic content analysis.

Findings –The study revealed that all but few respondents believed that they had LTS based on “Feloh’s” (ancestral gods) supremacy without recourse to documentary evidence of ownership. Similarly, all but few participants do not have access to three square meal per day throughout the study period. The study also found a strong relationship between LTS and FS in the study area.

Practical Implication - It provides an empirical base to equip policymakers with valuable information for making policies relating to female's access to land and food in agrarian settlements.

Originality/Value - This study is one of the first to empirically analyse in an eclectic context land and food security in female-led agrarian households of Tula, Nigeria.

Keywords: Access to land; female-led household; food sustainability; gender equality; land tenure; Tula.

1. INTRODUCTION

The nexus between land tenure security (LTS) and food security (FS) has been receiving attention from both academics and researchers in different climes (Lawal et al., 2019). The need for such studies in especially developing economies was observed to be more glaring in the face of the ongoing COVID-19 pandemic. The coronavirus pandemic appears to have posed a significant threat to FS in the world which is more amplified for female-led households of primarily agrarian settlements. In the developing economies, access to secured land is a crucial determining factor to FS and food sustainability at the household level (Holden & Ghebru, 2016; Lawal et al., 2019). The subjects of LTS and FS have been assessed as individual subjects and in relation to one another. It has also been evaluated with other

factors such as economic development, poverty, and agricultural productivity, among others, by previous studies such as Doken (2015) and Han et al. (2019). However, these studies did not focus on practical and sustainable options for the African female-led rural households, thereby creating a gap in the literature. To fill this gap, this paper examined how access to secured land affects and is affected by FS in female-led households of Tula agrarian settlements in Nigeria. Farmers in agrarian settlements of developing economies such as Tula are mostly subsistence farmers striving to provide for home consumption and not on a commercial scale. This explains why the study was focused on the household level. Furthermore, the paper addressed the problem of gender bias/inequality as regards access to and tenure security of farmlands for women.

According to the Food and Agricultural Organization [FAO], (2009), tenure rights were said to be a set of rules and norms that determines who can use what resource, under what conditions, and for how long. Agarwal's (1994) definition of tenure right (as cited in Dokken, 2015, p.107) states that "Tenure rights define to what extent a household or an individual can gain access to the benefit streams generated by land and provide a set of benefits that have a positive impact on livelihoods outcomes". LTS was seen by International Fund for Agricultural Development [IFAD], (2015, p.1) as "people's ability to control and manage land, use it, dispose of its produce and engage in transactions, including transfers". Holden & Ghebru (2016) asserted that the significant sources of land tenure insecurity include land encroachment, land grabbing and land redistribution by the government. According to Chigbu (2019), women tend to have land rights that are weaker in comparison to their male counterpart. Even though in most agrarian settlements, women are usually saddled with the responsibility of providing food for their respective households through subsistence farming. The World Bank report (2011) revealed that globally, it was observed that female farmers do not have access to sufficient secured land for farming. This has motivated countries such as Vietnam, Peru, Rwanda, and Ethiopia, to implement specific measures geared towards mitigating the challenges of women's access and rights to land to ascertain FS at the household level (Holden et al., 2011; Holden & Ghebru, 2016). This is because studies have provided empirical pieces of evidence that there is a correlation between access to secured land rights and improved agricultural productivity which consequently leads to FS (Petrescu-Mag, 2019; Keovilignavong & Suhardiman, 2020).

The FAO (2010, p.8) defines FS as "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meet their dietary needs and food preferences for an active and healthy life". The FAO report further explained that household FS is "the application of this concept to the family level, with individuals within households as the focus of concern". It was observed that over two billion people have food insecurity worldwide, with Africa having the highest prevalence. This result vis a vis the Sustainable Development Goal (SDG) of achieving access to food and zero hunger for all people (SDG target 2.1) by the year 2030 is quite perplexing (FAO, 2019). The food insecurity index as indicated by FAO' report for the year 2018 suggested that Africa has the highest level of food insecurity (52.59%) followed by Asia (22.8%) while Northern America and Europe had the least (8.0%). The report further revealed that food insecurity was observed to be higher in females than the male gender. Factors affecting FS include economic slowdowns and downturns, climatic conditions, conflicts, inflation, level of education, household income, employment, and family size among others (Frongillo et al., 2017; Smith et al., 2017; FAO,

2019). The recent COVID-19 pandemic is likely to be another devastating factor that will affect global FS in the nearest future. The effect of FS on man includes negative health impact and psychosocial impact, among others.

Concerning FS, it is expected to be sustainable at all levels, especially at the household level. Sustainability can be generally defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Smith, 1998). The concept of sustainability is an all-encompassing concept, including but not limited to the environment, economy and man’s social life. The subject of sustainability in developing economies had been investigated by previous studies such as Okonkwo, (2013), Ahenkan & Kojo-Osei (2014), Deng et al. (2020) and Yi et al. (2020) among others. However, these studies did not focus on practical and sustainable options for the African female-led agrarian households concerning LTS and FS. From the studies mentioned above, the following facts related to sustainability were gleaned: In terms of population, Africa is adjudged to be the second largest continent in the world and sadly, the most impoverished region (Oladeji, 2014). There is a gross mismatch between population and available/sustainable FS in many African nations. The population explosion experienced merely is faster than food production and agricultural development. The United Nations Department of Economic and Social Affairs [UNDESA], (2012) reported that Africa has the lowest life expectancy at birth as well as the life expectancy of 54 years (for adults), which is the weakest in the world. Oladeji (2014) stated that over 50% of Africans live below \$1.2 per day. It was revealed that by 2030, Africa would need at least 50% more food, 45% more energy and 30% more water (United Nations, MDG report, 2011). All these are indicators that developing economies, most notably African nations are far from achieving sustainability for, especially food when compared to its counterpart (the developed countries). This calls for all stakeholders (comprising of the government, NGO’s, religious groups, corporate organisations as well as individuals) to put their hands on deck to ensure sustainability in respect of food access to achieve the SDG Goal target 2.1 globally.

This study aims to examine the relationship between LTS and FS from the perspective of African female-led households; using Tula agrarian settlements as a case study to provide information that could aid in achieving sustainable LTS and FS. The research questions for the study include are lands cultivated by female-led households in Tula agrarian settlements secured? What is the level of FS among the selected households? How can sustainable LTS and FS be achieved in the study area? The remaining part of the paper is structured as follows: After the introductory part, the literature review/theoretical framework was presented in section two (2); section three (3) presents the methodology adopted; while section four (4) presents results and discussions; the paper closes with a concluding remark.

2. LITERATURE REVIEW/THEORETICAL FRAMEWORK

Researchers and academics have investigated the nexus between LTS and FS all over the world with different findings. In Southeast Asia, a study was conducted in Laos, which indicated that there was a strong significant relationship between LTS and FS. The authors examined the perception of rural farm households as regards land and FS. It was found that there was a uni-directional causal linkage between LTS and FS in the study area (Keovilignavong & Suhardiman, 2020). However, the study did not consider female-led households. In China, Liu et al. (2020) investigated the relationship between protected

farmlands (through zoning regulations) and FS. Findings from the study suggested that protected farmlands through zoning regulations could increase food production by 2.96% should other factors such as irrigation efficiency, cropping system, climatic conditions and soil fertility remain favourable. The study only focused on zoning regulations as a yardstick for tenure security, gender was not considered as a primary focus. This present study extends the frontier of knowledge in this field by hitherto considering the female gender as participants for the study. In another earlier similar study conducted in the same country, Han et al. (2019) assessed the correlation between LTS and other variables such as FS, fertility choice, house purchase among others as it relates to women from twenty-eight provinces selected from rural China. The methodology employed involved the use of a Tobit model for the analysis of the data sets used in the study. Findings from the study revealed that the primary instrument for achieving LTS was the "formal title certificate" issued by the government. The authors further asserted that to increase female's empowerment as it relates to land, viable and sustainable gender-friendly policies needs to be promulgated to narrow the gender gap. In Eastern Europe, Petrescu-Mag et al. (2019) investigated the relationship between agricultural land and FS. Non-parametric tests were conducted on the data sets used for the study. Findings indicated a strong correlation between agricultural land and FS in the study area. In Australia, it was found that FS was linked to productivity farming approaches which were endorsed by both government, farmers and the industry (Hamblin, 2009; Lawrence et al., 2013). In the US, the correlation between climate change and FS was examined by Bizikova et al. (2015). Findings from the study revealed that FS is impacted by climate change, land management and other critical infrastructure. Findings from the aforementioned studies cannot be generalized because of geographical locations, dynamics in the respective economies where the studies were domiciled, gender of participants and the methodologies adopted for each of the studies.

Vast literature focusing on emerging economies of primarily Africa also provided insight into the linkages between LTS and FS. The report provided by Kanayo et al. (2013) asserted that Africa is observed to be the most impoverished region in the world; this has constituted a great hindrance to the development of the region in terms of infrastructure, land-related issues, as well as FS. However, it should be noted that Africa has about fifty-four (54) countries with varying economic dynamics, hence, the above statement might not be true for some of the African countries. In some part of Africa, regardless that the female folk are more involved in farming to provide for the family than their male counterpart, women in most communities are denied access to secured lands. For example, Dokken (2015) examined the variance in access to land by male and female-led households in Ethiopia. Findings from the study revealed bias in land allocation process in favour of the male-led households. This scenario is not peculiar to Ethiopia, studies conducted by Odoemelam et al. (2013) revealed that 48% of women in Anambra engage in farming with limited access to secured land which consequently affects agricultural production in the study area. In another study conducted by Chigbu (2019), the author examined the role women played in impeding their access to land. Findings suggested that what was termed "brother complex" and "self-hurt" were the primary predictors of women's lack of access to land in South-eastern part of Nigeria which gives undue advantage to their male counterpart. This agrees with similar studies conducted by Agarwal (2003), Deere et al. (2003), World Bank (2011) and Dabara et al. (2017) which provided similar results. In terms of the correlation between LTS and FS in Africa, Deininger & Jin (2006) found that LTS influences investment incentives in agricultural lands in Ethiopia.

This corroborates the findings of Chirwa (2008), which was conducted in Malawi. Holden & Ghebru (2016) also found a positive correlation between LTS and FS. The authors (Holden & Ghebru) further revealed that in Africa, LTS, as well as FS, were negatively impacted by social conflicts. Lawal et al. (2019) also found that land conflicts such as the Tula-Awak land contestations negatively impacted on food production in the study area. In Ghana, it was found that land management practises positively impacted on households of smallholder farmers in terms of food consumption and poverty alleviation (Issahaku & Abdulai, 2020).

In Nigeria, all land is vested in the government under the Land Use Act of 1974 (Ankeli et al., 2015a, 2015b; Dabara et al., 2012). Individuals are granted limited tenure rights to such land by the government either through the customary land tenure system or the statutory land tenure system (Ankeli et al., 2017a; Dabara et al., 2019). The FS and food sustainability agenda are possible in Nigeria. The natural blessings in terms of natural resources, human resources, and so on place Nigeria on the right pedestal for sustainable development in all ramifications. Some of the options available to Nigeria were pointed out by renown scholars such as Dabara et al., (2016) and Oluwatayo & Ojo (2016) who argued that development in the agricultural sector is a crucial option for FS in Nigeria. For this to become a reality, all stakeholders must focus on addressing problems/challenges bedevilling the nation in terms of environmental, socio-political, and economic. Key among these challenges are the issues of abject poverty, gender bias policies and agricultural infrastructure deficit. The options and way forward for Nigeria will include mainly, revitalising the agricultural sector, which can play a crucial role in Nigerian sustainability agenda as well as promulgating gender-friendly policies on access to farmland. This is necessary because it has been found that women are more involved in food production at household levels; and that there is a nexus between LTS and FS (Dokken, 2015). Similarly, in Nigeria, LTS was found to significantly impact on production in the Agricultural sector (Dabara et al., 2019). Other factors impacting on FS as observed by scholars include the size of a household, the size of family's cultivable land, and the income level of the household's head (Abu & Soom, 2016). The consensus observed in the literature concerning LTS and FS suggests that there is a causal linkage between the two variables. The explanation given is that farmers with lands that are accordingly secured are motivated to invest maximally with a resultant effect of increased food production. Quite the opposite is observed for unsecured lands. Table 1 presents a summary of land-related theories compiled by Hull et al. (2019).

This study combined two theories (hinged on Hull et al., 2019 conservative and democratic adaptation theories) which are relevant in explaining the relationship between the study's key variables: First is the Komjathy & Nichols' (2001) model of women access to land and housing. This model sees access to land by women as restricted to merely indirect use rights which are dependent on the women's relationship with male relatives as their mothers, wives, sisters, or daughters. The second model is the Garry et al.'s (1996) liberal feminist paradigm which argues that women have been unfairly discriminated against on the grounds of their sex throughout the world. The theory preaches for equality of men and women in the societal systems through changes in the legal and political system to ensure that women are being represented on an equal level.

Table 1: Summary of land-related theories

Theory	Possible Indicators
Conservative	Preservation of customary tenure Broadly African view of land (as a patriarchal or male-controlled asset) Traditional leaders prominent in land administration
Democratic adaptation	Respecting and clarifying existing, legitimate land rights Improving gender equity, accountability and democracy Building on existing customary practices
Hybrid adaptation	Combination of statutory and customary arrangements Participatory approach: communities decide which rights are recorded
Incremental adaptation	Titles are a long-term objective Extra-legal, off-register practices recognised as legitimate Spontaneous titling according to need
Incremental replacement	Titles are the desired end state Customary tenure provides sufficient tenure security Legal recognition of customary tenure and adjudication practices
Evolutionary replacement	Land rights spontaneously evolve towards individualisation Titles are required for tenure security
Collective replacement	Nationalisation of all land/collective farming villages Equitable distribution of resources and services Democratisation of traditional leadership Improved productivity and self-reliance
Systematic titling	Titles are required for tenure security Titling leads to economic development Customary tenure must be replaced

Source: Hull et al., 2019

The motivation for this study borders on filling the identified gap in literature, which is the dearth of studies that focused on LTS and FS in female-led households in communities where agriculture is the primary occupation and means of sustenance. Furthermore, women tend to have land rights that are weaker in comparison to their male counterpart in the African context. Even though in most agrarian settlements, women are usually saddled with the responsibility of providing food for their respective households through subsistence farming. This becomes a source of concern because LTS is a significant determinant of land-related investments.

3. METHODOLOGY

The study area is Tula Baule in Kaltungo Local Government Area of Gombe State, Nigeria. It lies between latitude 9.8709⁰N and longitude 11.5134⁰E; it is located about 100 kilometres from Gombe, the state capital. It was the first headquarters of the Tangale-Waja Native Authority in the year 1915. Tula has vast fertile agricultural land for farming which is the principal occupation of its inhabitants. Tula Baule is made up of three Yaati (villages) namely: Yaa Bwadiye which have four Bintu (clans) comprising Biladira, Bilakwate, Kwallam and Bwatai. Yaa Balira has three Bintu, which are Lobuse, Loture and Lofine. The third Yaa is Yaa Dakitibe comprising of the Bintu Taule, Busem and Bilakwale. The respondents for this study were drawn from all the Yaati and Bintu, as mentioned. Each of the Bintu is made up of several Lo (hamlets) from where the research participants were purposively selected. The study

focused on LTS and FS at the household level rather than global, continental, national or regional levels. This is because the participants are all subsistence farmers whose primary intent of farming is to provide food for their immediate households and not for commercial purposes.



Figure 1: Map of Tula Homeland

Source: https://joshuaproject.net/people_groups/15623/NI

This study used the qualitative research design. The study was based on the constructivist paradigm in line with an earlier study conducted by Guba & Lincoln (1994). Furthermore, both the conservative and the democratic adaptation theories which are relevant in explaining the relationship between the study's key variables were used as the significant underpinning for the study (Hull et al., 2019). The researchers conducted in-depth interviews (audio-recorded) with female household heads in the three Yaati and ten Bintu of Tula Baule. The respondents were drawn from individual Lo. Female household heads who were ascertained to be the oldest in their respective Lo and had led their separate households for not less than five years were purposively selected to participate in the research work. Interviews of participants were concluded when a point of data saturation was reached (that is a point where no new information was received but a reoccurrence of the answers previously given by the prior interviewees). At this point, a total of nineteen participants across the three Yaati had been interviewed. From Yaa Bwadiye, three participants were selected from Biladira, and two from Bilakwate, Kwallam and Bwatai respectively. From Yaa Balira, two participants were selected

from Lobuse, Loture and Lofine, respectively. Furthermore, from Yaa Dakitibe 2 participants, each was also selected from Taule, Busem and Bilakwale.

The interviews were conducted in Tula language (that is the native language spoken by all the interviewees); this is because most of the participants do not understand the English language. The interviews were conducted between February and March 2020. All the interview sessions were duly recorded, and the responses of the respondents were subsequently translated to the English language and then transcribed using the Atlas.ti software. From the relevant details offered by the interviewees, the researchers were able to develop themes and patterns from the available data. Similarly, in line with previous studies such as Maxwell (2005), relevant quotes from the interviewees were included to substantiate the findings in the study.

The primary source of data for this study was one-on-one interviews conducted by the researchers with the participants. As a prelude to the interviews, the participants were duly informed of the purpose and procedure of the interview. They were also informed about the protection of their confidentiality. With the permission and consent of the interviewees, the sessions were audio-recorded using mobile phones; this was to ensure a complete and accurate transcript. A structured interview guide was used to elicit for rich data that could subsequently be used in qualitative analysis. The open-ended questioning approach was used to encourage the participants to respond to the questions freely. Probing questions were sometimes used to make the participants elaborate and clarify issues. Most of the interview sessions lasted between 15 to 20 minutes. The questions asked borders on the level of LTS among female-led households of Tula agrarian settlement; the level of FS among the selected households, and the relationship between LTS and FS in the study area (see Appendix I).

Analysis of data collected from the field was done in three phases. Firstly, the translated audio recordings were transcribed verbatim using the Atlas.ti software, this was to enable the researchers to carry out accurate analysis and subsequently interpret the data obtained. The interview transcript was reviewed by the researchers to identify recurring regularities, as well as quotes and phrases that were relevant to the study. These transcripts were coded accordingly and categorised using the Atlas.ti software. Secondly, the researchers used the coding to establish relationships between and across the transcribed data by creating quotations and appropriate codes which were eventually linked accordingly. Thirdly, the researchers created semantic networks from the quotations and codes, which were thus, given appropriate interpretations and drawing out inferences from the analysed data employing thematic content analysis.

4. RESULTS AND DISCUSSION

Analysis and discussion of the data obtained for the study were done in four subsections. The first subsection addressed significant findings concerning LTS. The second subsection presented the results and discussion concerning FS. The third subsection discussed the issue of sustainable LTS and FS in the study area, while the fourth subsection presented and discussed data on the relationship between LTS and FS in the study area.

4.1 Level of LTS among female-led households of Tula

The first research question of the study, which concerns the level of LTS among female-led households of Tula agrarian settlement was addressed in the first subsection. Four LTS themes emerged from the interviews which were analysed using the Atlas.ti software. This was shown on the semantic networks in Figure 2; the four themes include the type of tenure system practised; means of land acquisition; availability of documentary evidence on land acquired; and perception of security of land by the participants.

From the participants' responses, which was further depicted on the semantic networks in Figure 2, it was revealed that firstly, the dominant land tenure systems practised in the study area were mainly the customary and informal tenure systems. This finding is congruent with similar African based studies such as Lawal et al. (2019) and Dabara et al. (2019). Secondly, the participants identified three means by which they acquired their land, which include purchase, leasing and squatting. It was revealed that none of them acquired their land through direct inheritance (except for lands inherited by their husbands or male children). In the literature, it was observed that most African communities do not allow women to acquire land through inheritance. In studies such as Dokken (2015), Lawal et al.; Dabara et al., and Chigbu (2019), there is consensus that the girl child cannot inherit her fathers' land in the African context.

Similarly, a widow cannot inherit her late husband's landed property. It will either be inherited by her male children or her male in-laws. It is easier for the female gender in such communities to access land through purchase, leasing or squatting as seen in this present study. Thirdly, it was revealed that most of the participants do not possess any written documentary evidence to support their claim of land ownership. When asked whether they felt their land was secured or not, surprisingly, most of the respondents answered in the affirmative regardless of documentary evidence. One of the participants have this to say

“The lands are secured because if anyone tries to take it, the elders and mai anguwa (clan head) will intervene”. (Interviewee number 5, February/March 2020).

She believes that the elders and clan-heads who are custodians of culture and traditions also plays a role in land security in the community. In a similar study Dabara et al. (2019, p.56) asserted that the feeling of LTS regardless of documentary pieces of evidence could be because “in such communities, contestation and conflicts over land ownership are minimal since almost everyone knows each other, and which land belongs to which family”. Another participant claims that the gods of land also plays a significant role in LTS in the community.

“We do not have the problem of tenure insecurity in this village. You cannot claim someone else's land. Except if you want Feloh (ancestral gods) to strike you dead or put sickness on you”. (Interviewee number 14, February/March 2020)

This present study suggests that the belief and fear of the Feloh (ancestral gods) contributed immensely to the feeling of LTS in the study area. Most of the interviewees believe that Feloh always metes out judgement to land trespassers. This contradicts the findings of some similar studies such as Cheng et al. (2018) and Han et al. (2019) where it was asserted that LTS was achieved through securing of formal title certificate.

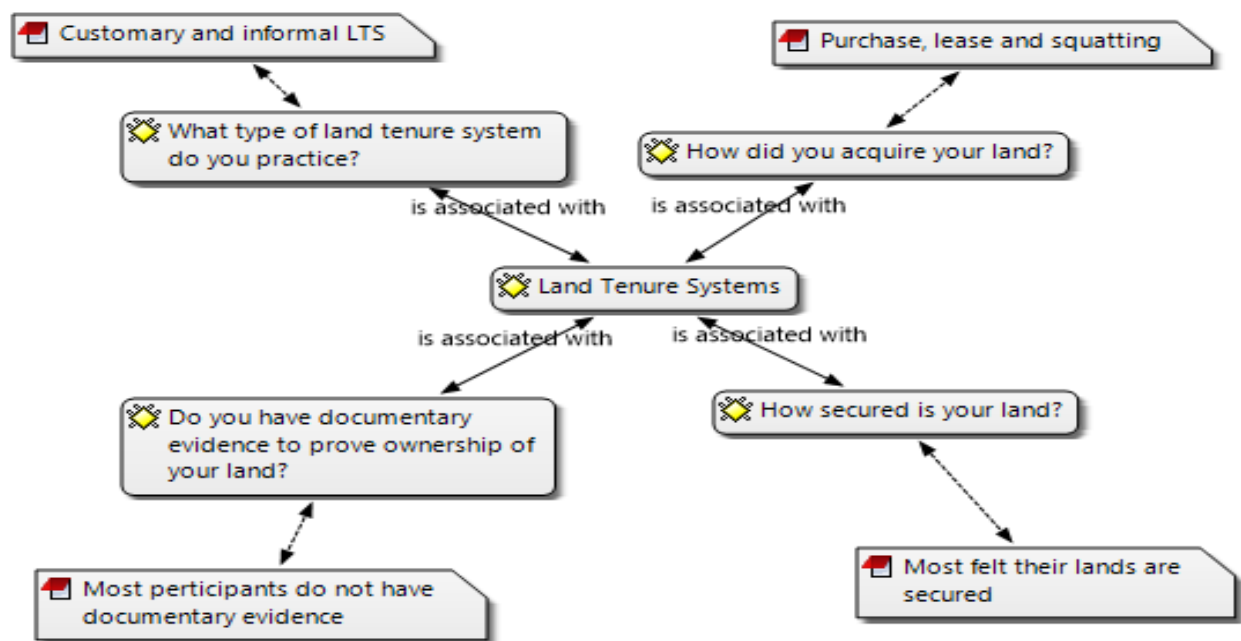


Figure 2: Semantic networks on land tenure security among female-led households of Tula agrarian settlements

4.2 Level of FS among female-led households of Tula

This subsection addressed the second research question of the study, which focused on the level of FS among the selected households of participants in the study area. Four FS themes emerged from the interviews which were depicted on the semantic networks in Figure 3. The four themes include food availability, food accessibility, food utilisation and food sustainability. However, this study focused on food access at the household level in line with similar studies (Ingawa, 2002; Babatunde et al., 2008). When the participants were asked whether their respective households had access to three square meal per day from January 2019 to December 2019 (the study period), most of the participants indicated that they did not. A few of them, however, revealed that they did have access to three square meal per day within the study period.

From the responses, it was observed that most of the participants do not have access to three square meals per day within the study period.

“Sometimes we eat three times a day, but most of the times its either once or twice a day”. (Interviewee number 3, February/March 2020)

“Most of us in this village live in poverty; we hardly have three square meal per day”. (Interviewee number 13, February/March 2020)

This finding agrees with Babatunde et al. (2008), where it was revealed that over 70% of Nigerians do not have access to three square meals per day. Similarly, Dabara et al. (2019) found that only 25.1% of respondents in a study conducted in Southwestern Nigeria had access to three square meals per day. This situation is quite pathetic; there is need for all stakeholders to put their hands on deck to ensure that the Sustainable Development Goal (SDG) of achieving access to food and zero hunger for all people (SDG target 2.1) by the year

2030 is achieved. However, very few of the respondents attested to the fact that they had access to 3 square meals per day. For example, one of the participants had this to say:

“Our family have access to three square meals per day, except when anyone does not feel like eating. Not because we do not have food but for any personal reason like sickness, or you do not like what was cooked or when you engage in fasting for religious purposes”. (Interviewee number 7, February/March 2020)

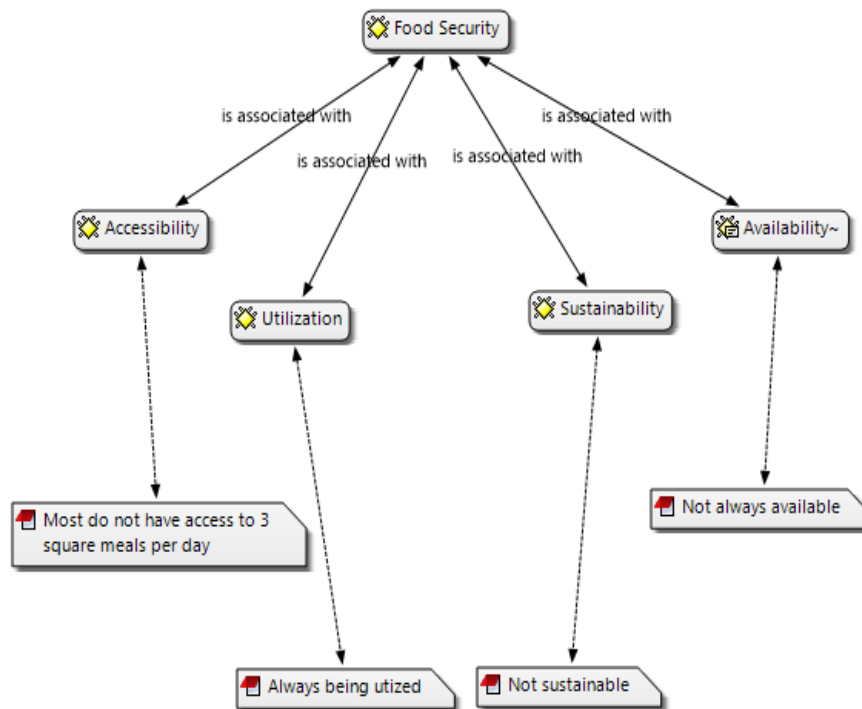


Figure 3: Semantic networks on food security among female-led households of Tula agrarian settlements

4.3 Sustainable Land and FS among female-led households of Tula

This subsection addressed the third research question of the study, which centred on sustainable land and FS among female-led households of Tula agrarian settlements. Nine sustainable land and FS security themes emerged from the interviews which were depicted on the semantic networks in Figure 4. The nine themes include promulgation of female-friendly laws and policies; provision of improved seeds/seedlings; modern method of farming; government intervention; provision of fertilizers; irrigation farming; provision of finance; labourers/human resources; and modern farming tools.

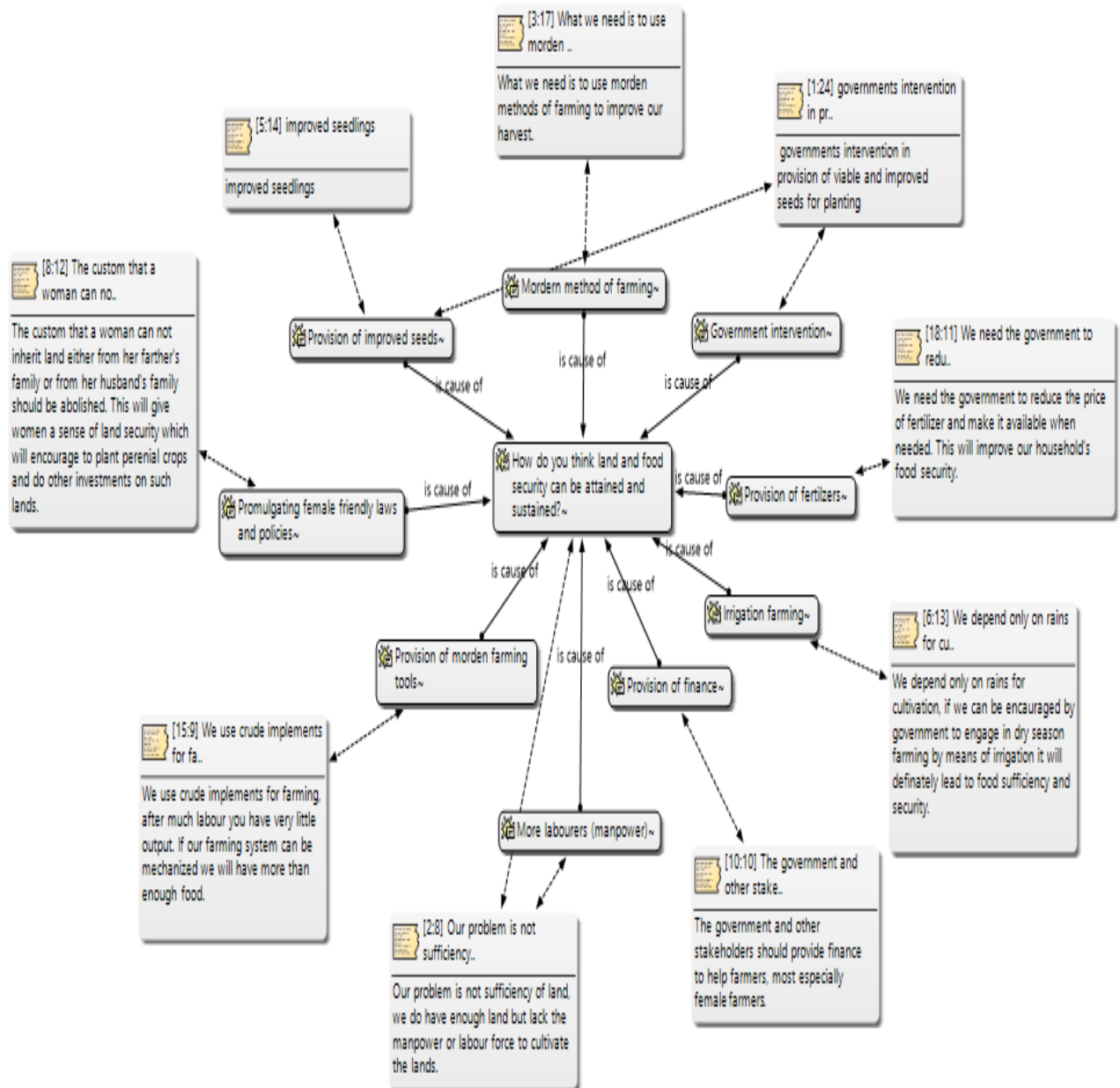


Figure 4: Semantic networks on sustainable land and food security among female-led households of Tula agrarian settlements

When asked what could be done to ensure sustainable LTS and FS in the study area, the participants provided the following suggestions. Some of the participants believed that if the female gender were given the same privileges as their male counterpart for a land inheritance, it would go a long way in mitigating the situation, hence leading to LTS.

“The custom that a woman cannot inherit land either from her father’s family or from her husband’s family should be abolished; this will give women a sense of land security which will encourage them to plant perennial crops and make other investments on such lands”. (Interviewee number 8, February/March 2020)

Another interviewee was of the opinion that widows should be protected from bad in-laws who usurp their rights by forcefully collecting their lands for selfish reasons.

“There should be strict laws and policies to protect widows from their in-laws who forcefully take away the lands left for them by their late husbands”. (Interviewee number 4, February/March 2020)

The participants indicated desire that the community leaders and the government should promulgate female-friendly land-related laws and policies. Others opined that provision of improved seeds/seedlings could lead to sustainable FS. All the participants are subsistence farmers who still use the traditional method of farming; it was suggested that the introduction of modern methods of farming could be a precursor to sustainable FS. Government interventions in the areas of finance, agricultural loans, provision of fertilizers, among others were some of the suggestions made by the participants. Some of the participants believe that introduction and encouragement in irrigation farming, as well as the provision of modern farming tools, will significantly mitigate the precarious situation experienced by the female-led households in the study area. It was suggested that financial intervention for particularly female affected households should be made available in terms of soft loans and interest-free loans. Removing gender inequalities and discrimination as well as the introduction of modern agriculture will improve FS in especially female households of emerging economies.

4.4 The Relationship between LTS and FS in Tula

This section addressed the fourth research question of the study, which determined the relationship between LTS and FS in the study area. The responses of participants suggested a relationship between LTS and FS in the study area. Some of the participants ascertained that they could not plant trees or perennial crops because of the uncertainties associated with their farmlands (for example, they are not sure if the family will allocate the same piece of family land to them for cultivation the next farming season). Others (especially widows) showed fears that their male in-laws might forcefully take the family farmland from them, which negatively impacts on their investment decisions on such lands. Studies such as Deininger & Jin (2006), Dokken (2015), Holden & Ghebru (2016), Lawal et al. (2019) and Dabara et al. (2019) also revealed that there is a strong correlation between LTS and FS. The implication is that for a sustainable FS, there is a need first to address the issue of LTS in all households.

5. CONCLUSION

This study examined the relationship between LTS and FS from the perspective of African female-led households in Tula, Nigeria. The study investigated whether lands cultivated by female-led households in Tula agrarian settlements are secured and whether such households have FS within the study period. The importance and significance of LTS and FS are well established in agrarian settlements of emerging economies of primarily African context. While a school of thought posited that possession of documentary evidence of ownership in the form of title registration provides LTS and consequently FS, another school of thought submitted that LTS could be achieved regardless of lack of title registration or documentary evidence. Findings from this study revealed that all but few respondents believed that they had LTS without recourse to documentary evidence of ownership. They believe that Feloh (ancestral gods) will mete out judgement to land trespassers; hence, the feeling of tenure security without recourse to written documentary evidence. This agrees with Abdulai &

Owusu-Ansah (2014), who asserted that documentary evidence of ownership was not necessarily linked to land tenure security in a study conducted in Ghana. However, it disagrees with the study conducted by Han et al. (2019) where documentary evidence in the form of formal land title certificates was the primary criteria for LTS. Similarly, all but few respondents do not have access to three square meals per day throughout the study period. The study also found a strong relationship between LTS and FS in the study area. This is congruent with findings from the literature in studies such as Dokken (2015), Holden & Ghebru (2016), Dabara et al. (2019) and Keovilignavong & Suhardiman (2020). The underlying dynamics between LTS and FS nexus has been consistent in literature which this study also highlighted. We believe that LTS for female-led agrarian households of Tula must be improved (through the eradication of female gender bias/inequality in the land allocation process in Tula) if the LTS and FS nexus is to be positively achieved sustainably.

The findings in this paper can plausibly be used for policy implications. The implication of this study for especially developing economies in Africa is that to ensure FS for especially agrarian households, farmers need to have LTS as this encourages investments in the secured land which consequently translates to availability and access to food for household consumption. The study also provided information that can be used by stakeholders such as the government, philanthropists, NGO's and concerned individuals in making informed decisions and policies that could lead to sustainable FS among, especially female-led households. It was recommended that governments and policymakers need to promulgate female gender-friendly policies to encourage and facilitate land ownership and access to females, thereby removing gender inequalities and discrimination in the land allocation process. Similarly, financial intervention for particularly female affected households should be made available in terms of soft loans, interest-free loans; and, the introduction of modern agriculture in agrarian settlements of primarily developing economies to enhance the possibility of their achieving the SDG goal of access to food and zero hunger for all people (SDG target 2.1) by the year 2030.

The study, however, has some limitations, it focussed on only female-led agrarian households, and its geographical coverage was limited to only Tula agrarian settlements. The implication of this is that the findings of this study cannot be generalised. This is because similar studies conducted on different geographical locations, gender, cultures etc may present different results. Hence it is recommended that for further studies, researchers can consider including all genders in the study as well as having a broader geographical coverage.

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Appendix I: Research questions and interview guide questions

Research Questions	Interview guide questions	Purpose of the question(s)
Preliminaries	To what Yaati (Village) do you belong?	To identify and select participants.
	Which is your Bintu (Clan)?	
	To what Lo (Hamlet) do you belong?	
	Who is the oldest female household head in your Lo?	
	How long have you been the household head of your family?	
What is the level of LTS among female-led households of Tula agrarian settlement?	What type of land tenure system do you practice?	To determine the level of LTS of the participants.
	How did you acquire your land?	
	Do you have documentary evidence to prove ownership of your land?	
	How secured is your land?	
What is the level of FS among the selected households?	What are your experiences with respect to food availability, access, utilisation and sustainability in 2019?	To determine the level of FS in participants' household.
	Do you at all times, have physical and economic access to sufficient, safe and nutritious food that meet your dietary needs and food preferences for an active and healthy life?	
	Do you always have access to three square meals a day (that meets the presiding question's requirement) from January to December 2019?	
How can sustainable land and FS be achieved in the study area?	What do you think can be done to attain and sustain land and food security in Tula community, especially among female-led households?	To identify and examine factors that could facilitate LTS and FS in the study area.
Is there any relationship between LTS and FS in the study area?	In your opinion, is there any relationship between LTS and FS?	To determine the relationship between LTS and FS in the study area.

Gender Land Right Issues under the Customary System of Ile-Ife, Nigeria

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Purpose: This study examines women's land rights under the customary system of Ile-Ife, Nigeria, intending to provide information that could inspire efforts to change women's lives and inform land policy.

Design/methodology/approach: A qualitative research approach was used in this study. Four key informant interviews and 13 structured interviews with rural women farmers were conducted during fieldwork in Ajebandele village, Ile-Ife, Nigeria. Purposive and stratified sampling were used, respectively. In both cases, the interviews were conducted in the local language (Yoruba). The respondents' opinions were recorded using an audio recorder, interpreted, transcribed, and analysed through content analysis.

Findings: The study discovered, among other things, that the customary land tenure system in Ajebandele village, Ile-Ife, Nigeria, has been refined over the last four decades to benefit women. Men and women have equal access to land rights in terms of land availability and affordability. Despite the progress, the study concludes that gender equality has not been wholly realised because rural women farmers lack tenure security.

Practical implications: The findings confirm custom and tradition as a principal barrier to women's secure land rights. Governments and society can address women's insecure land rights through advocacy and awareness campaigns to revolutionise the community's mind-sets and practices.

Originality/Value: This study appears to be the first that examines women's customary land rights in Ile-Ife, Nigeria, thus contributing to the knowledge base on this topic.

Keywords: Access to and control over farmland, land administration, gender inequality, tenure security.

1. INTRODUCTION

Land rights issues have a long history and are rooted in patriarchal descent worldwide. Land and land-related matters have always been regarded as "an all-men's affair". This is the supposed perception of customary land ownership and management structures and has become the belief of many (Bonye & Kpieta 2012). The provisions for women's land rights are ambiguous, especially within the customary systems. Access to land rights is governed by socio-cultural norms, which have profound effects on gender relations. Women face

discrimination when it comes to exercising their land rights. (Njieassam, 2019). The historical usurpation of women's land rights has created marginalisation and frustrations among women. Women have no incentive for food production and investment in farmlands because of the strength of women's access to land rights (Schurmann et al., 2020). Studies have suggested that women should have direct and visible autonomy in obtaining access and control over resources and participation in economic and political decisions (Berhane & Miruts, 2015).

Countries all over the world have been making policies towards the provision of gender-equitable land reform. However, the implementation of these gender-based policy reforms has been challenging (ibid). In traditional African society, custom and tradition remain a significant impediment in effecting strategies that support gender-equitable access to land rights in rural communities (Njieassam, 2019; Massay, 2020). A study that examined the implementation of customary land policies in Amhara, Ethiopia, discovered that programmes supporting women's equal access to land rights did not result in the requisite community improvements (Askale, 2005). Similar studies conducted in Cameroon (Fon 2011; Njieassam, 2019), Ethiopia (Berhane & Miruts, 2015), Ghana (Dery, 2015), Zimbabwe (Thobejane & Murisa, 2015) and Tanzania (Moyo, 2017; Massay, 2020) established that rural women farmer lack sufficient access to land. These studies further suggested that women cannot farm cash crops and participate in other programmes that could improve their socio-economic status due to insufficient access. Dowuona-Hammond (2003) attributes women's insufficient access to land to higher poverty levels and other stresses.

Nigeria is among the agrarian nations of West Africa, where access to land is crucial as land is the primary source of rural livelihood. Over the years, the land tenure system in Nigeria has undergone several reforms. The Land Use Act (LUA) of 1978 currently regulates land rights throughout the country. Before 1978, Nigeria operated customary land tenure systems. These customary systems were administered under the customs of the indigenous communities and varied from one locality to another. One common feature across the customary systems before 1978 is that land was communally owned. Landholding right was vested in the village, community, family, or kinship. "Individual grantee is held to possess usufruct rights over land granted him" (Aluko & Amidu, 2006, p.3). In addition, the customary systems were characterised by discrimination against women in land matters. Women did not have equal land rights with men, thus subjugating women's socio-economic and political rights under the dominations of their male counterparts.

The Land Use Act (LUA) was passed on March 29, 1978, in response to the inherent gender imbalance in land access and other problems with the customary systems. The Act was enacted to integrate the country's land tenure systems, make land more accessible to all Nigerians (male and female) and promote equity and justice in land allocation and distribution. The LUA differentiates two types of landholding systems: statutory (at the state level) and customary (at the local government level). The state government will give a statutory right of occupancy in urban lands, while the local government will give a customary right of occupancy in rural lands. The Act also established Land Use and Allocation Committees (LUAC) at the state level and Land Allocation Advisory Committees (LAAC) at the local government level. These new agencies provide land-related advice to the state and local governments, respectively (Chapter L5 Laws of Federation of Nigeria, 2004).

In many rural communities, women face prejudice, stereotyping, or unfairness in accessing customary land rights. Women's claims to land are determined by the men, which is reinforced by "cultural norms, coupled with other forms of social capital – marriages, the patriarchal system of inheritance, the sexual division of labour, social class and decision making" (Dery, 2016, p.33). Women depended on their male relations for land rights, while men did not depend on their relationship with women for land rights (Aluko & Amidu, 2006). Women would face dispossession threats if marital conflicts led to divorce or separation and at the death of a husband. These unjust land access pattern "has led to feminisation of poverty and the disempowerment of women from society to national level" (Thobejane & Murisa, 2015, p.44). The customary system in Ile-Ife, southwest Nigeria grants equal land access to both men and women, and women are allowed to inherit land from their husbands (Ogbu & Iruobe, 2018). However, there is no evidence on the status of women's land rights in the study area's customary land allocation process. Therefore, it is unclear whether the LUA's requirement for equitable land allocation requires action.

This study is significant as land monetisation, and the global land rush erodes women's access to land and farm production. This is especially true in Ajebandele, where the majority of the farmers are women. Access to land is a composite term referring to the availability of land, affordability of land, ease of transactions and tenure security. Feminist economic theories have been developed and extended to explain gender stereotypes that seem skewed in favour of men. In their attempt to understand gender discrimination, feminists differ widely in their analyses of the origins of gender inequality and what situates gender injustice. This study employs Garry et al. 's (1996) liberal feminist theory to examine women's access to land rights in Ajebandele village, Ile-Ife, Nigeria, utilising all four components of access to land. This is to provide information that could inspire efforts to change women's lives and inform land policy and legislation. The overarching research questions addressed by this study include: How is customary land allocated in Ile-Ife? What is the status of women in access to land rights in the study? What factors limit women's access to land in the study? The second section below presents a summary of relevant literature, the third section details the methods used for the study, the fourth section discusses the findings and the fifth section contains the concluding remarks.

2. LITERATURE REVIEW

2.1 Gender and land rights

Gender is a sex-role identification that emphasises the differences between males and females. Gender is a vital theoretical instrument in the debate over women's rights and prerogatives to social and material capital (Almaz, 2007). In many facets of society, including households, social, economic, and political institutions, gender discrepancies occur. According to the United Nations, gender imbalance originating from women's lower social standing exists in all facets of the society (households, social, economic, and political institutions). However, the size of the difference varies between nations, cultures, and time. Many scholars have drawn attention to gender and inequalities in land tenure systems. Massay (2020) in a recent study affirmed that specific customary practices continue to deny women of their land rights and that these traditions should be addressed. However, a few studies in Ghana suggested otherwise. While Woodman (1985) insisted that there is no

problem of gender inequalities in land tenure, Bugri (2008), on the other hand, reported that women's access to land is improving as a result of migration, education and economic change in rural communities. It is also said that, even though males appear to predominate, there is no sex discrimination or restriction on access to land for any purpose, including farming or home construction (Bonye & Kpieta 2012). Findings from the above-mentioned studies cannot be generalized because of differences in geographical location, cultural norms of the study area and the methodologies adopted for the studies. Hence, this present study extends the frontier of knowledge in this subject by considering gender land right issues under the customary system in Ile-Ife, Nigeria.

The drive to address gender inequities had led to the creation of ideas by women economists to explain their oppression, and as a result, feminism as an ideology was established. The concerns of feminist economists came from the traditional economic theory's strong denial of gender marginalisation. Feminist economists asserted that traditional economic theories skew gender relations favouring men, depicting women as dependent on fathers, husbands, or male partners. Feminists argue that this ideology encourages women's reliance on men, their secondary place within the household and community and their isolation from decision-making. This study employs Garry et al.'s (1996) liberal feminist paradigm to examine discrimination against women's access to customary land rights. The Garry et al.'s model contends that women have been unfairly discriminated against because of their gender throughout history. The theory advocates for gender equality in societal systems by enacting legal and political systems to ensure that women are represented on an equal footing. In line with Thobejane & Murisa (2015), the rationale for using Garry et al.'s model as a theoretical framework for this study is the model's emphasis on reforms in the legal and political institutions to ensure that women are represented on an equal footing.

2.2 Women's land right in context

Land rights are seen as one of the most important and effective means of maintaining long-term human development (Dabara et al., 2019). Land rights include ownership, utility, access, control, transfer, exclude, inherit and other types of land-related resource decisions (Berhane & Miruts, 2015). Akuna (2004) asserted that women's land rights must be recognised in terms of "access and control" to guarantee rights' security. According to Duncan (2004), access to land is the right to enter upon and use land in which such rights are usufruct rights. On the other hand, control over land is based on ownership and use decisions; this establishes the command of that individual over the land and the benefits derived from the land (Lastarria-Cornhiel, 1997). Securing women's access and control over the land they depend on for food security, shelter, security and family wellbeing is critical to women's empowerment (World bank, 2020). Agarwal (1994) also explained that women whose land rights are secure could get better social facilities because they have the income. According to Berhane & Miruts (2015), secure land rights are long-term, enforceable, appropriately transferable, and legally and socially legitimate. Berhane & Miruts, however, observed that women of developing nations, especially of Sub-Saharan Africa, have been in a distinctive social dilemma. Women's right to land is contingent on 'the socially embedded nature of land', which is favourable to men (Dery, 2016). The social system enforces men domination, reinforcing and perpetuating the systemic oppression, exploitation, and subordination of the women category (Walby 1990). Although women have legitimate land rights, they are seldom recognised socially or effectively enforced (Almaz, 2007). Therefore, "women's land rights need a deep

understanding of the relationship between legal and social recognition as well as the relationship between legal provisions and enforcements" (Almaz, 2007, p.11).

Studies such as Knight (2010) and Massay (2020) pointed out that women in Tanzania have been unable to exercise their land rights in practice despite its inclusive land law. Rural women farmers in northwest Cameroon have access to farmlands through their families, but they do not control the land (Fon, 2011). Berhane & Miruts (2015) reported that rural women's equitable access to and control over land was not fully realised in Tigray, Ethiopia. Dery (2015) noted that women in the rural communities do not own or control land in Ghana's Upper West region. Women's rights of access to and control over land were argued to be a subject of negotiating or bargaining with men as landlords (ibid). Thobejane & Murisa (2015) documented that women's land ownership is still contentious in Norton, Zimbabwe. Indigenous women in Cameroon also lack control and ownership rights to land, according to Njieassam (2019).

Evidence from the above studies further suggested that rural women farmers lack tenure security. Tenure security is when a person or household are "protected from involuntary removal from their land or residence" (Durand-Lasserve & Payne, 2012, p.9). Bazoglu & UN-Habitat (2011, p.5) also perceived tenure security as "the degree of confidence that land users will not be arbitrarily deprived of the rights they enjoy over land and the economic benefits that flow from it". Ghebru & Lambrecht (2017) found that tenure security is strongly associated with gender in Ghana; male household heads' land was relatively more secure than female household heads. Evictions, displacements, and encroachments have compromised women's land rights (Haywood et al., 2008). Dery (2016) reported cases of women losing access to lands that they toiled to clear or invested in during previous years without prior formal notice. Odoemelam et al. (2014) earlier declared that approximately 13% of the women in their study were refused access to land following a long period of fallow. Women are also dispossessed of their land right whenever their social relationship with a male family member end; a woman in a broken, divorced, or widowed union often loses her right to land (Runger 2006). Tenure insecurity is observed as one of the significant factors contributing to stagnating economic development among women landholders (Dabara et al., 2017). Sadly, Nigeria is among the countries where tenure insecurity rates were higher for women than for men (see Prindex, 2019).

Women applying for access to land right may face some challenges. In most farming communities, women face attitudinal impediments such as believing that women lack basic farming knowledge and a lack of self-confidence in making individual farming decisions (Enete & Amusa, 2010). Women's land ownership is viewed with suspicion in society, there is a perception about property misuse by women, and women face harassment when engaged in land-related transactions (International Organization for Migration, (IOM), (2016). More so, women seeking access to land right face bureaucratic obstacles, gender disparities within procurement systems dominated by men, a lack of awareness about the procedure, and low mobilisation of women's advocacy organisations around land ownership applications (Moyo, 2007).

2.3 Factors limiting women's land right

Factors limiting women's access to land rights are categorised as custom, tradition and religion (Moyo, 2017; Chigbu et al., 2019); cultural or legal constraints (Berhane & Miruts, 2015; Thobejane & Murisa, 2015); inheritance and gift (McDonald, 2011; Dancer, 2015); intra-household practices (marriage/divorce, bride price/dowry and polygamy) (Chu, 2011); non-implementation of strategies and laws governing land rights (Almaz, 2007; Massay, 2020); lack of educational/awareness and enforcement (McDonald, 2011; Giovarelli, 2016); inability to participate in public life and decision-making processes (Dery, 2016; Njieassam, 2019); financial constraints and the high illiteracy rate among women (Agana, 2012) and women's health status and "actions or inactions" (Chigbu, 2019). Thobejane & Murisa (2015) reported that the cultural practice of patriarchy remains the significant oppressive and unjust social system that limits women's right to land. In addition, women do not have the available resources needed to meet land ownership requirements (ibid). Furthermore, inheritance practices entail the parents distributing their land among their male children. However, McDonald (2011) reported that the norm is changing in Kanungu, Uganda, and parents are starting to include their daughters in the distribution process.

According to existing research, women in Africa have historically had difficulty gaining access to secure land rights. Women's access to land right under the customary systems is often nuanced by systemic and discriminatory practices reinforced by culture, patriarchal system of inheritance, custom and tradition. Africa has about fifty-four (54) countries with each country having different customs and traditions that regulate access to customary land rights. This study examines gender land right issues under the customary system of Ile-Ife, Nigeria, with a specific focus on whether the LUA, 1978 has affected women's land right in the study area. Therefore, this study intends to contribute to existing literature on gender and customary land right by developing and disseminating new knowledge that can educate policymakers and feminists on women's land rights issues.

3. METHODOLOGY

The research was conducted at Ajebandele village, a rural neighborhood in Ile-Ife, Osun State, Nigeria. The village is located in a tropical rain forest with an abundance of agricultural land; the soil texture ranges from medium to fine and usually is well-drained. The two seasons that characterize the climate are the wet season (April to October) and the dry season (November to March). Ajebandele is home to about 600 individuals from various ethnic groups, most of whom speak Yoruba (Deji & Solomon, 2020). The majority of the residents are subsistence farmers who grow cassava, yams, cocoa, and maize. Ajebandele is a typical agrarian settlement, with more women farmers than men, typically three women for every two men. According to Baale (the village's traditional head), Ajebandele is organised into six communities, each with an average of 60 women out of a total population of 600. Ajebandele, like other agrarian settlements in southwest Nigeria, has a customary land tenure system in which entities such as the community, clan, or family have the right to land ownership.

The study employed a qualitative analysis technique focused on feminist empirical methodology to address issues from a gender perspective. Data were collected using a key informant interview with community leaders and a structured interview with rural women farmers. While the key informants were purposively selected, women farmers were selected

using stratified sampling. First, the women were grouped into the six communities that made up the village. Next, women were randomly selected from each community. The sample's determination for this study followed the recommendations in Creswell & Poth (2018) that the required number of participants in qualitative studies depends on when a point of saturation is reached. Thus, both groups of respondents were continuously interviewed until a point of saturation was reached. In all, saturation was reached with four key informant interviews and 13 women farmers (two women from five communities and three women from one community). The 13th woman was required to achieve saturation. The key informants consisted of four of the six community heads in the village. They played a significant role in allocating customary land and provided detailed and reliable information on the subject matter. On the other hand, the women farmers were chosen because they would provide information on how they acquire land.

The research questions include: What is the customary way of allocating land in Ile-Ife in 2019 compared to the norm prior to 1978? What is the status of rural women in access to land rights in terms of land availability, affordability, tenancy security, and transaction ease? What are the factors limiting women's access to land right in the study area? All interviews were conducted between October and November 2019 using a structured interview guide in the local language (Yoruba). The research questions in the interview guide were the same for the two groups. An audio recorder was used to capture the respondents' answers to each of the study questions. The responses were gathered, translated, and transcribed into writing. After completing the transcription, the analysis was carried out using content analysis and narrations, which identified several themes.

4. DISCUSSION OF FINDINGS

This section discusses the findings on gender and access to land rights in Ajebandele village, Ile-Ife, Nigeria, in 2019. The themes that arose through content analysis are discussed and organised by the research questions. Some respondents' comments are incorporated in the text to help in discussing the study's findings.

4.1 Customary Way of Allocating Land

This subsection addresses the first research question (What is the customary way of allocating land in Ile-Ife in 2019 after the LUA?). Customary land is that which is owned by indigenous communities and administered following their customs. Key informants and women farmers explained the customary land allocation system in the study area. The responses received from the two groups of respondents are discussed below.

4.1.1 Key informant interviews

When asked about the customary way of allocating land, the key informants' responses revealed different classes of land and land allocation process as highlighted below:

Classes of land

Box 1

- There are three classifications of land in the study area; family land, community land and palace land.
- The classification is dependent on how the land is managed and controlled and how the incomes are distributed.
- The family members own and manage the family land; the village Baale and Chief Lukosi of Ile-Ife manage and administer the community land. The palace manages and governs the palace land.
- The income generated by the palace land is split into three parts: one for the labourer, one for the Lukosi compound, and one for the palace.

Source: Field Data, 2019

Land allocation

According to the key informants, the method of land allocation has changed since the LUA's passage. Prior to the LUA, land was acquired by first settlement. People were often given land without any documentation or payment, and these practices resulted in land disputes. The key informants highlighted the following changes in the land allocation process:

Box 2

- Land allocation in the village was entirely the responsibility of the community head.
- Currently, a committee oversees allocating land to everyone in the village interested in agricultural practices (regardless of gender).
- Individuals seeking land must provide a guarantor.
- Land allocated to individuals is documented.
- Land allocated is leased rather than sold.
- The allocatees bring wine to the elders for blessing and pay a tribute (a portion of the farmland's proceeds)
- The tribute is a form of a pledge given to the property owner for the leased land and is usually made once a year or as agreed upon by the parties.
- The tribute payable is dependent on the farm's proceeds and is renewable each year to account for fluctuations in the proceeds of the land.
- In some instances, cash payment is made before planting. Pay arrangements are based on mutual consent.
- Allottees in subsequent reallocations will be required to pay 3000 Nigerian Naira (7.9 USD) as an entry fee in addition to an agreed-upon tribute after each farming season.

Source: Field Data, 2019

In addition, the key informants noted that women's land access has improved. According to the reports, land rights are now available to both men and women. However, the key informants claimed that it is still difficult for women to inherit land owned by their husbands. In a key informant's words:

"Women were not entitled to inherit a property in the olden days. Women were denied the right to inheritance of their father's property in the olden days. Civilisation and several awareness programs have caused changes in access to land and women can claim their right to the deceased father's property just as the men but it is difficult to get land in one's husband house." (Community leader 1, 2019)

4.1.2 Interviews with Women farmers

When asked about how they acquired land in recent times compared to before the LUA, the responses indicated that women now acquire land through purchase, gifting and leasing. The women also stated that women now inherit land from their fathers, unlike in the past, when women were considered inheritable property.

“My husband was invited to this village by his friend who gave him farmland, which we are cultivating for both food and cash crops. We are not paying any tribute since the land was given freely. I also purchased a plot of land from an owner with agreement on the amount to pay.” (Women 2, 2019)

“I inherited it from my father. Women were restricted from inheritance in the olden days as they (women) formed part of the inheritable property.” (Woman 8, 2019)

The findings above suggest that the current land allocation system in Ajebandele improved compared to the practices before the LUA. The community devised a plan to facilitate land allocation by constituting a committee that oversees the process and reports to community leaders. An allottee of community land must be a farmer and provide a guaranty from a well-known community member. Previously, there was no record of land allocated. However, specifics of allocated land are now well documented, implying that land is receiving more attention, possibly because of increased recognition of its value. More so, there is no gender discrimination in land access; the previous restriction on women's access to land has been lifted, indicating that women's land access has improved, as mentioned in Bugri (2008).

4.2 Status of Women's Access to Land rights

This section explores the status of women's access to land rights in Ajebandele village. Access to land rights was assessed in terms of land availability, affordability, tenure security and transaction ease. The findings are discussed under each context's subsection.

4.2.1 Land availability

According to both groups of respondents, land is rightfully available to women in many ways. The six themes on how land is made available to women include land clearance, inheritance, purchase, lease, cultivation grant and a gift from friends. This finding is in line with Aluko & Amidu's (2006), both women and men farmers have access to available farmland within the village or family holdings. Thus, women's access to land has improved in terms of land availability. Table 1 shows the various theme on how land is made available to women and the number of women that obtained access to land through each theme.

In this study, six of the 13 women farmers interviewed acquired land through inheritance. Although most women accessed land right through inheritance, some women were reported to have been denied land right by greedy siblings. A woman is also denied land right by members of her husband's family, especially a childless woman. The two groups of interviewees established that community land was not inheritable; instead, the land is reallocated to community members. On the other hand, family land is inherited and sold subject to the family members' consent as represented by the head of the family.

The other ways of obtaining land rights were less popular among the women farmers. According to the key informants and women farmers, land clearance has ceased to be a way of gaining access to land right in the study area. This could be attributed to the monetisation and changing land values in most peri-urban and rural communities. Thus, land clearing is considered inadequate to be exchanged for land right.

Table 1. Ways land right is made available to women in Ile-Ife, Nigeria

Themes	Definition	Number of women that accessed land
Land clearance	Acquiring land right in exchange for clearing the landowner's land.	None of the 13 women farmers interviewed accessed land right through land clearance
Inheritance	Transmitting family land to the deceased's family lineage or heirs.	Six women acquired access to land right through inheritance
Purchase	An outright transfer of land right for cash payment.	Two women acquired land right through purchase,
Lease	Transferring leasehold interest in land to another person in return for money or farm produce.	Three women acquired access to land through a lease
Cultivation grant	Giving a person the right to cultivate the land without payment.	One woman accessed land right through a cultivation grant.
Gift	Conveying land right to a person without monetary or in-kind payment.	One woman obtained access to land through a gift by a friend.

Source: Field Data, 2019

4.2.2 Land affordability

This section discusses the cost of land acquisition and compares a woman's ability to obtain land through purchase, lease, or gift to that of a man. Four themes emerged from the responses: affordability of purchased land, affordability of tribute on leased land, affordability of wine as consideration for land allocation and affordability of land acquired through gift and cultivation grant. Responses from the interviewees revealed the followings:

Box 3

- Land acquired through purchase was high-priced for women and men in Ajebandele village.
- The purchase price is the same for both female and male farmers, but because women do not have the same purchasing power as men, the price could be more unaffordable for women.
- Acquiring land through a lease could be expensive for women farmers due to an unreasonable tribute.
- Tribute was deemed inexpensive when it is based on the farm proceeds, and the lessee farmer was required to pay after the harvesting of farm produce.
- Land allocation by the community was cheap to women because the necessity (wine) was inexpensive to both women and men.
- Both men and women farmers could afford to acquire through gift and cultivation grants because such land is given out freely.

Source: Field Data, 2019

4.2.3 Land tenure security

This section discusses the extent to which women's land right is safeguarded. It investigates the grounds for revoking women's land rights in comparison to men. Four themes that emerged from the responses are: revocation for public use, revocation for socio-cultural and family issues (such as divorce, misconduct, family crisis, death or land dispute), revocation for legal issues (violation of agreement, termination of a lease and unlawful sales), and revocation for economic issues (such as improper management and withdrawal for personal use). The responses to the question of how women's land rights might be revoked leads to the following conclusions:

Box 4

- Both men's and women's rights to farmland could be revoked without any form of discrimination for public use, legal and economic issues.
- Only women's land rights can be revoked in the event of divorce, separation and death of the spouse.
- Some women were displaced from their father's property by their siblings.
- Women mainly access land through cultivation grant from family and friends and the owner is free to withdraw it at any time.
- Most women farmers use the land under controlled conditions and constant interference.

Source: Field Data, 2019

It is essential to state that the view that only women's land rights were being revoked at divorce, separation and death of the spouse as reported in this study agrees with the position in Aluko & Amidu (2006) and further supports the argument in this paper regarding the disparity in land rights across gender. When a husband dies, the family members often evicted the wife (especially the childless ones) from her deceased husband's land. This resulted in the affected women losing rights to farmland, thus, rendering such women economically unproductive.

Furthermore, women mainly obtain use right to land through cultivation grant. This mode of land acquisition implies that the landowner retained the ownership right and can withdraw the use right at any time. Also, women farmers are unable to use the land without continual meddling. These factors undermine women's security of tenure. Thus, it is possible to conclude that women farmers in Ajebandele lack adequate security of tenure. This finding is consistent with the findings of Ghebru & Lambrecht (2017) in Ghana.

4.2.4 Ease of transaction

This section addresses the challenges women face before acquiring customary land in Ajebandele. Five themes that emerged from the responses included sexual harassment, doubt of women's competence, the requirement for a guarantor, lack of investment information and delays due to conditionality. The initial responses by both groups of respondents revealed that:

Box 5

- Some women were harassed by the community leaders while attempting to acquire farmland
- Women's access to land has been hampered by a lack of faith in women's ability to farm.
- A woman requesting land for farming was required to provide a guarantor before land can be allocated.
- Women are less knowledgeable about land-related matters because they are confined to the home. A lack of information severely limits women's access to land.
- Some women obtain land right on the condition that the recipients' daughter marries the landlord or the landlord's son. The acquisition may be delayed if the criterion is not met. This challenge was reported to affect both men and women that acquire land in such a manner.

Source: Field Data, 2019

Both groups of respondents acknowledged that the women's harassment by the community leaders had been overcome with the institution of the local committee that facilitates land allocation in the village. Also, the local committee ensures that the process of accessing land is not burdensome. However, individual landowners and community leaders are often sceptical of women's farming ability. Some women's land request was rejected or delayed land because of these reservations. This finding agrees with Enete & Amusa (2010) assertions that women face attitudinal barriers in most farming societies, which could be attributed to societal misconceptions about women farmers.

Furthermore, the requirement for a guarantor hampered women's access to land rights. There were cases where some husbands object to their wives having private farmland, and they often prevent other males from acting as guarantors for such spouses, thereby delaying or obstructing their access to land.

4.3 Factors Limiting Women's Land Right

This section discusses the factors limiting women's land rights in the study area. Six themes that emerged from the key informants and women farmers' responses are custom and tradition, religion, educational status and awareness, unavailability of finance, personal factors and socio-economic factors. When asked what factors limit women's land right. The women's initial responses include the following:

Box 6

- In the Idoma and Igala tribes, women are not permitted to participate in farming activities, so their access to farmland is limited.
- On religious grounds, the village's Niqobait (veiled Alhaja) were barred from farming and had no access to land.
- Women lack knowledge on their right to land, as stated in section 42 of the Nigerian constitution, and as a result, they were unable to exercise their rights.
- Land grabbers defrauded some women through fraudulent sales due to a lack of firsthand knowledge.
- Women's lower pay, coupled with homemaking responsibilities, negatively impact their income flow and ability to obtain adequate financing.
- Women's lack of land access was exacerbated by their health status, actions and inactions", incompetence, and desire for skill acquisition, trade or paid job.
- Greedy brothers also oppose women's access to land, claiming that "she will be getting married to a man, from whom she will get land".

- A polygamous family system, which required wives to work on their husbands' farmland, limited women's access to land right.
- Some husbands suppress their wives desire for land, whether through allocation or gift. This ensures that the wives will continue to work on the husband's farmland despite the unequal distribution of farmlands among wives in a polygamous family.

Source: Field Data, 2019

The interviewees explained that custom, tradition and religion significantly limit women's access to land rights. This finding is consistent with the outcomes in Moyo's (2017) and Chigbu et al.'s (2019). Women's educational status/awareness also limit their lack of access to land rights. Knowledge about land rights remains critical in breaking custom and traditional impediments to women's access to land rights. Almaz (2007) reported that women who knew their land rights have begun to challenge community traditions on land acquisition.

One limiting factor to purchasing land is the lack of access to financing, especially for women. Women were thought to work at a lower level and earn less money than men. This has a negative impact on their earnings and their ability to secure adequate funding to purchase land. This result supports Dowuona-(2003) Hammond's assertion that higher poverty levels among rural women are because of insufficient access to land. All the respondents also identified women's health status, "actions and inactions" as limiting women's access to land in line with Chigbu's (2019) submission.

5. CONCLUSION

This study examined gender land right under the customary system of Ile-Ife, Nigeria, with the intent of establishing the extent to which provisions of the Nigerian LUA advanced women's equal access to land right in the study area. Specifically, the study explored the customary way of allocating land in Ile-Ife in 2019 compared to the norm prior to 1978; the status of rural women's access to land rights in terms of land availability, affordability, tenancy security, and transaction ease; and the factors limiting women's access to land right in the study area. According to the study's results, farmland within a community or family is legitimately available to men and women. However, because of the high cost of land or overwhelming tribute, female farmers may be unable to purchase or lease land. In general, there was a noticeable change in the current land allocation system relative to procedures prior to the LUA. The customary land allocation process in Ile-Ife, Nigeria, has been refined over the past four decades to support women and, in theory, provides inclusive access to land in terms of land availability, affordability and ease of transaction. Though good progress has been recorded in the current land administration system of women's land rights, women were not fully beneficiary of their constitutional land right Ile-Ife, Nigeria. Women farmers lack access to land in terms of tenure security: women do not have control over land, when a woman's husband divorces, split from her, or dies, she loses her claim to the land. Thus, gender inequalities in land tenure security continue to exist in the study area because of cultural norms and traditional practices.

Lack of secure land right is a critical factor driving the creation and sustenance of poverty among women in rural communities of Sub-Saharan Africa. Therefore, there is a need for policymakers to restructure the customary land tenure system in a gender-sensitive way to strengthen women's secure land rights and ensure women enjoy equal benefits from policy results. Changes in the traditional practices that introduce women's tenure insecurity should

bring about greater gender justice in women's land rights. Governments and society could address women's insecure land rights through advocacy and awareness campaigns to revolutionise the community's mind-sets and traditional practices from this study's results and recommendations could be beneficial to other African countries having similar customs and traditions that impact women's secure land rights.

6. LIMITATION AND PATHWAY FOR FURTHER RESEARCH

Since this research was conducted in a village and during the rainy season, its applicability is limited; some places were inaccessible due to the village's poor road network. Although only a few farmers were interviewed, the researchers concluded that their responses were representative of the whole population. More research with more villages and respondents is advised to present comprehensive rural women's land rights issues for policy and adoption.

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Examining Zimbabwe's Expropriation and Compensation Process through the Lens of Procedural Fairness

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Purpose: This paper is an addition to the sparse academic works on the procedural fairness in compulsory acquisition and compensation of land and properties in Zimbabwe. Discovering a pragmatic way of resolving the centuries-long compensation disputes in Zimbabwe is the main motivation for this study.

Design / methods followed/ approach: The existing expropriation and compensation process was examined using the principles of procedural fairness which include representativeness, neutrality, accountability, consistency, correctability and grievance management. Data were collected through literature and questionnaire surveys. Content analysis was used to analyse the collected data with the aid of Atlas.ti8 and thematic analysis was done on data from questionnaires survey.

Findings: The result of this paper shows that the current expropriation and compensation process fall short to meet the standard of procedural fairness which include but not limited to representativeness, consistency, neutrality, accountability, correctability and grievance management. To correct the observed gaps in the existing expropriation and compensation procedure in Zimbabwe, a novel expropriation and compensation framework (ECF) was designed for Zimbabwe to bring fairness in the current process.

Research limitations / implications: The major limitation of this study was that data collection coincided with the COVID-19 induced lockdowns inhibited the planned face-to-face interviews. This would have made it possible for the researchers to make more enquiries as follow-up to preceding questions. This however did not impede the quality of research because the online platform was used to distribute questionnaires to the targeted research subjects.

Practical implications: Results of this study came at the most appropriate time, given the fact that the GCA has just been signed and is about to be implemented. Furthermore, the time can be considered ripe since the Parliament of Zimbabwe is currently working on aligning existing statutes with the 2013 constrictor. While the new Zimbabwean government is making appreciable progress, it is hoped that the contributions made in this study would lead to lasting solutions to age-long crisis.

Originality / Value of work: Several studies exist on the subject matter; however, this is the first study that focuses on procedural fairness in compulsory acquisition and compensation in Zimbabwe. This study designed an ECF to operationalise the proposed legal amendments and bring transparency and consistency in property valuation for expropriation in Zimbabwe and improve the level of satisfaction of affected people.

Keywords: Compensation, Expropriation, Fairness, Procedure, Zimbabwe

1. INTRODUCTION AND BACKGROUND

When meeting the common welfare of the people requires the use of land, governments all over the world will seize it through expropriation. Public applications that are commonplace include town planning, construction and upkeep of infrastructure, and public security (Langford & Halim, 2008; Daniel, Nkup, Samson & Wuyokwe, 2020). However, the removal of the incomes, social networks, and livelihood of individuals is closely related with expropriation (Ty, Van Westen & Zoomers, 2013; Dankani & Halidu, 2017). In most cases, money is given to the people whose land was taken as compensation for the losses that they have suffered. Compensation or palliative care is used to help people who have been relocated to remain exactly where they are before the exercise.

Expropriation problems usually arise when (1) compensation is undervalued, (2) compensation is delayed, (3) compensation is not provided to displaced people, (4) the decision to pay compensation is disregarded, and (5) laws with controversial provisions are utilized. To identify the fundamental sources of the first two challenges, studies have shown that improper property valuation methods are the main causes (Asian Development Bank, 2007; Cernea, 2008; Mahalingam & Vyas, 2011; Famuyiwa & Omirin, 2011; Pilosof, 2016; Tagliarino, 2017). Legal frameworks with controversial indices may lead to erroneous assessment and denial of compensation. The extent of this is directly related to the local environment and country's unique legislation. Additionally, this causes an unfair and inaccurate assessment of compensation values, which is incongruent with the principles of equality and equivalence (Kakulu, 2008a, 2008b; Alemu, 2012, 2013; Tagliarino, 2017).

There has been a strain on the relationship between dispossessed people and the expropriating authorities because of insufficient amount of compensation offered (Ige et al., 2016; Ige et al., 2016; Oladapo & Ige, 2014), Ding, 2007; Wang, 2013; Qu, Heerink, & Xia, 2015; Qu, Heerink, Xia & Guo, 2018). In Zimbabwe, the issue of expropriation and compensation is quite complex. Firstly, there was the contentious compulsory acquisition of the white commercial farmlands, during the early 2000 Fast-Track Land Reform Programme (Pilosof, 2016). Secondly, there were cases of land acquisition for diamond mining in Chiadzwa (Manicaland Province) in 2009 and 2011, and land acquisition for dam construction in Tokwe-Mukosi (Masvingo Province) in 2011 and 2013. (Chishanga, 2014; Marungwara, 2014; Ruguwa, 2017; Gukurume & Nhodo, 2020). In all cases, fairness relative to denial or inadequate amount of compensation subsist leading to myriads of court cases.

The aim of this study was to explore a better approach of settling Zimbabwe's lingering issues with expropriation and compensation. When the new government in Zimbabwe took office in November 2017, it indicated its commitment to resolving the two decade long compensation dispute. In 2020 there was a consensus between the government of Zimbabwe and former commercial farmers who signed the Global Compensation Agreement in July of the same year. The global compensation agreement was based on the legal provisions of the *Constitution of Zimbabwe* of 2013 and the *Land Acquisition Act (Chapter 20:10)* of 1992. However, sufficient evidence from existing literature which suggests that displaced people are not satisfied with the compensation which is guided by the existing expropriation laws in Zimbabwe (Chishanga; 2014; Marungwara, 2014; Mavhura, 2020; Gukurume and Nhondo 2020; Zulch, Yacim and Paradza, 2021; Yacim, Paradza and Zulch, 2021). According to Ruguwa

(2017) and Madebwe et al., (2011), the process of compulsory acquisition and compensation of communal land is shrouded in obscurity.

In view of the foregoing discussion, one will be justified to question if the existing expropriation and compensation process can pass the test of procedural fairness. Previous studies including Chan (2003) in China, Alias & Daud (2006) in Malaysia, Anim-Odame (2011) in Ghana, Alemu (2013) and Komu (2014) in Ethiopia and Tanzania, evaluated the implications of expropriation and compensation. The known expropriation and compensation studies that examined the tests of procedural fairness included Cheng (2008) in China; Vu (2017) in Vietnam; Rao et al. (2018) in Australia; Mangioni (2018) in Australia; Rao (2019) in India. While these studies are major contribution to the subject matter under discourse, they were undertaken in context different from Zimbabwe as such findings from these studies can't be generalized or used unless prior knowledge about Zimbabwean practices is acquired to provide contextual solutions.

In Zimbabwe, research work on the subject matter includes (Ng'ong'ola, 1992; Hansungule, 2000; Nyambara, 2001; Chigora & Guzura, 2008; Nyandoro, 2012; 2019; Pilosof, 2016; Thondhlan, 2016; Mashizha & Mapuva, 2018; Vengesai & Schmidt, 2018; Adekoye, 2019; Gukurume & Nhondo, 2020; Mavhura, 2020). A significant amount of effort was invested in coming up with possible solutions to the long-term imbalances. However, despite their valuable contributions, the focus of their work was not adequate in addressing the issue of procedural fairness that is expected to bring this lingering crisis to finality.

2. THEORETICAL FRAMEWORK

There are two major theories that influence the compensation processes, these are the indemnity and the taker's gain theories (Serkin, 2005; Kabanga, & Mooya, 2018). The indemnity theory is built on the concept that everyone who has been affected must be reimbursed in an amount that is equal to the damages incurred (Food and Agriculture Organization, 2008; Vaughan & Smith, 2014; Denyer-Green, 2014; Kabanga, & Mooya, 2017; Tagliarino, 2017; Agegnehu, & Mansberger, 2020).

Thus, the guiding principle behind the indemnity theory is that expropriatees must neither gain nor be burdened because of the compulsory acquisition of their property(ies) (Mahalingam & Vyas, 2011; Marboe, 2014). In this regard, compensable heads of claim must be for the property (land and all improvements (Food and Agriculture Organization of the United Nations, 2017) and intangible value aspects such as disturbance allowance, solatium, severance and injurious affection (Rao, Tiwari & Hutchison, 2017).

On the other hand, the idea behind the taker's gain theory is that the expropriating authority should pay for just what it gained from dispossessed people (Denyer-Green, 2014). Unlike the indemnity theory, compensation under the taker's gain theory is for the land or just the improvement on the land whilst excluding compensation for the intangible aspects (Kabanga & Mooya suggest, 2018). According to Ambaye (2014), under the taker's gain theory, compensation is based on the current use without taking into consideration the potential of the subject property.

A review of the history of compensation for expropriation in Zimbabwe shows that its compensation has changed on a spectrum, moving from the taker's gain theory on one extreme to the indemnity theory on other. Since the beginning of the colonial era in 1890, there was compensation for land expropriated from indigenous Africans who were undercompensated for their improvements on the land (De Villiers, 2003; Pazvakavambwa & Hungwe, 2009; Nyandoro, 2012; Njaya, 2013; Bonarjee, 2013). In the views of policy makers, the land did not belong to the displaced persons hence no compensation was paid. One will be justified to argue that before independence, compensation for expropriation was based on the taker's gain theory.

After independence 1980, Zimbabwe has seen a major paradigm shift in the compensation trajectory with the adoption of a market value-based compensation (Palmer, 1990; UNDP, 2002; Moyo, 2006; Njaya & Mazuru, 2010; Moyo, 2011; Dabale, Jagero & Chiriga, 2014). This market-based compensation policy was guided by the indemnity compensation theory where, prompt and adequate compensation was paid before compulsory acquisition of land. However, this policy only lasted a decade (Magaisa, 2010) prior to being superseded by the payment of fair compensation in the early 1990s (Madhuku, 1999).

A closer scrutiny of the existing expropriation and compensation laws in Zimbabwe shows an attempt to balance the indemnity and the taker's gain theories. For example, under Sections 72 and 295 of the *Constitution of Zimbabwe* of 2013 it was specific that for land expropriated for land reform from indigenous Zimbabweans, the compensable heads of claim must include land and improvements. Similarly, when land is expropriated from non-Zimbabweans of countries with bilateral relationship with Zimbabwe the compensable heads are the same with those of indigenous citizens. On the other hand, if land is expropriated from foreign nationals without a bilateral relationship with Zimbabwe, compensation is just for the improvements on the land.

Land is excluded on the compensable heads of claim and the justification of doing so is that the same land was expropriated from the indigenous Zimbabweans without compensation; therefore, the former colonial masters must pay the compensation. By so doing, the government of Zimbabwe pays for only what it is gaining (improvements on the land) and not what the displaced people has lost. In view of the foregoing discussion, it can be inferred that the theory guiding compensation for expropriation in Zimbabwe is a hybrid of the taker's gain and the indemnity theories.

3. LITERATURE REVIEW

The literature review section is divided into two. Section 2.1 discusses the literature on the concept of procedural fairness and Section 2.2 is centred on existing literature on expropriation and compensation in Zimbabwe.

3.1 The Concept of Procedural Fairness

According to Rao, Tiwari & Hutchison (2018), the issue of fairness in expropriation goes beyond the compensation amount but it should include the entire expropriation process. Mangioni (2018) is of the view that it is the practice of the expropriating officials that determines the fairness of the whole process. Rao (2019) noted that the concept of

procedural fairness which emanated from the legal fraternity has recently gained popularity in other areas which include education, political sciences, and business management. Of late scholars (who include Cheng (2008), Vu (2017) and Rao (2019)) used the principles of procedural fairness that include representativeness, consistency, neutrality, accountability, as well as correctability and grievance management to assess procedural fairness in compulsory acquisition and compensation. Figure 1 is a diagrammatic presentation of the concept of procedural fairness anchored by its principles.

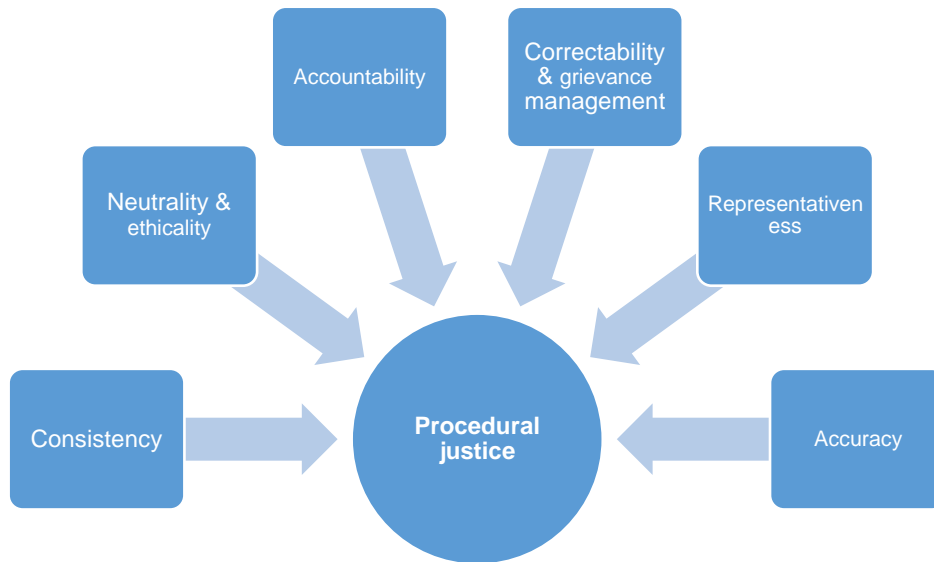


Figure 2: The Concept of Procedural Justice

Source: Adopted from Vu (2017:43) and Rao, Hutchison & Tiwari (2020:75).

Figure 1 shows that the principle of procedural justice is anchored by 6 principles including representativeness, consistency, neutrality, accountability, as well as correctability and grievance management. Firstly, consistency relates to using a uniform procedure during different times and when dealing with different people (Vu, 2017). When it comes to expropriation and compensation this relate to the use of a standardised way of doing things for example during property valuation the same procedure must not change when done by different valuers or when done by the same valuer for different people. If there is no consistency, then there is no procedural fairness.

The second principle is neutrality which according to Vu (2017) refers to the absence of bias on the individuals and institutions involved in making decisions regarding compulsory acquisition and compensation. If those who make decisions are interested parties then they will not be neutral thereby resulting in a biased process. Once there is a probability of biasness then there might be legitimacy challenges resulting in the procedural fairness being questioned. In the subject under study for example is those involved in the expropriation, or anyone related from them was a beneficiary of the expropriated land then there might not be procedural fairness. Related to the principle of neutrality is the principle of ethicality is the principle of ethicality which refers to moral principles governing good behaviour. Immoral behaviour like corruption and acceptance of bribes are against the principle of ethicality (Vu, 2017). From a broader view, if public officers involved in the expropriation and compensation

do not adhere to ethical standards then they will not be neutral as well resulting in them being inconsistent.

Thirdly the concept of procedural fairness is based on the principle of representativeness which relates to the active involvement of affected people during decision making (Vu, 2017, Rao, 2019). The expropriating authority must not just dictate things to affected people, but it must consult and incorporate their views when making decisions which affect them (Walters & Akujuru, 2016). Also, dispossessed people must have easy access to professional representation from valuers and/or lawyers (Chan, 2003; Zrobek & Zrobek, 2008a, 2008b; Johnson & Chakraarty, 2013; Arul vikram & Murali, 2015; FAO, 2017). According to Moyo (2016), dispossessed people are supposed to be given a chance to justify their compensation claims before the expropriation. The compensation value must be negotiated by the affected people and the expropriating authority without intimidation (Cheng, 2008; Zrobek & Zrobek, 2008b; Tagliarino, 2017). Johnson & Chakravarty (2013) emphasised the importance of affected people to be well informed about the provisions of the law so that will not be disadvantaged when negotiating with the expropriating authority. Vital information must be easily available to affected and interested people at no or very low cost (Viitanen & Kakulu, 2009; Arul vikram, & Murali, 2015; Grover; 2019).

The other principle of procedural fairness in the principle of accuracy which relates to minimisation of errors when collecting and processing information about compulsory acquisition and compensation (Vu, 2017). This principle can also be related to the principle of representativeness in that if there is transparency data collection and affected people are given a chance to confirm if the processed information is correct then errors might be minimised. According to Chan (2003) Cheng (2008) and Zrobek & Zrobek (2008b), the expropriation and compensation process considered to be fair when it is transparent.

If errors were identified there should room for correction (the principle of correctability and grievance management. This principle relates to a procedure which provide for independent institutions to deal with appeals and make corrections where necessary. When following this principle, fairness can also be measured based on whether the law provides a clear procedure for challenging the compensation in a court of law (FAO, 2012; Tagliarino, 2017).

Besides a procedure correcting the errors made, there should be accountability. This principle dictates that someone must take responsibility for decisions made by the expropriating authority. The principle of accountability relates to undocumented promises which were made by government authorities to affected people (Rao, 2019). Principles of procedural fairness as discussed in the foregoing discussion will be used as a reference point for this study when examining procedural fairness in compulsory acquisition and compensation in Zimbabwe.

3.2 Existing Literature on Expropriation and Compensation

Whenever land is expropriated, the expropriation authority has an obligation to pay compensation. Several studies were done on expropriation and compensation in different countries and/or regions. Arul Vikram and Murali (2015) compared India's expropriating laws with similar laws from Indonesia, Nigeria, Malaysia, Bangladesh, Trinidad & Tobago, Slovenia,

Mali, Nanjing, and Vietnam. They employed a content analysis and noted lack of clear technique for calculating compensation.

Kakulu (2008) examined British and Nigerian laws that guide expropriation and compensation and noted certain problematic spots in the Nigerian laws. These negative spots included absence of transparency in processes and procedures; lack of a detail heads of claims; inadequate compensation for farmland and lack of advance compensation. Similarly, the study of Ambaye (2014) in Ethiopia arrived at a same conclusion, and thus suggested that Ethiopian laws could be strengthened through the adoption of a market value-based compensation for urban land and inclusion of injurious affection and severance in the compensable heads of claim.

Olanrele et al. (2017) compared the legal frameworks guiding property valuation for compensation in Nigeria to those of the United Kingdom, Denmark, the United States of America, Australia, New Zealand, Hong Kong, Malaysia, South Africa, and Rwanda. Their study used variables that include the following compensable heads of claim, land, buildings, crops, severance, and disturbance. However, like the other reviewed studies, lack of consistency dominated the practice across the countries considered.

Ghimire, Tuladhar and Sharma (2017), gauged the expropriation and compensation assessment guidelines designed by the Food and Agriculture Organisation, and the World Bank, to those of China, India, Malaysia, Nepal, and Norway. The study employed specific set of parameters for assessment, including transparency, public participation, benchmarking, and access to information. It was discovered that lack of consistencies to the stated criteria was observed among many countries, except Norway. The implication was for the other countries to develop sound principles in their expropriation and compensation practices.

Tagliarino (2017) did a study across fifty different countries in three continents including Africa, Asia, and Latin America. The objective was to compare the legal frameworks as it concerns property valuation for compensation of expropriated properties with the guidelines of Food and Agriculture Organisation. The conclusion reach was that because of the differences in the legal provisions of these countries, assessment of compensation is dissimilar. While the study advocates for a uniform legal framework for expropriation and compensation across all countries of the world, the findings revealed that country-specific laws on the subject matter still hold sway.

Rao, Tiwari & Hutchison (2018), the issue of fairness in expropriation goes beyond the compensation amount but it should include the entire expropriation process. Mangioni (2018) is of the view that it is the practice of the expropriating officials that determines the fairness of the whole process. Rao (2019) noted that the concept of procedural fairness which emanated from the legal fraternity has recently gained popularity in other areas which include education, political sciences, and business management. Of late scholars (who include Cheng (2008), Vu (2017) and Rao (2019)).

There is vast literature on compulsory acquisition and compensation in Zimbabwe (see Madhuku, 1999; Moyo, 2000; Pazvakavambwa & Hungwe, 2009; Magaisa, 2010; Chivandi, Fushai & Masaka, 2010; Mashingaidze, 2013; Pilossof, 2016; Dhlakama, 2017; Vengesai & Schmidt, 2018; Chazireni & Chigonda, 2018; Mavhura, 2020; Gukurume & Nhodo, 2020).

However, all these studies focused on the adequacy of compensation offered/paid or the level of satisfaction of affected people hence the issue procedural fairness in Zimbabwe's expropriation and compensation process remains underserved in literature.

Paradza, Yacim and Zulch (2019) compared the legal provisions of the *Land Acquisition Act of 1992* of Zimbabwe with the guidelines prepared international agencies and noted gaps in the *Land Acquisition Act of 1992*. The authors went on to propose a legal framework which seeks to amend certain provision of the *Land Acquisition Act of 1992*, but they did not propose a new framework in line with the principles of procedural fairness. Furthermore, a property valuation framework proposed by Mutema (2019) and went on to be adopted by the Government of Zimbabwe for property valuation for compensation of farms expropriated during the Fast-Track Land Reform Programme is worth mentioning.

Thus far, as previously observed, Cheng (2008); Vu (2017); Rao et al. (2018); Mangioni (2018); Rao (2019) are the known studies that evaluated the influence of procedural fairness in the entire expropriation and compensation processes. However, as observed previously, their still exist a gap in the Zimbabwean expropriation and compensation arenas that is worth examining as findings from these studies require country specific application. Nonetheless, this current study found persuasion in them worthy of use as a guide towards the evaluation of the procedural fairness in Zimbabwe.

4. METHODOLOGY

A case study of properties expropriated during the Fast-Track Land Reform Programme was adopted. This case study was motivated by the fact that after vast pieces of land were expropriated from multitudes of commercial farmers (FCFs), the dispute took 2 decades. Whereas existing studies on the disputed expropriation focused on the issue of compensation, Magaisa (2010) and Pillosof (2016) rightfully pointed out that the issue is complex and goes beyond just the compensation offered.

Data for this paper were collected through a literature and questionnaire surveys. A detailed review of the *Land Acquisition Act of 1992* and the *Constitution of Zimbabwe of 2013* was done, and content analysis was used to examine the provisions of these laws against the principles of procedural fairness. The total population for this study consisted of 126 respondents. There were two theme groupings within the population: a group of 120 former commercial farmers, and 6 private property valuers, who were hired by former commercial farmers. The researchers obtained a list of farms valued by the Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement between 2009 and 2019. The list showed that one hundred and fifty-eight farms were valued for compensation during the multi-currency period. Of the one hundred and fifty-eight farms, one hundred and three were owned by companies while fifty-five were owned by natural persons across the eight provinces of Zimbabwe, as shown in Figure 2.

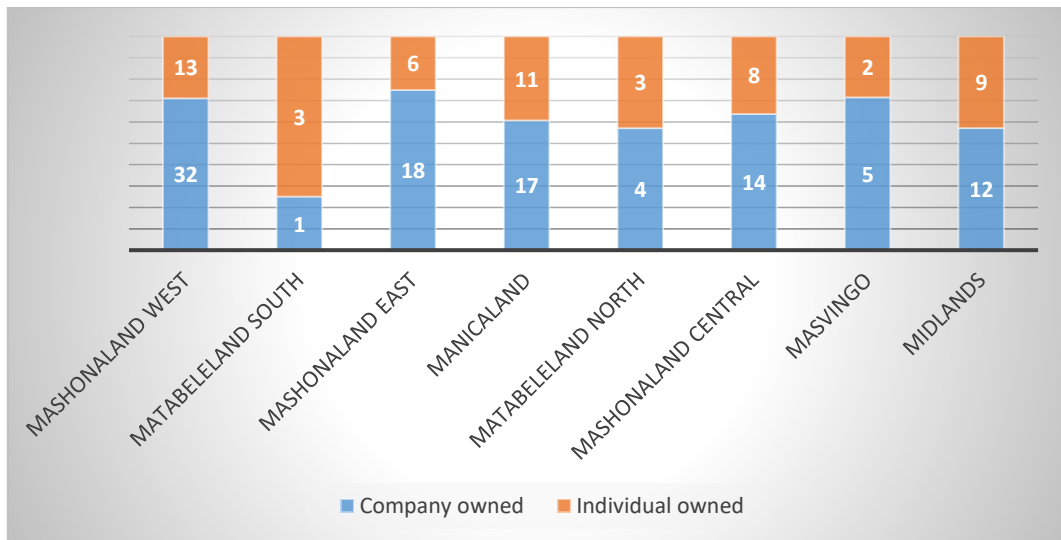


Figure 3: Ownership of Farms Valued by the Compensation Committee Before the Global Compensation Agreement

Sources: Research findings (2020)

Most of the valued farms were owned by companies, as shown in Figure 2. There was also evidence of multiple farm ownership with 1 company owning 3 farms in Midlands Province, and 6 farmers owning 2 farms each in Mashonaland West, Mashonaland East, Midlands, and Matabeleland North.

It was important to ensure that there were no multiple participants, hence, even those with multiple farms were given an equal chance of being selected to form the sample. To achieve this, during sampling, the researcher considered just one farm from multiple farm owners. As such a total of 150 former commercial farmers were considered as shown in Figure 3.

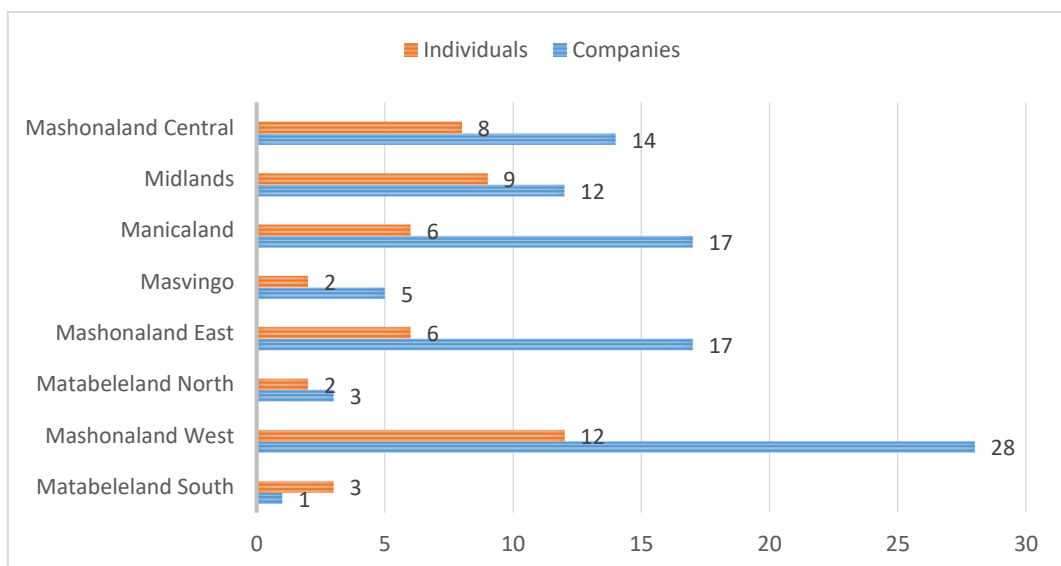


Figure 4: Research Population (Farmers' thematic group)

Source: Research Findings (2020)

A 5% margin of error was adopted at a 99% confidence level and 50% response distribution, resulting in a sample size of 120 (95%) former commercial farmers. All property valuers were considered as respondents since they were just 6 (5%). A summary of the total population is shown in Figure 4.

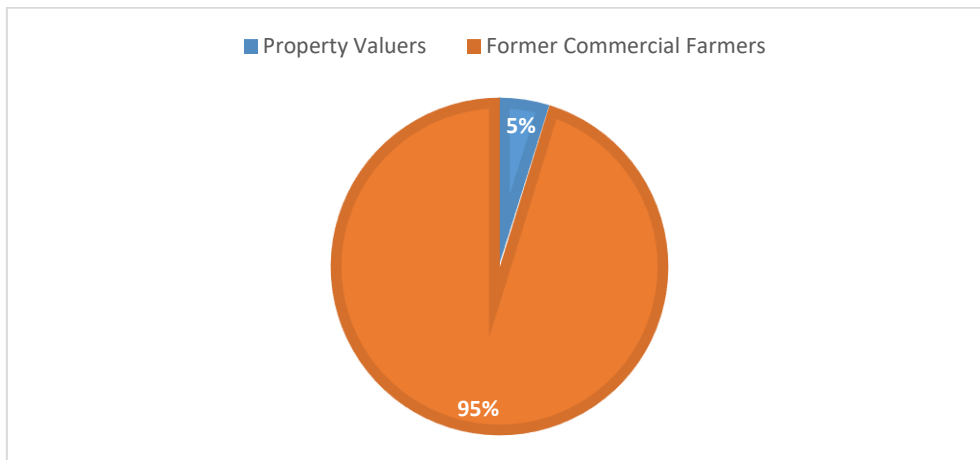


Figure 5: Research Population

Source: Research findings (2020)

One hundred and twenty-six electronic questionnaires were sent to respondents. Electronic mails were used mainly because of the restriction occasioned by the COVID-19. Of the one-hundred and twenty-six questionnaires, seventy-two were returned (sixty-eight from former commercial farmers and 4 from private property valuers) which translate to fifty-seven percent response rate. Two answered questionnaires returned from former commercial farmers were not valid hence only sixty-six were considered for analysis.

Thematic analysis was used to analyse the data and 4 themes were developed based on procedural fairness during (1) consistency, (2) correctability/grievance management and neutrality, (3) representativeness and (4) consistency and accuracy. Computer-aided data analysis was done using Atlas.ti8 to create comments, memos and networks which relate to the common and conflicting ideas from different sources. Before the coding exercise, documents were put in files which were then uploaded to the Atlas.ti8 software. During data analysis, selected quotations from participants were used to augment the researcher's interpretation of the research findings in line with the recommendation of Morrow (2005).

5. RESULTS AND DISCUSSION

This section is structured into 4 parts with the first part (Section 5.1) discusses consistency and Section 5.2 correctability/grievance management and neutrality. Section 5.3 dwells on representativeness, whereas Section 5.4 consistency and accuracy in Zimbabwe's expropriation procedure.

5.1 Accountability in Zimbabwe's Expropriation Procedure

The decision to expropriate real estate in Zimbabwe is made by the President or the Minister assigned by the President as provided by Section 3 of the *Land acquisition Act* of 1992. In terms of the existing law, when expropriating, the executive neither involve the judiciary, the legislature nor affected people which is against the principle of representativeness. According

to Moyo (2016), this was done to reduce the length process of acquiring land for the purposes of reform. In the interest of accountability, it might be prudent for the executive to at least involve another arm of government or an independent institution when taking an expropriation decision. A good suggestion of an institution which might play a pivotal role in expropriation is the Zimbabwe Human Rights Commission which was established in terms of Chapter 12 of *Constitution of Zimbabwe* of 2013 might play a key role in expropriation and compensation. Alternatively, the parliament might be actively involved for checks and balances on the decisions made by the executive.

Also, as discussed before, according to Rao (2019), the principle of accountability dictates that someone must be held accountable for all actions taken by the expropriating authority, including undocumented promises. Section 8 of the *Land Acquisition Act* of 1992 which provides for penalties for affected people who:

“demolishes, damages, alters or in any other manner impairs the land described in that preliminary notice without the permission in writing of the acquiring authority....”

However, the same statute is silent on penalties for any omission or act of negligence done by the expropriating authority (its employees or agents) during the expropriation process. However, it is important that if the affected people are aggrieved, they can approach a court of law for remedy.

5.2 Correctability/Grievance Management and Neutrality in Zimbabwe’s Expropriation Procedure

As discussed before, those involved in administering expropriation programmes must not have conflict of interest and correctability relates to the use of independent institutions in handling grievances and make necessary remedies. These two principles are interrelated that is why they will be discussed together. When affected people are given a notice of intention to expropriate as provided in the *Land Acquisition Act* of 1992, they have thirty days to make any objections/representations. This provision can be commended because it opens doors for the expropriating authority to consider the views of affected people and where necessary revise the initial decision. However, it is important to note that objections are sent to the expropriating authority and not to an independent institution. In this case, there are chances of conflict of interest since the expropriating authority is also the one to handle objections from affected people which might be against the principles of neutrality and ethicality.

More than half of the former commercial farmers (60%) decried that they were violently evicted from the farms they bought after independence, without notice of intention to expropriate and they lost more than just improvements on the land as they were not allowed to take any of their farm belongings including movables. Worth noting is the story of FCF40 who narrated that:

“The expropriation of my farm was not done legally. Farms were settled before the farms were gazetted. I was allowed to complete the grading of the tobacco crop but was not allowed to remove any equipment from the farm. Subsequently got a High Court order to be able to remove my equipment, but when presented to the settlers, the police threatened to arrest me if anything was removed. We never recovered any of the equipment. The property was bought after 1980 with Certificates of No present interest from the government (1987 and 1991).”

Another former commercial farmer who narrated a similar story as follows:

“No responses were ever received to written objections. The police assisted the beneficiary of our home to break in and take possession. This took place even before any legal clarity had been reached.”

In terms of Section 29 of the *Land Acquisition Act* of 1992 read together with 5 of the *Acquisition of Farm Equipment or Material Act* (Chapter 18:23) of 2004, preliminary property valuation for expropriation is done by Designated Valuation Officers. These Designated Valuation Officers are appointed from the serving civil servants and Chimbetete noted that not of them are not registered professional valuers in terms of the *Valuers Act* (Chapter 27:18) of 1996 because they do not meet the prerequisites for registration. Also, it must be noted that currently Designated Valuation Officers are employees of the expropriating authority and the same minister responsible for land who has the mandate to expropriate land is also responsible for appointing Designated Valuation Officers. Given the fact that the expropriating authority also acts as a valuer, one is justified to question the neutrality of the decisions to be made by the same. Arguably, Designated Valuation Officers (civil servants) might not be objective in the assessment of property values. The cases of skewed estimation of values by property valuers in favour of their paymaster might attract a well-done job from the government, but huge cries from displaced persons.

The *Constitution of Zimbabwe* of 2013 allows any of the disputing parties to approach a competent court of law for the determination of a fair compensation value as provided by Section 71(3) of the *Constitution of Zimbabwe* of 2013. A competent court stated in Section 71 of The Constitution of Zimbabwe of 2013 refers to the Administrative Court of Zimbabwe as specified by Sections 7, 24, 29D and 42 of the *Land Acquisition Act* of 1992 read together with Section 8 of the *Acquisition of Farm Equipment or Machinery Act* of 2004. A constitutional provision of an independent dispute resolution mechanism is highly commended as it follows the principles of grievance management and neutrality. However, Section 73(3) of the same constitution restricts courts from presiding over any dispute relating to compensation for agricultural land acquired from foreign nationals for the purposes of land reform and resettlement. Because of this provision, some affected former commercial farmers who failed to access local courts to get recourse ended up approaching regional and international courts/tribunals.

Some former commercial farmers felt that the current expropriation process is not fair due to conflict of interest of those involved in the acquisition, valuation and appeal processes. FCF10 explained that:

“If you do your research, you will establish that government officials, including designated valuation officers, members of the compensation committee and even those in the judiciary benefited from our expropriated farms. Do you think these people will be impartial when handling our issues when they have interests in the same issue?”

It must be noted that the authors could not verify this claim.

In the views of former commercial farmers, the existing expropriation and compensation process in Zimbabwe was not fair due to delays by court when handling disputes. FCF4 narrated that:

“We had to vacate the property immediately and took three months for the High Court to permit us to return. By then the person allocated the property had moved his staff into the accommodation and had cows and sheep in the garden area, that destroyed the garden.”

In the words of another former commercial farmer:

“We were prosecuted and went to court 7 times before the case was dropped around 2 years after we had vacated the property.”

In cases where the outcome of the court cases are delayed for too long, if one is to take an example of a 7 years’ delay then surely there is justification for unfairness. This view is supported by a common saying that ‘justice delayed is justice denied.’

5.3 Representativeness in Zimbabwe’s Expropriation Procedure

As discussed before the principles of representativeness affected persons to be actively involved during the expropriation process. Currently, expropriates in Zimbabwe are only involved when decisions have already been made either when making objections, representations to the expropriating authority or when challenging the expropriation process in court. The Compensation Committee which is mandated with determining the compensation amount is made up of senior civil servants without representatives of affected people. Some former commercial farmers claimed that initially this committee used to have representatives of affected people.

Lack of representativeness during property valuation for compensation was confirmed by 75% of the Property Valuers who pointed out that there is no fairness because the Compensation Committee is given the sole mandate to estimating the fair compensation without the involvement of affected people. In the words of PV1:

“The CC is by law required to assess compensation value with advice from the Minister of Lands and Minister of Finance. The committee is one-sided and has no PVs and farmer representation.”

The other PV expounded that:

“The Act specifies the composition of the Compensation Committee, that include Secretaries of various ministries, the Chief Lands Officer, The Government Valuation Officer and five others to be appointed by the Minister. In the past, this has included members of the private sector valuation profession representing those whose land is being expropriated; however, this is no longer the case. With the current legal provisions, the owner of the acquired land can only appeal on the basis that the Compensation Committee has operated outside the principles of Section 21 and 29C.”

Former commercial farmers also lamented that their expropriated properties were expropriated for valuation in their absence, for example FCF30 explained as follows:

“I was not involved when the government inspected my property for the purposes of assessment of compensation. I was offered payment, but it was a small fraction of the valuation done by professional farm valuers. The offer was changed several times but was never realistic or acceptable.”

It must be noted that inspection of some of the farms expropriated during the Fast-Track Land Reform Programme were inspected for property valuation for compensation after more than a decade after acquisition. As such some of the affected farmers have already migrated to other countries hence the logistics or their representatives to be present during inspection could have been a mammoth task.

It is also important to note that the Joint Technical Negotiation Compensation Committee was established in 2017 for the purposes of addressing sticking issues in the Zimbabwean compensation dispute. The good thing about this committee is that unlike the Compensation Committee which exclude representatives of the expropriatees, former commercial farmers were well represented. After protracted negotiations, the Joint Technical Negotiation Compensation Committee managed to reach a compensation consensus and signed the global compensation agreement in 2020. The success of the Joint Technical Negotiation Compensation Committee is a testimony of the importance of representation in expropriation and compensation. However, the existing law was not amended to reflect this important principle hence the Compensation Committee is the only institution which is currently recognised at law.

5.4 Consistency and Accuracy in Zimbabwe's Expropriation Procedure

This section discusses whether there is uniformity and a quality control mechanism in the existing expropriation process in Zimbabwe. Compulsory land acquisition in Zimbabwe is provided for by a number of statutes including: Sections 71, 72 and 86 of the *Constitution of Zimbabwe* of 2013, Section 3 of the *Land Acquisition Act* of 1992, Section 40 of the *Forest Act (Chapter 19:05)* of 1949, Section 12 of the *Communal Lands Act* of 1982, Section 120 of the *Parks and Wildlife Act (Chapter 20:14)* of 1975, Section 27 of the *Land Commission Act (Chapter 20:29)* of 2017, Part VII of the *Regional Town and Country Planning Act (Chapter 29:12)* of 1976, Section 150 of the *Urban Councils Act* of 1997 as well as Section 78 of the *Rural District Councils Act (Chapter 29:13)* of 1988. A closer review of these statutes shows that there is consistency in that most of them just provides a skeleton and point to the principal statute (the *Land Acquisition Act* of 1992) for more flesh. But, on the other hand, there is a notable gap between the *Land Acquisition Act* of 1992 and the *Community Lands Act* of 1982 when it comes to how communal holdings are valued. There is not even a single reference of community land in the entire Part V of the *Land Acquisition Act* of 1992.

There is evidence to suggest lack of consistency in property valuation for expropriation in Zimbabwe. Firstly, and most importantly, the compensation disputes between the government of Zimbabwe and former commercial farmers was mainly caused by large differences between the claim by former farmers and government's offer. There is also evidence of compensation disputes between communal farmers and government. The researchers failed to get access to original valuation reports to compare those done by professional valuers representing former commercial farmers and the ones done by Designated Valuation Officers. They managed to examine court case on compensation for expropriation in Zimbabwe. Reviewed cases include the *Interfresh Limited and AARDCOR Limited versus the Minister of Lands and Rural Resettlement (the Interfresh case)* which was settled by the Administrative Court of Zimbabwe in 2015 and the *Mike Campbell (Pvt) Ltd. and William Michael Campbell and 77 others versus the Government of Zimbabwe* which was settled by the Southern African Development Community Tribunal in 2008.

Another court case which was reviewed is the *Bernadus Henricus Funnekotter and others versus Government of Zimbabwe* which was settled by the International Centre for Settlement of Investment Disputes in 2009. A common denominator in these three different court cases is that there was no consistency in valuation approaches used and the compensation amount arrived at by private valuers and designated valuation officers. These glaring inconsistencies in case law could reflect property valuation for expropriation which is marred by lack of uniformity. The same wide differences in value estimates for compensation were also seen during negotiations for compensation from 2017 to 2020. The Government of Zimbabwe initially offered a global compensation of US\$1.2 billion as compared to US\$5.2 billion initially claimed by the former commercial farmers.

6. CONCLUSION AND RECOMMENDATIONS

The subject of expropriation and payment of compensation is a common occurrence in most countries. This is because growth or development is inevitable in any human society. Crises usually occur when the process or procedure leading to expropriation are carried out without following to laid down legal guidelines or when laws are enacted to favour the expropriating authority which in this study is the government. The consequences of neglecting any of the above issues by expropriating authorities or affected parties is dire and does not cure with passage of time unless the right thing is done.

This state of affair is unfortunately the case of expropriation and compensation in Zimbabwe prior to and after the independence. Thus this paper delved into the salient issues bothering the procedure and fairness in expropriation and compensation. The study concluded that the entire subject is shrouded in complexities given its historical context. It is therefore recommended that the contentious Land Acquisition Act of 1992 must be amended and strengthened on issues of transparency and accountability, and most importantly, promoting the participation of affected people during the whole process.

The limitations of this study are that it was done during the period of COVID-19 induced lockdowns and when the negotiations between representatives of former commercial farmers and the Government of Zimbabwe were negotiating the global compensation agreement hence it was not possible to visit offices to get some relevant documents like valuation reports. It is recommended that further research must be done on property valuation for expropriation practice based on actual valuation reports done by both Designated Valuation Officers and professional property valuers.

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A Framework for Financing Housing Development and Ownership in Africa

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Purpose: There is a need for the modification of mortgage finance to embrace new innovative finance options that will facilitate access to housing by low- and middle-income earners in Africa. Thus, this paper seeks to evaluate the suitability of informal finance options for incremental housing development in Africa.

Design/Methodology: A desktop survey of the literature was carried out to consider mortgage financing in contrast to other housing financing options. The approach was used to critically appraise and consolidate existing studies on innovative financing (informal finance option) in Africa. The Mendeley app was used to collate and organize the literature chronologically spanning 24 years of 1994-2018. Thematic content analysis was used to appraise positions, gaps, and lapses in the implementation of different informal housing financing solutions.

Findings: In most African countries like Kenya, Rwanda, Nigeria, and Malawi, mortgage finance research continues to grow as a major part of affordable housing finance. However, there are considerable interests in innovative affordable housing finance tools and incremental housing for the low-income groups.

Research limitations/implications: This study is limited by the low volume of quantitative literature and data gaps about incremental housing in the African context. However, this motivates the need for a more elaborate exploration of the research and knowledge available.

Practical implications: This study adds to the growing discussion of exploring available research on innovative housing finance in Africa.

Originality/Value of work: To our knowledge, this study provides insight into the opportunities for a diverse pool of formal and informal financing options to build an acceptable house finance framework for the African housing market.

Keywords: Incremental, housing, finance, framework, mortgage, loans, affordability, developing, economies, Africa.

1. INTRODUCTION

For a lot of households, buying a home is a huge capital outlay and mortgage lending is one of the many options for financing the purchase. This role played by mortgage finance translates as an opportunity for prospective homeowners who cannot access a lump sum today. However, in several developed and developing economies, inadequate access to

mortgage finance and issues of affordability continue to motivate a need to research other instruments for financing housing (Melzer, & Hayworth, 2018).

With the predicted growth in urban population across developed and developing economies, housing needs are bound to become more urgent and sophisticated. According to the report of the World Bank Group (2015), Africa is urbanizing faster than income is growing and consequently effective demand for housing is low. Consequent to this, financial institutions that provide mortgage financing apply stringent loans criteria, offer high and variable interest rates, and require short repayment periods. This situation makes housing finance through mortgages unattainable for a lot of Africans (Nyasulu, & Cloete, 2007). Furthermore, it creates a situation where most prospective homeowners rely on grants, government subsidies and other informal modes of finance.

One can infer from this that investment in formal housing finance for low-income groups has increasingly become unattractive to investors. The studies of Wallace, (1995); Gurrán, & Whitehead, (2011); Poon, & Garratt, (2012); Bright & Demarco (2016); Ryan-Collins, (2019) observed that mortgage finance plays a major role as a contributor to housing affordability in most developed economies. However, this is different in developing countries, especially, across Africa. The challenge of accessing mortgage loans by the low-income class and utilising the same for homeownership has been a herculean task.

For example, in Rwanda, commercial banks dominating the mortgage market provide expensive middle and short-term home loans, conditioned loan to value (LTV) ratio and conditioned payment-to-income ratio from which stem limited housing affordability (Iyandemye & Barayandema, 2018; Fuchs, 2018). What this implies is that only high-income households with collateral assets, and who are capable of shorter repayment periods often qualify for mortgage finance. This is similarly the case as reported in studies undertaken in Ghana, Zimbabwe, Namibia, Ghana, Nigeria, Uganda, and Tanzania (see Quansah & Debrah, 2015, 2004; The World Bank 2011). This is because the low-income earners cannot repay mortgage loans especially the size required for housing. Thus, the objective of providing affordable housing for low-income earners is inhibited in most developing countries.

Therefore, the majority of Africa's housing demand will have to consider less conventional/informal financing options to meet housing needs. To stem the growth of informal settlement and slums, country leaders must explore a variety of financing options for housing modification, development, and incremental housing in Africa. Despite these obvious needs, research into new and innovative finance options have been polarized, disjointed and seemingly incoherent on the informal or incremental housing finance. Thus, the concern on whether informal housing finance can be considered as an alternative, substitute, or complement to mortgage finance in Africa. Several studies on the subject matter have focused on re-inventing or modifying mortgage finance suitable for the African market (see Nyasulu & Cloete, 2007; Melzer, 2015; Akenga, Olang & Galo, 2015; Nyanyuki & Omar, 2016).

The lack of clear consensus on research and innovation aimed to improve mortgage finance across these studies is a matter of concern, hence, the need for this study. The purpose of this study, therefore, was to explore the need for an alternative form of financing housing

development and ownership. Thus, the main motivation is to build a financing framework that is suitable for the African housing market.

2. BACKGROUND

Finance plays an important role in housing delivery and provision globally and Africa is not exempted. The housing deficit experienced across sub-Saharan Africa can be linked to various factors including poor access to financing options and an undue focus on mortgage/formal financing. A mortgage is the pledging of property to a creditor as security for the payment. The lender holds the title to the borrower's real estate until the debt is completely paid up (Struyk, et al. 2010). Financial institutions involved in mortgage lending use investors' money to lend to those who want additional funds to finance their house purchases or construction (Nyasulu & Cloete, 2007). Often the lender requires some risk assurance in form of collateral, or they hold on to the deed certificate till loans are fully repaid.

The selection criteria for a mortgage are designed to ensure profitability for the financial institution and lenders. This objective may not particularly be aligned with the affordability agenda of borrowers. This is because the income of the prospective homeowner and other criteria set by the bank is used to assess default risk and ability to repay loans. In a lot of African economies, income levels are too low for most people to be eligible for mortgages. This contributes to the continued growth of the housing deficit (United Nations Human Settlements Programme, 2005).

Therefore, as population and urbanization growths continue unabated, the lack of access to finance by a majority would often grow. Considering the popularity of mortgages in housing finance research, diversifying, and exploring innovations in housing finance would require a clear agenda for inquiry. It is important to consolidate how financing can be done to bridge the gap between the lender and prospective homeowners. As far back as the early 90s, developed economies like the United States have been faced with the challenge of providing affordable housing to low-income groups. Yet, this affordable housing gap has remained unfilled even with the development of mortgage finance (Wallace, 1995; Cacdac & Warnock, 2008).

Table 1: Global Mortgage Finance Products (adapted from Cacdac & Warnock, 2008)

	The average length of the contract (years)	Estimated Average LTV (%)	Average Max LTV (%)	Fixed or variable interest (Mode)
Africa	23	-	90	Variable
Eastern Europe	23	50	85	Variable
Emerging Asia	22	73	84	Variable
Latin America	21	90	83	Variable
Middle East	14	-	80	Variable
Europe	25	74	95	Variable
North America	28	68	98	Fixed
Pacific	27	78	83	Variable

As seen in Table 1, the mortgage finance framework in Africa does not show any significant difference compared to the developed countries. Compared to the Middle East, Eastern Europe, and Emerging Asia, Africa seems to have a mortgage finance system that offers high Loan-to-Value (90%) and a 23-year contract period (provide source). One can infer that the mortgage data collected in Africa is only restricted to a small population of high- and middle-income people. Thus, the information in Table 1 only proves further that deepening mortgage finance or increasing the supply of mortgage finance may not be the solution that Africa needs.

What this means is that households must rely on their savings, family support, and contributions to build their homes incrementally (Groves, 2004). The Centre for Affordable Housing Finance in Africa (CAHF) (2012) opines that the development of appropriate and fully accessible housing finance systems across Africa is challenged by a narrow focus on the mortgage instrument and a failure of housing policy and delivery systems to acknowledge and support the potential of incremental housing. Furthermore, the popular mortgage finance option is often considered expensive for most households to acquire. For example, Quansah, & Debrah, (2015) found that mortgage finance in Ghana is often considered too expensive for most prospective homeowners.

In Malawi, Nyasulu & Cloete (2007) found that the average mortgage payment is about 150% above the average monthly income level. Also, the ratio of average house price to annual income is more than 5 and thus considered to be unaffordable for more than 50% of households living in urban areas. Their study confirms that only about 35% of the population can access formal finance sources, due to low-income levels and a high level of insecure jobs. Therefore, they propose a diversity of financing options including mortgage finance, fully guaranteed loans, payroll-based systems, micro-finance methods, rental, public/private partnerships, and securitisation, to increasing access. Nyasulu & Cloete (2007) confirm that formal housing finance in Malawi is rudimentary and access criteria are often too stringent that it excludes 65 per cent of potential beneficiaries.

Furthermore, a lot of economic policies, and housing finance investment seem to reflect the belief that simply adjusting mortgage finance does not offer a definite solution to this problem of unaffordability. Mortgage finance promises prospective owners an opportunity to spread a bulk purchase over a short or long repayment term. This inherently promises affordability for people who cannot ordinarily commit to a once-off property purchase. However, mortgage finance seems to only serve the high-income population and a limited number of middle-income people (Ayeniyo, 2020; Hawtrey, 2009; Samuel, 2019). An analysis carried out by Nkechi, Samuel & Meshack (2019) reports that commercial bank mortgages had no significant contribution to housing finance in Nigeria with a proportion of less than 1% on a yearly average.

Similarly, Hawtrey (2009) also argues that mortgage finance for developer-built units served only a small upper-middle class. The remaining population appeared marginalized from economic growth and unable to afford commercially produced housing. This is further corroborated by The World Bank (2011) report on Kenya's Mortgage Market. The report stated that an ideal mortgage financing system should have a sufficient absolute level of income, verifiable and regular income but most of Kenya does not have this. Furthermore, for a lot of the cases where mortgage finance has recorded some success, it is with the

understanding that this cannot be replicated in developing economies with poverty rates and lower income levels (See Anacker, 2019; Nyasulu & Cloete, 2007; Iyandemye & Barayandema, 2018; Nyanyuki & Omar, 2016).

3. CONTEXTUAL UNDERPINNINGS OF INFORMAL/INCREMENTAL HOUSING FINANCE

Several studies on informal housing allude to the significant advocacy and contribution of John F.C. Turner's theories of incremental housing to this research focus (Ryan-Collins, 2019; Akinwunmi, 2009; Donkor-hyiaman, 2018; Van Noorloos, et al. 2020). Notable among the studies that explored Turner's self-help theories is Van Noorloos, et al. (2020). The study shares an extensive examination of the informal incremental housing system in the context of present-day Africa. It also posits that the relationship between housing consolidation and the management of different types of finance, the role of savings, and the costs of self-help housing has been hardly addressed in research. Their position is that informal housing finance seems less stringent when compared to mortgage finance. This is because this source of funding from friends and family, savings, and community contributions sometimes seem to be the more accessible option. However, because of the nature of these forms of financing, they are inconsistent, piecemeal, and not always available.

Furthermore, Van Noorloos, et al. (2020), discuss housing finance and the need to distinguish between supply-side and demand-side financing when it comes to incremental housing. Based on this, it is important to note that housing finance in the African context needs to be considered from the end-user's perspective. If incremental housing finance must be designed to reach the neediest, it should give cognizance to how Africans incrementally build their homes and as such rely on informal and incremental finance. This perspective draws from John F.C. Turner's theories that advocate assisted self-help housing as the most affordable housing option in developing economies as against the formal options like mortgage finance.

While referencing JFC Turner's self-help theories, Ntema (2011) notes that Mortgage finance adopted from developed economies forces the purchase of ready-developed housing. This contributes significantly to the problem of affordability. Therefore, this study proposes an affordable housing finance framework that is more suitable to the economic realities of Africans and the need to build incrementally. The framework is expected to closely align financing of a home purchase or ownership with the socioeconomic status of African households. In most African settings, households develop or own their houses in bits or incrementally such that at year 0, the land is acquired, and development might take several years. The time taken to gather the required equity or debt finance for acquisition may have taken several months or years by household. In countries like Nigeria, for instance, low-income home buyers or developers relied on pooling of resources together from friends, relatives, or work colleagues to raise funds. Others look to workplace cooperative society for raising required finance with limited repayment period.

Thus, the proposed house financing framework must incorporate the income source and level, family size to determine the appropriate type of accommodation for household, cheaper building materials and length of repayment among others.

4. LITERATURE REVIEW

This section reviews related literature on housing finance affordability as it concerns the incremental housing finance system. Among various studies that have considered the subject of affordable housing in Africa, Groves (2004) makes one of the earliest cross-continental contributions. His study investigated the challenges facing the provision of affordable housing in African cities. He pointed out that privatised African housing markets are often small-scale and largely financed by building societies – a reminder of colonial pasts. Financing in these times struggled because of poor macroeconomic conditions and Structural Adjustment Programs that withdrew government funding, tax, and regulatory privileges. It can be inferred that finance failure is partly influenced by the apathy or lack of government role in developing scalable markets.

Similarly, several studies have blamed the failure of formal housing finance in Africa on neoliberal market systems (Goebel, 2007; United Nations Human Settlements Programme, 2005; Ferguson & Smets, 2010). These studies believe that liberalizing the market would only seem to absolve the government of its responsibility towards housing the poor. However, in the journey towards innovative finance for incremental housing, enabling markets can be seen from a different and more positive perspective.

Groves (2004) recommends government subsidies and aid that augment savings, credit co-operatives, employee savings schemes and other traditional forms of rotatory credit associations. Meanwhile, they note that any innovation in finance would not be sustainable without tenure security. This suggests that the author believes that lack of government involvement and insecure land tenure is the biggest bottlenecks to financing affordable housing for low-income groups. The study suggests that an appropriate way forward would include liberalising land supply through market forces and development and financing for the middle-income groups. Their study assumes that a liberal market would be accommodating to the needs of many Africans and contradicts its position that government involvement is required to strengthen the market.

Furthermore, the question of risk and how it is shared among the stakeholders to housing development is critical to financing. In addressing risk and transaction cost, Ferguson & Smets (2010) believe that every finance framework must include a legal aspect; user credit information, trust, or collateral; and it must redefine the role of government. In a study of Botswana's housing finance system, Berge & Jing (2010) discovered a small housing finance market dominated by commercial banks. Despite the gains of a stable macroeconomy, they noted a lack of competition, focus on high-income groups, inexistent secondary market, and hesitation to lend to other low-income groups. Berge, & Jing (2010) believe that unlike many other developing countries in Africa, Botswana's stable macroeconomic development since the 1980s and 1990s has ensured that housing finance is unhindered. However, despite the shift in the structure of bank lending to households, with property loans increasing rapidly between 2002 and 2006, still development remains slow. In their consideration of the development of housing finance in Botswana, they attributed the lack of scale to a large population that are considered low-income and risky subsequently excluding most of the financing of the poor household.

In discussing housing finance, Tomlinson (2007) and Berge & Jing (2010) refer to the framework developed by Hassler (2005). In this framework, 5 preconditions for a workable housing finance market are identified. The framework adopted often builds on stable macroeconomic conditions, a legal framework for property rights, a functioning property market, mortgage market infrastructure and funding mechanisms. However, when working with this framework, several studies ignored the macroeconomic differences between developed and developing economies. Thus, it is necessary to align the framework to the African market incorporating other mechanisms that have been used among Africans to raise funding for their other needs. What this creates is a bleak legal and macroeconomic and higher risk perception by lenders operating in emerging African economies, (see Datta & Jones, 2001; Cacadac, & Warnock, 2008; Hawtrey, 2009).

According to Berge & Jing (2010), besides locational, urbanization, and legal framework challenges to financing housing, a lot of low-income applicants for financing are challenged with exclusionary selection criteria. This belief or lack of faith in the profitability of lending to low-income homeowners can be attributed to several indicators including macroeconomic perception. The formal finance selection criteria are often designed to protect lenders and investors from the risk and volatility inherent in developing markets. This is not unreasonable as the purpose of investment is largely profitability. However, it becomes imperative to consider hybrid frameworks that improve risk management practices while giving investors more confidence to diversify financing products that extend to the low- and middle-income groups.

Assisting people who are already used to building incrementally in terms of finance could mean a lot of things to financiers, the government, and even the homeowners. Habitat For Humanity (2014) advocates the provision of Housing Microfinance to assist this incremental or progressive mode of housing development that accounts for up to 90 per cent of residential construction in the developing world. Developing a framework for assisted incremental or self-help housing as a paradigm could be a way forward for creating enabling markets for innovative financing options for low- and middle-income groups across Africa.

While some studies see enabling housing markets and self-help as an ideal pathway for achieving housing finance affordability others see this as a mere abandonment of government duties and a detrimental result of neoliberal economic policies. For example, Hawtrey (2009) reports that For the World Bank, enabling housing markets mainly meant virtually abandoning sites-and-services and slum-upgrading projects for two decades in favour of funding national mortgage systems with loan terms of typically 20 to 30 years for the middle and upper-middle classes. Similarly, Kongoro & Owino (2016) claim that incremental housing, despite its popularity, is not the solution to the low access to housing finance in Kenya. In the face of a staggering failure of formal/mortgage finance across African economies, and unique macroeconomic realities, housing finance frameworks must be duly situated in the African context.

This study hopes to consolidate knowledge on innovative and inclusive approaches to financing and enabling affordable housing for low-income groups in Africa. It proposes a new financial framework that reimagines the role of government as a market enabler and risk buffer that would improve private investor confidence.

5. METHODOLOGY

Further to developing a finance framework for African housing markets, a thematic content analysis approach is employed. This study critically appraises and consolidate existing studies on innovative financing in Africa. It identifies 18 studies that discussed the enabling market and incremental housing model as part of the affordable housing research focus. The literature selection focuses on developing economies especially those that include a mix of qualitative and quantitative data from African countries and some in comparison with more developed economies. The literature was selected from Google Scholar top results for searches relevant to keywords like mortgage, housing finance, and affordability in developing economies. Mendeley app was used to collate and organize the literature chronologically while selecting top results focused on African markets. The literature spans 24 years from 1994-2018.

The 5 preconditions as explained by Berge & Jing (2010) include stable macroeconomic conditions, a legal framework for property rights, a property market, mortgage market infrastructure and funding sources to promote financial intermediation. By inspecting literature, this study expands on data points that can be used to consolidate the housing finance framework in operation in some African countries. This would then provide the basis for recommending and designing a new framework that is representative.

The content analysis method adopted is a tabulated critical assessment of literature. It seeks to summarize key findings on the suitability, adoption, and capacity of other innovative housing finance solutions other than mortgage financing within the African affordable housing context. This literature review employs a critical content review that hopes to determine if research and inquiry paradigms are giving sufficient focus to the incremental housing finance needs across Africa.

The study does not assume that all literature on housing finance in Africa can be examined. So the selection is limited to literature that specifically focuses on innovation and the incremental housing finance sector in Africa. However, this critical review and content analysis select some of the most relevant empirical, quantitative, and qualitative literature available across various African economies. This seeks to consolidate the extant knowledge and developments in the affordable housing finance discourse.

6. RESULTS AND DISCUSSION

This section contains an analysis and discussion of the results. The analysis was done in three subsections including the results from previous studies on challenges of mortgage financing systems in Africa, incremental housing finance and finally the framework for the adoption of incremental housing financing for the African market.

6.1 Challenge of mortgage financing system in Africa

In discussing the challenges to the development of mortgage financing systems in Africa, several factors have been considered overtime. Popular among these challenges are weak or lacking secondary markets to ensure liquidity and long-term funding, low-income levels across most developing economies, an unstable macro economy that informs high inflation and interest rates, poor legislation/regulation that enforces foreclosure, weak land titling

systems and poor tenures, almost non-existent credit information, and financial illiteracy or cultural issues like an aversion to credit (Donkor-hyiaman, 2018).

Table 2: Challenges of Mortgage Financing in Kenya, Ghana, Rwanda, and Botswana

Author	Weak Secondary mortgage market	Low-Income levels	Unstable Macroeconomy	Lack of credit history	Poor regulation and collateral	Financial illiteracy	Lack of tenure security
Teye, Teye & Asiedu (2013)	√	√	√	√	√	√	√
The World Bank. (2011)	√	√	√	√	√	√	√
Samuel (2019)	√	√	√				
Berge & Jing (2010)	√	√	√		√	√	√

6.2 Incremental housing finance in Africa

The challenges of mortgage financing do not completely rule out the existence of housing markets and financing in Africa. Across the continent, homeowners have gone on to build incrementally. This necessitates the development of a framework that is suited to the financing needs of these incremental housing processes. Informal markets do not have to lack structure. Hence this study inspects the nature and operation of incremental or informal housing systems across Africa to developing a housing finance framework.

Building on existing frameworks like the International Finance Corporation (2019), and the Hassler (2005) housing finance framework, the study examined 7 African housing markets. The indicators inspected in Table 3 depicts the housing finance strategies adapted in housing markets that seek to address the need for incremental/informal housing finance options. The study captures differing but similar strategies for improving access to housing finance in Kenya, Nigeria, South Africa, Botswana, Namibia, Egypt, and Morocco. The frameworks address tenure security, diversity of funding sources, collateral or loan security, government's role, and loan terms, differently. However, some common themes can be established and applied for developing an African housing finance framework that accommodates informal and incremental housing needs.

Table 3: Incremental housing finance frameworks in Africa

Incremental Housing Finance in Africa							
	Kenya	Nigeria	South Africa	Botswana	Namibia	Egypt	Morocco
Land Tenure							
Opportunity to Regularize Tenure	√	√	In progress	-	√	X	√
Funding Sources							
Housing Microfinance (HMF) Providers	13	1 013	4 500	12	423	969	12
Govt. & DFI Subsidies	√	√	√	√	-	√	√
Savings/Deposits Coops	√	-	-	315	√	-	-
Repayment guarantee?							
Pension fund Guarantee	√	-	-	X	√	-	-
Community Guarantee							
Government Guaranteed loan	√	√	-	√	-	√	√
Savings history	√	√	-	-	-	-	-
Employment history		√	-	-	-	-	-
Government Role							
Interest rate subsidy	√	√	-	X	√	√	√
Cash Grants	√	-	√	√	√	√	√
Tax Incentives	√	-	-	-	-	-	√
Loan Terms							
LTV %	-	90-100		100	100+	-	-
Repayment Period (yrs.)	Variable	30	20	20	25	20	25
Repayment Schedule	-	Monthly	Monthly	-	-	-	-
Interest	18	6	25	17-24	8.75	10	4.45

Sources: (Groves, 2004; Hassler, 2005, Gardner, 2008; International Finance Corporation, 2019; Centre for Affordable Housing Finance in Africa, 2020)

6.2.1 Tenure Security

Kenya, Nigeria, Namibia, and Morocco demonstrate the strong pursuit of integrating informal settlements through tenure regularization. While South Africa pursuing legislative reforms for the Upgrading of Land Tenure Rights targeted at excluded or discriminated groups (Centre for Affordable Housing Finance in Africa, 2020). Despite Egypt's strong housing finance efforts, the demolition of informal settlements is bound to discourage support for incremental or informal housing efforts. This consequently increases the issues of unaffordable housing for informal housing. Tenure security is a major determinant for building investor's confidence and creating avenues to regularize informal settlements is bound to increase housing finance supply. The United Nations Human Settlements Programme has committed to improving the lives of 100 million slum dwellers by 2020 through tenure security action plans (Groves, 2004). African housing markets would benefit immensely from frameworks designed to extend tenure security to informal settlement dwellers.

6.2.2 Diversity in Financing

The need to combine various financing sources for incremental housing is an African reality. In Table 2, the responses of various African countries to this need provides interesting insights. Nigeria and South Africa have the largest pool of Microfinance providers with 1 013, and 4 500 respectively. Gardner (2008) reports that between 10% and 33% of all microfinances in South Africa is applied to housing in some way, which implies a housing-related microfinance portfolio up to R10.7-billion (about US\$1.1 billion). The Nigerian situation can be assumed to be similar to Habitat for Humanity (2014) suggest that 20% of microenterprise lending is used for housing in developing economies. There is also a huge reliance on government and DFI subsidized loans which is indicative of the slow adoption of the government's role as an enabler instead of the provider. However, in Botswana, Kenya, and Namibia, the growth of Savings cooperatives is a great financing initiative that should be given more attention as a source of financing. Encouraging deposits and savings to pool funding is bound to create a sustainable way to promote savings culture while offering a chance for longer-term and large-scale finance for incremental housing.

6.2.3 Loan Repayment Guarantee

Understanding the challenges with tenure security and lack of collateral in a lot of incremental housing systems, lenders and investors confidence would rely on other forms of guarantees. Government guaranteed loans are popular across 5 countries of the 7 in Table 2. A few other approaches for securing loans that have been recorded include pension-fund guaranteed loans and the use of savings history as a basis for extending housing finance. In Nigeria, the Federal Mortgage Bank uses worker's contributions to the National Housing Fund as eligibility criteria for subsidized housing loans. Furthermore, the employment of the Bank Verification Number (BVN) technology in Nigeria to guarantee repayments stands out as an innovative tool (Centre for Affordable Housing Finance in Africa, 2020).

6.2.4 Government Role

Shifting from affordable housing provider to enabler means a lot of things for various markets. In Africa, cash grants to the affordable housing market are still popular instruments employed. Only Nigeria does not have any direct cash transfer model for supporting the purchase or ownership of affordable housing. Interest rate subsidies are also relatively popular in Kenya, Nigeria, Namibia, Egypt, and Morocco. Meanwhile, tax relief and concessions to developers are also seen in Kenya and Morocco. It is still a popular experience to have the government acting as providers of housing finance instead of acting solely as market enablers.

6.2.5 Loan Terms and Affordability

Information on loan terms for the informal sector is not constant or readily available. However, it is common to find 100% LTV instruments that seek to reduce the risk of loans for the recipients. However, this means that credit risk is often a burden on lenders must bear. Sharing credit risk through equity is not as popular as it should be. Interest rates are not constant, and this is indicative of varying risk perceptions across Africa. Morocco's low interest is attributed to a stable macroeconomy, and government-guaranteed loan system known as FORGARIM (Centre for Affordable Housing Finance in Africa, 2012). It can be inferred that housing finance frameworks that share the risk burden among stakeholders have greater chances of improving affordability.

6.3 Framework for the Adoption of Incremental Housing Financing For the African Market

Seeing the unique challenges of operating formal mortgage finance in most African countries, this study proposes a diverse framework to create a pool of informal financing solutions that achieve inclusive financing for low- and middle-income earners. The framework proposed reflects some of the strategies employed in African markets that have achieved limited success in addressing incremental housing needs. The study recommends a hybrid framework that relies and builds on the 5 preconditions for housing finance frameworks by Hassler (2005). The Assisted/Government Guaranteed Incremental Housing Finance Loan framework is illustrated in Figure 1.

Based on the framework developed, here are recommendations for achieving incremental housing finance frameworks in African markets:

1. Tenure security plays a huge role in the risk perception of informal settlements in African countries. An opportunity to regularize tenure would significantly improve opportunities for informal homeowners to be integrated into a deed's registry, giving them collateral. This
2. Prioritize data and research that focuses on innovation for financing incremental housing. Increasing credit information is critical to investor confidence. In place of a credit registry, African economies will benefit from identification systems that provide sufficient information on savings history, employment history. This should also offer information sharing as a benefit to housing microfinance lenders and credit bureaus that can centralize information for monitoring repayment capacity and behaviour. Donkor-hyiaman (2018) has discussed the importance of credit information in detail.

In Nigeria, the Bank Verification Number (BVN) is employed as an alternative to credit information availability and gives access to customer data (Centre for Affordable Housing Finance in Africa, 2020).

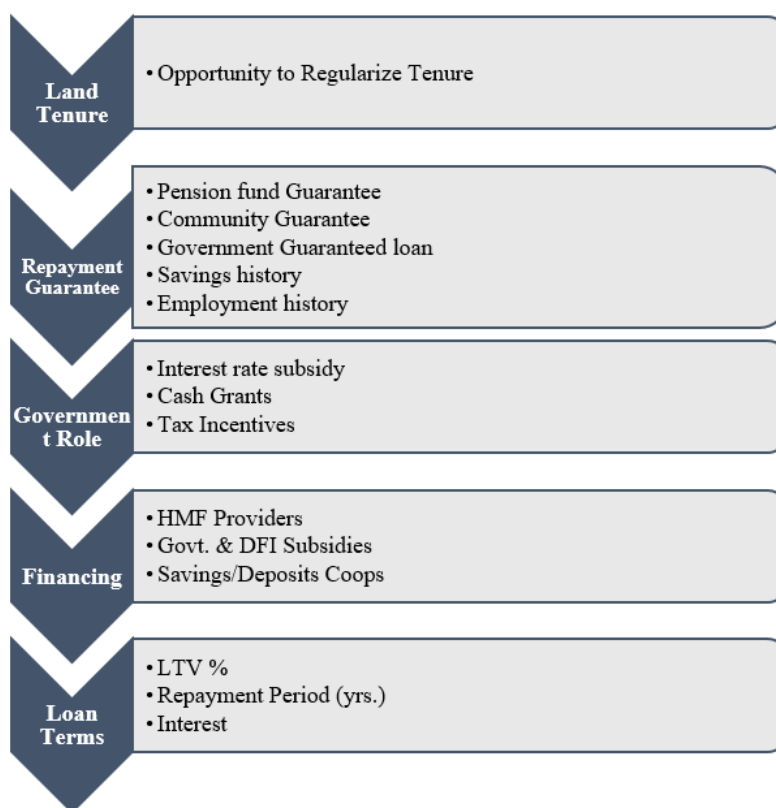


Figure 1: Assisted/Government Guaranteed Incremental Housing Finance Loan

- Identify other finance options like pension-backed housing loans, government-assisted self-help in South Africa, and shelter microfinance in Kenya. The World Bank (2011) on developing Kenya's mortgage market discusses the use of pension as collateral. The program uses up to 60 per cent of a pensioner's accumulated pension savings as collateral guaranteeing a housing loan. This application of pension savings as collateral is widely recommended (Akenga, Olang & Galo, 2015; Berge & Jing, 2010). Other guarantee systems like community guarantees and government-guaranteed loans offer a greater risk management opportunity that will improve investor confidence.
- Consistent measures of affordability should be defined for markets across Africa. The measures of affordability like debt-to-income percentage, repayment period, and lending rate provide inconsistent results indicating a huge data gap. This further increases the difficulty that is inherent in acquiring relevant information about how Africans meet their housing needs. With the growth of liquidity through pension funds or savings cooperatives, for example, longer-term financing can be offered for incremental housing. The repayment terms are often more affordable where the funding supply is greater.

5. A lack of stable cost of financing (interest rates) is reflective of a vast, diverse, and almost incomparable financing experience for most of Africa's developing economies. This could be a result of the volatility and uncertainty that characterises such economies. The role of government in creating enabling macroeconomic conditions cannot be overemphasized. The provision of interest rate subsidies would allow lenders to provide affordable financing while maintaining profitability.
6. Diversifying financing products as seen in Morocco and Botswana, which are notably the most robust and diversified affordable housing markets in Africa, provide incentives for finance innovation. The two economies have evidence of innovative finance models extending beyond formal mortgage finance (Centre for Affordable Housing Finance in Africa, 2012). Kenya also has records of limited efforts to diversify housing finance products to include building society loans, but the market is dominantly financed through mortgages (The World Bank, 2011).
7. In South Africa, a predominantly state-funded approach has left a huge affordability gap to consider. The data on affordability for South Africa was difficult to assess as homeowners are not fully committed to participating in the finance process. The state-funded housing approach leaves no incentive for homeowners to invest in repayments of financing their homes. Transitioning from a state-funded approach to build a framework for self-help is critical for sustainability across Africa.

7. RECOMMENDATIONS AND CONCLUSION

This study examined the literature on incremental housing finance and other innovative housing finance options to develop an African housing finance framework. Housing affordability in emerging markets is a critical discourse as it has an impact on the quality of life, access to assets, financing, and several other positives for low-income groups. Several approaches have been employed, particularly in developing countries, to provide housing that low-income groups can afford. This is typically in response to the observed growth of rural-urban migration, squatter settlement developments, and the general need to provide habitable shelter for a fast-growing urban population.

The approach to enabling markets and informal housing finance in Africa needs a drastic shift in focus. The over-reliance on the adaptation of mortgage as a possible approach to enabling the market leaves a huge information gap surrounding other unconventional finance approaches like housing microfinance, community financing and pension-backed/guaranteed loans. Furthermore, this gap is bound to increase the resistance of formal housing finance companies to design financing products for incremental or self-help housing. It is recommended that research focus on enabling African affordable housing markets to begin to look outside mortgage expansion and more closely into informal finance solutions.

This agrees with the UN-Habitat (2005) study that confirms a global interest in the development of microfinance institutions lending to low-income shelter development projects. There is a need for research focus to move away from setting the conversation around affordability as it relates to access to formal finance and rather to informal incremental housing. Furthermore, this approach does not allow for an understanding of the unique macroeconomy of informal markets as a tool for innovation. Instead of seeing informality as a threat, there is a need to understand how innovative financing could be designed to handle the uncertainty and risk perception of African markets.

There is a need to set out a clear, comprehensive, and robust research agenda for understanding the financial needs of self-help housing, both in respect of affordability and product design. The strengths of non-conventional finance in meeting the needs of low-income groups, inform the potential for rotating savings, credit associations, and financial cooperatives. Therefore, research and policy that strengthen the understanding of these informal finance tools could change the risk perception of African informal markets. This could, consequently, improve the interest of lenders and financiers in investment for assisted self-help housing finance. More so, growth in the knowledge around cooperatives, housing microfinance, and other informal housing finance tools that are incremental and less stringent than mortgage finance, is beneficial. Within unconventional frameworks, the security of the loan can be handled differently. The lender's risk should be reduced by combining small advances with short repayment periods and diversifying finance sources.

The role of government as an enabler should be channelled at risk management practices like providing loan guarantees that would improve investor confidence. Tax incentives and concessions for developers, savings cooperatives and pooling funds from the private sector would position the government as a strong housing market enabler. It is recommended that housing finance research should embrace the enabling market paradigm in the unique context of informal macro economies that dominate Africa. Therefore, housing finance innovation can significantly benefit policy designs that accommodate the unique macroeconomic context of developing markets and their affordable housing needs.

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Do REITs Hedge against Inflation? Evidence from an African Emerging Market

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Purpose - This study examines how returns on Nigerian REIT (N-REIT) behave in relation to inflation changes from 2008 to 2019 to provide information for investment decisions.

Design/Methodology/Approach – Eleven years monthly return data from 2008 to 2019 were collected from databases and annual reports of the three active REITs in Nigeria. Inflation rates covering the study period were collected from the Central Bank of Nigeria’s database. The authors adopt the Fama and Schwert model, an extension of the Fisher hypothesis, to test N-REIT's inflation-hedging capability.

Findings –The empirical results suggest that N-REIT has perverse hedging-characteristics (poor inflation hedges) across all inflation exposures (actual, expected, and unexpected). The Engle-Granger causality tests conducted corroborates these results.

Practical Implication - This study reveals the peculiar nature of Nigerian REITs in relation to inflation, which could have profound investment implication for domestic and foreign investors.

Originality/Value - This study is one of the first to empirically analyse the inflation-hedging characteristics of REITs in the second-largest African REIT market (N-REIT).

Keywords: Emerging economies, inflation-hedge, investment, real estate, returns, risk.

1. INTRODUCTION

Information on the behaviour of REIT returns against inflation is important to investors as this can help guide them to protect their funds against inflation risk. Specifically, unravelling the relationship between REIT return and inflation has been a major concern to both investors and researchers worldwide. This is because inflation can erode the purchasing power of investors' investment funds. Hence, rational investors are careful not to expose their investment funds to erosion by inflation. There are several theoretical and empirical studies on Real Estate Investment Trust (REIT) in terms of its returns, risk-adjusted and diversification performance in especially developed economies (Lin *et al.*, 2019; Salisu *et al.*, 2020). However, there is a dearth of literature on the inflation-hedging characteristics of African REITs. Previous real estate-related studies which examined inflation-hedging characteristics focus on direct real estate, example include Taderera and Akinsomi (2020), where commercial real

estate was found to provide perverse hedging characteristics in the short run (in South Africa), while retail and industrial property types provided a good hedge against inflation in the long run. Other similar studies focused primarily residential and commercial properties, and are mostly concentrated on REIT markets of developed economies such as the US, UK, etc. Findings from such studies cannot be generalised for various reasons. According to Loo *et al.* (2016 p. 231), such reasons could include differences in "asset management structure, geographical restriction of underlying assets, real estate development allowance, gearing restriction as well as dividend pay-out requirement". Furthermore, it was observed that the peculiarities associated with the structure, conduct and performance of individual REIT markets could also explain why findings from one REIT market might not reflect the others (Dabara *et al.*, 2015; Dabara and Ogunba, 2019). These assertions are particularly true for REIT markets of emerging economies, such as the Nigerian REIT (N-REIT) market in Africa.

Hence, this study examines the inflation-hedging characteristics of N-REITs, with a view to providing information for investment decisions. Besides, the study determines whether there is a causal relationship between returns on N-REIT and inflation. Research papers on the inflation-hedging attributes of REITs in African emerging markets are rare. This paper contributes to knowledge in this field by investigating the correlation in terms of causality between returns on N-REIT and different exposures of inflation in Nigeria. The Nigerian REIT is increasingly prominent and significant in the African REIT market block, being the number two REIT market after South Africa. This study extended the frontier of knowledge by testing the Fisher hypothesis (extended by Fama and Schwert, 1977) on an emerging REIT market. Information from this study can be beneficial to domestic and foreign investors, as it will guide them in making informed investment decisions to protect their funds against inflation risks.

Since its creation in the US (in 1960), REIT has provided a viable and profitable platform for diverse categories of investors. From a global perspective, about 35 countries have adopted the REIT regime (having over 800 REITs) and over \$2 trillion in market capitalisation (EPRA, 2020; Parker, 2020). According to Marzuki and Newell (2020), about 5% of the global REIT is accounted for by REITs in emerging markets. Nations in developed economies (notably the US, Japan, and Australia) have significantly developed their REIT markets to matured and established stages over the past decades.

Countries of emerging economies, primarily Africa, on the other hand, are just beginning to accept and introduce REITs into their respective real estate investment space and are all at the nascent stage of development (see Table 1). Notably are South Africa, Ghana, Kenya and Nigeria (Dabara and Ogunba, 2020).

Table 1: REIT in the African continent

Country	Year of establishment	Number of active REITs	Market capitalization (USD)	Primary sector
Ghana	1994	1	12.6 million	Residential/commercial
Nigeria	2007	3	136 million	Residential/commercial
Tanzania	2011	1	40 million	Residential
South Africa	2013	32	22 billion	Residential/commercial
Kenya	2013	1	35.5 million	Commercial
Rwanda	2013	1	29 million	Residential/commercial
Morocco	2015	1	n/a	Commercial

Source: Author's compilation from Kruger-levy & Dauskardt (2017), EPRA (2020) and Dabara (2021)

Despite being a new investment vehicle in the African continent, REITs are adjudged to be essential growth stimulants to the region's foreign and domestic investors' capital deployment in the real estate markets (Marzuki and Newell, 2019). This has stimulated research interest in REIT, which have translated to several empirical studies targeted at examining the investment dynamics associated with REIT at the global, regional and national levels (Parker, 2009; Li *et al.*, 2017; Reddy and Wong, 2018). Some empirical evidence suggests that direct real estate are good hedges against inflation (Hoesli *et al.*, 2008; Dabara, *et al.*, 2012; Larsen and Mcqueen, 1995; Taderera and Akinsomi, 2020). However, the question of whether financial assets backed by direct real estate assets, such as REIT, also behaves like their underlying assets concerning inflation easily comes to mind. This is because the operations of N-REIT in the capital market differs from its operations in the direct real estate market. It has been observed that N-REIT hardly trades in the capital market for a very long time now, this is further impacted by the double digits inflation experienced in Nigeria over the years. Nigerian inflation rate has been higher than most African countries, it even exceeded 17% in 2017 to date and there is no hope of significant decrease in the nearest future. It has been fluctuating and has been unsteady for quite some time now thereby affecting the economy grossly. Within the study period, inflation rates in Nigeria ranged between 9.97% and 18.45% with most of the rates being in the double digits range. At the moment, inflation rates have decreased a bit to 17.75% as at June 2021. The high inflation situation in the country has grossly impacted most sectors of the economy including the real estate sector which are all prone to the risk of inflation.

Hence, the study examines the inflation-hedging characteristics of N-REIT to provide information for investment decisions. The study seeks to answer the following research question: Is there any relations between returns on N-REIT and inflation, and if yes, what is the nature and significance of the relations? The paper's remaining part is structured as follows: the next section (2) presents the review of relevant literature; section 3 presents the theoretical framework and methodology adopted for the study. Section 4 presents the empirical results and discussion, while section 5 presents the implications of findings and conclusion.

2. LITERATURE REVIEW AND THEORETICAL MODEL

2.1 REITs and Inflation in Developed Economies

The REIT in developed economies is observed to present more developed, established, and matured markets (EPRA, 2020). Studies that examine the relationship between REIT returns and inflation have divergent findings. For instance, Park *et al.* (1990), using the Fama and Schwert (1977) regression model, found that REIT behaves like other stocks about its relationship with inflation. That is, it provides a perverse hedging characteristic. Similar results were found when Larsen and McQueen (1995) examined the correlation between inflation and REITs, direct real estate, and gold in the US. However, Salisu *et al.* (2020) found contradictory results, and they posited that US REIT were good inflation-hedges before and after the GFC (Global Financial Crisis). In Germany, Obereiner and Kurzrock (2012) found that G-REIT provides perverse hedges in relation to expected and unexpected inflation exposures. Liu (2009) found a different result in the Hong Kong REIT market, where a complete hedge was recorded in the short run but showed perverse hedging characteristics in the long run. Similar results were found in the UK REIT market (Hoesli *et al.*, 2008). In Switzerland, REIT was a complete hedge concerning the expected inflation exposure but perverse with the unexpected inflation exposure component. In a recent study Akinsomi (2020) found that the COVID-19 pandemic significantly impacts on the performance of REIT.

The result of the causal relationship of REIT returns, real activity, monetary policy and inflation, using investment error correction model in the US, indicated that REIT returns manifest spurious inflation hedge contrary to Fisherian theory (Glascock *et al.*, 2002). In the earlier opinion of Lu and So (2001), the use of a vector error correction model indicated that inflation does not granger-cause REITs returns, but REITs returns reflect changes in monetary policy. However, in the context of macro-economic variables, there existed a proxy negative relationship. For instance, in the UK, the use of Markov-switching model variants in the analysis of the impact of monetary policy on the REIT market indicated that the monetary policy environment triggered changes in terms of boom and bust market (Fatnassi *et al.*, 2014), similar findings were observed in Singapore and Japan (Fang *et al.*, 2016). When inflation is separated and classified, equity REIT returns rise in response to both increases and decreases in inflation, using a pooled estimation methodology (Simpson *et al.*, 2007).

2.2 REITs and Inflation in Emerging Economies

There are presently about 225 REITs in emerging markets, with about \$100.3 billion in market capitalisation, which contributes approximately 5% of global REITs (EPRA, 2020). The African continent seems to be lagging in terms of REIT markets (Olarenle *et al.*, 2019). South Africa appears to be ahead of other countries in the region (with 32 REITs). It has a total market capitalisation of about \$22 billion, making it the largest in the global emerging REIT market (EPRA, 2020). Furthermore, it is the only African country classified as transparent on the JLL and LaSalle Global Transparency Index, with a composite score of 2.37, ranking number 24 in the world (JLL and LaSalle, 2020). Concerning Emerging REIT markets, Lee and Lee (2014) pointed out that there was no evidence of REITs' inflation hedging capability in emerging REIT markets. Edionwe and Ogunba (2017) asserted that REITs in emerging markets do not hedge against inflation, thereby agreeing with Lee and Lee's earlier submissions. However, Aik (2012) found that Malaysian REIT effectively hedges against the eroding power of inflation. Similarly, in Turkey, Erol and Tirtiroglu (2008) found a positive correlation in relation to

returns on Turkish REIT and the expected as well as the unexpected inflation rates. These results show that findings on the correlation between REIT and inflation exposures in emerging markets are mixed.

2.3 REITs in Nigeria

The Nigerian REIT (N-REIT) was established in 2007, with the Skye Shelter Fund REIT being the pioneering company. It was created on July 23rd, 2007, and was officially listed on the Nigerian Stock Exchange (NSE) on February 28th, 2008. It has a market capitalisation of about \$6.5 million. The Union Homes REIT was established in 2008, with a market capitalisation of approximately \$40.8 million, while the UPDC REIT got established in 2013 with a market capitalisation of about \$87.2 million. The N-REIT market has a combined market capitalisation of about \$136 million and is modelled after the US REIT in terms of regulatory structure (see Tables 2 and 3).

Table 2: REIT in Nigeria

Company	Year of Commencement	Number of Shares	Share Price Per Unit	Market Capitalisation	Primary sector	Number of Properties	Location
Skye Shelter REITs	2007	20,000,000	₦100 (\$0.33)	₦2,000,000,000 (\$6,514,658)	Residential	12	Lagos and Abuja
Union Homes REITs	2008	250,019,781	₦47.59 (\$0.16)	₦11,898,441,378 (\$38,757,138)	Residential/commercial	23	Lagos and Abuja
UPDC REITs	2013	2,668,269,500	₦10.49 (\$0.03)	₦27,936,781,665 (\$90,999,289)	Residential/commercial	14	Lagos, Abuja, Port Harcourt, Kaduna and Aba
Total		2,938,289,281	₦158.08 (\$0.52)	₦41,835,223,043 (\$136,271,085)		49	
Mean		979,429,760	₦52.69 (\$0.17)	₦13,945,074,348 (\$45,423,695)			

Source: Dabara (2021)

Table 3: Regulatory structure of N-REIT compared with SA-REIT

Regulatory requirements/procedures	N-REIT	SA-REIT
Year of commencement	2007	2013
Management	Internal Management	Internal and external
Minimum Capitalisation	NGN1bn (US\$5m)	R300 million (\$19.7 million)
Property Investment	At least 75% on real estate assets for close end and 0% on real estate assets for open-end	At least 75% in real estate
Overseas Investment	No	Yes
Property Development	Yes, only for inclusion in portfolio	Yes
Distribution	At least 90%	At least 75%
Capital gain tax	Exempted	Exempted
5/50 rule of ownership	Applicable	Not applicable
Unit Holder	Minimum of 100	No restriction
Market transparency	Low transparent tier	Transparent tier
Listing	Nigerian Stock Exchange (NSE)	Johannesburg Stock Exchange (JSE)
Regulatory body	Securities and Exchange Commission (SEC)	JSE
Legislation	Investment and Securities Act (ISA) 2007	Section 25BB of the Income Tax Act
Risk monitoring committee	Not mandatory	Mandatory
Debt profile	Not applicable	below 60% of gross asset value
transferability of shares	Transferable	Transferable
Market capitalisation	\$136 million	\$22 billion

Source: Dabara (2021)

Nigeria is the most populous nation on the African continent, with approximately 200 million people. It is believed to be among the fastest-growing economies found on the African continent, with one of the largest property markets. The recent JLL and LaSalle Global Transparency Index put Nigeria at the low transparency tier, with a composite score of 3.74 and ranking number 68 globally (JLL and LaSalle, 2020). Regardless, the Nigerian property market is robust and flourishing (most especially the commercial and residential property types). This has attracted a consistent, steady capital inflow within the last decade from pension funds, investment managers, and individual investors as a result of the demand-pull dynamics (occasioned by the urban population explosion in major cities like Lagos, Abuja, Kano and Port-Harcourt). Part of this substantial property market is the Nigerian REIT market (the second largest REIT market in Africa, after South African REIT market), modelled after the US REIT. The N-REIT (which is still in its nascent stage) was created to extend the investment horizon in the Nigerian real estate investment space in terms of enhanced returns, ease of transaction, flexibility, and liquidity. However, there seems to be a dearth of information concerning N-REITs, regardless, that it could provide a global investment universe for both domestic and foreign investors. This has stimulated the researchers' motivation for this study.

Therefore, this present paper contributes to the international REIT literature by providing information on the inflation-hedging characteristics in the context of African REIT (specifically, Nigerian REIT), which is generally lacking. Findings from the study could be a helpful guide for investment stimulation/decisions. The study results have revealed the peculiar nature of Nigerian REITs; both individual and institutional investors (foreign and domestic) can use this information for informed investment decisions within the context of REIT in emerging economies (specifically, Nigeria).

3. THEORETICAL MODEL

3.1 Modelling Hedging Against Inflation: The Fisher Hypothesis and the Fama and Schwert (1977) Model

The primary theoretical model employed by researchers in relation to the inflation-hedging characteristics of investment vehicles is the model proposed by Fama and Schwert (1977). Fama and Schwert's model is an extension of the Fisher (1930) hypothesis which states that "real interest rates depend on nominal rates and inflation, such that nominal rates, less inflation, result in real interest rates". Following Fisher's ideas, Fama and Schwert extended the Fisher model to include the unexpected inflation exposure in addition to the initial actual and expected components. Their theory states that "expected nominal return on properties is the sum of real return, expected inflation, and unexpected inflation".

Thus, in the Fama and Schwert' model, the "relationship between the nominal interest rate, expected real return, expected inflation rate and the unexpected inflation rate" was formulated. Fama and Schwert used the Consumer Price Index (CPI) as a proxy for the actual inflation rate, which was congruent to Fisher's development theory. They used the economic variable such as short time interest rate (the 90 days Treasury bills) for the expected inflation rate component. At the same time, the difference between the former and the latter was used to estimate the unexpected component of the inflation rate. The limitation and shortcoming of the Fama and Schwert's model is that spurious results could be obtained since the model did not analyse for stationarity status of the dataset used. This present study adopts Fama and Schwert's model to determine the inflation-hedging characteristics of N-REIT. But however improved on the model by first carrying out stationarity test on the dataset used by means of the Philip-Perron (PP) unit root analyses. We made an inference which states that "inflation hedging is the ability of an asset to protect against erosion by an increase in prices". This attribute is present in an asset if the asset's nominal return has a positive correlation with inflation exposures, which can be assessed against the actual, expected and unexpected inflation exposures.

4. METHODOLOGY

4.1 The Data

We obtain a secondary dataset for the Nigerian REIT market, which comprise specific monthly data from databases (Investing.com and cashcraft stockbroker website) and annual reports of the three active REITs in Nigeria. Inflation rates covering the study period were also collected from the Central Bank of Nigeria's database. The study period covers from 2008 to 2019 due to data constraints. We consider this time-frame adequate for the study in line with

other studies conducted on small REIT markets such as Malaysian Islamic REIT (Newell and Osmadi, 2009) and Irish REIT (Marzuki *et al.*, 2019). The study utilised data collected from all three existing and active N-REIT companies to provide the true picture of the REIT industry in Nigeria. The N-REIT shares are traded daily on the Nigerian Stock Exchange (NSE). The monthly data on share prices and dividends were sourced from the respective REIT company's annual reports, journals and online databases such as the Investing.com and cashcraft stockbroker website. The monthly data on both the Consumer Price Index (CPI) and the Nigerian 90-day Treasury bill rates were collected from the CBN database (Central Bank of Nigeria).

4.2 Statistical Analysis

First, the monthly share prices and dividends of the N-REIT companies collected for the study were subsequently used to calculate the Holding Period Returns (HPR) on N-REIT. At the moment, Nigeria does not have an index for N-REIT, hence the authors created one using the Holding Period Returns which was calculated using the following formula below

$$HPR_t = \frac{NI_t + (CV_t - CV_{t-1})}{CV_{t-1}}$$

HPR_t = Holding Period Return

CV_{t-1} = Capital value of N-REITs at the beginning (Share prices)

CV_t = Capital value of N-REITs at the end (Share prices)

NI_t = Income of N-REITs received during the holding period (Dividend)

Second, the Philip-Perron (PP) unit root analyses were used to test the null hypothesis of a unit root on the HPR and inflation rates for this study; this was to test for the stationarity or otherwise of the datasets. Third, monthly data on the Nigerian CPI was estimated as actual inflation (AI). The expected inflation (EI) was derived from the 90-day Treasury bill rates, while the difference between the former and the latter was estimated as the unexpected component of inflation (UEI). While the expected inflation gets priced into the market, the unexpected inflation acts as a source of volatility to the market. Fourth, N-REIT's inflation-hedging characteristics were derived through the Fama and Schwert' (1977) model. Finally, the Granger Causality Test was conducted to examine a causal relationship pattern in a uni-directional or bi-directional way between N-REIT returns and inflation exposures.

5. RESULTS AND DISCUSSION

Table 4 presents the results from the Philip-Perron (PP) stationarity test conducted. The PP test-statistics are integrated of order I(0), computed with constant, with constant and trend, and without constant and trend. The results presented in Table IV suggests that all the datasets are statistically significant at 1st Difference without constant and trend. Therefore, we can reject Ho for all the datasets. This could be interpreted to mean that the datasets are all stationary at 1st difference (significant at 1% critical values) and are integrated of order I(0).

Table 4: Phillips-Perron unit root test on N-REIT returns and inflation rates

			N-REIT	AI	EI	UEI
	With Constant	t-Statistic	-11.675	-2.496	-3.3554	-2.8455
		Prob.	0.0000	0.1186	0.0142	0.0546
		Sig.	***	n0	**	*
At Level	With Constant and Trend	t-Statistic	-11.961	-2.295	-3.6786	-2.8841
		Prob.	0.0000	0.4336	0.027	0.1708
		Sig.	***	n0	**	n0
	Without Constant and Trend	t-Statistic	-11.41	-0.007	-1.1568	-2.2491
		Prob.	0.000	0.6787	0.2248	0.0241
		Sig.	***	n0	n0	**
			d(REITS)	d(AI)	d(EI)	d(UEI)
	With Constant	t-Statistic	-45.182	-2.6946	-17.495	-16.288
		Prob.	0.0001	0.0774	0.0000	0.0000
		Sig.	***	*	***	***
At First Difference	With Constant and Trend	t-Statistic	-47.186	-2.8662	-17.444	-16.231
		Prob.	0.0001	0.1767	0.0000	0.0000
		Sig.	***	n0	***	***
	Without Constant and Trend	t-Statistic	-45.595	-2.6634	-17.561	-16.316
		Prob.	0.0000	0.0079	0.0000	0.0000
		Sig.	***	***	***	***

Notes

a: Null Hypothesis: the variable has a unit root

b: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant

c: Lag Length based on SIC

d: Probability based on MacKinnon (1996) one-sided p-values.

e: AI is actual inflation rate, EI is expected inflation rate and UEI is unexpected inflation rate

Table 5 presents the minimum, maximum, mean and standard deviation of the monthly data on the HPR of N-REIT as well as inflation exposures. The returns obtained from N-REIT had a mean value of 0.69% with a standard deviation (indicating the level of risk) of 4.24. The mean and standard deviation values for the actual, expected and unexpected inflation rates were: 11.60 and 2.81; 9.37 and 3.66; and 2.61 and 4.12. The return value provided by N-REIT was observed to be positive but relatively low. When compared to REIT industries of other countries that started in the same year with Nigeria (2007), such as the UK, Malaysia and Germany, it was observed that the later provided better return values than Nigerian REIT (Dabara and Ogunba, 2020; Dabara, 2021). This result implies that N-REIT's performance cannot be generalised, neither can it be presented as a time-based phenomenon; other REIT industries (e.g. the U.K and Malaysia) performed better within the same time-frame. For the inflation components, it was observed that the actual inflation and the expected inflation

rates were somewhat high (with a mean of 11.60 and 9.37, respectively). However, the unexpected inflation rates were seen to be low (with a mean value of 2.61). The implication of these findings for domestic and foreign investors is that they need to weigh both returns and risk of N-REITs and the inflationary trend in the economy to guide their investment decisions. This is not farfetched as investors have varying risk tolerance levels due to their difference in risk averseness. The results found in this study disagree with findings from other REIT industries of emerging markets such as Malaysia (Aik, 2012), which suggests that this study's findings are not an emerging market phenomenon.

Table 5: Descriptive statistics

	Minimum	Maximum	Mean	Std. Deviation
N-REITS	-29.68	17.43	0.69	4.24
ACTUAL INFLATION	5.50	17.63	11.60	2.81
EXPECTED INFLATION	0	15.00	9.37	3.66
UNEXPECTED INFLATION	-3.47	7.51	2.61	4.12

Figure 1 shows that the HPR of N-REIT experienced low volatility, while the inflation rates experienced high volatility within the study period. The smoothed trendlines suggest a slight but consistent and steady increase in the HPR of N-REIT, as well as the actual and expected inflation rates. However, the unexpected inflation rate component reveals a slight and consistent decrease within the study period. The three-year forecast from 2020 to 2022 also suggests a slight, consistent and steady increase for HPR of N-REIT, actual inflation rates and the expected inflation rates throughout the forecasted years. The unexpected inflation rate forecast suggests a continuous decrease. The observed R^2 values were as follows: 39.58%, 3.43%, 4.51%, and 6.3% for the HPR of REIT, actual, expected, and unexpected inflation rates, respectively. The results from Figure 1 shows the lack of volatility from N-REIT returns compared with the actual, expected and unexpected inflation rates. This certainly could be due to the limited trading and static nature of N-REITs in the capital market arising from low patronage. It is observed that perhaps, this low volatility could account for the result of the relationship between N-REIT and inflation in Nigeria.

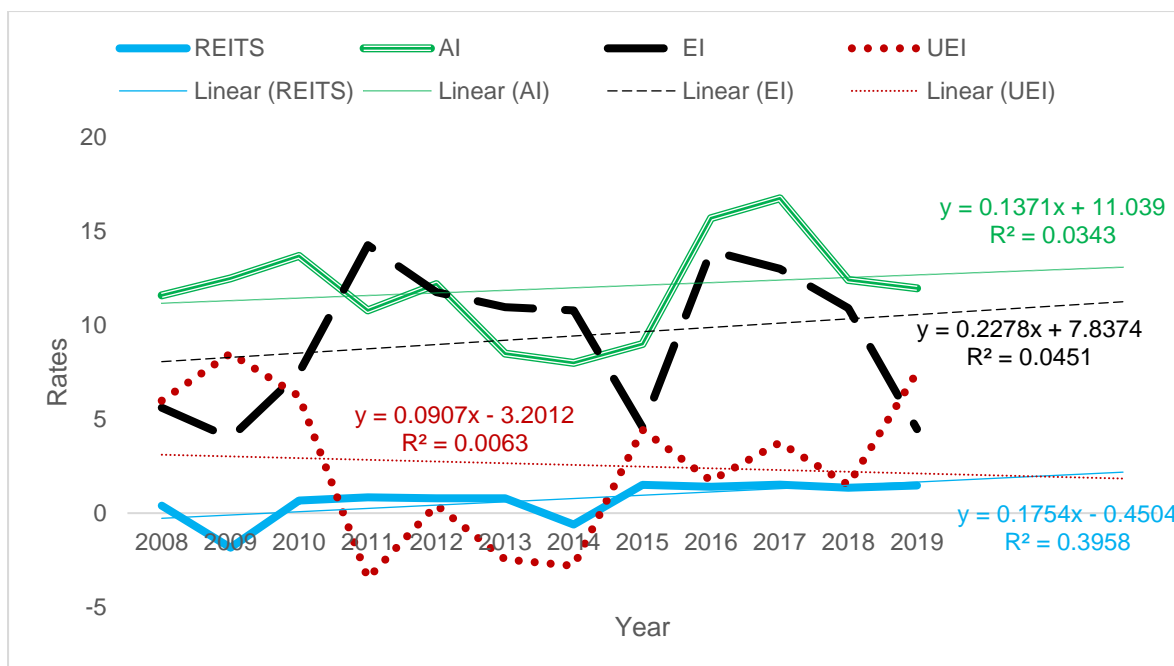


Figure 1: Trend analysis of holding period return on N-REITs and inflation rates in Nigeria

The results of the monthly inflation-hedging test are presented in Table 6. The N-REIT Beta coefficient (β) on actual inflation is -2.708 with a P-value of 0.359. The Beta coefficient on expected inflation is -3.208, with a P-value of 0.372, while for the unexpected inflation component is -3.703, with a P-value of 0.403. All the inflation exposures have negative β s, and all their P-values are not statistically significant at the 1%, 5% and 10% level of significance; hence, we accept the null hypothesis H_0 . This indicates perverse hedging characteristics for all the inflation exposures, which means that N-REIT stockholders funds were not protected against the loss in the purchasing power that arise due to either actual, expected or unexpected inflation exposures. The proportion of explained variance as measured by adjusted R-Square indicates the variation in N-REIT returns explained by the inflation rates were 4.8%, 3.1% and 8.3% for the actual, expected and unexpected inflation exposures. This means that inflation, by itself, explains very little of the variation in N-REIT returns. It shows that there may be other factors influencing the changes in the N-REIT returns rather than inflation. (Dabara *et al.*, 2015) and (Dabara *et al.*, 2018) suggested that financial structure, market structure and other investment parameters can significantly impact indirect investment assets classes.

The findings of this study agree with and confirm the results of earlier studies conducted by Park *et al.* (1990), Larsen and McQueen (1995), Lee and Lee (2014) and Edionwe and Ogunba (2017). However, it should be noted that the Edionwe and Ogunba' study was a comparative study with a shorter timeframe. Hence, this present study covers larger timeframe covering a more recent transacted period. Thereby providing a current situation and a more recent picture of the investment asset in Nigeria. Furthermore, it should be noted also that the consistent double digits inflation rates in Nigeria as well as the minimal trading experienced and static nature of N-REIT's returns contributed in impacting the low returns obtained. This influences and makes the impact on inflation on N-REIT returns peculiar and more adverse than any in the global REIT market.

Table 6: Inflation-hedging characteristics of N-REIT

Asset	Inflation component	Standardised Coefficients Beta	R Square	Sig.	Type of Hedge
N-REITs Returns	Actual inflation	-2.708	0.048	0.359	Perverse hedge
	Expected inflation	-3.208	0.031	0.372	Perverse hedge
	Unexpected inflation	-3.703	0.083	0.403	Perverse hedge

Table 7 presents the results of Granger Causality tests on both HPR of N-REIT and inflation rates. The results obtained indicate that there is no causality between N-REIT and inflation in the study area. This suggests that no significant relationships existed among the variables as shown by the P-values, which were not significant at either 1%, 5% or 10%. This means that inflation does not significantly affect or impacts the returns of N-REIT. This corroborates the earlier findings where the variation in N-REIT returns (as determined by Adjusted R-Square) explained by the inflation rates were 4.8%, 3.1% and 8.3% for the actual, expected and unexpected inflation exposures. This result in the N-REIT industry implies that an increase or decrease in any of the inflation exposures does not significantly change the HPR of N-REIT.

Table 7: Granger Causality tests of N-REIT and inflation rates

Null Hypothesis	F-Statistic	Prob.
AI does not Granger Cause N-REIT	2.28749	0.1054
N-REIT does not Granger Cause AI	0.16537	0.8478
EI does not Granger Cause N-REIT	0.46917	0.6265
N-REIT does not Granger Cause EI	0.17958	0.8358
UEI does not Granger Cause N-REIT	0.20447	0.8153
N-REIT does not Granger Cause UEI	0.29075	0.7482

6. PROPERTY INVESTMENT IMPLICATIONS AND CONCLUSION

Research papers concerning the inflation-hedging attributes of REITs in African emerging markets are not substantial. This paper contributes to knowledge in this field by investigating the causal relationship between returns on N-REIT and inflation exposures in Nigeria. The Nigerian REIT is increasingly prominent in the African region. Being one of the pioneering and very few active REIT markets in Africa, N-REIT provides an investment platform for domestic and foreign investors. This study extended the frontier of knowledge by testing the Fisher hypothesis (which was extended by Fama and Schwert (1977)). The test suggests that N-REIT has perverse hedging-characteristics (poor inflation hedges). The Engle-Granger causality tests conducted corroborates these results. These findings confirm the results of Park *et al.* (1990), Larsen and Mcqueen (1995), Lee and Lee (2014) and Edionwe and Ogunba (2017), which affirms that REITs are perverse hedges against inflation. This study results reveal the

peculiar nature of Nigerian REITs; the Nigerian REITs had experienced very low patronage over the years. There is hardly any trading on N-REITs in the capital market which makes it static over a long period of time. Consequently, providing low returns. Furthermore, the inflation rates in Nigeria has mostly been in double digits within the study period. However, the results of Granger Causality tests as well as the variation in N-REIT returns (as determined by Adjusted R-Square) explained by the inflation exposures suggests that there is no significant impact by inflation on N-REIT returns. This result in the N-REIT industry implies that an increase or decrease in any of the inflation exposures does not significantly change the HPR of N-REIT. The theoretical implication of this results is that contrary to the Fama and Schwert's assumptions that inflation significantly impacts on investments, N-REIT showed otherwise. The practical implication of this is that both individual and institutional investors (foreign and domestic) can use this information for informed investment decisions within the context of REIT markets in emerging economies of Africa, especially, Nigeria. This is not far-fetched as investors have varied risk tolerance levels due to their differences in risk averseness.

The way forward for N-REIT could be in changing its regulatory structure, like what was done in the Belgium REIT market (see Marzuki and Newell, 2019). The Nigerian government, the Nigerian Security Exchange Commission and Policymakers, as well as all stakeholders in the N-REIT industry should come up with innovative regulations and policies to encourage patronage of N-REIT and curb the minimal trading and the static nature of N-REIT. One way this can be done could be through creation of awareness of the inherent potentials in REITs. The N-REIT companies also can engage in advertisements, innovative research aiming at encouraging patronage, and provision of databases showing the performance of the asset to inform potential investors. The study is by no means without limitations. The study period was short due to data constraints; only three active REITs are available in the Nigerian REIT market. A longer timeframe and more active REITs could have presented a better picture of the market.

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